BIDS STUDY REPORT

LABOUR MARKET AND SKILL GAP IN BANGLADESH

(Macro and Micro level Study)

Skills for Employment Investment Program (SEIP)
Finance Division, Ministry of Finance

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(Macro and Micro level Study)

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Skills for Employment Investment Program (SEIP) commissioned Bangladesh Institute of Development Studies (BIDS) to conduct a research on labour market and skill gap analysis in Bangladesh in the priority sectors identified by SEIP. BIDS conducted one macro level and nine micro level studies. This publication is a compilation of those study reports. To keep the volume handy some annexes have been excluded in this publication.

The views, findings, interpretations and conductions expressed in the reports are those of the authors and do not necessarily reflect the views of Skills for Employment Investment Program. SEIP does not guarantee the accuracy of the data included in this work.

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Message

It is indeed a great pleasure to know that the Skills for Employment Investment Program (SEIP) has taken initiative to publish the study report on “Labour Market and Skill Gap Analyses”. I understand that the study, conducted by Bangladesh Institute of Development Studies (BIDS), is the first of its kind in this field in Bangladesh.

The main objective of the government is to achieve the status of a middle income country by 2021 and high income country by 2041 through improving the living standard of the masses. To this end we need accelerated economic growth. Bangladesh recorded higher GDP growth and per capita income in the last several years due to inclusive state policy and pursuing prudent fiscal policy, implementation of different reform programs and continuation of development activities. Skilled workforce is one of the key components of sustainable economic growth and social development. The 7th Five Year Plan of the Government of Bangladesh and the UN Sustainable Development Goals (SDGs) emphasize the development of skilled workforce and decent work.

It has been reported that the skill level of workers in Bangladesh are not aligned with the growth trajectory it is currently in. Low level of skills has been identified as the major constraint to the growth of Bangladesh. Training transforms workforces into human capital and helps them to stay relevant by improving skill and competitiveness among other things. In this context SEIP rightly engaged BIDS to conduct a study on labour market and skills gap analyses in the nine priority sectors and forecast the supply and demand of labour in the next 5 to 10 years period.

This study will help policy makers to foresee the future situation and take steps accordingly. Using this report as a baseline document the government will be able to plan for the future development of skilled workforce.

I would like to thank BIDS for conducting this study with utmost sincerity and professionalism. My thanks also go to ADB, SDC and concerned industry associations who extended their support to this initiatives.

Finally I thank SEIP for publishing the compiled document of the 10 study reports. I am confident that this compiled report will help policymakers, researchers and other training providers to plan for the future labour market and formulate strategies accordingly.

Hedayetullah Al Mamoon
Senior Secretary
Finance Division
Ministry of Finance

Foreword

There is no better alternative for Bangladesh to building skilled workforce for accelerated economic growth, poverty reduction and raising the living standards of the common masses thereby. Realizing this fact, Finance Division has undertaken the Skills for Employment Investment Program (SEIP) with the financial support from Asian Development Bank (ADB) and Swiss Agency for Development & Cooperation (SDC) to enhance the skills of our workforce.

I am delighted to know that Skills for Employment Investment Program (SEIP) entrusted Bangladesh Institute for Development Studies (BIDS) to conduct a study on "Labour Market and Skill Gap in Bangladesh". One of the objectives of the study was to review and assess the current status and emerging needs of the economy of Bangladesh in terms of skilled workforce, especially of the sectors that can contribute more to economic development. Another objective was to project the need for future skills in order to achieve higher economic growth.

Bangladesh achieved higher economic growth in the past several years and per capita income has also been increasing due to numerous initiatives taken by the Government in this regard. GDP growth rate was 7.11% in the last fiscal year which is higher compared to any time in the recent past. It may be noted that current economic growth is basically factor driven and problem with such kind of growth is that the marginal efficiency of factors diminishes in the long run. However, if we could initially convert our growth in to productivity driven through skills enhancement and innovation driven through knowledge & Information Technology in the long run, it will be easier to achieve the nation's goal of becoming a higher income country by 2041.

It is pleasing to note that despite time constraints, BIDS completed one macro and nine micro level studies in nine priority sectors selected by SEIP. The studies provided a clear picture of skills mismatch and the next 10 years (2016-25) demand for workforce in the nine priority sectors namely construction, RMG & Textile, Light Engineering, IT, Shipbuilding, Leather goods, Hospitality and Tourism, Agro-food processing and Health Care.

It is also known that the findings were based on the quantitative analysis of available secondary data, Labour Force Survey 2010 & 2013 and also data from the respective Industry sectors. One of the significant findings is the substantial decline in the proportion of unskilled labour force from 40% in 2006 to 21% in 2013. This indicates that the share of skilled labour force in the market is rising signifying more productivity. As projection shows, skill labour force gap will be around 7.0 million by 2025. I hope, undertaking of activities under SEIP is a right step towards impending need to bridge this gap.

In tandem with the observation of the studies, I would like to emphasize the need for strong Industry linkages to reduce the skill mismatch. I also echo with the observations of the studies to give due importance and by policy, pays special attention to women skills development. Understandably, this will facilitate women's employment and thereby contribute towards women empowerment.

I would like to thank BIDS for inviting me at the "BIDS Research Almanac 2016" and sharing the findings of the studies. I also take this opportunity to thank SEIP management for their timely initiative to compile and publish the reports of BIDS and make it available sufficiently to the interested stakeholders.

I believe, the 10 reports prepared by BIDS will help researchers, planners, policy makers and development partners to plan for the future, to create a platform for the supply of skilled labour force and reduce skill mismatch significantly though I understand that there may be some shortcomings in the study reports due to time constraints.

I would like to thank SEIP, BIDS, ADB, SDC and concerned trade bodies for joining their hands together to enhance substantially the supply of skilled labour force. I am almost certain that this effort will continue and have lasting impact on our economic growth and development.

Mahbub Ahmed
Alternate Executive Director
Asian Development Bank
(Former Senior Secretary, Finance Division)

ACRONYMS

7FYP	Seventh Five Year Plan
ADB	Asian Development Bank
AEIS	Annual Establishments and Institutions Surveys
ASSL	Ananda Shipyard and Slipways Ltd.
BACI	Bangladesh Association of Construction Industries
BAMI	Bangladesh Association of Medical Institutes
BAPA	Bangladesh Agro Processors Association
BBS	Bangladesh Bureau of Statistics
BEIOA	Bangladesh Engineering Industry Owners' Association
BFLLFEA	Bangladesh Finished Leather, Leather goods and Footwear Exporters' Association
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BIDS	Bangladesh Institute of Development Studies
BIMT	Bangladesh Institute of Marine Technology
BIO	Business Intermediary Organization
BITAC	Bangladesh Industrial and Technical Assistance Center
BKMEA	Bangladesh Knitwear Manufacturers and Exporters Association
BLETI	BEIOA-Light Engineering Training Institute
BMDC	Bangladesh Medical and Dental Council
BMET	Bureau of Manpower, Employment and Training
BNC	Bangladesh Nursing Council
BOC	Bangladesh Oxygen Company
BOI	Board of Investment
BSCIC	Bangladesh Small & Cottage Industries Corporation
BSTI	Bangladesh Standards and Testing Institution
BTEB	Bangladesh Technical Education Board
BUET	Bangladesh University of Engineering and Technology
CFC	Common Facility Centre
CHW	Community Health Worker
CME	Center for Medical Education
CNC	Computer Numerical Control
COEL	Center of Excellence for Leather .
DGHS	Director General of Health Services
DMCH	Dhaka Medical College Hospital
DNS	Directorate of Nursing Services
DWT	Dead Weight Tonnage
EU	European Union
F&B	Food and Beverage
FGD	Focus Group Discussion
FP	Family Planning
FY	Fiscal Year
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GoB	Government of Bangladesh
GR	Growth Rate
GVA	Gross Value Added
GVA-FC	Gross Value Added at Factor Costs
HACCP	Hazard Analysis and Critical Control Point
HCP	Health Care Providers
HR	Human Resource
HRD	Human Resource and Development
HRH	Human Resource and Health
HTS	Hospitality and Tourism Sector

IE	Industrial Engineering
ILET	Institute of Leather Engineering & Technology
ILO	International Labour Organization
ITC	International Trade Centre
KII	Key Informant Interview
LEIS	Light Engineering Industry Sector
LEISC	Light Engineering Industry Skills Council
LES	Light Engineering Sector
LFMEAB	Leather goods & Footwear Manufacturers & Exporters Association of Bangladesh
LFS	Labour Force Survey
LGRD	Ministry of Local Government and Rural Development
MDGs	Millennium Development Goals
MFA	Multi-Fiber Arrangement
MOE	Ministry of Education
MoF	Ministry of Finance
MoHFW	Ministry of Health and Family Welfare
MoI	Ministry of Industries
MOLE	Ministry of Labour and Employment
NGO	Non-government Organization
NHTTI	National Hotel and Tourism Training Institute
NIET	National Institute of Engineering & Technology
NTVQF	National Training and Vocational Qualifications Framework
OLS	Ordinary Least Square
R&D	Research and Development
REHAB	Real Estate and Housing Association of Bangladesh
RMG	Ready-Made Garments
SDGs	Sustainable Development Goals
SEDF	South Asia Enterprise Development Facility
SEIP	Skills for Employment Investment Programme
SFYP	Sixth Five Year Plan
SMEs	Small and Medium Enterprises
SMF	State Medical Faculty
SMI	Survey of Manufacturing Industries
STED	Skills for Trade and Economic Diversification
SYB	Statistical Year Book
T&T	Travel and Tourism
TIB	Transparency International, Bangladesh
TTC	Technical Training Center
TVET	Technical and Vocational Education and Training
UCEP	Underprivileged Children's Education Programme
UNDP	United Nations Development Programme
VCA	Value Chain Analysis
VTTI	Vocational Teacher's Training Institute
W.H.O	World Health Organization
WB	World Bank
WMS	Western Marine Shipyard
WTTC	World Travel and Tourism Corporation

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CHAPTER- 1

Labour Market and Skill Gap in Bangladesh: Macro Level Analysis

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Executive Summary

Utilisation of the growing labour force for the future growth of Bangladesh requires that the productivity of labour force be enhanced through proper education and skill development. Bangladesh government needs a proper assessment of the demand for labour and situation of skills in the labour market in order to take up concrete plans for skill development for the medium to longer term requirements of the economy.

The objectives of the macro part of the study are as follows:

- To review and assess current status and emerging needs of the Bangladesh economy in terms of skilled workforce, especially in priority sectors identified in the Seventh Five Year Plan to be supported by SEIP.
- To project future skill needs in order for the country to achieve higher growth in these sectors.

The analysis provides projections of sector-wise employment for the next 10 years (2016-2025). Using up-to-date data from census and labour force surveys, this part quantifies requirements of skilled workforce for each sector for the next 10 years. It provides estimates of training targets to be considered under SEIP.The analysis identifies other growth sectors (in addition to the presently planned 10 sectors of SEIP) where skill development will be necessary and need prior planning.

As a background to this analysis, considerations are given to key features of the labour market, such as public and private job markets, formal and informal sectors and the nature of female employment.

Methodology and Data Sources

Quantitative analysis of available secondary data and re analysis of unit records of the LFS 2013 and 2010 data were the main sources of data.

Discussions were taken up with representatives of chosen sectors and with other experts. Industry representatives provided inputs through informal discussion as well as through responses.

The macro-level analysis follows methodologies used in earlier studies (especially, ADB 2015). The previous analysis needs modifications on the basis of the projections in the Seventh Five-Year Plan, Census Final Report-2011, Labour Force Survey-2013, data on labour migration obtained from various documents, BMET website, etc.

Recent Changes in the Labour Market

Education and Skill Training

Share of labour force without education has gone through a substantial decline in recent years. In 2013, it was only 21 per cent compared to 40 per cent in 2006. Share of labour force with higher secondary or above education has risen from 8.5 per cent to 18.9 per cent during the 2006 - 2013 period.

In 2013, about 5.4 per cent of labour force (.574 million) was with technical/vocational training. The number and share with vocational/technical education was much smaller in 2010 i.e. 0.08 million and 0.14 per cent respectively. In 2006, the figures were very close: 0.06 million received such training which constituted 0.13 per cent of labour force. The comparison should be done cautiously because one cannot be sure whether the definition used has been the same in all these rounds of LFS.

Trained Workers in the 10 Sub-sectors: Existing Situation

Among the 10 sectors (construction, RMG ,textile , agro-processing, healthcare , IT and hospitality, leather, light engineering, shipbuilding), construction, RMG, textile and agro-processing employ significant share of workers. Within the macro picture (LFS data), these sectors account for 3.8, 8.4 and 2.5 per cent of all employment respectively. Gender disaggregated data show that women's share is the largest in textile and RMG followed by agro processing and healthcare. Other seven sectors within the chosen ones account for very small share of women's employment (and total employment).

Data on share of trained workers reveal that healthcare, IT and hospitality are dependent on trained workers, the share ranging from 25 per cent to 40 per cent. Share of trained workers in light engineering and shipbuilding is high, although employment share of these two is small. Share of female workers with training is high in healthcare and IT and these shares are almost the same for men and women. Nonetheless, the sectors where women's share of employment is high, namely RMG and Textile, the trained workers' share

is much lower among women compared to men. Therefore, it is desirable that a predominantly larger share of the projected training in these sectors should be targeted to women. If such training is implemented, female workers will experience upward mobility with higher productivity and higher wage, which will encourage growth of women's LFPR.

Evidence on Skill Shortage

Findings of existing studies indicate the presence of skill shortage in Bangladesh as well as in other Asian countries. ADB's analysis of barriers to modern sector growth has listed the shortage of skilled labour as among the most important constraints.

Direct evidence on skill shortage can come from (a) estimates of unemployment rate and labour force participation rate (LFPR) for those with and without technical education, (b) employers views on the adequacy of skilled workers, and (c) wage difference between labour force with and without technical training.

LFS data shows very low unemployment rate among those with technical training (Table A1.11). The rates are much lower than those with general education (SSC/HSC). Moreover, unemployment rate among those with technical qualification decreased during 2006 - 2010.

LFS data shows that LFPR is the highest among those with technical skills. In fact, it is much higher than those with SSC/HSC levels.

An indirect test of whether there is excess supply of technical/vocational training in Bangladesh's labour market is to examine the contribution of such training on productivity and get reflected in higher wage.

Results show significant positive impact of vocational/technical diploma on wage/salary. The value of wage is higher for those with technical training, after controlling for education levels. Past studies based on multiple regression analysis show similar result.

A discussion session has been held with representatives of industry organisations and training coordinators of sectors having training links with SEIP. Most sectors have viewed shortage of skilled workers as one of the critical constraints to the growth of the respective sector.

Projections of Labour Supply and Demand and Training Needs

Labour supply (15+ years) is projected at 64.8 million in 2016 and 82.9 million in 2025. In 10 years time, a 78 per cent increase takes place. This is less than the percentage change of population in the 15+ years age group.

Since the projection of labour supply has been based on past trends of LFPR, and in the recent past LFPR has increased only at a slow pace, the supply projection may lead to underestimation.

During this period labour demand has been projected to increase from 63.5 million to 88.7 million. The rapid increase in projected labour demand is the result of high projections of GDP growth, which has been assumed to be sustainable with the same elasticity of employment as experienced during the last decade. From the year 2021, labour demand will be in excess of supply of labour. In fact, Planning Commission has also estimated that during the Seventh Five Year Plan period, labour demand generation would be in excess of supply.

Total training target for the 10 sectors will be 5.43 and 7.21 million respectively in the years 2020 and 2025.These are higher than the ADB (2015) projections because of higher projections of labour demand in the present study.

These data should be interpreted as rough estimates and many of the assumptions may no longer remain valid and re-projection may be needed after another 5-10 years.

The projections of training target may raise a question about whether sufficient number of prospective workers will be available to opt for skill training. Evidence of skill mismatch often discourages prospective labour force to enter skill training. The situation is expected to change with the dynamic changes in the economy:(a) attainment of general education will rise and a larger share of young persons will have SSC and above level education, which will make them easily trainable; and (b) Moreover, better job availability for trained persons will encourage young persons to enter training programmes.

Concluding Observations

- **Industry Link**
  To reduce skill mismatch, industry link must play an important role. Industry link can help projection of growth of a sector and thus revision of projected training needs. In this context, the practical aspects of establishing such links need more attention. Industry associations will obviously be the most important channel for establishing such link. SEIP can adopt plans to generate a data base for the relevant industries with a system of regular updating. It can also put in place a system for establishing links with unorganised part of the producing units as well.

- **Gender Dimensions**
  Keeping in line with existing distribution of employment and incorporating the expectation of further increase, women should constitute about 80 per cent of trainees in these subsectors' occupations. Women should also get priority for training in "high-skilled" occupations. "Retraining" facilities of employed women can help their upward mobility.

- **Suggestions for Related Research**
  SEIP is imparting training in skills which are relevant to many sectors and to both domestic and overseas employment. An overall assessment of the impact of training should be done before further expansion of such training.

1.1 Introduction

1.1.1 Background

Bangladesh has achieved significant progress in terms of both economic growth and social change during the last two decades. The country has experienced a rise of per capita gross domestic product (GDP) from US$ 445 in 2001 to US $1235 in 2014 and has achieved overall macroeconomic stability. Bangladesh has recently entered the list of lower middle-income countries.

Sustained economic growth and macroeconomic stability has been associated with the country's progress in the areas of social development including education, health and poverty reduction. Bangladesh's progress in the sphere of social development has been acclaimed internationally.

Bangladesh's achievement in terms of acceleration of GDP growth has taken place despite its poor resource base. A growing labour force, especially youth force and existence of surplus labour in the traditional sector, has helped the growth process. In fact, the dual sector theory of development has outlined that the development of densely populated economies can take place through absorption of surplus labour in the modern manufacturing sector (Lewis 1954). Marginal productivity is likely to be higher in the modern sector and therefore, through reinvestment of profit, and labour transfer from traditional sector, economic growth is expected to continue. Bangladesh's labour intensive export growth is a concrete manifestation of Lewis (1954) formulated growth path through transfer of surplus labour from traditional sector to modern industries.

Further acceleration of GDP growth can be difficult due to a number of challenges facing Bangladesh. The constraints of high population density and limited natural resources are accentuated by unplanned use of resources. Rapid and unplanned urbanisation, shortage of energy and physical infrastructure discourage investment, especially in activities with long gestation gap. Private investment as a share of GDP has been stagnating during the last decade. To overcome these constraints, resources from both internal and external sources must be mobilised.

In the backdrop of these constraints, a silver lining takes the form of a large and growing labour force, which may be utilised for labour-intensive growth. Even if the growing youth population can be viewed as a potential resource and has recently been labeled as "demographic dividend", this potential can be actually utilised if their human capital potential is fully utilised. In fact, utilisation of the growing labour force for Bangladesh's future growth requires that the labour force's productivity is enhanced through proper education and skill development. This in turn requires adoption of proper plan and target for skill training.

The Government of Bangladesh recognised the need for improvement of the country's Technical and Vocational Education and Training (TVET) system and its commitment is reflected in the adoption of National Education Policy 2010 and National Skills Development Policy 2011. These policies have outlined the routes for expansion, diversification, extension and development of technical and vocational training programmes to improve the quality and consistency of nationally recognised qualifications.

The Sixth Five Year plan (SFYP) and the Seventh Five Year Plan (7FYP) have included policies to achieve these goals. Both the documents recognised the shortcomings of the contents of existing training courses. Such problems have resulted in skill mismatch as stated by 7FYP, "As Bangladesh continues to industrialize and undergo structural change, it has been observed that the skill level of workers were not aligned with the stage of growth. Industries in the private sector consistently identify low skill levels amongst the labour force as a fundamental constraint to Bangladesh's growth." The previous five year plan also pointed out that "low level of educational attainment of the Bangladeshi workforce limits the possibility of its competing in the global market" and therefore it is proposed to "continuing upgrading and adaptation of workers to changing skill demand."

1.1.2 Objectives and Rationale of the Study

Bangladesh government needs a proper assessment of the demand for labour and situation of skills in the labour market in order to take up concrete plans for skill development for the medium to longer term requirements of the economy. This is needed both at the aggregate or macro level and at the sectoral level and the present study aims to provide both.

In fact, the overall study broadly consists of two levels of analyses:

i) macro/sector level analysis
ii) micro/subsector level disaggregated analysis

These two levels of analyses will offer overall economic and sector-wide overviews of labour supply and demand and future skill needs in priority sectors. A thorough analysis of salient characteristics of the labor market in Bangladesh will also be incorporated.

The objectives of the macro part of the study are as follows:

- To review and assess current status and emerging needs of the Bangladesh economy in terms of skilled workforce, especially in priority sectors identified in the national economic development plan to be supported by Skills for Employment Investment program (SEIP).
- To project future skill needs in order for the country to achieve higher growth in these sectors.

Studies on skill development conducted earlier are based on older data sets (ADB 2015, MOE and MOLE 2014,Rahman et al. 2008), which therefore would need to be updated in the light of availability of more recent data. Further, the Seventh Five Year Plan of Bangladesh has adopted GDP growth targets different from the path envisaged in the Sixth Five Year Plan which should also be taken into account in projecting skill requirements.

The macro labour market analysis focuses on projecting labour force across sectors and in total. The analysis provides projections of sector-wise employment for the next 10 years (2016-2025). Using up-to-date data from census and labour force surveys, this part quantifies requirements of skilled workforce for each sector for the next 10 years. It provides estimates of training targets to be considered under SEIP; and potential demand in priority growth sectors and skills by categories. The analysis identifies other growth sectors (in addition to the presently planned 10 sectors of SEIP) where skill development will be necessary and need prior planning.

As a background to this analysis, considerations are given to key features of the labor market, such as public and private jobs markets, formal and informal sectors and the nature of female employment. Underemployment and youth unemployment are critical issues, implying loss of productive resources and its analysis can offer insights into how this can be overcome through training. Attention has been paid to the operation of the labour market, including structural changes, barriers to entry and to exit, child labour, female labour, migrant labour, and real wage trends.

In projecting the requirement of skilled workforce by sector or occupations, overseas migration of semi-skilled and skilled manpower is also considered. The study attempts to obtain projections for the next 10 years with some rough estimates for 2040 and 2050.

1.1.3 Methodology and Data Sources

Initially, a review of relevant findings from existing reports is undertaken. This is followed by quantitative analysis of available secondary data. In addition, re analysis of unit records of LFS 2013 and 2010 data is carried out to obtain more detailed information of relevant aspects.

Discussions were taken up with representatives of chosen sectors and with other experts. Industry representatives provided inputs through informal discussion as well as through responses to questions.[1]

The macro-level analysis follows methodologies used in earlier studies (especially, ADB 2015). The previous analysis needs modifications on the basis of the projections in the Seventh Five Year Plan, 2011 census final report, 2013 labour force survey, data on labour migration obtained from various documents, BMET website, etc.

Basis for Projections

The macro-level analyses provide projections of labour supply and demand by sector projections for overseas employment and skills composition of labour demand by sector over time. On the labour supply side, factors affecting population growth, working age population and labour force participation rates among

[1] The author found these responses very useful.

males and females are considered. The labour supply depends on both age distribution and labour force participation rates (LFPRs). Therefore, past trends have been used to arrive at estimates of LFPR to be used for the coming years.

On the demand side, analysis takes into account the trends of economic growth, wages, productivity, technology, capital intensity of production, and domestic demand growth. These data will come from government's policy documents as well as from LFS and other available data sources.[2]

It may, however, be mentioned that the scope of the study is rather limited. Since the latest LFS was conducted in 2013, all analyses are based on this. These projections may diverge from the sectoral projections taken up for this study which use data from survey of enterprises. Validity and usefulness of the projections of training targets will depend on whether the assumptions of GDP growth are realised.

1.1.4 Organisation of the Report

The report consists of the following sections:

1.1 Introduction
1.2 Recent changes in labour market
1.3 Existing evidence on skill shortage
1.4 Projections of population, LFPR and labour supply, and labour demand: Macro-level analyses
1.5 Labour demand and training needs for 10 sectors
1.6 Concluding remarks and suggestions for skill generation routes

1.2. Recent Changes in the Labour Market

1.2.1 GDP Growth and Structure of Employment

Beginning from the mid 1990s, Bangladesh's GDP growth has accelerated. Success in terms of acceleration of GDP growth has continued despite various adverse circumstances in the international and domestic spheres. Its economic performance has demonstrated resilience of the economy in the face of adverse effects of international financial downturn, price hike of imports and growing price competition in the export markets relevant for the country.

Despite the hurdles of global economic problems, average annual real GDP growth accelerated during 2001-2006 and 2006-2011, the average annual rates of GDP growth were 5.7 and 6.2 per cent respectively in these periods. After this, real GDP growth per year has gone through a slight deceleration (2013-2014) but a reversal of the pattern has already been observed.

During the entire period, remittance inflow has accelerated. During the 2006 - 2010 period, share of remittance increased from 5.9 per cent of GDP in 2005 to 10.84 per cent of GDP in 2010. In the last few years, growth of remittance has slowed down. The share of remittance in GDP has still been 8.2 per cent in 2014, higher than the share in 2005. Commendable growth of remittances (and export) have led to improvements of fiscal and balance of payment situation and contributed to macroeconomic stability.

Capacity to generate employment depends not only on growth of aggregate GDP but also on the sectoral structure of growth. Productivity of employment also depends on the structure of the GDP.

Structural change in terms of sectoral share of GDP has taken place during the last 15 years. During 2000-2014, share of agricultural GDP has gone down from 20.8 per cent to 16.3 per cent while the share of industry has risen from 23.4 per cent to 29.6 per cent. Service sector's share has remained more or less unchanged.

Since Bangladesh has experienced a structural change in the economy in terms of the share of GDP in various sectors, it is expected that this will be associated with a structural change in employment. This aspect needs scrutiny. Decline of share of agriculture in total employment has been rather small. The shares were 50.8 and 47.6 per cent in 2006 and 2010 respectively. In 2013 there has been a further decline and agriculture's contribution was 45.1 per cent (Table A1.1).

Detailed sectoral classification of employment has been presented in Table A1.2. The share of manufacturing has gone through an increase while the share of trade has declined. In fact,during the 2006-2013 period the highest rise of share of employment has taken place in manufacturing.

[2] The projections, however, depend on the performance of the economy in terms of various indicators and should not be taken as inflexible parameters. Rather, these may be viewed as broad guidelines.

The distribution of status of employment shows (Table A1.3) the dominance of self/family employment. Share of self employment was 47 per cent in 2000 and 41 per cent in 2013. Considering family employment as a total of self-employment and unpaid family helper, its share was 59 per cent in both 2000 and 2013. High share of such family employment and lack of training may be interlinked. The benefits of formal training are expected to take the form of higher share of formal employment and paid employment outside the family sphere and in the absence of prospects of paid employment, participation in training is not attractive.

Rise in the share of manufacturing sector employment can be considered as a positive feature if it is accompanied by a rise of productivity. Otherwise, this cannot offer promising route to development. Estimates of productivity (GDP per worker), presented in Table A1.4 show the growth of labour productivity. Both 2006-2010 and 2006-2013 period saw positive changes in labour productivity (GDP per employed person). In the period 2006-2010, the figure has risen from 96,630 taka to 107,134 taka and in 2013 the figure was 120,527 taka (1995-96 prices). Growth of labour productivity was 3.62 and 3.13 per cent per year during the two periods. During this period the average hours worked was the same. Therefore, the rise of productivity is not merely due to rise of total labour hours. In most sectors, growth of productivity has risen over the period. However, GDP per worker has gone through a decline in the manufacturing sector, which is an alarming feature.

Formal labour contract is one of the indicators of a well functioning modern labour market. Nonetheless, a very high share of informal contract indicates a backwardness of the labour market in Bangladesh. During 2000 - 2010, the share of formal employment fell from 24.7 per cent to 12.5 per cent. In 2013, it has risen to 21.6 per cent, which is still less than the share in 2000 (Table A1.5).

Nonetheless, it is quite possible that neither the employees nor the field enumerators have sufficient information as to whether the unit where they are employed is formally registered and therefore the data should be interpreted cautiously. Also, the registered formal enterprises may provide employment on an informal basis as it is more convenient for the employer. On the other hand, workers may consider themselves as regular formal employees, even if they do not have any written contract or job offer with a clear statement of the terms of employment including wage etc.

Table 1.1 shows that the 10 selected sub-sectors accounted for 17 and 16 per cent of total employment respectively in 2013 and 2010. Among these sub-sectors, RMG and construction are most sizeable. A qualificatory comment is pertinent here. Since these are the skill-intensive sub-sectors, easing the skill constraint is likely to raise the share of total employment in these sub-sectors. Among these sub-sectors, the share of food processing, textile and healthcare has risen over this period.

The share of RMG has stagnated (the share was 5.7 per cent in 2010 and 5.2 per cent in 2013), which goes contrary to expectation. Light engineering, although accounts for a small share, has increased its share as well as the size of employment.

Table 1.1 : Share of selected sub-sectors in total employed persons

Sector	2010 (LFS)			2013 (LFS)		
	Male	Female	Total	Male	Female	Total
Agro processing	1.0	1.1	1.1	1.7	4.5	2.5
Healthcare (nursing & health care)	0.7	0.5	0.6	1.0	1.5	1.1
Hospitality and tourism	2.0	0.3	1.5	0.0	0.0	0.0
RMG	5.4	6.4	5.7	3.1	10.1	5.2
Textile	1.8	1.7	1.8	2.3	5.3	3.2
Leather	0.2	0.1	0.2	0.2	0.1	0.2
IT	0.0	0.0	0.0	0.2	0.1	0.2
Construction	6.3	1.4	4.8	5.0	1.0	3.8
Light engineering	0.3	0.3	0.3	0.7	0.3	0.6
Shipbuilding	0.0	0.0	0.0	0.1	0.0	0.1
All others	82.3	88.1	84.0	85.7	77.1	83.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: LFS (various years).

1.2.2 Education and Skill Training

Productivity of labour can be enhanced through education and skill development. Changes in quality of employed labour force in terms of educational attainment and skill endowment are important since Bangladesh aims to "raising competitiveness through education and skill development," which is an important goal of DWCP (2012). Share of labour force without education has gone through a substantial decline. In 2013, it was only 21 per cent of labour force compared to 40 per cent in 2006. Share of labour force with higher secondary or above education has risen from 8.5 per cent to 18.9 per cent during the 2006 to 2013 period (Table 1.2).

Table 1.2: Distribution of labour force by education

Education	% of employed population	
	2013	2010
None	21.3	40.1
Primary	28.7	22.8
Secondary	30.6	29.5
Higher Secondary	12.8	3.7
Tertiary	6.1	3.7
Others	0.4	0.1

Source: LFS, (various years).

Data on skill acquisition of labour force and its changes can be observed over time from LFS data. In 2013, about 5.4 per cent of labour force (0.574 million) was with technical/vocational training. The number and share with vocational/technical education was much smaller in 2010, 0.08 million and 0.14 per cent respectively. In 2006, the figures were very close,0.06 million received such training which constituted 0.13 per cent of labour force. The comparison should be done cautiously because one cannot be sure whether the definition used has been the same in all these rounds of LFS.

Government investment policy decisions for development of human capital must take into account the competing demand in these two areas (general education and technical training). In fact, development in the areas of education and skill training may actually complement each other.

Public Sector Employment

The dominance of informal employment discussed above points towards the likely low share of public employment. In fact, government has turned to policies of private sector led growth and therefore almost all employment in agriculture and industry is created within the purview of private employers. In 2010, only 2.5 per cent of all employment was in Public sector and most of it was in services like education and health. It is expected that the share is even smaller in recent years and therefore the latest LFS does not provide this breakdown.

Rural-urban Difference

There is no formal restriction on rural-urban mobility in Bangladesh's labour market. Still there are significant differences in job characteristics in urban and rural areas. Share of employment in agriculture is much higher in rural areas, and average income is lower. Share of labour force without education or less than primary level attainment is much higher in rural areas, about 59 per cent, while this is 28 per cent in urban areas. This will act as a restricting force for entry of rural labour force into skill training.

1.2.3 Child labour

National Child Labour Survey, 2003 provides data on child labour situation in Bangladesh. These data shows that, the number of child labour stood at 1.70 million in 2013. Among them 1.28 million were engaged in hazardous work. Children's participation rate in economic activity has gone through a substantial decline during 2003 - 2013. Although the number of child labour in hazardous work has not changed, the non-increasing number means a fall in the share of children who are in this category. In fact, the number would be even higher in the absence of the policy interventions on this front. More concrete steps to remove hazardous child labour can be taken through strategies of rehabilitation through appropriate training programmes.

This will result in a rise in demand for youth and adult labour force. This will percolate through the labour market, which in turn will add to the adult population with training need.[3]

1.2.4 Role of Female Labour Market in the Context of Skill Generation

Women constitute 30 per cent of total employed labour force in Bangladesh (Table A1.6). This share has risen from 21 per cent in 2000 to 30 per cent in 2013. Female LFPR has also increased during this period and stands at 33.5 per cent in 2013. In fact, during the 2000 - 2013 period, female employment growth has been much higher than growth of male employment(Table A1.7). Therefore, it is expected that future growth of labour force will depend mainly on growth of female labour force through continuous increase of female LFPR. Female LFPR in Bangladesh is at present much lower than South-East Asian and East Asian countries.

A larger share of female labour force is currently employed in the traditional sector. Although female labour force has grown at a rapid pace during the last one and a half decades, this has taken place mainly through growth of self-employment and unpaid family employment. Future growth of female labour supply will require expansion of paid employment opportunities for young women who have completed primary to secondary education. For this group, skill development through technical training has relevance both from the supply and demand side.

Gender inequality in the labour market has received attention in the context of women's deprivation. Nonetheless, in the context of future economic growth through skill intensive sectors, it should be emphasized that women's larger share in future training can help them to contribute to the country's economic growth and also to achieve higher upward mobility in jobs and move up the wage scale ladder. At present male-female wage difference for the same job is not vey high and it has been declining. But on average women's wage is lower because of their lack of upward mobility in occupation hierarchy.

1.2.5 Trained Workers in the 10 Sub-sectors: Existing Situation

The training need projections have been based on an assessment of present distribution of labour force in the sectors and the incidence of training as of 2013. Data have been disaggregated by sex to obtain some idea about training target break down by sex.

The current situation of trained workers in the relevant 10 sectors as well as for broad sectors is shown in Tables 1.3 and 1.4. Among the 10 sectors, construction, RMG and textile and agro-processing employ significant shares of workers. Within the macro picture, these sectors account for 3.8, 8.4 and 2.5 per cent of all employment. Gender disaggregated data show that women's share is the largest in textile and RMG, followed by agro-processing and health care. Other seven sectors within the chosen ones account for very small share of women's employment (and total employment).

Table 1.3 :Share of workers with and without training in 10 sub-sectors

Sector	Male			Female			Total		
	Received any training?			Received any training?			Received any training ?		
	Trained	Not trained	All	Trained	Not trained	All	Trained	Not trained	All
Agro-processing	7.5	92.5	100.0	7.2	92.8	100	7.3	92.7	100.0
Healthcare (nursing and health care)	38.6	61.4	100.0	40.7	59.3	100	39.4	60.5	100.0
Hospitality and tourism	28.7	71.3	100.0	0	100.0	100	25.0	75.0	100.0
RMG	11.4	88.6	100.0	5.7	94.3	100	8.1	91.9	100.0
Textile	9.2	90.8	100.0	6.0	94.0	100	7.7	92.3	100.0
Leather	5.1	94.9	100.0	3.6	96.4	100	4.8	95.2	100.0
IT	41.4	58.6	100.0	31.2	68.8	100	39.7	60.3	100.0
Construction	7.9	92.1	100.0	6.0	94.0	100	7.8	92.2	100.0
Light engineering	12.7	87.3	100.0	14.1	85.9	100	12.9	87.1	100.0
Shipbuilding	15.7	84.3	100.0	1.7	98.3	100	13.7	86.3	100.0
Total	**11.7**	**88.3**	**100.0**	**8.5**	**91.5**	**100**	**10.4**	**89.6**	**100.0**

Source: Estimated from the LFS 2013 data.

[3] In the present estimates, this has not been added to the training need projection because this will depend on adoption of specific schemes for elimination of child labour (hazardous plus others).

Table 1.4 : Share of workers with and without training by broad sectors

Sector	Male			Female			Total		
	Received any training?			Received any training?			Received any training?		
	Trained	Not trained	All	Trained	Not trained	All	Trained	Not trained	All
Agriculture, forestry and fishing	2.2	97.8	100.0	2.0	98.0	100.0	2.1	97.9	100.0
Mining and quarrying	6.0	94.0	100.0	8.6	91.4	100.0	6.2	93.8	100.0
Manufacturing	10.1	89.9	100.0	6.2	93.8	100.0	8.5	91.5	100.0
Electricity, gas, steam and air conditioning supply	30.9	69.1	100.0	43.7	56.3	100.0	32.4	67.6	100.0
Water supply, sewerage, waste management and remediation activities	14.3	85.7	100.0	37.2	62.8	100.0	17.4	82.6	100.0
Construction	7.5	92.5	100.0	6.0	94.0	100.0	7.3	92.7	100.0
Wholesale and retail trade, repair of motor vehicles	6.1	93.9	100.0	4.1	95.9	100.0	5.9	94.1	100.0
Transportation and storage	18.8	81.2	100.0	16.0	84.0	100.0	18.7	81.3	100.0
Accommodation and food service activities (Hotel and restaurant)	3.0	97.0	100.0	5.6	94.4	100.0	3.4	96.6	100.0
Skilled service	33.2	66.8	100.0	35.5	64.5	100.0	33.5	66.5	100.0
Education and health	38.6	61.4	100.0	49.0	51.0	100.0	42.5	57.5	100.0
Others	17.1	82.9	100.0	10.3	89.7	100.0	13.4	86.6	100.0
Total	9.1	90.9	100.0	7.4	92.6	100.0	8.6	91.4	100.0

Source: Estimated from the LFS 2013 data.

The picture of share of trained workers reveals that health care, IT and hospitality are dependent on trained workers, the share ranging from 25 per cent to 40 per cent. Share of trained workers in light engineering and shipbuilding is high, although employment share of these two is small. Share of female workers with training is high in health care and IT and these shares are almost the same for men and women. None the less, the sectors where women's share of employment is high, namely RMG and textile, the trained workers' share is much lower among women compared to men. Therefore, it is desirable that a predominantly larger share of the projected training need in these sectors is targeted to women. If such training is implemented, female workers will experience upward mobility with higher productivity and higher wage, which will encourage growth of women's LFPR.

1.3 Evidence on Skill Shortage

1.3.1 Existing Studies on Skill Projection

Only a small number of studies have attempted to analyse skill gap in Bangladesh's labour market. Only two studies (MoE & MoLE 2012, ADB 2015) have attempted economy wide analysis of skill needs. MoE and MoLE study has been based on survey of industry to generate data on skill demand. Skill supply data comes from training providers' statistics based on secondary data. The supply, however, could not be disaggregated by suitability for sectors and by level of skill. Therefore, the study concludes that these data are not suitable for estimation or projection of skill gap. It should be pointed out that a survey of existing industries only cannot provide skill demand projections for coming years because much of future demand is likely to come from new enterprises.

ADB (2015) provides estimates of skill demand and training needs. Although it does not explicitly address skill gap or skill shortage, the "training need" may be accepted as skill gap.[4] While the existing supply may meet a part of the training need, given the very small existing supply (in comparison to total skill demand or skill need), the entire "training need" may be accepted as skill gap/shortage. The projections are based on background data on labour force growth and sectoral composition of labour from the LFS 2010.

[4] Their estimates are based on a "training factor" coefficient which has taken this into account.

The Sixth Five Year Plan provides the GDP growth projections for this study. Since new LFS report (BBS 2013) is now available and the Seventh Five Year Plan (PC 2015) provides new GDP growth projections, ADB (2015) projections require revision in light of the new data.

1.3.2 Skill Constraint: Evidence

Before moving on with projections of skill gap/training need, a pertinent question is whether there is at all a shortage of skilled labour. Findings of existing studies indicate the presence of skill shortage in Bangladesh as well as in other Asian countries. ADB's analysis of barriers to modern sector growth has listed the shortage of skilled labour as among the most important constraints (Alamgir 2015). Skill shortage has been emphasized as one of the most important constraints to economic growth in India as well. For example, a government document states, "The lack of adequately skilled workforce is now regarded as one of the main obstacles to sustaining the current rate of (economic) growth" P 112 ILO, MOLE Government of India (2009).[5]

In Bangladesh there has been a deep rooted pessimism about the usefulness of skills and the vocational training system. Vocational education system in Bangladesh was initiated in early phase of development when industrialisation was at a rudimentary stage with hardly much demand for skilled labour force. Moreover, technical education was socially less acceptable than the general stream. As a result, enrolment in the vocational institutes was less than the capacity and the diploma holders faced widespread unemployment.

A number of tracer studies demonstrate high unemployment rate among those with technical training. Tracer studies usually show high unemployment rate because of expectations-related to job offers (Mondal and Chowdhury 2015). This study shows unemployment rates among TVET recipients are in the range of 20 to 30 per cent. This is obviously high. But, in contrast, average waiting time for first job is only 4 to 8 months. Therefore, the high unemployment rate is possibly due to methodological problem or having a high share of sample from persons who just finished training. A part of the unemployment may be due to skill mismatch, that is, the type of skill generated was different from what has been demanded in the market. More direct evidence on skill shortage can come from (a) estimates of unemployment rate and labour force participation rate (LFPR) for those with and without technical education, (b) employers views on the adequacy of skilled workers, and (c) wage difference between labour force with and without technical training.

LFS data show very low unemployment rate among those with technical training (Table A1.11). The rates are much lower than those with general education (SSC/HSC). Moreover, unemployment rate among those with technical qualification decreased during 2006 - 2010.

LFS data show that LFPR is the highest among those with technical skills (Table A1.12). In fact, it is much higher than those with SSC/HSC levels of education. This is a positive aspect that those with technical skills are more likely to be either employed or seeking jobs.

An indirect test of whether there is excess supply of technical/vocational training in Bangladesh's labour market is to examine the contribution of such training to productivity and get reflected in the higher wage.

Results show a significant positive impact of vocational/technical diploma on wage/salary (Table A1.13). The value of wage is higher for those with technical training, after controlling for education levels. Past studies based on multiple regression analysis show similar result (Rahman Islam 2013).

Nonetheless, the projections of training need provided in the following section by no means imply that trained personnel of that magnitude will be immediately absorbed through employment in the preferred location and in jobs befitting with the training courses. The utilisation of persons with technical training has to be planned through appropriate investment resulting in the realisation of the GDP growth targets. Creation of training facilities and skilled personnel should take into account the ongoing experience and the actual growth path realised (in contrast to projections of 7FYP), which may need modifications depending on domestic and international factors.

A discussion session has been held with representatives of industry organisations and training coordinators of sectors having training links with SEIP. Most sectors have viewed shortage of skilled workers as one of the critical constraints to the growth of the respective sector.

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[5] In an article by World Bank it was commented that 'Insufficient supply of quality skills is one of the impediments to further economic growth in India" quoted by Economic Times' of India 05-06-2011).

1.4 Projections of Labour Supply and Demand and Training Needs

1.4.1 Projection: Methodology

Assessment of demand for skill is obtained through projections which takes into account the past progress of skill training among labour force. Progress of skill training is likely to have a link with educational attainment of labour force and projections must take such links into account. Therefore, the picture of quality of labour force in terms of education and skills and the changes in these features provide inputs into skill demand projection.

Education-skill link is unearthed through the cross-tabulation presented below. Table 1.5 shows a positive association between skill training and education. Share of trained labour force is very small among those with less than SSC level education. This is quite expected since enrolment into most of the formal training courses require at least SSC completion. Among employed persons with HSC and tertiary attainment, 16 and 32 percent respectively obtained skill training. Above data implies:

a) With gradual increase of SSC and above level completion, persons eligible for entry into formal skill training will progressively rise.

b) Since a large share of labour force possess less than SSC level education, their training needs should be taken into account and special training modules need to be designed.

c) More research is required to examine why the tertiary degree holders opt for skill training and whether this could be integrated into their general studies.

The projections of labour supply and labour demand

Following steps are involved in the projections of skill demand, skill supply and skill gap.

(a) Projections of population (aged 15+ years) are obtained from recent sources. BBS (2015) uses final census 2011 data and provides projections by age group for three alternative scenarios. We have used the medium TFR based values of population projections for age group 15+ years.

(b) Labour supply is given by projected population and projections of LFPR, which are based on past LFS data.

(c) Labour demand projections are obtained from projections of GDP growth and employment elasticity of GDP growth. Projections of GDP growth are given by 7FYP. Employment elasticity has been estimated from past GDP data (MoF, various years) and employment data (from LFS). Elasticity values for 2006 to 2010 and 2010 to 2013 show wide variations. Therefore, elasticity has been obtained for this entire period, i.e., 2006 to 2013. For 2021 and later, GDP growth is assumed to stabilise at 8 per cent per year.

(d) Projections of overseas employment have been obtained on the basis of growth of overseas employment during 1995 - 2015. For the years after 2021, overseas employment is assumed to be around the same level, as domestic demand exceeds domestic supply.

Demand for Trained Labour Force and Training Targets

To obtain the projections of demand for trained labour force, the present skill composition of labour force has been used as the base. From the occupation structure given in the LFS 2013, classification into four categories, namely highly skilled, skilled, semi-skilled and unskilled have been made. Taking into account the educational attainment of these groups, and on the basis of assumptions related to trainable labour force, the share of labour force constituting the potential demand for skill has been worked out (Table A1.14.). Then the choice has to be made about change of the training demand coefficient over the years. The change has been kept low in view of the rise of quality of general education and higher share of labour force with tertiary education who will not need training. These forces imply reduced importance of TVET and greater prospect of on-the-job training.

The economy's "training target" projections are numbers which 'should' receive training and not actual number targeted for training. This is less than total training needs because the existing capacity has been taken into account through the share of skilled workers who are trained through the existing system. But this is not an actual/effective target based on current capacity. Only a part of this can be trained through current capacity.

During 2010 - 2013 those "not-trainable" (Primary or less education) within the labour force decreased from 63 per cent to 60 per cent. It is expected that this group will continue to decline at this rate or faster. In addition, those with specialised higher education, not requiring training will rise from about 5 per cent to 7-8 per cent. The share of labour force requiring training is estimated to be about 18 - 20 per cent of total labour force (the share may increase at a very slow pace, given the two counteracting forces).[6]

1.4.2 Projections of Labour Supply, Labour Demand and Training Needs: Macro level Analysis

Labour supply (15+ years) is projected at 64.8 million in 2016 and 82.9 million in 2025. In 10 years time, a 78 per cent increase takes place. This is less than the percentage change of population in 15+ years age group, which is expected to rise more than 100 per cent.

Since the projection of labour supply has been based on past trends of LFPR, and in the recent past LFPR has increased only at a slow pace, the supply projection may lead to underestimation.

During this period labour demand has been projected to increase from 63.5 million to 88.7 million. The rapid increase in projected labour demand is the result of high projections of GDP growth, which has been assumed to be sustainable with the same elasticity of employment as experienced during the last decade. From the year 2021, labour demand will be in excess of supply of labour. In fact, Planning Commission has also estimated that during the Seventh Five Year Plan period, labour demand generation would be in excess of supply. Tables 1.5 to 1.10 provide data on projections for also 2030, 2040 and 2050. These data should be interpreted as rough estimates and many of the assumptions may no longer remain valid and re-projection may be needed after another 5-10 years.

Table 1.5 :Link between education and training

Education level	Whether received any training?		
	Yes (%)	No (%)	Total (%)
No class passed	3.2	96.8	100.0
Class I - IV	2.5	97.5	100.0
Class V - VII	3.4	96.6	100.0
Class VIII - X	4.6	95.4	100.0
SSC	8.2	91.8	100.0
HSC	15.6	84.4	100.0
Others	31.7	68.3	100.0
Total	7.3	92.7	100.0

Source: LFS (2013).

Table 1.6 :Projections of population and labour supply

Year	Population 15+ (million)	Labour supply (million)
2016	111	64.79
2017	114	66.86
2018	117	69.00
2019	120	71.19
2020	123	73.47
2021	126	75.81
2022	128	77.52
2023	130	79.28
2024	132	81.07
2025	134	82.90
2030	145	92.99
2040	163	111.25
2050	175	128.16

Source: Author's estimate based on Population census and LFS data.

[6] The estimate is based on the share of semi-skilled persons who are trainable. It is assumed that the share which are currently in skilled occupation are trained through existing training system and on the job training and only the share in semi-skilled occupations are subject to lack of skill training.

Table 1.7 :Projections of labour demand and overseas employment

Year	Labour demand (million)	Supply- demand Gap (million)	Total overseas employment
2016	63.56	1.24	588 ,344
2017	65.74	1.12	622 ,704
2018	68.06	0.94	659 ,070
2019	70.52	0.67	697 ,559
2020	73.15	0.32	738 ,297
2021	76.02	-0.21	781 ,413
2022	79.00	-1.48	827 ,048
2023	82.10	-2.82	875 ,347
2024	85.31	-4.24	926 ,468
2025	88.66	-5.75	980 ,573
2030	107.35	-14.36	1,302 ,355
2040	157.38	-46.13	2,297 ,352 (1,302 ,355)
2050	230.73	-102.57	4,052 ,527 (1,302 ,355)

Source: Author's estimate based on LFS and other secondary data.

1.4.3 Labour Demand and Training Targets in 10 Sub-sectors

Table 1.8 shows the projections of labour demand and training targets in 10 sub-sectors.[7] We have assumed a structural change in the year 2025. Therefore, the projections show major changes in total labour demand in the 10 sectors after this year. It should be mentioned that the sectoral labour demand projections, presented in Table A 1.6, are based on the LFS 2013 distribution of labour force among these sub-sectors and LFS data under represent the share (and number) of employed persons in some of the fast growing sub-sectors (e.g., RMG, IT, etc.). Therefore, labour demand from this source may not tally with the training targets of Table 1.8 which is based on a different distribution obtained on the basis of ADB (2015). As mentioned earlier, the macro projections may diverge from the sectoral projections taken up for this study which use data from survey of enterprises and not the historical employment elasticity used in the present report.

Projections of training targets show a less dramatic change compared to labour demand change because the training factor does not change much as the expectation is that on-the-job training, expansion of higher education and better quality of secondary education will keep training demand within a practical limit. In fact, the projected training requirement still require much expansion of the capacity of training provision.

The projections of overseas employment have been based on past trends which shows a decline during the last 7-8 years. In fact, the decline has been even faster in the current fiscal year when remittance earnings have also gone through a decline. Use of this trend gives projected figures of overseas employment, which are lower than expected or targeted by 7FYP. As a result, the projected overseas employment figures are less than previous projections (ADB 2015).

The declining or non-increasing trend of overseas employment during the last few years has been due to the declining demand in the global market. In fact, the slack in demand for Bangladeshi labour in the Middle Eastern countries may continue or worsen if the oil price decline in the world market is not reversed.

Moreover, the demand for skilled workers from Bangladesh may not increase as fast as we may expect. Overall demand for skilled component of overseas workers is not actually quite elastic. Therefore, the projected training targets (Table 1.9) for overseas employment may prove to be overestimates and will need periodic review. Demand growth for "high skill" workers is likely to continue and only a high quality, higher education system can feed this demand.

[7] Sectoral labour demand for 10 sectors has used LFS (2013) distribution as the base and has added the assumption that there will be structural changes (between the share of these 10 sectors vis-á-vis the others) once in 2020 and 2025.

Table 1.8 : Projected training targets by sectors in Bangladesh (in millions), 2016-2050

Sector	2016	2018	2020	2025	2030	2040	2050
Agro-food	0.013	0.014	0.015	0.021	0.030	0.055	0.099
Healthcare	0.051	0.045	0.041	0.025	0.031	0.045	0.065
Hospitality and tourism	0.005	0.006	0.009	0.014	0.023	0.066	0.201
RMG	1.235	1.380	1.547	2.117	2.850	5.485	9.902
Textile	0.309	0.344	0.387	0.829	0.626	1.371	2.476
Leather	0.087	0.096	0.108	0.149	0.207	0.385	0.693
IT	0.617	0.690	0.773	1.059	1.482	2.743	4.951
Construction	0.383	0.431	0.488	0.635	0.813	1.202	1.543
Light engineering	0.247	0.276	0.309	0.423	0.592	1.098	1.980
Shipbuilding	0.031	0.035	0.039	0.053	0.074	0.138	0.248
Others	1.437	1.569	1.716	1.881	3.026	4.557	7.317
Domestic (Total)	4.416	4.886	5.433	7.207	9.755	17.143	29.475

Source: Based on training target ratio used in ADB (2015) and Table 1.6.

Table 1.9 : Projected training targets for overseas employment in Bangladesh (in millions), 2016-2050

Year	Projected overseas employment	Projected training target for overseas employment
2016	0.588	0.464
2018	0.659	0.235
2020	0.738	0.263
2025	0.981	0.270
2030	1.302	0.307
2040	2.297	0.450
2050	2.297	0.451

Source: Based on training target ratio used in ADB (2015) and Table 1.6.

Skill generation through TVET vs. improvement of quality of general education

The emphasis on TVET and high training targets projections should not be treated as a shift away from general education to TVET. Rather, it must be reiterated that an improvement in quality of education at secondary and higher secondary level is a pre-requisite for success of TVET. An improvement of quality of higher secondary education and tertiary level general education can even reduce the need for persons with technical training. Therefore integrated policies and programmes are required for the expansion of TVET and improvement of quality of general education.

The projections of training target may raise a question about whether sufficient number of prospective workers will be available to opt for skill training. Evidence of skill mismatch often discourage prospective labour force to enter skill training. Moreover, most young persons may be in need of entering job market as soon as they leave school/complete education. In this context the labour market situation discussed above may have a relevance.

Doubts about availability of trainees are usually based on low unemployment rate and low age of entry into labour force. However, the situation is expected to change with the dynamic changes in the economy. Two types of changes on the supply side are expected. First, attainment of general education will rise and a larger share of young persons will have SSC and above level education. Overall quality of education will improve. This will make them easily trainable. Moreover, better job availability for trained persons will encourage young persons to enter training programmes.

1.4.4 Skill Shortage: Outlook and Views of Representatives of Selected Sub-sectors

As mentioned in the section on methodology, the study sought opinion of representatives from chosen sub-sectors.[8] Following discussion presents these opinions and data. While the macro projections (Sections1.4.2 and1.4.3) come from secondary data based methods, the projections of industry representatives reflect two aspects: their own assessment of growth of the sector/sub-sectors and overall economic situation of the country.

Table 1.10 shows that the six reporting sub-sectors have attached significant importance to shortage of skilled labour as a constraint behind growth.

Table 1.10 : Importance of skill shortage in different sub-sectors

Sectors	Rank
IT	5th
Light engineering	2nd
Ship building	5th
Leather goods and footwear	1st
Construction	2nd
RMG: Knit	1st
RMG: Woven	3rd

Source: Data obtained from sector representatives, 2016.

Each sector has identified the skilled occupations where training programmes should be undertaken. Table 1.11 provides a list of these occupations. For some of the sub-sectors, we have obtained ideas about the extent of demand and shortage of skilled workers within various categories (Table 1.12). Additional data are presented in Annex tables (Tables A1.3 to A1.8).

Table 1.11 :Occupations where SEIP should take up training

Sectors	Occupations
IT	Mid level professionals, specified skill workers
Light engineering	Leather, CAD-CAM, Welding, CNC Cutting
Ship building	Welding and Fabrication, Electrical and Navigation, Machine Tools Operation, CAD and CAM, Piping, Painting
Leather goods and footwear	Sewing, Cutting, Setting and Assembling, Supervisor, Quality Controller, Lasting
Construction	Rod Binding and fabrication, Masonry, Plumbing, Electrical, Tiles and Marble Work, Aluminum Fabrication
RMG: Knit	Cutting, Sewing & Finishing department(Skilled and semi - skilled), Planning, Industrial Engineering & Production, Quality, Product Design & Development, Admin, HR, Compliance & Fire Safety (Mid Level Managers)
RMG: Woven	Basic Operator, Technician, Mid level, New entrants in mid level

Source: Data obtained from sector representatives, 2016.

These data sometimes differ from the macro projections. For example, discussion with construction sector representatives shows that the training targets given by this source are higher than the macro projections for the initial years.

Opinion was also sought on the role of training of women. Sectors like construction and shipbuilding are of the view that only about 5-10 per cent of future training should target women. Even for IT sector which is not

[8] Some sub-sector representatives reported their inability to provide data within the short span of time and the employers' views for these sub-sectors will come from micro survey based studies.

physical skill intensive, suggestion has been made that only 30 per cent of targeted training should go to women. This share is high in the views of employers of RMG (Table 1.12). Growth of skill based sectors in the coming years cannot be achieved only through skill training among male labour force. In fact, more probing into the reasons of employers' or prospective trainees'/job entrants' lack of enthusiasm about entry of women into skill training and in turn into skilled jobs is needed. The gender issues related to skills development and utilisation deserve urgent attention among researchers and policy makers.

Table 1.12 : Share of technical training enrolment that should go to women

Sectors	Female student training enrolment share (%)
IT	30
Light engineering	N.A.
Ship building	5-10
Leather goods and footwear	60
Construction	5-10
RMG: Knit	50

Source: Data obtained from sector representatives, 2016.

Table 1.13: Estimates of labour demand and labour shortage in the coming years

Shipbuilding					
Year	Total labour demand (in thousands)	Demand for skilled labour (in thousands)	Demand for unskilled labour (in thousands)	Shortage of skilled labour (in thousands)	Shortage of unskilled labour (in thousands)
2016	45	25	20	12	5
2018	50	28	22	14	6
2020	55	30	25	16	7
2022	60	33	27	18	7
Construction					
Year	Total labour demand (in thousands)	Demand for skilled labour (in thousands)	Demand for unskilled labour (in thousands)	Shortage of skilled labour (in thousands)	Shortage of unskilled labour (in thousands)
2016	5500	500	5000	10	15
2018	6000	600	5400	20	20
2020	6500	800	5700	30	25
2022	7000	1000	6000	40	45
2024	7500	1200	6300	50	60
2026	8000	1300	6700	60	75
2030 (approx)	9000	1400	7600	80	85
2040 (approx)	9500	1500	8000	100	100

Source: Data obtained from sector representatives, 2016.

1.5 Concluding Observations

1.5.1 Guidance related to Training

Both direct and indirect evidence highlight skill shortage as a constraint to growth. On the supply side, the size of labour force, especially youth labour force, will continue to grow and its share in the labour force will also grow during the next 20-25 years. Therefore, an appropriate road map for skill generation must be worked out. In this context, some general recommendations as well as specific guidelines have been more or less comprehensively presented in ADB (2015) report. Therefore, we only emphasize a few specific issues relevant in the context of skill generation in the coming decade.

- ***Industry link***
  Skill mismatch not only causes wastage of resources but also discourages prospective future trainees. To reduce such mismatch, industry link must play an important role. Industry link can help projection of growth of a sector and thus revision of projected training needs. In this context, the practical aspects of establishing such links need more attention. Industry associations will obviously be the most important channel for establishing such link. Nonetheless, the industry associations or trade bodies cannot account for the labour demand or skill needs of the non-member factories. Therefore, SEIP can adopt plans to generate a data base for the relevant industries with a system of regular updating. It can also put in place a system for establishing links with unorganised part of the producing units as well.
- ***Gender dimensions***
  Women are likely to contribute a larger share of future growth of labour force compared to men. Therefore, a movement towards a skilled labour force requires proper emphasis on skill training among women. In a number of sectors, women already constitute major shares of labour force. These are RMG, hospitality and tourism, and health services. Therefore, keeping in line with existing distribution of employment and incorporating the expectation of further increase, women should constitute about 80 per cent of trainees in these subsectors' occupations. Women should also get priority for training in "high-skilled" occupations. "Retraining" facilities of employed women can help their upward mobility.
- ***Career planning and training for youth***
  Young students in schools, who are prospective trainees, should be encouraged and guided to do career planning early. In particular, after junior school certificate, (eight grade exam) those who score less than certain grade, should be given various vocational training options.
- **High skill target vs. improvement of quality of education**
  The emphasis on TVET and high training needs projections should not be treated as a shift away from general education to TVET. Rather, it must be reiterated that an improvement in quality of education at secondary and higher secondary level is a pre-requisite of success of TVET. An improvement of quality of higher secondary education and tertiary level general education can even reduce the need for persons with technical training. Therefore, integrated policies and programmes are required for the expansion of TVET and improvement of quality of general education.

1.5.2 Suggestions for Related Research

SEIP is imparting training in skills, which are relevant for many sectors and for both domestic and overseas employment. An overall assessment of the impact of training should be done before further expansion of such training.

1.5.3 Identification of New Sectors Requiring Training Programmes: Skill Generation for Backward Linkage Sectors

While it is apparent that the 10 skill-intensive modern sectors focused by SEIP will require skilled labour power, other sectors will also needs more skilled labour during the coming days. In particular the backward linkage sectors relevant for the already chosen sub-sectors need special attention because skill enhancement in those sub-sectors can lead to greater efficiency, which will then be transmitted to the already chosen sectors. Such backward linkage sub-sectors may come also from service and agriculture.- Three sub-sectors have been identified in this context. These are:

a) Printing and packaging, which has linkage with most of the manufacturing sectors.
b) Child care service, which has linkages with most sectors employing (or having future plans to employ) large share of female labour.
c) Interior designing/Art and design, which has linkage with construction.

Among these three sub-sectors, development of skill for "Child Care Services" (CCS) can have a number of linkage effects. CCS can help raise women's LFPR. Even for women who are currently working, CCS can help improve their productivity and can have positive impact on children. Research findings show that female workers of RMG sector arrange various precarious child care arrangements which can have adverse effect on child's development.

Training may be provided for skilled and semi-skilled occupations of the sector and also to the prospective entrepreneurs.

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Appendix -Tables

Table A1.1 : Distribution of male and female labour force by broad economic sector: 1995-2013

(Per cent)

Period	Male			Female			Male and female		
	Agriculture	Non-agriculture	Total	agriculture	Non-agriculture	Total	Agriculture	Non-agriculture	Total
1995-1996	52.3	47.7	100.0	27.8	72.2	100.0	48.9	51.1	100.0
1999-2000	51.8	48.2	100.0	46.9	53.1	100.0	50.8	49.2	100.0
2002-2003	49.8	51.2	100.0	58.7	42.3	100.0	51.7	48.3	100.0
2006	41.8	58.2	100.0	68.3	31.7	100.0	48.1	51.9	100.0
2010	40.2	59.8	100.0	64.8	35.2	100.0	47.6	53.1	100.0
2013	41.6	58.4	100.0	53.7	46.3	100.0	45.1	54.9	100.0

Source: LFS (various years).

Table A1.2 :Distribution of employed persons by industry and sex: 2000-2013

(Per cent)

Major Industry	1999-2000			2006			2010			2013		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Agri. forestry and fisheries	50.8	51.8	46.2	48.1	41.8	68.3	47.6	40.18	64.8	45.0	41.7	53.5
Mining and quarrying	0.5	0.3	1.0	0.1	0.1	0.1	0.2	0.25	0.1	0.4	0.5	0.1
Manufacturing	9.5	7.5	17.7	11.0	10.9	11.5	12.5	12.75	11.8	16.4	13.9	22.5
Electricity, gas and water	0.3	0.3	0.2	0.2	0.2	0.0	0.2	0.24	0.0	0.3	0.5	0.2
Construction	2.8	3.2	1.3	3.2	3.9	0.9	4.8	6.31	1.4	3.7	4.8	1.0
Trade, hotel and restaurant	15.8	18.2	6.3	16.5	20.4	4.1	14.0	17.24	6.3	13.0	16.4	4.6
Transport, storage and communication	6.3	7.8	0.6	8.4	10.8	0.6	7.4	9.87	1.5	6.4	8.8	0.7
Finance and business services	1.0	1.2	0.6	1.6	1.7	1.1	0.7	0.83	0.3	0.9	1.1	0.5
Community and personal services and others	12.9	9.6	26.2	10.9	11.0	13.6	12.7	12.33	13.7	14.7	12.7	16.9
All	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: LFS (various years).

Table A1.3 : Distribution of employed persons by status of employment: 1996-2013

(Per cent)

Status of employment	1995 -1996	1999 -2000	2005 -06	2010	2013
Self -employed	45.4	46.7	42.0	40.8	40.6
Employer	0.4	0.3	0.3	0.2	0.9
Employee	16.8	16.7	13.9	14.6	23.2
Unpaid family helper	12.0	12.0	21.7	22.5	18.2
Day labourer/irregular	25.3	24.3	20.1	32.5	15.5
Others	-	-	2.0	0.8	1.6
All	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: BBS: LFS (various years).

Table A1.4: Growth of labour productivity in major sectors: 2006-2013 (GDP-Employment Ratio)

Sectors	2006	2010		2013	
	GDP/Emp	GDP/Emp	GR_GDP/Emp	GDP/Emp	GR_GDP/Emp
Agriculture	38206.48	41400.39	2.09	44838.43	2.77
Manufacturing	141336.14	148077.40	1.19	139641.42	-1.90
Other Services	143619.00	166178.40	3.93	162198.25	5.22
Trade	87720.45	107475.58	5.63	130039.38	7.00
Transport and Communication	116944.66	160697.71	9.35	210064.76	10.24
Others	219547.20	227591.10	0.92	240125.09	1.84
Total	**96630.29**	**107134.32**	**2.72**	**120527.00**	**4.17**

Source: Estimated from Bangladesh Economic Review and LFS data.

Table A1.5 :Size and share of labour force in formal and informal sector: 2000-2013

Years	Share of employment (%)		Size of employment (million)	
	Formal	Informal	Formal	Informal
2013	21.6	79.4	12.0	46.1
2010	12.5	87.5	6.8	47.3
2006	21.5	78.5	10.2	37.2
2003	20.8	79.2	9.2	35.1
2000	24.7	75.3	9.6	29.3

Source: LFS (various years).

Table A1.6 :Employment rate and share of women in total employment by sex: 2000-2013

Year	Sex	Share in total employment (%)
2013	Female	30.0
	Male	70.0
2010	Female	29.9
	Male	70.1
2006	Female	23.8
	Male	76.2
2000	Female	21.1
	Male	78.9

Source: BBS, LFS (various years).

Table A1.7 : Labour force participation ratio by sex

Period	Sex	Employment growth	LFPR*
2000 -2003	All	4.4	57.3
	Male	3.4	87.4
	Female	7.7	26.1
2003 -2006	All	2.2	58.5
	Male	1.5	86.8
	Female	4.6	29.2
2006 -2010	All	3.3	59.3
	Male	1.2	82.5
	Female	9.1	36.0
2010 -2013	All	2.4	57.1
	Male	2.8	81.6
	Female	1.3	33.5

* LFPR values are for the years 2003, 2006, 2010 and 2013.Source: LFS (various years).

Table A1.8: Distribution of status of employment by sex: 2000 to 2013

Status of employment	1999 -2000		2006		2010		2013	
	Female	Male	Female	Male	Female	Male	Female	Male
Self - employed	26.6	51.4	15.9	50.0	25.1	47.5	12.3	52.3
Employer	0.0	0.3	0.1	0.3	0.2	0.2	0.1	1.2
Employee	20.3	15.8	11.7	14.5	8.9	17.0	23.2	23.2*
Unpaid family helper	34.1	6.4	60.1	9.7	56.3	7.1	50.1	5.1
Day labourer	19.0	26.1	7.9	24.0	7.1	28.9	7.6	19.0
Others	-	-	4.3	1.5	2.4	-	4.7	0.3
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: BBS: LFS (various years). * Gender disaggregated data not available. So assumed the same share.

Table A1.9 :Sectoral distribution of GDP

	% of GDP	
	2000 (1)	2014 (1)
Agriculture	20.8	16.3
Industry	23. 4	29.6
Manufacturing	14.8	19.5
Services	55.8	54. 1

Source: Bangladesh National Account Statistics, BBS.

Table A1.10 : Overseas employment: 2000-2014

Year	Total	Male	Female	Female as % of total
2000	222,686	222,232	454	0.2
2003	254,190	252,837	2,353	0.9
2006	381,516	363,471	18,045	4.7
2009	475,278	453,064	22,214	4.7
2012	600,000	562,696	37,304	6.2
2013	400,000	344,000	56,000	14.0
2014	425,684	349,677	27,706	7.9

Source: MoF (various years), BMET Website.

Table A1.11: Unemployment rate among labour force with vocational training and general SSC/HSC holders in Bangladesh

Qualification	Unemployment rate (%)		
	2005	2010	2013
SSC	7.78	7.33	4.4
HSC	9.98	13.74	7.9
Technical/Vocational	6.99	1.20	2.5*

Source: LFS (various rounds).
* Includes technical and all other residual group.

Table A1.12 : LFPR among persons with and without skill training

Training	LFPR (per cent)
None	58.7
Technical/vocational training	68.6
Catering service training	72.1
Tailoring/garments training	74.1
Foreign language training	71.2
In service training	85.4
Nursing training	63.0
Youth development training	72.5
Others	79.2

Source: LFS (2010).

Table A1.13 : Average monthly wage of trained and untrained workers who have SSC or above education

Sector	Gender	Whether received any training?	
		Yes	No
Agriculture, forestry and fishing	Male	10, 976.20	9, 055.65
	Female	10, 196.64	9, 378.48
Mining and quarrying	Male	10, 000.00	8, 710.77
	Female	-	9, 000.00
Manufacturing	Male	14, 252.83	11, 745.68
	Female	12, 609.69	11, 620.75
Electricity, gas, steam and air conditioning supply	Male	12, 627.76	14, 772.91
	Female	-	16, 295.91
Water supply, sewerage, waste management and remediation act	Male	12, 760.45	11, 524.62
	Female	14, 569.62	13, 395.18
Construction	Male	15, 690.61	9, 721.82
	Female	13, 491.45	9, 147.26
Wholesale and retail trade, repair of motor vehicles	Male	15, 018.39	12, 270.86
	Female	13, 486.38	13, 758.49
Transportation and storage	Male	13, 627.08	12, 020.72
	Female	6, 711.86	9, 084.57
Accommodation and food service activities (Hotel and restaurant)	Male	13, 250.44	11, 275.28
	Female	15, 000.00	11, 516.68
Skilled service	Male	14, 779.15	13, 919.33
	Female	10, 829.61	12, 720.04
Education and health	Male	14, 199.00	14, 371.96
	Female	15, 014.06	14, 592.35
Others	Male	13, 460.57	12, 348.60
	Female	12, 264.88	7, 852.25
Total	Male	14, 243.21	12, 018.67
	Female	13, 734.05	11, 466.22

Table A1.14: Background data for determining trainability

Type	Not trainable	Trainable	Training not relevant	
	Low/No education	Secondary & above education		Total
Occupation requiring various levels of skill	Number ('000) (%)	Number (000) (%)	Number ('000) (%)	Number ('000) (%)
High skill	-	-	4343 (100%)	100%
Skilled	3742 (35.4%)	6829 (64.6%)	-	100%
Semi -skilled	19962 (57.6)	14685 (42.4%)	-	-
Unskilled	-	=	8005 (100%)	100%
		Total trainable 21514 (37.0%)		

Source: Estimated from the LFS 2013.

Table A 1.15 : Labour demand projection for 10 chosen sectors (in million), 2016-2050

Sector	2016	2018	2020	2025	2030	2040	2050
Agro -food	2.00	2.43	2.91	4.46	5.40	7.92	11.61
Healthcare	0.89	1.08	1.29	1.98	2.40	3.52	5.16
Hospitality and tourism	0.03	0.04	0.04	0.07	0.08	0.12	0.18
RMG	4.10	4.98	5.98	9.16	11.09	16.26	23.84
Textile	2.53	3.07	3.69	5.65	6.85	10.04	14.72
Leather	0.12	0.15	0.18	0.28	0.34	0.49	0.72
IT	0.14	0.17	0.20	0.30	0.37	0.54	0.79
Construction	3.03	3.68	4.42	6.76	8.18	12.00	17.59
Light engineering	0.46	0.56	0.68	1.03	1.25	1.83	2.69
Shipbuilding	0.05	0.06	0.07	0.11	0.14	0.20	0.29
Overseas employment	0.59	0.66	0.74	0.98	1.30	2.30	2.30
Others	49.61	51.19	52.94	57.87	69.95	102.16	150.85
Total	63.56	68.06	73.15	88.66	107.35	157.38	230.73
Domestic	62.97	67.40	72.41	87.68	106.05	155.08	228.43

Note: Based on the LFS 2013 sectoral distribution and assuming structural change (assuming the share of 10 sectors will grow 2 times by 2025 compared to 2013).

Table A1.16 : Number of new enterprises started and will start in different years by sector

Sectors	2015	2017	2020
IT	300	500	600
Light engineering	NA	10-12	15-20
Ship building	2	4	6
Leather goods and footwear	11	20	25
Construction	700	800	900
RMG: Knit	67	80	60
RMG: Woven	125	160	250

Source: Data obtained from sector representatives, 2016.

Table A 1.17: How much growth will take place through various routes (%)

Sectors	a	b	c	d
IT	20	30	50	
Light engineering		30	25	45
Ship building	30	40	15	15
Leather goods and footwear	25	50	5	20
Constructio n	60	20	10	10
RMG: Knit	18	72	2	8

Source: Data obtained from sector representatives, 2016.

Note (a): Through better quality output, (b): Growth of production of present products, (c): Through growth of high value new products, and (d): Others

Table A1.18 : Strategies of tackling the skill shortage by various sectors

Sectors	a	b	c	d	e
IT		****	***	**	
Light Engineering		***	**		
Ship Building	**	****	*	***	
Leather Goods and Footwear	*	****	***	**	
Construction	****	****	***	**	*
RMG: Knit	***	****	*	**	

Source: Data obtained from sector representatives, 2016.

Note **** Most Important, *** Second, ** Third, * Fourth and (a): Use middle men to keep a reserve for social demand (involving contracts in future markets), (b): More on-the-Job training, (c): Keep production target limited to avoid labour shortage, (d): Raise wage offer/ other facilities, (e): others

Table A1.19 :Projected labor shortage by Occupation

Leather goods and footwear				
Name of key skilled occupations in this sector	What share of sector's employment is in this occupation (%)	What will be the shortage of such employees (as% of total demand) in		
		2016	2020	2024
1. Sewing	50	45	47	48
2. Cutting	5	3	4	4
3. Lasting	10	7	6	5
4. Setting and Assembling	5	3	5	4
5. Table Work	10	6	7	6
6. Quality Controller	3	6	5	3
7. Finishing and Packing	3	4	2	4
8. Supervisor	2	4	3	4
9. Line leader	4	5	3	4
10. Machine maintenance technician	1	2	3	1.5
11. Pattern making and Engineering	1	3	2	2
12. Advance CAD design	1	2	3	4
13. Inventory	2	3	3	1.5
14. Material selection	0.5	2	1	2.5
15. Compliance	0.5	2	2	1.5
All unskilled	2	3	4	3
Total	100	100	100	100

Source: Data obtained from sector representatives, 2016.

CHAPTER- 2

Labour Market and Skill Gap Analysis for Readymade Garments Sector in Bangladesh

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Executive Summary

Introduction

During the last two decades, readymade garment (RMG) sector has contributed significantly to growth of Bangladesh economy. It has also become the major export earner of the country. Its share of total export has risen from 65.6 per cent in 1996 to 82.05 per cent in 2016. To attain the US $50 billion export target, which is almost double of the current level, the country must switch towards high value, skill-intensive export items. This endeavour may face a new challenge arising from the lack of supply of skilled workers.

The objectives of the study are: (i) identifying key categories of current occupations and trades in the sector; (ii) estimating current and future needs for skilled workers in each of the categories; and (iii) recommending ways to meet the future needs for skills demands in the sector. The study is based on data from both primary and secondary sources. Primary data have been generated through discussion with industry representatives and survey of enterprises.

Current Structure of RMG Employment and Labour Market

Data shows that over these years, the skill composition of workers has changed substantially. In 2010, about 28 per cent workers were unskilled, which decreases to 16 per cent in 2015 and the decline has been compensated mostly by an increase in the share of skilled workers, which was 43 and 56 per cent respectively in 2010 and 2015. The share of semi-skilled workers increased by one percentage point only, from 29 per cent to 30 per cent, during this period. From the enterprise survey, distribution of workers by occupation and sex has been obtained. 55 per cent of production workers in these enterprises are women. Women constitute more than 70 per cent in the occupation of “sewing machine operator” and “folder”. Male workers are more than 90 per cent in “cutter” and “fusing machine operator” occupation, and also dominate in “finishing”, “packing” and “quality inspection.”

Skill Shortage and Market Responses

Nonetheless, in practice, the enterprises take steps to mitigate the problem of skill shortage, both in the immediate short run and also in the medium term.

The short-term steps include:

a) provision of short duration on the job training to unskilled workers hired as “helpers”.
b) bid away workers from other industries through offering higher wage/better remuneration package.
c) to attract skilled workers and to retain them for longer duration one of the most effective strategies is to pay wages on time. Factories paying wage on a specific date (before the 7th) are attractive to the prospective workers.

Employers try to build loyalty of workers by hiring their relatives/co-villagers. When training organisations and/or externally funded training projects take up plans for skill training for RMG workers, the above context (of in-house capacity) must be kept in mind.

Overseas Employment of Skilled Workers from RMG Sector

BMET overseas employment data show that there was 19.3 per cent growth of RMG worker employment during the last four years (2012-2015). It is assumed that in the next five to six years it will grow at the same rate. Then the projected overseas employment from the RMG sector would be 36,346.

Labour Demand Projection by Occupation and Skill Level

Surveyed enterprises ranked skill shortage as one of the major constraints for future growth in the sector.

About 30 percent of enterprises ranked labour first as a constraint, 20 per cent reported as second, and another 20 percent reported it as the third most important constraint for future growth.

The analysis of the survey data shows that sewing machine operators are at the top of the list in terms of current employment, existing demand and projected future demand. The existing shortage for sewing machine operators nears 83,000 and projected demand is 3,027,886 by 2021 and 4,054,975 by 2026. The analysis also reveals that the demand for skilled employees is the highest, followed by semi-skilled and unskilled. Interestingly, the quality inspector (cutting, sewing, and finishing) is in second position in terms of both existing shortage (21,350) and projected demand (385,401 by 2021 and 527,470 by 2026).

Finishing operators (ironing etc.) are in third position in terms of both existing shortage (14,640) and projected demand in the next 5-10 years (366,417 by 2021 and 533083 by 2026). The percentage, projected demand over current employees, is highest for quality controllers, at around 37 per cent. Overall, the estimated number of existing shortage for RMG employees is 176,187 and the projected demand is 54,51,558 by 2021 and 74,50,051 by 2026.

Skills Development Practices in the RMG Sector and Future Training Needs

The survey results show that 70 per cent of the surveyed factories have in-house training facilities for their workers. Some training programmes have been organised for all employees, such as basic training, fire safety training, etc. The skill development training programmes target unskilled, semi-skilled and skilled groups separately. The duration of unskilled workers training varies between 4 and 12 weeks.

The sector will demand 3.66 million skilled workers by 2021 and 5.3 million by 2026. This implies that in 2021, about 462,000 workers with training from other TVET organisations will be needed. In 2026, the number will be 802,000. The existing enterprises have developed in-house training capacity, but the new enterprise (entering industry after 2016) might not have such skill training and upgrade facilities. Those new enterprises may need more skilled workers from TVET organisations.

Suggestions for Future Research

(I) Expansion of skill training and a movement in the direction of higher capital intensity can open up new dimensions of gender inequality. Moreover, the short span of women's career in RMG can have implications for efficiency of the fund spent on their training. These aspects can be addressed through a research based on workers' survey.

(II) A study of the "impact assessment of SEIP training" should be taken up urgently, especially in the context of export oriented RMG growth.

(III) The number of small and micro units of RMG production, which used to survive through sub-contracting, is shrinking. This will have implications for employment growth.

Policy Suggestions for Skill Generation for RMG

The entrepreneurs and other stakeholders related to RMG sector must prepare themselves for the expansion of the sector. Following interventions are being suggested in this context:

- Entrepreneurs may periodically (at a particular time of the year) publicise their demand for semi-skilled and skilled workers in various occupations. A central body may take up the responsibility of coordinating the industry demand and communicating it to the trainers.
- Entrepreneurs may from time to time communicate with the training organisations, and especially SEIP, and inform them about the type of machinery which should be used to train prospective RMG workers.
- Public-private partnership will also need to be strengthened in this context. Government's TVET organisations should introduce courses geared to the needs of export-oriented RMG.
- There should be a thorough evaluation of the appropriateness of current training programmes of SEIP, especially those related to RMG.

Table E. 1: Projected labour demand (10 years) by occupation, sex and skill level

Occupation	Skill level	Projected employment in 2021			Projected employment in 2026 (No skill composition change)			Projected employment in 2026 (with skill composition change)		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Cutter man	Unskilled	28051	25016	3035	38568	34395	4173	36927	32931	3995
	Semi-skilled	75500	71309	4190	103805	98044	5761	82059	77505	4554
	Skilled	195165	180197	14968	268333	247753	20580	291309	268967	22342
	Total	**298418**	**273227**	**25191**	**410295**	**375660**	**34635**	**410295**	**375660**	**34635**
Sewing Machine Operator	Unskilled	284621	75256	209365	381168	100784	280383	364948	96496	268452
	Semi-skilled	766055	159686	606369	1025909	2158	812056	810995	169054	641941
	Skilled	1980237	536486	1443751	2651954	718468	1933486	2879032	779988	2099044
	Total	**3027886**	**749893**	**2277992**	**4054975**	**1004265**	**3050710**	**4054975**	**1004265**	**3050710**
Fusing Machine Operator	Unskilled	20696	10841	9855	27124	14208	12916	25970	13603	12367
	Semi-skilled	55704	29239	26465	73004	38320	34684	57711	30292	27418
	Skilled	143994	139818	4176	188714	183241	5473	204873	198931	5942
	Total	**220175**	**211309**	**8866**	**288554**	**276934**	**11620**	**288554**	**276934**	**11620**
Overlock Machine Operator	Unskilled	15050	4515	10535	19974	5992	13982	19124	5737	13387
	Semi-skilled	40508	31528	8980	53760	41842	11918	42498	33076	9421
	Skilled	104712	62929	41783	138967	83516	55452	150867	90667	60200
	Total	**160111**	**108299**	**51812**	**212488**	**143728**	**68761**	**212488**	**143728**	**76168**
Button Machine Operator	Unskilled	3920	1307	2614	5000	1667	3334	4788	1596	3192
	Semi-skilled	10552	4461	6091	13458	5690	7769	10639	4498	6141
	Skilled	27275	12372	14903	34789	15781	19009	37768	17132	20636
	Total	**41706**	**17977**	**23729**	**53195**	**22929**	**30266**	**53195**	**22929**	**30266**
Kansai Machine Operator	Unskilled	1708	1067	640	2158	1349	809	2067	1292	775
	Semi-skilled	4597	3735	862	5809	4720	1089	4592	3731	861
	Skilled	11882	10342	1540	15017	13070	1947	16303	14189	2113
	Total	**18168**	**14784**	**3384**	**22961**	**18684**	**4277**	**22961**	**18684**	**4277**
Finishing	Unskilled	34443	23622	10821	50110	34366	15743	47977	32904	15074
	Semi-skilled	92704	68531	24172	134870	99703	35167	106617	78816	27800
	Skilled	239637	194925	44712	348636	283587	65049	378489	307870	70619
	Total	**366417**	**289525**	**76892**	**533083**	**421216**	**111867**	**533083**	**421216**	**111867**
Quality Inspector	Unskilled									
	Semi-skilled	98663	64367	34295	135032	88095	46937	105494	68824	36670
	Skilled	286738	189429	97310	392438	259257	133180	421976	278771	143205
	Total	**385401**	**251340**	**1340 61**	**527470**	**343991**	**183479**	**527470**	**343991**	**183479**
Embroidery Machine Operator	Unskilled	8805	4047	4758	11104	5104	6000	10631	4887	5745
	Semi-skilled	23698	11454	12244	29886	14445	15441	23625	11419	12207
	Skilled	61260	35202	26058	77255	44394	32862	83870	48195	35675
	Total	**93669**	**48345**	**45324**	**118127**	**60969**	**57158**	**118127**	**60969**	**57158**
Folder	Unskilled	18542	8484	10058	26267	12018	14249	25149	11507	13642
	Semi-skilled	49906	23073	26833	70697	32685	38011	55887	25838	30048
	Skilled	129007	28056	100951	182750	39744	143006	198398	43147	155251
	Total	**197258**	**54505**	**142752**	**279434**	**77212**	**202222**	**279434**	**77212**	**202222**
Poly Man	Unskilled	6211	4000	2210	8614	5548	3065	8247	5312	2935
	Semi-skilled	16716	12920	3796	23184	17920	5264	18327	14166	4161
	Skilled	43210	22210	21000	9936	30804	29126	65062	33442	31620
	Total	**66071**	**35968**	**30103**	**91637**	**49885**	**41752**	**91637**	**49885**	**41752**
Packer/ Packing Man	Unskilled	22299	21145	1154	29005	27504	1501	27771	26333	1438
	Semi-skilled	60017	46811	13206	78067	60889	17178	61713	48133	13579
	Skilled	155144	150536	4608	201801	195807	5994	219081	212574	6507
	Total	**237223**	**212290**	**24932**	**308564**	**276134**	**32430**	**308564**	**276134**	**32430**
Quality Controller	Unskilled	-	-	-	-	-	-	-	-	-
	Semi-skilled	50858	38911	11947	82390	63036	19355	109854	84048	25806
	Skilled	288198	159383	128815	466879	258200	208679	439415	243012	196404
	Total	**339056**	**195899**	**143157**	**549269**	**317355**	**231914**	**549269**	**317355**	**231914**
All Occupation	Unskilled	444347	204781	239567	599091	276096	322996	573598	264347	309251
	Semi-skilled	1345477	469991	875486	1829871	639196	1190675	1490010	520478	969532
	Skilled	3666460	1806664	1859796	5027463	2477304	2550158	5386443	2654194	2732249
	Total	**5451558**	**2448889**	**3002669**	**7450051**	**3346630**	**4103421**	**7450051**	**3346630**	**4103421**

Labour Market and Skill Gap Analysis for Readymade Garment Sector

2.1 Introduction

It is more or less uncontroversial that the transformation of the Bangladesh economy requires acceleration of industrial growth. During the last two decades, readymade garment (RMG) sector has contributed significantly to growth of Bangladesh economy. It has also become the major export earner of the country. Its share of total export has risen from 65.6 per cent in 1996 to 82.05 per cent in 2016. The industry has been lauded for its success in terms of job creation especially for female workers. In the process of such growth, the entrepreneurs of the sector had to overcome many barriers and constraints and government's pragmatic policies provided the required support.

In this context, constraints related to physical infrastructure, lack of smooth supply of electricity, shortage or high cost land for industrial use, availability of finance, etc. have drawn attention of the concerned parties. While the availability of low cost labour has been one of the most important factors contributing to the competitiveness of the industry, the future competitiveness and growth of the sector cannot solely rely on the supply of low wage workers without much education or skill endowment. To attain the US $50 billion export target, which is almost double of the current level, the country must switch towards high value, skill intensive export items. This endeavour may face a new challenge arising from the lack of supply of skilled workers.

The present chapter of the micro-level subsector analysis looks at RMG as one of the priority sectors under Skills for Employment Investment (SEIP). The objectives of the study are: (i) identifying key categories of current occupations and trades in the sector; (ii) estimating current and future needs for skilled workers in each of the categories and (iii) recommending ways to meet the future needs for skills demands in the sector. This skills gap analysis will provide a detailed picture of skill targets by occupations.

2.1.1 Methodology and Data Sources

The study is based on data from both primary and secondary sources.[1] The secondary sources include findings from existing studies with appropriate references at the relevant places. Data from LFS 2013 have been reanalyzed. In addition, primary data has been generated through:

a) Discussion with industry representatives
b) Discussion with key informants including academicians and policy makers
c) Survey of enterprises
d) Information from training providers

Survey of Enterprises and Training Centres

This present study examines the skill composition and occupation structure and makes projections of skill shortage based on data from enterprises collected through questionnaire survey. The nature of the sample and survey requires clarification.

- The survey covered 10 large enterprises (with more than 400 workers), covering three types of factories, 5 units of knitwear, one sweater and 4 woven factories, which were chosen purposively.
- Location of the factories are as follows :

Dhaka	:	6
Narayanganj	:	1
• Gazipur	:	3

Obviously, the reason behind the choice of only large factories needs clarification. It has been done because the share of small or even medium sized enterprises is small, less than 10 per cent at present. In contrast, studies conducted 10 years ago obtained a more balanced distribution in terms of employment size.

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1 Discussion with industry representatives (BGMEA and BKMEA) helped in the following:
- o Categorisation of occupations into skilled, semi-skilled and unskilled
- o Overall industry outlook on skill shortage at present and in future
- o Enterprise selection

Moreover, the current tendency is a transformation of the structure of RMG industries towards concentration of production and employment in large units. It is extremely important to understand the nature and implication of such concentration. SEIP and BIDS have therefore decided to focus on large enterprises.[2]

2.2 Brief history of Emergence of RMG in Bangladesh

Spectacular growth of RMG sector has started from the beginning of the 1990s. In 1990, its rank in terms of value addition of manufacturing sub-sectors was third. In 2002, the rank has risen to first and since then it has been at the top.[3] RMG's contribution to export earning of the country increased from 3.89 per cent in 1984 to 32.45 per cent in 1990, 75.61per cent in 2010 and 82.05 per cent in 2016. Thus, the country is overwhelmingly dependent on this sector for its export earnings. Growth of the sector vis-á-vis other manufacturing sub-sectors (shown in Table 2.2), shows that its index is not only highest, but the index is also rising and has been at the top during the 2010-14 period.

Data presented in Table 2.1 show that total employment in the industry expanded from less than half a million to about 4.0 million during 1990 - 2015. The rate of growth of employment has not been uniform during the entire period. Growth was sharp during the first half of the 1990s and it slowed down during 1995-2005. However, the rate of employment growth picked up again during 2005-2010 and the growth rate was more than double compared to that attained during the previous ten years. Since 2010, employment in the sector has stagnated. The decline of growth of employment after the initial period of high growth was due to the fact that the industry was going through a period of stabilisation and consolidation. The growth acceleration during 2005-2010 is quite remarkable. This is particularly notable in the context that there was a general apprehension about the adverse effect of the withdrawal of the quota system in the post-MFA regime. RMG sector in Bangladesh has not only survived the withdrawal of MFA but has also been showing a stable growth. However, the stagnation of employment in recent years (2013-2015) shows a stark contrast to the earlier periods. This slowdown of employment generation will disappoint policymakers who wish to depend on RMG for significant employment growth.

Table 2.1: Growth of employment in the RMG industry in Bangladesh (1990-2015)

Periods	Annual rate of growth (%)
1990 -95	29.07
1995 -00	5.92
2000 -05	4.56
2005 -10	11.50
2010 -15	1.02

Source: Estimated from data fromhttp://bgmea.com.bd/home/pages/TradeInformation

Table 2.2: Index of production of selected manufacturing industries,2000, 2010 and 2013 (Base: 1988-89=100)

Industry	1999 -2000	2009 -10	2012 -13
Manufacture of food, beverages and tobacco	180.60	314.40	413.85
Sugar	112.50	56.69	97.64
Tobacco manufacturing	304.78	642.57	937.17
Cotton textiles	98.07	308.33	298.92
Jute textile	66.42	59.61	83.75
Garments	766.32	1643.1 9	3216.31
Leather and leather products	154.41	88.14	160.40
Paper and paper products	64.16	21.80	66.48
Chemicals and rubber	148.81	400.91	407.52
Pharmaceuticals	318.00	1075.30	1048.42
Fertiliser	199.11	72.89	67.24
Ceramic	67.35	227.70	234.66
Cement	399.39	836.42	1006.22
Metal products	97.96	190.23	340.59

Source: BBS, Statistical Yearbook of Bangladesh, 2013.

[2] However, it is recognised that an intensive research should be undertaken to study the prospects and challenges faced by the small enterprises and this has been noted in the last section.

[3] There is a large body of literature on the history of the growth of the RMG industry in Bangladesh and the factors contributing to that growth. Some recent examples are Lopez-Acevado and Robertson, (2012), Mckinsey (2011), (2015).

The stagnation of size of employment has not led to a stagnation of output growth, as shown in Table 2.2 This actually implies that during this period, productivity of labour in the sector has increased. Here one must ask the question about quality of labour force engaged. An enhancement of education/skill has taken place along with use of higher levels of technology and higher capital intensity. This brings us to the question of skilling of labour force and its links with total labour demand and training needs. This aspect will receive detailed attention in some of the following sections.

2.2.1 Skill Shortage: Evidence from Existing Studies

A number of recent studies and reports have highlighted skill shortage as a constraint behind RMG growth. Studies conducted before 2005 did not consider this aspect as relevant. Therefore, the findings from a few major studies conducted during 2006-2016 have been quoted below.

Rahman et.al. (2008) have examined whether shortage of skilled workers poses a constraint to growth of RMG after 2005. Their survey conducted in 2005 shows that this constraint was considered as relevant by a small percentage of entrepreneurs (one per cent among knit and 2 per cent among others).

Mckinsey (2011) highlights skill shortage in the sector and mentions that all types of stakeholders mentioned lack of skilled middle management as a key factor limiting productivity. Experts estimate that there is currently 25 per cent shortage of skilled workers in Bangladesh's RMG industry. The study projected that the industry will require 6 million workers in 2020.

The report states, "RMG industry's image is not attractive enough to interest young top employees and graduates." Although the reason behind this is not so obvious, a likely factor is the notion that employment in RMG sector involves long hours of work and lower compensation package.

Berg et al.(2012) stated, "Suppliers productivity must improve .... to close gaps with other sourcing countries and to satisfy new customer requirements for more sophisticated products." In this respect a concern is "... the insufficient size of skilled workforce, particularly middle managements."

According to a recent report on employment generation prospects (Ahmed 2014), "there is not enough skilled workers in the labour market to meet the rapidly growing demand of skilled labour. In the last 5 years the demand for skilled labour has increased from 80 to 100 per cent." The report identified the following occupations where shortage of skills has been observed: operators; supervisors; quality controllers; IT officers; technicians; cutting supervisors and managers; factory managers; HR managers; compliance managers and supervisors; dyeing managers; knitting managers, supervisors and technicians; washing managers, supervisors and technicians, printing managers, supervisors and technicians; embroidery managers and technician; and backward linkage managers, supervisors and technicians for operations involving accessories, buttons, zipper, thread, cartons, polybags, etc. Skills required for operation and maintenance of machineries for dyeing, knitting, printing, washing and embroidery is especially high because the machines are highly sophisticated. Moreover, the technologies involved in these machineries are constantly being upgraded creating a need for skill up-gradation.

Rahman (2015) findings show larger skill deficit. The study has estimated that the shortage is only 5 per cent. This stands in contrast to the figures reported by BGMEA and BKMEA officials (quoted in the same study), which is 15 to 20 per cent.

While there is a large variations in projections of demand and skill shortage, a part of it may be due to the difference in the concept of skilled worker used. All studies quoted above do not present their definition. Rahman etal. (2008) and Rahman (2015) use definitions, which are quite different.

Definition of skill used in existing studies

Although the problem of conceptualisation of skill and skilled worker prevails across sectors, each sector has specific identification of occupations, which are skilled. Lopes-Acevado and Robertson(2016) have used a peculiar cut-off for identifying skilled workers. Those with education above HSC (grade XII) are labelled as skilled and a conclusion has been reached that skilled female labour force has lower elasticity of supply with respect to wage. Such statement can give a misleading policy direction. We have arrived at a definition of skilled worker, which takes into account the definition used by other studies as well as inadequacies of those definitions and has taken into account employers' views. This definition is as follows:

Unskilled	Needs close supervision to perform any function and does not have an experience of any skilled/semi-skilled job in the RMG sector
Semi-skilled	Can perform only one function without supervision
Skilled	Can perform more than one function without supervision

Unskilled coincides with "helper" occupation in grades VII. Semi-skilled coincides with grades IV-V, Skilled group coincides with grades I-IV and Supervisors. In about 90 per cent, cases the overlaps hold.

With inputs from industry association representatives and the enterprise survey data, we have identified the actual occupations which fall under each of the above three categories. In addition, at the top are professional, managerial etc., which are sometimes referred to as "highly skilled."

2.3 Current Structure of RMG Employment and Labour Market

Since the mid 1990s RMG sub-sector has emerged as the largest source of modern manufacturing employment. It is therefore expected that this sub-sector will influence the market for hired labour and will itself be influenced by the prevailing labour market situation.

In a labour market characterised by low labour force participation of women (LFS 1996, 2006, 2013) and low wage of women employed in informal sectors, new entrants of female labour force was a positive factor contributing to the growth of the sector. Such female workers as well as male workers were unskilled, uneducated and unaware about the expected terms of employment in a formal sector and were ready to accept low wage, long hours and lack of standard formal workers' benefits.

In course of time, due to several accidents in RMG factories, concerns about labour standards and occupational safety came to the forefront. Employers, with support of "Alliance" and "Accord", have made progress with compliance. Improvements have taken place in terms of compliance indicators. As a summary statement, all the surveyed factories mentioned that they were compliant. However, it was not possible to verify the claim.

Occupation and skill

On the basis of the survey data, the current occupation structure has been identified. Skill shortage and projections based on this structure have been prepared. At the outset, the occupational structure receives attention.

The lists of occupations are actually the sections of the factory's production process. Unskilled workers in each section are actually known as "helpers" and may belong to any section but the data related to where they are actually placed in that particular section at the time of the survey. Table 2.3 shows the detailed distribution of workers in each occupation.

These enterprises have identified 13 different occupations and within most of the occupations there are prospects of skilled, semi-skilled and unskilled types of positions. Data on distribution of production workers among these occupations are shown in Table 2.3. The largest number of workers belong to "sewing machine operator" group (56.2 per cent). Other important occupations are "cutter man/woman" 15 per cent), "finishing (ironing)", "quality inspection" (12 per cent) and "packing" (4.6 per cent).

Workers within each occupation can belong to one of the three skill categories: unskilled, semiskilled and skilled. Table 2.4 provides a summary of the distribution of production workers by skill categories. Inquiry was also made about the distribution existing in these units five years ago. Data show that over these years, the skill composition of workers has changed substantially. In 2010, about 28 per cent workers were unskilled, which decreased to 16 per cent in 2015 and the decline has been compensated mostly by an increase in the share of skilled workers, which was 43 and 56 per cent respectively in 2010 and 2015. The share of semi-skilled workers increased by one percentage point only, from 29 per cent to 30 per cent, during this period (Table 2.4).

Table 2.3 : Distribution of workers by occupation and sex

Occupation	Share of various occupations in total production workers			Share of men and women in each occupation		
	Male	Female	All	Male	Female	All
Cutter man/woman	11.1	0.8	5.4	91.6	8.4	100
Sewing machine operator	31.2	77.2	56.5	24.8	75.2	100
Fusing machine operator	9.0	0.3	4.2	96.0	4.0	100
Overlock machine operator	4.5	1.8	3.0	67.6	32.4	100
Button machine operator	0.8	0.8	0.8	43.1	56.9	100
Kansai machine operator	0.7	0.1	0.4	81.4	18.6	100
Finishing (Iron)	11.1	2.4	6.3	79.0	21.0	100
Quality inspector*	10.2	4.4	7.0	65.2	34.8	100
Embroidery machine operator	2.1	1.6	1.9	51.6	48.4	100
Folder	2.1	4.6	3.5	27.6	72.4	100
Poly man/woman	1.4	1.0	1.2	54.4	45.6	100
Packer/ Packing man/woman	9.1	0.9	4.6	89.5	10.5	100
Quality controller*	6.7	4.0	5.2	57.8	42.2	100
Total	100	100	100	44.9	55.1	100
Average total workers	1274.9	1563.2	2838.1	1274.9	1563.2	2838.1

Note: Quality Inspector performs sampling inspection, assure quality in cutting, sewing and finishing stages. Quality inspector has a role in all production stages. So an enterprise has cutting sewing and finishing quality inspectors. Both male and female quality inspector perform the same role. Quality controllers are the supervisor of quality inspectors.

Table 2.4 :Skill composition of the workers in the RMG sector

Skill Level	2010	2015
Skilled	43.0	56.5
Semi-skilled	29.0	30.2
Unskilled	28.0	16.0
Total	100.0	100.0

Gender dimension of RMG employment has always received attention. From the early years, RMG has depended on female labour force and women constituted more than 70 per cent of total production workers. These women were mostly without education and were employed at unskilled positions (helpers).

For the present study, workers' survey has not been conducted. Nonetheless, from the enterprise survey, distribution of workers by occupation and sex has been obtained Table 2.3 contains this distribution; 55 per cent of production workers in these enterprises are women. Women constitute more than 70 per cent in the occupation of "sewing machine operator" and "folder". Male workers are more than 90 per cent in "cutter" and "fusing machine operator" occupation, and also dominate in "finishing,""packing" and "quality inspection".

2.3.1 Hiring Practices and Other Features of RMG Employment

The present recruitment process and preference related to workers' features can affect the labourmarket as well as skill development pattern. Table 2.6 shows that employers try to benefit by drawing workers with experience in other enterprises. Only two out of ten employers showed preference for TVET qualifications. The other important preference is reference by currently employed workers. Recruitment process is dominated by "walk-in-test" and "advertisement at the gate" (Table 2.7).

Table 2.5 :Average number of workers/employees by sex

Skill level	No .of workers			% of workers		
	Male	Female	Total	Male	Female	Total
Unskilled	209	245	454	16.4	15.6	16.0
Semi -skilled	300	558	858	23. 5	35.7	30.2
Skilled	790	813	1,602	61.9	52.0	56.5
Total	1,275	1,563	2,838	100.0	100.0	100.0

Note: excluding professionals and sales.
Source: Survey of Enterprises, 2016.

Table 2.6 :Qualification preferences for hiring workers

Characteristics preferred	No .of Enterprises	% of enterprises
TVET	2	20.0
Unskilled from market	7	70.0
From own village	1	10.0
Referred by existing worker	8	80.0
Have experience in other enterprises	10	100.0

Source: Survey of Enterprises, 2016.

Table 2.7 :Recruitment practices of employers

Recruitment practice	% of all workers
Walk -in test	53.9
Advertisement in gate	36.1
Advertisement in newspaper	1.3
Direct contact with training service providers	1.1
Through labour contractors	3.6
Others	4.0
Total	100.0

Source: Survey of Enterprises, 2016.

Table 2.8: Who provides in-house training to workers

Who trains workers	No .of enterprises
Instructors	7
Supervisors	5
Others (relevant expert, IE, HR, SEIP, etc.)	6

Source: Survey of Enterprises, 2016.

2.3.2 Skill Shortage and Market Responses

According to the views of stakeholders and owners, in the phase of restructuring of RMG and its transformation into a sophisticated technology based industry, demand for skilled labour will sharply rise. Data from the surveyed enterprises and from views of KIs show that, skill shortage will range between 20 and 40 per cent of demand.

Nonetheless, in practice, the enterprises take steps to mitigate the problem of skill shortage, both in the immediate short run and in the medium-term.

The short-term steps include:

a) provision of short duration on the job training to unskilled workers hired as “helpers.”
b) bid away workers from other industries through offering of higher wage/better remuneration package.
c) to attract skilled workers and to retain them for longer duration one of the most effective strategy is to pay wages on time. Factories paying wage on a specific date (before the 7th) are attractive to the prospective workers.

Employers try to build loyalty of workers by hiring their relatives/co-villagers. Reference of the existing workers is an important part of the recruitment process. Medium and longer term strategies of the employers include having their own training unit. Most of the large enterprises have created such a component during the last 5-6 years and are of the view that they should strengthen the “in-house training capacity.”When training organisations and/or externally funded training projects take up plans for skill training for RMG workers, the above context (of in-house capacity) must be kept in mind.

2.3.3 Role of Expatriate Workers

Another recent phenomenon needs attention in this context. This is the employment of foreign nationals. From the initial stage of the RMG industry, foreign nationals have been employed. In the early days, technical persons and personnel for supervision/planning of technical sides were required.

In recent years, factories hire expatriate workers for high skilled and managerial jobs. Employers mentioned the following reasons for hiring foreign nationals:

- Obviously, they are qualified and possess skills which are not locally available. These skills include "communication skills and excellent spoken English" so that the buying house representatives and foreign contact people are impressed. The skills/productivity of such persons is so high that the higher salary is more that compensated.
- When a unit has a foreign national in a high ranking position, he prefers to bring in more people from his country.

2.3.4 Overseas Employment of Skilled Workers from RMG Sector

Overseas employment, especially of skilled workers can be an important source of foreign exchange earnings for the country and expansion of such employment is being encouraged through various means. However, the present concerns about skill shortage in RMG sector require that the role of such workers' foreign employment is monitored.

Data on skilled workers from Bangladesh going abroad for employment in RMG sector has been presented in annex Table A 2.3. Annual data, disaggregated by occupation, shows that the total number is rising although the number of workers with specialised higher level of skill is not large. Overall, the number of machine operators (the category which employs the highest share) getting overseas employment is not large compared to total domestic employment in this category in RMG sector. But the situation needs continuous monitoring so that a sudden skill shortage is not created in the country.

Bureau of Manpower, Employment and Training (BMET) overseas employment data show that there was 19.3 per cent growth of RMG worker employment during the last four years (2012-2015). We assume that in the next five to six years it will grow at the same rate. Then the projected overseas employment from the RMG sector would be 36,346 (Table 2.9).

Table 2.9: Current and projected overseas employment from RMG sector

Year	Overseas employment (2012-2015)
2012	7,430
2013	8,960
2014	11,168
2015	12,591
Projected overseas employment (2016-2021)	
2016	15024
2017	17928
2018	21392
2019	25527
2020	30460
2021	36346

Source: Estimated from BMET overseas employment data.

2.4 Labour Demand Projection by Occupation and Skill Level

Earlier sections have already indicated that the sector is currently facing shortage of skilled workers. In future growth initiatives, along with general constraints, the skilled worker shortage is going to pose a major constraint. According to the surveyed enterprise officials, there are not enough skilled workers in the labour

market to meet the rapidly growing demand for skilled labour. These enterprises ranked skill shortage as one of the major constraints to future growth in the sector. About 30 percent of enterprises ranked labour first as a constraint, 20 percent reported as second, and another 20 percent reported it as the third most important constraint for future growth (Table 2.10). It may be noted that in the last 5 years, the demand for skilled labour has increased by 31 percent.

Table 2.10 : Rank of skill worker shortage

Rank of Skill Shortage	No. of enterprises	%
1st	3	30.0
2nd	2	20.0
3rd	2	20.0
4th	2	20.0
5th	1	10.0
Total	10	100.0

Source: BIDS 2016

Data from the present survey reveal that the current shortage[4] is only 4.4 percent; of which 5.4 percent in skilled, 3.6 percent in semi-skilled, and 1.8 percent in unskilled workers category. Presently, employment in the RMG sector is about 4.0 million. Considering a shortage of 4.4 percent of workers, the current employment capacity of the sector becomes 4.2 million.

The RMG sector wishes to achieve a US $50 billion export target by 2021 or at a time close to this. The export growth will come from better quality output, increased current production, and the production of high value products. According to primary survey data, around 82 percent of export contribution will come from existing old and relatively newer firms. The remaining 17.8 percent will come from new future enterprises. These will either be new business units of existing business groups, or completely new enterprises.

Table 2.11 :Channels contributing to future growth

Growth possess	**%**
Through better quality output	37.2
Growth of production of present products	31.9
Through growth of high value new products	19.4
Others	15.0
Total	100.0

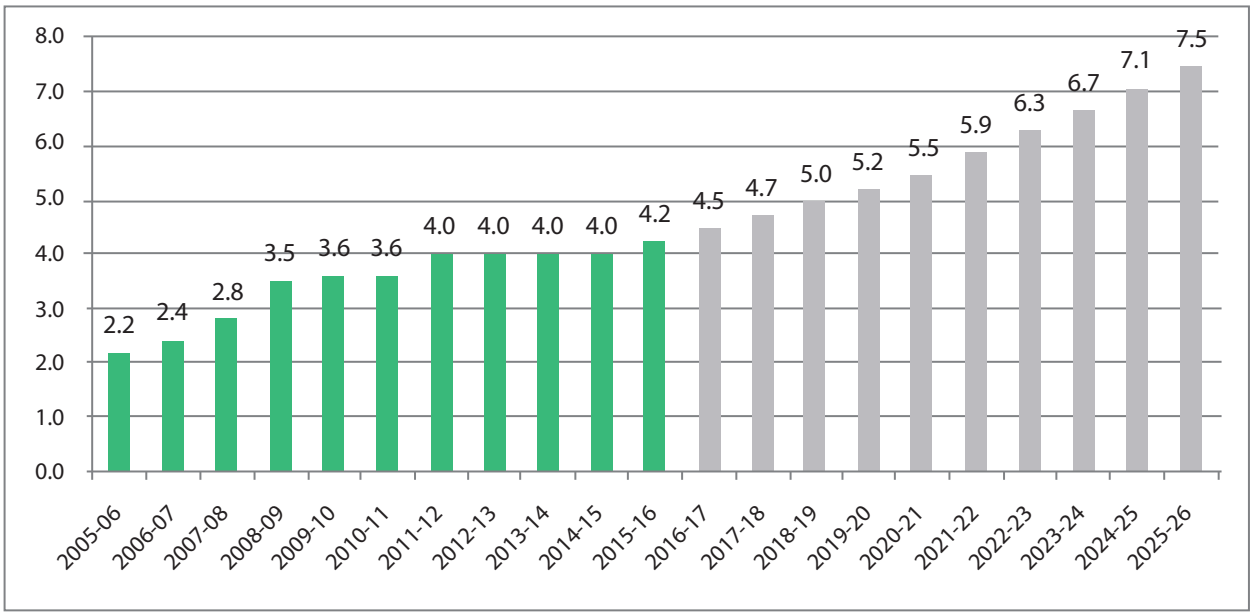
During the survey, we asked the respondents about their projected worker demand in 2021. The estimated projected demand considers current employment, current shortage, and projected demand for the next 5 years as reported by the surveyed enterprises. The methodology to estimate projected demand is straight forward. They are a combination of the following:

- Current employment figures collected from BGMEA
- The projection of employment figures done by the enterprises
- The 17.8 percent contribution of new future firms (noted by the surveyed enterprises)
- To make employment projection for the period of 2021-2026, we assumed the same employment growth during 2016-2021. We produced two employment projection figures: one with the same skill composition as 2016-2021 (no skill composition change), and other one with 5 percent increase of workers in skilled category.
- The sex composition is assumed to remain unchanged as the current employment in 2016.

  Primary survey data suggested employment in RMG sector reaching 5.5 million by 2021 and 7.5 million by 2026. Figure 2.1 shows the current and projected employment in RMG sector from 2005 to 2026.

[4] "A shortage occurs when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions." Shah and Burke, 2003.

Figure 2.1: Current and projected employment (in million) in RMG sector



Source: Authors' calculations; BGMEA

The current worker shortage constitutes 4.4 percent. The survey results show that projected demand of employees for existing enterprises for the next five years will be around 10 percent of current employees, composed of 81 percent skilled, 16 percent semi-skilled, and 3 percent unskilled workers.

In the existing employment, the percentages for skilled, semi-skilled and unskilled are 55 per cent, 33 per cent and 12 per cent respectively. Table 2.12 summarises the existing and projected demand of RMG employees in both numbers and proportions. The number of employees has been estimated with the consideration of current employee as 4.0 million.

Table 2.12 :The existing and projected labour demand

Skill level	Current Employment in 2016		Existing shortage, 2016		Projected employment in 2021		Projected employment in 2026 (No skill composition change)		Projected employment in 2026 (with skill composition change)	
	Unit	%	Unit	%	Unit	%	Unit	%	Unit	%
Unskilled	618,708	15.5	8,577	4.9	444,347	8.2	599,091	8.0	573,598	7.7
Semi-skilled	1,230,164	30.8	48,130	27.3	1,345,477	24.7	1,829,871	24.6	1,490,010	20.0
Skilled	2,258,250	56.5	119,479	67.8	3,666,460	67.3	5,027,463	67.5	5,386,443	72.3
Total	4,000,000	100	176,187	100	5,451,558	100	7,450,051	100	7,450,051	100

The analysis of the survey data shows that sewing machine operators are at the top of the list in terms of current employment, existing demand and projected future demand. The existing shortage for sewing machine operators nears 83,000 and projected demand is about 3,027,886 by 2021 and 4,054,975 by 2026 (Annex Table A 2.4). The analysis also reveals that the demand for skilled employees is the highest, followed by semi-skilled, and unskilled. Interestingly, the quality inspector (cutting, sewing, and finishing) is in second position in terms of both existing shortage (21,350) and projected demand (385,401 by 2021 and 527,470 by 2026). Some enterprises provide information on overlock and kansai operator along with sewing machine operator (Annex Table A 2.4).

Finishing operators (ironing etc.) are in third position in terms of both existing shortage (14,640) and projected demand in the next 5-10 years (366,417 by 2021 and 533,083 by 2026). The percentage, projected demand over current employees, is highest for quality controllers, at around 37 percent. Overall, the estimated number of existing shortage for RMG employees is 176,187 and the projected demand in the next 5 years by 2021 is 54,51,558 and in the next 10 years by 2026 is 74,50,051 (Annex Table A 2.4).

With the pace of technological progress, the RMG units are gradually replacing manual tools with automated machines that require less manual labour and more expertise of skilled workers. Capital-labour ratios are higher for newer firms with older firms also investing gradually.

The macro study projected 7.5 million employment in the RMG sector by 2020, which is considerably higher compared to the micro study's 5.5 million level of employment by 2021. The current projection is based on the distribution of workers obtained from 10 enterprises. The macro figures are based on secondary data (LFS 2006-2013) with high employment elasticity and GDP growth and thus give higher employment demand.

2.5 Skills Development Practices in the RMG Sector and Future Training Needs

Workers in the RMG industry in Bangladesh achieved skill mostly through informal training, and on-the-job training. On-the-job training typically provides employees with specific technical skills needed to complete their work. This training is usually provided in the workplace after an employee is hired. In general, workers enter the RMG industry as unskilled workers (assistants, helpers) and acquire skills by observing operators, and becoming junior operators – general operators – operators, depending on their performance. It is a common scenario for operators to be trained as assistant operators/helpers, gaining experience over time and becoming senior operators. Some of the senior operators with several years of experience, better educational levels, and having acquired skills in all operations of the process are promoted to the positions of supervisor.

In order to better understand the current skills development practices of the RMG sector, relevant data were collected from factories during the primary survey. The survey results show that 70 percent of the surveyed factories have in-house training facilities for their workers. Some training programmes have been organised for all employees, such as basic training, fire safety training, etc. The skill development training programmes target unskilled, semi-skilled and skilled groups separately. The duration of unskilled workers training varies between 4 and 12 weeks, semi-skilled workers training varies between 1 and 4 weeks, and skilled workers training lasts 1 week only. Training is conducted by training instructors, supervisors and relevant experts from Industrial Engineering (IE) section, HR section, etc.

As discussed earlier, skilled worker shortage will be one of the major constraints to attaining the $50 billion RMG export target. Enterprises are trying to minimize the skill shortage problem through on-the-job training, skill upgradation training, etc. The existing enterprises have been developed in-house training capacity and skill upgradation, but the future new enterprises (entering industry after 2016) might not have such kind of skill training and upgradation facilities. Those new enterprises may need more skilled workers from TVET organisations. According to the primary survey results, in future, they will also rely on fresh graduates from TVET institutions for about 13 percent of skilled workers demand, and we assume that new enterprises enter after 2016 will rely on fresh graduates from TVET institutions around 26 percent of skilled workers demand. According to the labour demand projections, the RMG sector will demand 3.66 million skilled workers by 2021 and 5.3 million by 2026. This implies that in 2021, about 462,000 workers with training from other TVET organisations will be needed. In 2026, the number will be 802,000. The existing enterprises have developed in-house training capacity, but the new enterprise (entering industry after 2016) might not have such skill training and upgradation facilities. Those new enterprises may need more skilled workers from TVET organisations. The current on-the-job training and skill upgradation strategies are not sufficient to supply those skilled workers to ensure export growth in this sector. Therefore, we have to strengthen and increase the capacity of public and private technical training institutes. The training programmes of the Technical Training Centres (TTCs) often target small-scale tailoring jobs, although some of the respondents claimed that their trainees get employment in export-oriented RMG units and some of them may even go abroad.

Government TTCs are providing training on RMG activities on different trades. We collected training data from 40 government TTCs out of 53 public TTCs. Their training programmes mainly concentrate on 4-6 RMG trades, such as woven garments machine operator, mid-level garments supervisor, quality control management, sewing machine operator etc. The duration of training depends on course type, and usually lasts 6 months. Average student capacity in these courses varies between 30 and 60 students per occupation (Table 2.13). Besides government TTCs, BGMEA runs 12 training centres, one technical institute and one university. BKMEA also runs 6 training institutes to train unskilled workers.

Besides government and industry associations (BGMEA and BKMEA), some private institutions like UCEP and NGOs like UDDIPAN, TMSS and Dhaka Ahsania Mission provide skill training on RMG trades. UCEP offers its TVET programme through its 10 technical schools in 8 districts and also through outreach centres with the government in 2 districts as well as in the campus of UCEP's General Education setups in a number of locations. UCEP's has training facilities for five RMG trades including quality control management, sewing machine operation, tailoring and dressmaking, industrial sewing machinery and linking machine operation. All trades except tailoring and dress making, with 6-month duration with 120-200 students in 10 technical schools.

Table 2.13 List of training facilities related to RMG trades offered by TTCs

SL No.	Trade / Courses	No. of TTCs	Avg. duration	Avg. student capacity
Public Technical Training Centres				
1	Woven Garments Machine Operator	20	2-6 months	37
2	Knit Machine Operator	1	2 months	60
3	Dress Making and Tailoring	6	6 months	42
4	Dress making and Embroidery	7	6 months	43
5	Mid-Level Garments Supervisor	10	6 months	55
6	Quality Control Management	10	6 months	37
7	Sewing Machine Operator	24	6 months	43
8	Pattern, Marking and Design man	3	6 months	60
9	Certificate in Garments Manufacturing	4	2 months	27
10	Boutique and Block batik	2	6 months	65
11	Sweater and Linking Machine Operator	1	6 weeks	30
12	Sewing Machinery Maintenance	1	3 months	30
	Total sample TTCs	40		
Private Technical Training Centres				
1	Quality Control Management	11	3-6 months	50-120
2	Dress Making and Tailoring	15	6 months	30-60
3	Dress making and Embroidery	15	6 months	25-120
4	Boutique and Block batik	6	6 months	30
6	Industrial Sewing Machinery	12	6 months	40-60
7	Linking Machine Operation	10	6 months	60-120
8	Merchandising and Apron Merchandising	3	6 months	25-60
9	Pattern Making Operation	1	6 months	30
10	Production Planning and Controller	1	6 months	30
11	Garments Design and Pattern Making (Diploma)	1	4 Years	150
12	Dying Textile Engg. (Diploma)	1	4 Years	160

Dhaka Ahsania Mission is running 5 fully fledged vocational training institutes and 2 rural vocational training centres in Dhaka, Gazipur, Jamalpur and Jessore districts. The Skill Development Training program is providing training on 6 RMG trades including Dress Making and Tailoring, Embroidery and Jori Chumki, and Block, Boutique and Screen printing, Sweater Knit Machine Operation, and Sweater and Linking Machine Operation.

In training centres, the training module is comprised of two-thirds practical work and one-third academic work. The trainers are well experienced with more than 5 years in their relevant field, and they have B.Sc. Diploma as education qualifications. Some trainers do not have B.Sc. degree, but they have long experience.

Workers with training have some advantages on initial salary compared to fresh workers. Training centres sometimes help in job placement. Some enterprises claim that in the near future, mid-level or semi-skilled workers will be vital, as now a days firms in the market employ fewer unskilled workers due to technological changes as skill upgradation process starts from unskilled level. However, technical training centers can fulfill existing and upcoming skilled worker shortages. The private training centres also have job placement facilities after the completion of the training programme; sometimes private institutes ensure job placement by taking small fees.

The total supply of training falls short of total needs. Calculate in future, the supply-demand gap will increase unless special steps are taken to enhance supply. Moreover, the training quality is often inadequate when one considers the growing sophistication of machinery used in modern RMG units. This is particularly true for training provided by public sector TTCs. Some of the TTCs received support from various projects and these TTCs use recent equipment and machines for training. Most of the others use age-old machines.

Table 2.14 Demand-supply gap of skilled worker

Year	Supply from Public TTCs	Demand from enterprises
2016	28,362	-
2021	36,198	462,000
2026	46,198	802,000

Source: Calculated from Public TTCs information and 10 enterprise information

There are 53 technical training centres in the public sector in Bangladesh. We have collected information on training capacity related to RMG skills from 37 public TTCs. On the basis of that information, the annual training capacity of 53 public TTCs is around 28,362. We assume that this capacity will grow on an average 5 percent annually. Then the projected training capacity will be 36,198 and 46198 by 2021 and 2026 respectively. It shows there will be a huge demand-supply gap (Table 2.14) in future in the sector. Although we did not incorporate private technical training centres capacity in our calculations, their capacity at present is small in number.

2.6 Concluding Observations and Suggestions

2.6.1 Suggestions for Future Research

While the present study focuses on current situation of RMG sector in terms of skill shortage and skill demand and projects future skill needs, certain issues have come afloat which deserve more attention from researchers. A few important ones have been listed below.

i) Skill demand in RMG and gender inequality in employment prospect in RMG are likely to be interlinked. Expansion of skill training and a movement in the direction of higher capital intensity can open up new dimensions of gender inequality in terms of the share of women getting employment in various occupations and male-female wage difference. These questions need attention in future research. Moreover, the short span of women's career in RMG can have implications for efficiency of the fund spent on their training. These aspects can be addressed through a research based on workers' survey.

ii) A study of the "impact assessment of SEIP training" should be taken up urgently, especially in the context of export-oriented RMG growth.

iii) The number of small and micro units of RMG production, which used to survive through sub-contracting, is shrinking. This will have implications for employment growth through Small and Medium Enterprises (SMEs). This aspect needs attention through survey of small units of RMG.

2.6.2 Concluding observations

The most important observations revealed by the survey of enterprises are the following:

- All entrepreneurs have highlighted the shortage of skilled workers as a constraint to the growth of export.
- In general terms, the extent of shortage would be definitely above 20 per cent of total labour demand and may rise up to 40 per cent.
- During the last five years, demand for unskilled labour came down from 27.5 per cent in 2010 to 16.0 per cent in 2015. Share of skilled and semi-skilled increased from 43.2 and 29.3 per cent in 2010 to 56.5 and 30.2 per cent in 2015. If the same trend continues, there will be very little demand for unskilled workers and the share of skilled and semi-skilled is expected to increase by 5-6 percentage points each.
- According to the projections of the study, demand for skilled labour in the sector will be 3.66 million in 2021 and 5.3 million in 2026. On the basis of current employers' estimate of dependence on TVET trained workers, 0.48 million and 0.70 million workers with TVET training will be demanded. Current TVET organisations can train only a negligible share of this demand. Therefore, concrete steps need to be taken to raise the capacity of existing organisations.

2.6.3 Policy Suggestions for Skill Generation for RMG

The role of policies for faster growth of apparel export by South-Asian countries and for capturing a bigger share of global export by them emphasize investment in infrastructure and in ensuring compliance of labour standards. In this context, trade policies have been emphasized by Lopez-Acevedo and Robertson(2016). The study did not take a clear position about labour policy, whether there should be upward adjustment of wages to keep pace with inflation and whether flexible hiring and firing of workers are desirable, or not for making the apparel sector competitive deserve more in-depth assessment.

In the context of labour policy, skill development is often emphasized as a means of raising labour productivity, which is likely to push up wages. Emphasis on skill development actually reflects the belief that it can help both workers and employers and is a rather neutral labour policy.[5]

Bangladesh's South-Asian competitors in apparel export, namely Sri Lanka and India, have embarked on large investments in skill development related to this sector. For example, India's vast network of technical and engineering institutes target to cater to the needs of the apparel sector. Ministry of Skill Development and Entrepreneurship was created in India in 2014. Even before that Indian government embarked upon major skill development investments. Similarly, Sri Lankan policies focused on skill development which thrived on their overall high general education levels' achievement. It is true that Bangladesh adopted "National Skills Development Policy" 2011. But this has not yet been fully translated into actual improvement of quality of technical education and matching it with growing RMG sector's needs.

Although the industry's stakeholders are adopting steps for training to cater to their specific needs, the orientation basically evolves around on-the-job training.

In this context, the latest five year development plans have not specifically addressed time bound needs of policies for skill development in the context of RMG growth and not to speak of linking such policies with labour policies. For example; Seventh Five Year Plan (7FYP) has emphasized skill development but within a more general context and not for RMG. Rather the manufacturing sector development strategies have advocated export diversification and related policies. Although the first year of the Plan has not seen much of diversification, skill development support to RMG has not yet been planned, except SEIP's and a few other projects agenda consisting of 10 sub-sectors funded by other international organisations.

The entrepreneurs and other stakeholders related to RMG sector must prepare themselves for the expansion of the sector and to meet the skill demand. Following strategies and programme interventions are being suggested in this context.

a) New entrepreneurs must take the possibility of skill shortage into account in their planning and build a capacity for training of semi-skilled workers.

b) Supply of semi-skilled workers can come from existing and newly created training facilities. Even if enterprises prefer to create skill through in-house training, it may be easier for them to train the semi-skilled workers. The training organisations which impart training to create semi-skilled workers, may not find themselves redundant and may choose to train workers for "skilled" or highly skilled jobs.

c) Entrepreneurs may periodically (at a particular time of the year) publicise their demand for semi-skilled and skilled workers in various occupations. A central body may take up the responsibility of coordinating the industry demand and communicating it to the trainers and may link the enterprise with an appropriate training organisation.

d) Entrepreneurs may from time to time communicate with the training organisations, and especially SEIP, and inform them about the type of machinery which should be used to train prospective RMG workers.

e) Public-private partnership will also need to be strengthened in this context. Government's TVET organisations should introduce courses geared to the needs of export-oriented RMG. Courses may be offered at elementary, intermediate and advanced level, which may suit the accelerating technological advancement of the RMG sector. Relevant owners' association may play a proactive role in this context and enter into effective partnership with government and private TVET organisations.

f) There should be a thorough evaluation of the appropriateness of current training programmes of SEIP, especially those related to RMG.

[5] However, there has been hardly any study on whether investment on skill development leads to wage increase.

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Appendix Tables

Table A2.1 Average number of workers/employee by sex

Occupation	Skill level	Current employment (%)		
		Total	Male	Female
Cutter man	Unskilled	1.9	3.3	0.4
	Semi-skilled	1.1	2.1	0.1
	Skilled	1.6	2.9	0.3
	Total	4.7	8.2	0.8
Sewing Machine Operator	Unskilled	8.6	4.4	13.2
	Semi-skilled	18.9	7.6	31.0
	Skilled	23.0	12.0	34.6
	Total	48.5	23.2	75.5
Fusing Machine Operator	Unskilled	0.0	0.0	0.0
	Semi-skilled	0.1	0.1	0.1
	Skilled	3.5	6.6	0.2
	Total	3.6	6.7	0.3
Overlock Machine Operator	Unskilled	0.1	0.1	0.1
	Semi-skilled	1.3	1.9	0.6
	Skilled	1.2	1.4	1.0
	Total	2.6	3.4	1.7
Button Machine Operator	Unskilled	0.0	0.0	0.1
	Semi-skilled	0.4	0.3	0.4
	Skilled	0.3	0.3	0.3
	Total	0.7	0.6	0.8
Kansai Machine Operator	Unskilled	0.0	0.1	0.0
	Semi-skilled	0.1	0.2	0.0
	Skilled	0.2	0.3	0.0
	Total	0.3	0.5	0.1
Iron Man	Unskilled	0.6	0.8	0.4
	Semi-skilled	0.7	1.0	0.4
	Skilled	4.1	6.5	1.6
	Total	5.4	8.3	2.3
Quality Inspector	Unskilled	0.3	0.4	0.1
	Semi-skilled	0.6	0.7	0.4
	Skilled	5.5	7.0	3.8
	Total	6.0	7.6	4.3
Embroidery Machine Operator	Unskilled	0.5	0.4	0.6
	Semi-skilled	0.4	0.4	0.4
	Skilled	0.7	0.8	0.6
	Total	1.6	1.6	1.6
Folder	Unskilled	0.2	0.1	0.2
	Semi-skilled	0.6	0.5	0.6
	Skilled	2.3	1.0	3.7
	Total	3.0	1.6	4.5
Poly Man	Unskilled	0.0	0.1	0.0
	Semi-skilled	0.1	0.1	0.0
	Skilled	0.9	0.9	0.9
	Total	1.0	1.1	1.0
Packer/ Packing Man	Unskilled	1.2	2.2	0.1
	Semi-skilled	1.4	2.1	0.6
	Skilled	1.3	2.4	0.1
	Total	3.9	6.8	0.9
Quality Controller	Unskilled	0.2	0.3	0.1
	Semi-skilled	0.4	0.5	0.2
	Skilled	3.9	4.2	3.7
	Total	4.5	5.0	3.9

Table A 2.2 Distribution of current employment and labour shortage by occupation, sex and skill level

Occupation	Skill level	Current employment (%)	Current employment (units)			Existing shortage (%)	Existing shortage (units)		
			Total	Male	Female		Total	Male	Female
Cutter man	Unskilled	2.2	88840	79228	9612	2.5	2221	1981	240
	Semi-skilled	1.3	52973	50033	2940	4.5	2384	2252	132
	Skilled	1.9	75233	69463	5770	6.0	4514	4168	346
	Total	**5.4**	**217047**	**198724**	**18322**	**4.2**	**9119**	**8349**	**770**
Sewing Machine Operator	Unskilled	10.1	402862	106521	296342	0.0	0	0	0
	Semi-skilled	22.0	881387	183727	697660	4.0	35255	7349	27906
	Skilled	26.8	1070425	290000	780425	4.5	48169	13050	35119
	Total	**56.5**	**2260949**	**559952**	**1700997**	**3.7**	**83425**	**20661**	**62763**
Fusing Machine Operator	Unskilled	0.0	1776	930	846	2.3	40	21	19
	Semi-skilled	0.1	2462	1292	1170	3.5	86	45	41
	Skilled	4.1	163762	159012	4750	5.5	9007	8746	261
	Total	**4.2**	**168000**	**161235**	**6765**	**5.4**	**9133**	**8765**	**368**
Overlock Machine Operator	Unskilled	0.1	4228	1268	2960	1.8	74	22	52
	Semi-skilled	1.5	58490	45523	12966	3.5	2047	1593	454
	Skilled	1.4	57926	34812	23114	5.0	2896	1741	1156
	Total	**3.0**	**120644**	**81604**	**39040**	**4.2**	**5017**	**3394**	**1624**
Button Machine Operator	Unskilled	0.0	1691	564	1128	1.8	30	10	20
	Semi-skilled	0.4	17336	7329	10007	3.0	520	220	300
	Skilled	0.3	13671	6201	7470	4.5	615	279	336
	Total	**0.8**	**32698**	**14094**	**18604**	**3.6**	**1165**	**502**	**663**
Kansai Machine Operator	Unskilled	0.1	2255	1409	846	1.5	34	21	13
	Semi-skilled	0.1	4510	3664	846	3.5	158	128	30
	Skilled	0.2	7611	6624	987	4.0	304	265	39
	Total	**0.4**	**14376**	**11698**	**2678**	**3.5**	**496**	**404**	**92**
Finishing	Unskilled	0.7	27005	18521	8485	2.5	675	463	212
	Semi-skilled	0.8	32550	24063	8487	4.5	1465	1083	382
	Skilled	4.8	192303	156423	35880	6.5	12500	10167	2332
	Total	**6.3**	**251859**	**199006**	**52852**	**5.8**	**14640**	**11567**	**3072**
Quality Inspector	Unskilled								
	Semi-skilled	1.0	40000	26096	13904	3.5	1400	913	487
	Skilled	6.4	254995	168458	86537	8.0	20400	13477	6923
	Total	**7.0**	**281597**	**183644**	**97953**	**7.6**	**21350**	**13924**	**7427**
Embroidery Machine Operator	Unskilled	0.6	23193	10661	12532	2.0	464	213	251
	Semi-skilled	0.5	18386	8886	9499	4.5	827	400	427
	Skilled	0.8	32697	18789	13908	5.5	1798	1033	765
	Total	**1.9**	**74275**	**38336**	**35940**	**4.2**	**3090**	**1595**	**1495**
Folder	Unskilled	0.2	7701	3523	4177	2.0	154	70	84
	Semi-skilled	0.6	25912	11980	13932	3.0	777	359	418
	Skilled	2.6	105635	22973	82662	7.0	7394	1608	5786
	Total	**3.5**	**139248**	**38476**	**100772**	**6.0**	**8326**	**2301**	**6025**
Poly Man	Unskilled	0.0	1980	1276	705	1.0	20	13	7
	Semi-skilled	0.1	4593	3550	1043	3.0	138	107	31
	Skilled	1.0	41064	21107	19957	5.0	2053	1055	998
	Total	**1.2**	**47638**	**25933**	**21705**	**4.6**	**2211**	**1204**	**1007**
Packer/ Packing Man	Unskilled	1.4	57176	54217	2960	1.0	572	542	30
	Semi-skilled	1.7	66357	51756	14601	2.0	1327	1035	292
	Skilled	1.5	58842	57095	1748	4.0	2354	2284	70
	Total	**4.6**	**182376**	**163208**	**19168**	**2.3**	**4253**	**3806**	**447**
Quality Controller	Unskilled								
	Semi-skilled	0.6	25208	19287	5922	10.0	5042	3857	1184
	Skilled	4.6	184087	101806	82280	5.0	9204	5090	4114
	Total	**5.2**	**209295**	**120926**	**88369**	**5.0**	**10465**	**6046**	**4418**
All Occupation	Unskilled	12.0	618708	285136	333572	1.8	8577	3953	4624
	Semi-skilled	32.9	1230164	429711	800453	3.7	48130	16812	31318
	Skilled	55.1	2258250	1112763	1145487	5.4	119479	58874	60605
	Total	**100.0**	**4000000**	**1796836**	**2203164**	**4.4**	**176187**	**79145**	**97042**

Table A 2.3 Overseas migration of professionals/workers during 2012-2015

Occupation	2012	2013	2014	2015
Cutting Master	19		2	1
Designer	5	14	38	4
Dry Cleaner			226	
Embroidery Labour	144	47	41	17
Embroidery/Tailor	18	59	49	17
Executing button holes and keys with automatic machines		1	-	-
Execution of Pockets with automatic Machines		4	-	-
Fabricator	38	7	38	18
Garment Production Manager		-	1	
Garments Worker	6	-	5	
Iron man	10	-	420	75
Kansai Machine Operator		-	1	2
Laundry Attendant	24	-	1	-
Laundry Man	42	8	18	9
Linking Operator (Female)		-	-	164
Machine Labour	46	-	-	33
Machine Operator	1,823	2,602	5,036	1,845
Machine Operator (Female)	2,825	1,307	1,262	3,263
Machine Technician	50	2	-	1
Merchandiser	39	-	4	1
Overlock Machine Operator	9			
Packing Technician	11	7	8	9
Pattern Maker		-	1	
Production Manager		1	4	3
QA/QC Engineer		2	-	197
QA/QC Inspector		1	-	8
Quality Checker	6	22	-	58
Quality Controller	37	23	31	16
Quantity Surveyor	1	103	2	-
Sewer	3	-	-	1
Sewing line chef in charge	9	-	-	3
Sewing Operator(Female)	1,489	2,641	1,952	1,699
Spinning Technician	60	-	21	8
Supervisor(Female)	2	-	1	-
Supervisor(Operation)		-	1	-
Swear		-	-	4
Swing Line Checker		-	1	-
Tailor		1,982	1,965	3,988
Textile Engineer		3	-	2
Washer	124	11	-	-
Weaving Technician	590	113	39	1145
Total	**7,430**	**8,960**	**11,168**	**12,591**

Table A 2.4 Projected labour demand (10 years) by occupation, sex and skill level

Occupation	Skill level	Projected employment in 2021			Projected employment in 2026 (No skill composition change)			Projected employment in 2026 (with skill composition change)		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
Cutter man	Unskilled	28051	25016	3035	38568	34395	4173	36927	32931	3995
	Semi-skilled	75500	71309	4190	103805	98044	5761	82059	77505	4554
	Skilled	195165	180197	14968	268333	247753	20580	291309	268967	22342
	Total	**298418**	**273227**	**25191**	**410295**	**375660**	**34635**	**410295**	**375660**	**34635**
Sewing Machine Operator	Unskilled	284621	75256	209365	381168	100784	280383	364948	96496	268452
	Semi-skilled	766055	159686	606369	1025909	213853	812056	810995	169054	641941
	Skilled	1980237	536486	1443751	2651954	718468	1933486	2879032	779988	2099044
	Total	**3027886**	**749893**	**2277992**	**4054975**	**1004265**	**3050710**	**4054975**	**1004265**	**3050710**
Fusing Machine Operator	Unskilled	20696	10841	9855	27124	14208	12916	25970	13603	12367
	Semi-skilled	55704	29239	26465	73004	38320	34684	57711	30292	27418
	Skilled	143994	139818	4176	188714	183241	5473	204873	198931	5942
	Total	**220175**	**211309**	**8866**	**288554**	**276934**	**11620**	**288554**	**276934**	**11620**
Overlock Machine Operator	Unskilled	15050	4515	10535	19974	5992	13982	19124	5737	13387
	Semi-skilled	40508	31528	8980	53760	41842	11918	42498	33076	9421
	Skilled	104712	62929	41783	138967	83516	55452	150867	90667	60200
	Total	**160111**	**108299**	**51812**	**212488**	**143728**	**68761**	**212488**	**143728**	**68761**
Button Machine Operator	Unskilled	3920	1307	2614	5000	1667	3334	4788	1596	3192
	Semi-skilled	10552	4461	6091	13458	5690	7769	10639	4498	6141
	Skilled	27275	12372	14903	34789	15781	19009	37768	17132	20636
	Total	**41706**	**17977**	**23729**	**53195**	**22929**	**30266**	**53195**	**22929**	**30266**
Kansai Machine Operator	Unskilled	1708	1067	640	2158	1349	809	2067	1292	775
	Semi-skilled	4597	3735	862	5809	4720	1089	4592	3731	861
	Skilled	11882	10342	1540	15017	13070	1947	16303	14189	2113
	Total	**18168**	**14784**	**3384**	**22961**	**18684**	**4277**	**22961**	**18684**	**4277**
Finishing	Unskilled	34443	23622	10821	50110	34366	15743	47977	32904	15074
	Semi-skilled	92704	68531	24172	134870	99703	35167	106617	78816	27800
	Skilled	239637	194925	44712	348636	283587	65049	378489	307870	70619
	Total	**366417**	**289525**	**76892**	**533083**	**421216**	**111867**	**533083**	**421216**	**111867**
Quality Inspector	Unskilled									
	Semi-skilled	98663	64367	34295	135032	88095	46937	105494	68824	36670
	Skilled	286738	189429	97310	392438	259257	133180	421976	278771	143205
	Total	**385401**	**251340**	**134061**	**527470**	**343991**	**183479**	**527470**	**343991**	**183479**
Embroidery Machine Operator	Unskilled	8805	4047	4758	11104	5104	6000	10631	4887	5745
	Semi-skilled	23698	11454	12244	29886	14445	15441	23625	11419	12207
	Skilled	61260	35202	26058	77255	44394	32862	83870	48195	35675
	Total	**93669**	**48345**	**45324**	**118127**	**60969**	**57158**	**118127**	**60969**	**57158**
Folder	Unskilled	18542	8484	10058	26267	12018	14249	25149	11507	13642
	Semi-skilled	49906	23073	26833	70697	32685	38011	55887	25838	30048
	Skilled	129007	28056	100951	182750	39744	143006	198398	43147	155251
	Total	**197258**	**54505**	**142752**	**279434**	**77212**	**202222**	**279434**	**77212**	**202222**
Poly Man	Unskilled	6211	4000	2210	8614	5548	3065	8247	5312	2935
	Semi-skilled	16716	12920	3796	23184	17920	5264	18327	14166	4161
	Skilled	43210	22210	21000	59930	30804	29126	65062	33442	31620
	Total	**66071**	**35968**	**30103**	**91637**	**49885**	**41752**	**91637**	**49885**	**41752**
Packer/ Packing Man	Unskilled	22299	21145	1154	29005	27504	1501	27771	26333	1438
	Semi-skilled	60017	46811	13206	78067	60889	17178	61713	48133	13579
	Skilled	155144	150536	4608	201801	195807	5994	219081	212574	6507
	Total	**237223**	**212290**	**24932**	**308564**	**276134**	**32430**	**308564**	**276134**	**32430**
Quality Controller	Unskilled	-	-	-	-	-	-	-	-	-
	Semi-skilled	50858	38911	11947	82390	63036	19355	109854	84048	25806
	Skilled	288198	159383	128815	466879	258200	208679	439415	243012	196404
	Total	**339056**	**195899**	**143157**	**549269**	**317355**	**231914**	**549269**	**317355**	**231914**
All Occupation	Unskilled	444347	204781	239567	599091	276096	322996	573598	264347	309251
	Semi-skilled	1345477	469991	875486	1829871	639196	1190675	1490010	520478	969532
	Skilled	3666460	1806664	1859796	5027463	2477304	2550158	5386443	2654194	2732249
	Total	**5451558**	**2448889**	**3002669**	**7450051**	**3346630**	**4103421**	**7450051**	**3346630**	**4103421**

CHAPTER- 3

Labour Market and Skill Gap Analysis for the Construction Sector of Bangladesh

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Construction Sector of Bangladesh

Executive Summary

The contribution of the construction sector to Bangladesh's GDP is about 7.3 percent at constant prices in the fiscal year 2015-2016 (Ministry of Finance, 2016). Construction is a major component of gross fixed capital formation (GFCF) in the country, representing about 70 to 75 percent of total investment or GFCF (BBS, 2015).Within the heading of construction, residential and non-residential housing comprises about 78 per cent of total construction spending (BBS, 2015). Most of the construction activities are accounted for by the private sector with 'private building' accounting for 65 per cent of total construction expenditure. In addition, the sector employs more than 2.1 million people, absorbing a significant share of Bangladesh's labour force (LFS, 2013). In fact, according to LFS data, it is the second largest provider of non-agricultural employment after the ready-made garments sector.

Although the construction sector plays a pivotal role in the growth accelerating phase of Bangladesh, entrepreneurs have had to overcome many barriers and constraints including the challenge of adopting technological changes in the construction sector. In recent years, labour shortages, especially in skilled categories for most trades in the construction sector have emerged as a major concern, especially in the backdrop of rapid change in the construction technologies. This gives rise to a potential constraint for future growth in the sector, as well as for overall economic growth.

The present study on the micro-level subsector analysis looks at construction as one of the priority sectors under Skills for Employment Investment Program (SEIP). The objectives of the study are: (i) to assess the labour market's demand and supply dynamics for construction sector; (ii) to identify key categories of current occupations and trades in the sector; (iii)to ascertain whether any skill-gaps in the construction sector that spread over a variety of occupations will arise in the future, projected over the next 10-20 years; and(iv) to assess the training capacity and recommending ways to meet the future needs for skills demands in the sector. This skill gap analysis will provide a detailed picture of skill targets by occupations.

This study collects information using a combination of primary enterprise surveys and secondary sources. We collected primary data by conducting enterprise surveys with construction sector representatives, real estate sector enterprises; public and private technical training centers, and consulted with relevant personnel in the industry. As secondary information, we collected labour force participation and employment characteristics information from the Labour Force Survey (LFS), trends in GDP contribution and growth of the sector from Ministry of Finance, and trends of foreign migrants in the construction sector from the Bureau of Manpower, Employment, and Training (BMET). For understanding the industry and its components, we gave due consideration to the composition of stakeholders acting as the vital sources of information in the construction sector.We collected enterprise specific information from 7 real estate firms to examine the skill composition and existing occupational trades. We collected detailed information on 13 specific real estate building projects to identify the nature of skill-gaps and devise projections for future skills needs in the construction sector. Next, to assess current training capacity and project for future training needs, we collected training-related information from different types of training institutes.

The construction sector has diversified types of construction activities involving buildings, bridges, roads, and flyovers etc. where technology differs greatly across the categories. Given the short duration of the study, we limited our enterprise surveys to a relatively homogenous product i.e. the 'real estate sector', which represents-as building construction-the bulk of the total construction sector GDP. However, our aggregate labour demand-supply projections for the construction sector are based on the primary data coming from the real estate sector. This is admissible since occupational trades are similar across building construction and civil engineering projects.The most important observations revealed by the study are the following:

During the period of 2000-2016, construction sector went through a significant technological change like tilling, electric rode & wall cutting, imported windows & doors, ready mix, excavator, aluminum framework, cranes etc. that demanded more and more skilled workers. Presently, there is a skilled worker shortage in all trades, especially in plumbing, electrical works, masonry, rod binding, painting, tiling etc. In next 5 years further technological advancements will permeate production processes in the sector and the total demand

for skilled worker will increase more. In the next 5-10 years, skilled worker demand will increase for operating small cranes in building construction, masons, plumbers, electrical mechanics, rod-binders, painters, tillers, and shuttering worker etc.

The projected demand suggest that aggregate demand for construction workers will rise by approximately 28 per cent, from 3.2 million in 2016 to 4.1 million by the end of seventh five year plan period. By 2025, the aggregate demand for construction worker will reach at 4.9 million growing by 59 per cent from the level projected for 2016. Combining with the demand for construction workers in the international market, total demand for construction workers will rise from 3.34 million in 2016 to 4.04 million in 2020, increasing further to 5 million by the end of 2025.

Analyzing the future working age population, we find that in general, labour supply will not be a serious problem at the aggregate level. However, skilled workers will be a concern. The findings from the enterprise survey suggest that in 2016, an average building construction will involve 31.7 per cent skilled-workers, 31.8 per cent semi-skilled workers and 28.6 per cent unskilled workers. This composition needs to evolve into the pattern dictated by technological change involving 37 per cent skilled-workers, 41 per cent semi-skilled workers, and 22 per cent unskilled workers in 2021.

We assume that only the skilled and semi-skilled segments of the construction workers need to be trained, as there will always be demand for some 35 per cent unskilled workers who are likely to perform as helper/low skilled workers. In the next five years (by 2021), 1.22 million workers will need to be trained, 54 per cent of them would be trained as skilled workers. In the next 10-year horizon, additional 1.6 million workers are to be added to the figure stated above. Thus, by 2025, composition of the training need will be divided between 53 Per cent skilled and 47 per cent semi-skilled workers. The yearly average training need in the next 10 years will stand around 0.284 million. This may be contrasted with the available training capacity of at most 70,500 per year for the construction sector, indicating the enormous challenge of the skill formation for this sector alone.

Comparison of the training capacity with the projected demand for skills indicates that only 25 per cent of the training need for 2017 may be satisfied with the existing arrangements. This signals severe shortage in training capacity. The clear message from this analysis is that, the current set-up with moderate growth in training will not be adequate to meet the demand for skilled and semi-skilled workers in the construction sector in the medium-term.

A major rethinking by way of investing in schooling and skilling of the labour force is needed to meet the growing domestic and foreign demand for construction workers and thereby remove one of the key binding constraints to accelerate economic growth in the next decade.

Labour Market and Skill Gap Analysis for the Construction Sector

3.1 Introduction

The construction sector plays a prominent role in the growth accelerating phase of a developing economy by supporting capital infrastructure and meeting the housing needs associated with rapid urbanisation. Bangladesh is no exception to this. The contribution of the construction sector to Bangladesh's GDP is about 7.3 percent at constant prices in the fiscal year 2015-2016 (Ministry of Finance 2016). Construction is a major component of gross fixed capital formation (GFCF) in Bangladesh, representing about 70 - 75 percent of total investment or GFCF (BBS 2015).Within the rubric of construction, residential and non-residential housing comprises about 78 per cent of total construction spending (BBS 2015). Most of the construction activities are accounted for by the private sector, with "private building" accounting for 65 per cent of total construction expenditure. The expansion of housing, construction, trade and other services in the private sector has been supported by the inflow of remittance income from abroad. It provides a diversified employment base for rural, especially male, workers(MoF 2016).

Entrepreneurs have had to overcome many barriers and constraints including the challenge of adopting technological changes in the construction sector. Other challenges include high capital costs, inadequate access to electricity and gas facilities, lack of enforcement of safety regulations, as well as high input costs. In recent years, labour shortages, especially in skilled categories, for most trades in the construction sector have emerged as a major concern, particularly in the backdrop of rapid change in the construction technologies. This gives rise to a potential constraint for future growth in the sector, as well as for overall economic growth.

This study has been conducted to plan skill development for the industry in order for industrial objectives of growth and productivity to be met among other long-term requirements of the Bangladesh economy. The present chapter of the micro-level subsector analysis looks at construction as one of the priority sectors under Skills for Employment Investment Program (SEIP). The objectives of the study are:

(a) to assess the labour market's demand and supply dynamics for construction sector;
(b) to identify key categories of current occupations and trades in the sector;
(c) to ascertain whether any skill gaps in the construction sector that spread over a variety of occupations will arise in the future (over the next 10-20 years) and
(d) to assess the training capacity and recommend ways to meet the future needs for skills demands in the sector. This skill gap analysis will provide a detailed picture of skill targets by occupations.

This study has been conducted to plan skill development for the industry in order for industrial objectives of growth and productivity to be met among other long-term requirements of the Bangladesh economy.

3.2 Methodology

The study was conducted using a combination of primary enterprise surveys and secondary sources. Also a mix of research techniques and tools were used in line with the study objectives. We collected labour force participation and related employment characteristics information from the labour force surveys (LFSs), trends in GDP contribution and growth of the sector from Ministry of Finance, and trends of foreign migrants in the construction sector from the Bureau of Manpower, Employment and Training (BMET).

In addition to secondary data, we conducted enterprise surveys with construction sector representatives, real estate sector enterprises and public and private technical training centres, and consulted with relevant personnel in the industry.

The construction sector has diversified types of construction activities involving buildings, bridges (small and large projects), roads, flyovers, etc. where technology differs greatly across the categories. Given the short duration of the study, we limited our enterprise surveys to a relatively homogenous product i.e. the "real estate sector", which represents-as building construction-the bulk of the total construction sector GDP. However, our aggregate labour demand-supply projections for the construction sector are based on the primary data coming from the real estate sector. This is admissible since occupational trades are similar across building construction and civil engineering projects. The sample selection procedures and survey methods for the enterprise surveys are discussed below.

3.2.1 Sample Selection and Survey Instrument

Several aspects are noteworthy. First, to address the study objectives we collected three types of information from three groups of respondents. We also designed our questionnaire into three parts: sector specific information, enterprise specific information,and project specific information.

- **Sector specific information:** For understanding the industry and its components, we consulted with Bangladesh Association of Construction Industry (BACI) representatives, enterprise owners and relevant professionals of the sector.We conducted *one focus group discussion (FGD)* with *BACI representatives and eight key informant interviews (KII)* with relevant personnel in the industry. We gave due consideration to the composition of stakeholders acting as the vital sources of information in the construction sector.

- **Enterprise specific information:** We collected enterprise specific information from *seven real estate firms to* examine the skill composition and existing occupational trades.

- **Project specific information:** We collected detailed information on 13 *specific real estate building projects* to identify the nature of skill gaps and devise projections for future skills needs in the construction sector. We divided projects into two categories during data collection: large scale projects for buildings with 10-16 floors and small scale projects for buildings with 6-9 floors.

Second, to assess current training capacity and project for future training needs, we collected training related information from three different types of training institutes, including public technical training centres (TTCs), private technical institutes and training centres for foreign migrants. For understanding this sector, we conducted eight KIIs with relevant personnel from those institutes.

- **Public Technical Training Centres:** We *collected existing training capacity information* by construction trade from 40 public TTCs. To understand the training modules, trainer's educational qualification and trainee backgrounds, we collected information with a structured questionnaire survey from four public TTCs.

- **Private Technical Training Centres:** We collected training capacity information from *private technical school i.e. UCEP Bangladesh,* which has technical schools at each divisional level.

- **Technical Training Centres for Migrant Workers:** Bangladeshi migrant workers, especially construction migrants, working in Singapore, Malaysia and the Middle East took construction trade related training from Bangladesh. We collected information, through a structured questionnaire, from three TTCs

3.3 Macro Overview of the Construction Sector

According to International Standard Industrial Classification (ISIC) Revision 4 or Bangladesh Standard Industrial Classification (BSIC) 2009, construction activities are classified into three major categories: general construction, specialised construction activities for buildings, and civil engineering works. It includes new construction works, repairs, additions and alterations, manufacture of buildings or structures on the site, and construction of a temporary nature[1].

In the construction sector, buildings are of two types: dwellings and non-dwellings with pucca (pucca and semi-pucca), and kutcha. The share of dwelling construction expenditure is higher than non-dwelling construction. According to the Population and Housing Census 2011, 25 percent of dwellings in urban areas are pucca compared to only 2.7 percent in rural areas (BBS 2015).

[1] General construction is the construction of entire dwellings, office buildings, stores, other public utility buildings, farm buildings, etc.. Construction of civil engineering works covers roads, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities, etc. (BBS 2015).

Table 3.1: Share of building and other than building in total construction expenditure

Year	Expenditure in construction (in million Tk.)	Share of residential and non-residential buildings in total construction expenditure		Public sector construction other than buildings (%)
		Total buildings (%)	Private buildings (%)	
2006	844,381	75.11	65.47	15.33
2007	954,661	76.58	67.56	14.06
2008	1,103,272	78.05	70.18	12.26
2009	1,273,669	79.39	72.07	11.25
2010	1,429,513	79.06	71.39	12.81
2011	1,641,692	77.61	68.98	14.56
2012	1,956,904	76.31	67.61	16.05
2013	2,354,061	75.20	65.40	17.46
2014	2,620,743	78.03	69.06	14.37
2015	3,145,411	78.58	69.64	14.54

Source: BBS, Statistical Year Book of Bangladesh (various years).

The construction expenditure has five major parts: kutcha houses construction, residential and non-residential buildings, private agriculture construction, installation cost of irrigation and public sector other construction. The share of building (residential and non-residential) constitutes more than two-third of the construction expenditure, while public sector construction other than buildings accounted for only around 14-15 percentage (Table 3.1). This implies that most of the labour demand originating in the construction sector comes from the residential and non-residential building activities.

Construction activities are not uniformly distributed across all areas of the country. It is prominently present in urban areas and in major cities like Dhaka, Narayanganj, Chittagong, Sylhet, Rajshahi, Khulna and Rangpur. Public sector construction deals with civil engineering works carried out through contract basis, while dwelling construction carried out on own account and on a fee or contract basis.

3.3.1 Aggregate Output and Employment Trends

The building construction industry is considered one of the fastest growing and largest sectors in Bangladesh in terms of output growth and employment generation. The construction industry of Bangladesh has grown considerably during the last decade, accounting for about 7.3 percent of the GDP of the country (MoF 2016). In addition, the sector employs more than 2.1 million people, absorbing a significant share of Bangladesh's labour force (LFS 2013). In fact, according to LFS data, it is the second largest provider of non-agricultural employment after the ready made garments sector.

The size of the construction industry is around BDT 61,729 crore or 617.3 billion during the last fiscal year of 2015/2016. The contribution of the construction sector to GDP of the country increased from 6.5 percent in FY2006 to 7.3 percent in FY2016.Bangladesh's construction industry has grown at a compound annual growth rate of about 7.5 percent during FY2006-FY2016 and about 8.4 percent during FY2011-FY2016 due to massive infrastructure investments and rapid rise in housing demand (Table 3.2). The growth rate of infrastructural investments significantly increased as the government undertook Padma Bridge project. Rapid urbanisation and building of infrastructure including roads, bridges and flyovers are the main factors behind the growth of the construction sector.

Table 3.2:Sectoral GDP and Contribution in GDP

Year	Construction sector			Real Estate, renting and business services		
	Size of the GDP (in crore Tk.)	GDP contribution (%)	Growth (%)	Size of the GDP (in crore Tk.)	GDP contribution (%)	Growth (%)
FY 2006	29,825	6.52	8.69	37,935	8.29	3.77
FY 2007	31,836	6.49	6.74	39,382	8.03	3.82
FY 2008	33,742	6.5	5.99	40,876	7.87	3.79
FY 2009	35,962	6.58	6.58	42,442	7.77	3.83
FY 2010	38,554	6.65	7.21	44,078	7.61	3.85
FY 2011	41,235	6.67	6.95	45,790	7.41	3.88
FY 2012	44,709	6.78	8.42	47,586	7.22	3.92
FY 2013	48,305	6.9	8.04	49,509	7.07	4.04
FY 2014	52,209	7.03	8.08	51,615	6.95	4.25
FY 2015	56,698	7.16	8.60	53,888	6.81	4.40
FY 2016	61,729	7.28	8.87	56,320	6.65	4.51

Source: Ministry of Finance, 2016.

The government's development projects under the annual development programme have given a big boost to the construction sector, which resulted in higher production and consumption of construction materials i.e. steel and cement. The government has a number of ongoing flyover and other construction projects in Dhaka and Chittagong, including four lane highways. There is expectation of increased growth in this sector in the near future.

Employment generating potential of the construction can hardly be over-emphasized. In 2013, total construction sector employment was around 2.14 million. Even at the current growth rate (5.2 percent annually), total employment in the construction sector will increase to 3.35 million by 2021 and to 4.43 million by 2026 (calculation based on LFS data).Table 3.3 shows the employment trend in the construction sector over the period 1999-2013. The moot point is that the construction industry is a labour-intensive industry, and by the same token, the same inference can be drawn for the real estate sector. After all, the real estate sector forms a major part of the construction sector and a major part of the labour force engaged in the construction sector is also engaged in the real estate sector (Ahmed 2014).

Table 3.3: The labour force engagement to the construction sector, 1999-2013

Year	Employed person (in "000")			% of total employed person		
	Male	Female	Total	Male	Female	Total
1999-2000	1045	91	1136	3.4	1.2	2.9
2002-2003	1445	97	1542	4.2	1.0	3.5
2005-2006	1421	104	1525	3.9	0.9	3.2
2010	2391	227	2618	6.3	1.4	4.8
2013	1975	169	2144	4.8	1.0	3.7

Source: Labour Force Survey (various years) BBS.

While RMG sector employs mainly the female labour, construction sector mostly deploys the male labour. Thus, around 92 percent of construction employees are male (LFS 2013). The sector generates jobs for skilled, semi-skilled and unskilled workers both in the formal and informal sectors. According to Bangladesh Association of Construction Industry (BACI)[2], more than 10,000 enterprises are working in the construction sector. The categorical composition of the current workforce in the construction sector is: 10 percent skilled, 20 percent semi-skilled, and the remaining 70 percent of workers are unskilled (BACI 2016). Although the construction industry is growing in each city of Bangladesh a remarkable growth has started from the capital

[2] BACI is the premier association for the construction industry of Bangladesh and is a link among all organisations and firms, which currently deals in the development sector of the country as well as the world (http://www.baci-bd.org/).

city of Dhaka. This is because more than 40 per cent of the urban population resides in Dhaka alone. With the expansion of the middle class, more people are willing to purchase housing thus increasing housing demand.

Employment in the construction sector is poverty reducing when compared to the wage level of agricultural wage workers (who constitute the poorest segment of the rural population). Construction workers, on average, have higher wages than agricultural wage labourers, but earn lower wages than those employed in the manufacturing sector. Although the relative gap has narrowed down in recent years, the matched wage gaps between the skilled categories of construction workers and agricultural wage workers are still considerable (Table 3.4). This provides incentives to the prospective workers to move out of the farm sector and seek skilled trades in the construction sector.

Table 3.4: Daily wage rates of major construction trades and agriculture (in current Taka), 2008-2014

Construction trades	2008	2010	2014
Foreman	250	450	462
Head Mason	250	400	402
Mason	180	300	317
Rod Mistry	230	350	343
Carpenter	230	350	345
Painter	230	350	345
Pipe fitter	160	350	-
Plumber	230	350	359
Tiller	230	400	338
Wire man	160	350	402
Welder	230	400	345
Technician	250	450	571
Manual labour (skilled)	160	200	247
Manual labour (unskilled)	150	175	200
Agriculture	117	160	276

Note and Source: Schedule of rates, LGED, 2008; the rates in MES schedule 2010 & PWD SoR for Civil Works 2014. All information is collected and delivered by BACI. Agriculture wage is collected from Ministry of Finance, 2016.

3.3.2 Trends in the Real State Sector

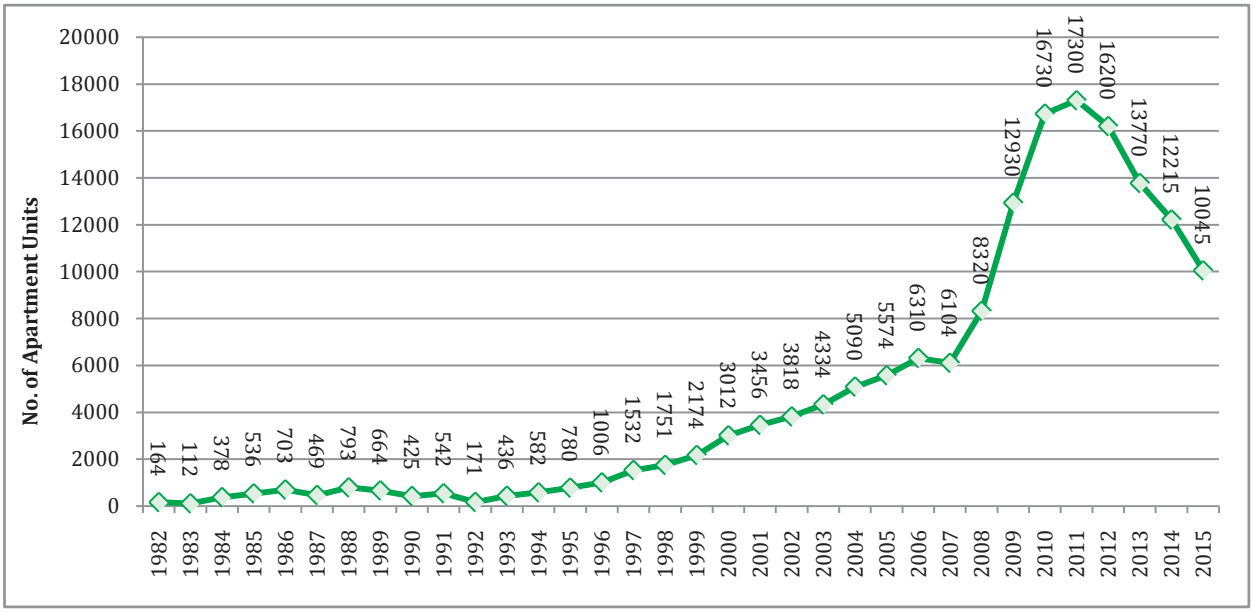
In terms of GDP, the contribution of real estate renting and business services sector is estimated at around BDT 563.2 billion in 2005-2016. The sector has been growing at a rate of 4 percent during 2006-2016, but has slowed down considerably since 2012 at 2 percent. According to the Real Estate and Housing Association in Bangladesh (REHAB)[3], the sector contributes 12-15 percent of the GDP and employs about 2.5 million skilled and unskilled labour. Annual turnover of this sector is BDT 28 billion, providing BDT 2 billion in the tax revenue to the government. It also stimulates demand for 250 supplementary industries, e.g. steel, cement, tiles and sanitary-ware, cable and electric ware, paint, glass and aluminum, brick and building materials, etc. (Siraj 2015).

The private sector contributed significantly to the supply of housing (particularly urban housing) and real estate companies came into business in the 1980s. At the beginning of the 1980s, there were less than 10 developers, and the number of companies increased to about 200 by 2000. In 2014, the total number of real estate companies stood at over 1,500 (Siraj 2015). REHAB members can deliver 9,000-10,000 apartment units per year. In Dhaka, the proportion of REHAB member-produced flats is 40 percent and non-REHAB member-produced flats is 60 percent (Sheltech 2016). During the last 30 years, private developers produced more than 150,000 apartment units (Sheltech Survey 2015).

[3] http://www.rehab-bd.org/

The capital city of Dhaka has a population of 14.5 million, and each year more than 0.77 million additional people join through natural growth and migration (BBS 2011,Siraj 2015). At this population growth rate, 0.18 million new houses are needed to fulfill the pressures of housing demand. The real estate sector can provide only 10,000-12,000 dwelling units per year, which is quite low. Furthermore, the real estate sector has been facing recession since 2012 and apartment delivery declined sharply during this period (Figure 3.1).

Figure 3.1: Yearly apartment delivery, 1982-2015



Source: Siraj (2015).

Growth for the industry was decent between the years 1990 and 2000, and growth for the industry was excellent during 2009-2011. This is attributable to strong remittance inflows during the second half of the 2000s. The cost of construction in the past decade has seen considerable rise in tandem with increase in the cost of procuring land for real estate development. At some point or other, the price of land has to face some inevitable "market corrections." In the 2010s, the real estate sector has witnessed recession. According to Sheltech, a pioneer real estate firm of the country, the overall real estate market has gone down by 40 percent in 2015 compared to what was prevailing in 2009-11. Before the boom period, countless unprofessional developer companies entered the market, creating unhealthy competition.This put pressure on both land and apartment prices. Due to the rise in apartment prices and governmental regulations (i.e. tax, registration costs, etc.), the number of buyers fell. Consequently, a number of smaller developer companies have quit the market, while existing companies took on fewer projects after 2012, leading to a steep decline in the number of apartments.

Technological Changes in the Construction Sector

Arnold and Shah (1984) have considered earlier the implication of the booming Bangladeshi labour migration to the Middle East during the period of 1975-1984 for the construction sector. According to them, remittance not only brings strong economic benefits for the Bangladesh's economy but also indirectly foster the "acquisition of skills" by workers and hence labour productivity, which can be a source of additional growth benefits to the domestic economy. The increased productivity of returnee Bangladeshi workers was due to exposure through foreign training and experiences. This is further corroborated by Rashid and Aziz's (2001) case study which shows a large number of Bangladeshi migrant workers returned back during 1990-1991 due to the crisis in the Persian Gulf. These workers also contributed to the growth of the construction sector. In addition, availability of Chinese cheap technologies and local innovation in machinery parts and/ or small machinery used in the construction sector also induced favourable technological changes.

During the period of 2000-2016, rising wage rates increasing production costs caused entrepreneurs to move to relatively more capital intensive production processes. Specific technological changes started to emerge in the real estate sector, which include tiling over floor mosaic, use of electric cutters for rods rather

than manual cutting, wall-cutting machines and import of windows and doors, thereby reducing local carpentry work, introduction of cement-mixers (ready-mix) allowing easier construction with less manual labour, excavators for digging earth instead of using manual labour, use of steel in pillars instead of bamboo and wood, aluminum framework, cranes for heavy-lifting, etc. These technological innovations have reduced labour usage on average 40 percent according to case studies. Thus, in the past, excavation was done by manual labour alone, but it is now done by excavating machines; similarly, ready-mix machine reduces time for construction. These technological changes have reduced demand for relative unskilled labour and increased the demand for skilled labour, and, in effect, helped to cut back on labour costs.

By 2021, as suggested by case studies, further technological advancements will permeate production processes in the real estate sector. The quantity of labour usage will reduce as a result of technological improvement. While more projects will be initiated due to population growth, this growing demand is likely to be met by the proportionately larger supply of skilled labour. In the next 5-10 years, according to the industry entrepreneurs, skilled worker demand will be increased in a number of areas. For instance, small crane operation in building construction will go up, so will the use of masons, plumbers, electrical mechanics, rod-binders, painters, tiling, and shuttering workers. Due to these technological advancements, the top 20 firms in the industry have been able to enhance their productivity, whereas the remainder category may not benefit much in the future, at least without additional investments. Presently, however, there is shortage of skilled workers in all trades, especially in plumbing, electrical works, masonry, rod binding, painting, and tiling.

3.3.3 Trends in International Migration

So far we have discussed only domestic demand for construction workers. Another source of demand for construction workers relates to growing foreign demand. A number of countries in the middle, and upper-middle income group are passing through the phase of "infrastructure building," thereby generating demand for migrant construction workers. Bangladesh can take advantage of this phase of international and regional development as potential construction workers exporting country. Overseas employment, especially of skilled workers, can be an important source of foreign exchange earnings for the country. The major destinations for construction sector migrants include Singapore, UAE, Saudi Arabia and other Middle-Eastern countries. Construction migrants, however, require prior training on relevant construction trades. Presently, there are 53 TTCs in the government sector, which provide training on different construction trades. In addition, migrant workers are trained from different Singaporean training centres in the country, such as South Point Overseas, Unique Eastern Pvt. Ltd and the like. However, they meet a tiny fraction of potential foreign demand for Bangladeshi construction workers. To what extent Bangladesh would be able to reap the benefits of this "infrastructure building phase abroad" would depend critically on the ability to train skilled construction workers in large numbers and ensure their timely availability for the export market.

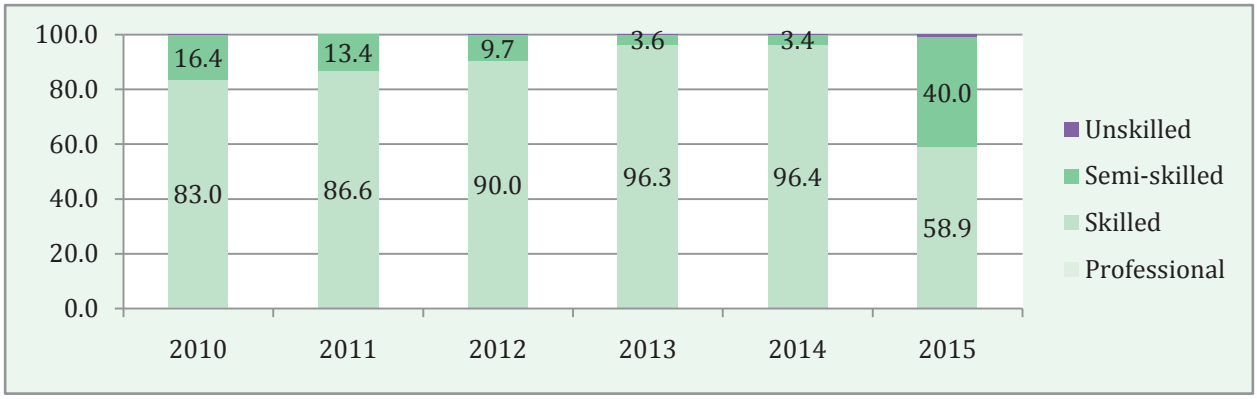
Table 3.5: Overseas employment in the construction sector by skill level, 2010-2015

Year	Professional		Skilled		Semi-skilled		Unskilled		Total	
	Unit	% of total	Unit	% of total	Unit	% of total	Unit	% of total	Unit	% of total
2010	281	14.4	42,906	29.9	8,489	37.9	2	0.00	8,529	12.4
2011	28	1.1	39,575	14.4	6,102	25.3	0	0.00	6,127	7.7
2012	90	0.2	37,748	15.5	4,081	24.9	5	0.00	4,111	6.7
2013	19	1.5	39,754	33.6	1,498	5.4	10	0.00	1,513	11.2
2014	25	0.4	54,549	31.4	1,929	4.3	74	0.03	2,007	11.6
2015	46	2.6	94,318	37.9	64,121	74.2	1,619	0.58	65,815	25.9

Source: Authors' calculation based on BMET data, 2016
Note: % of total means proportion of construction migrants compared to total migrants.

Data on skilled workers from Bangladesh going abroad for employment in the construction sector has been presented in Table 3.5 and Figure 3.2.Migrant workers in the construction sector contributed to around 10 per cent of total migrant workers during the period of 2010-2014. However, the matched figure went up to 25.9 percent in 2015 i.e. more than doubled in just one year (Table 3.5). This shows the nature of volatility in the construction labour market overseas. In general, most construction migrants are skilled and semi-skilled, as the primary requirement for migrants is training completion certificates or experience certificates.

Figure 3.2: Distribution of construction migrants by skill level, 2010-2015



Source: Authors' calculation based on BMET data, 2016.

Annual disaggregated data on the construction migrant workers show that top 10 occupations constituted over 80 percent of total construction migrants abroad (except in 2015). Occupations include masons, painters, pipe fitters, steel fixers, plumbers, tillers, plaster-masons, concreter (mixer-man), formworks installers, and rod-binders. BMET disaggregated data indicate that in the case of the construction trades most drop registered correspond to the semi-skilled category (Table 3.6). Table 3.7 shows the top 10 construction migrant-absorbing countries, which contribute to the absorption of around 95 percent of total construction migrants. These data confirm the popular perception about Middle-Eastern countries (Oman, Qatar, UAE), and Singapore as the most popular destinations for construction migrants.

Table 3.6: Overseas employment in the construction sector by top 10 construction trades

Construction trades	2010	2011	2012	2013	2014	2015
Mason	17,611	23,512	21,614	19,223	26,151	20,868
Painter	5,256	8,868	7,773	7,325	7,576	4,530
Pipe-fitter	1,101	2,206	1,418	189	3,490	7,091
Steel-fixer	6,330	512	1,298	2,167	2,966	1,318
Plumber	3,208	995	1,038	2,296	4,296	2,536
Tillers	3,245	1,968	1,817	1,610	1,839	488
Plaster-mason	3,614	70	1,703	705	1,802	687
Concreter (Mixer-man)	762	788	435	99	603	38
Formworks Installer	541	0	0	105	0	1 , 632
Rod-binder	253	170	11	57	168	118
% of construction migrants	81.1	85.5	88.5	81.8	86.4	24.6
Total	**51,678**	**45,705**	**41,924**	**41,281**	**56,577**	**160,104**
Construction Worker	7,314	6,079	4,555	6,685	5,865	119,782

Source: Authors' calculation based on BMET data, 2016.

Table 3.7: Overseas employment in the construction sector by top 10 countries

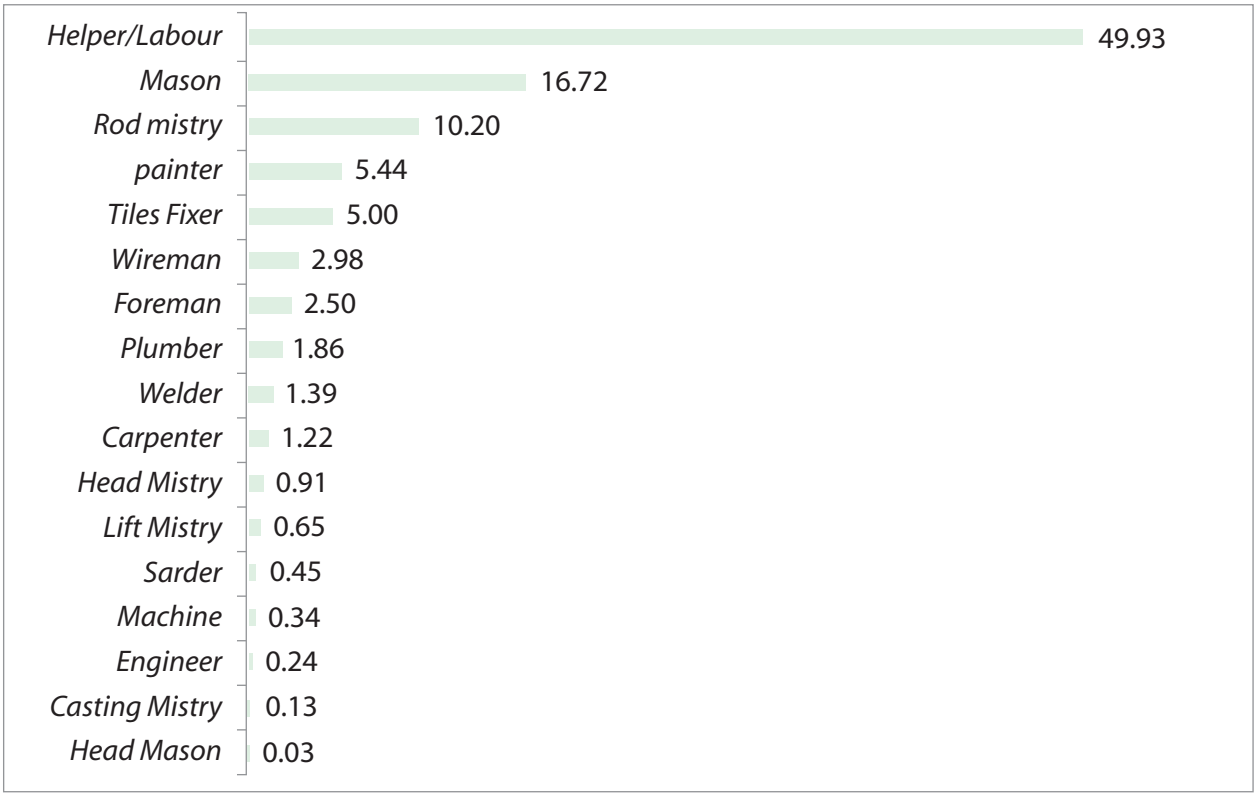
COUNTRY	2010	2011	2012	2013	2014	2015
Oman	3,887	11,078	14,779	18,847	21,484	43,945
Singapore	6,009	6,188	3,887	5,162	5,437	27,982
Qatar	723	1,454	2,302	4,934	8,607	34,197
United Arab Emirates	13,031	23,318	12,919	47	39	315
Libya	24,372	16	5,694	5,683	12,417	1,149
Iraq	2,025	0	0	2,995	5,713	17,941
Bahrain	295	705	329	363	644	9,131
Maldives	6	243	91	638	770	7,303
Malaysia	3	6	3	35	9	6,028
Mauritius	690	1,332	843	1,157	334	1,308
% of construction migrants	98.8	97.0	97.4	96.6	98.0	93.3
Total	51,678	45,705	41,924	41,281	56,577	160,104

Source: Authors' calculation based on BMET data, 2016.

3.4 Current Composition of Human Capital of Construction Workers

Construction of a building requires different types of labour based on the stage of production. Utilising the data gathered from 13 building construction sites, Figure 3.3 shows the labour requirements by trades to construct an average size building. Approximately, 90% of the labour-days are employed by workers from five trades: helper/labour(50%), mason(16.7%), rod mistry(10.2%), painter(5.44%), tiles Fixer(5%), and electrical wireman(3%). In contrast, combined share of labour-days from head mason, casting-mistry, engineer, and machine operator stands at less than one percent. While the dominance of the relatively unskilled labour is still a valid proposition in the context of this industry, the signs of change towards higher skills are already apparent.

Figure 3.3: Labour proportion by trades/occupations to construct an average size building



Source: Construction Enterprise Survey (BIDS, 2016).

The proportion of female workers in total number of workers is extremely low. As Table 3.8 shows, only 1.3 per cent of the workers in the surveyed project sites are found to be female. This is even lower than the macro statistics, where 7.8 per cent of the workers in the construction sector are female (LFS 2013). Among all of the workers, the proportion of female skilled and female semi-skilled workers is even smaller. Among the female workers, 19 per cent are skilled, 38 per cent are semi-skilled and 43 per cent are unskilled. All of the female workers employed are working either as helper or labourer at different stages of production.

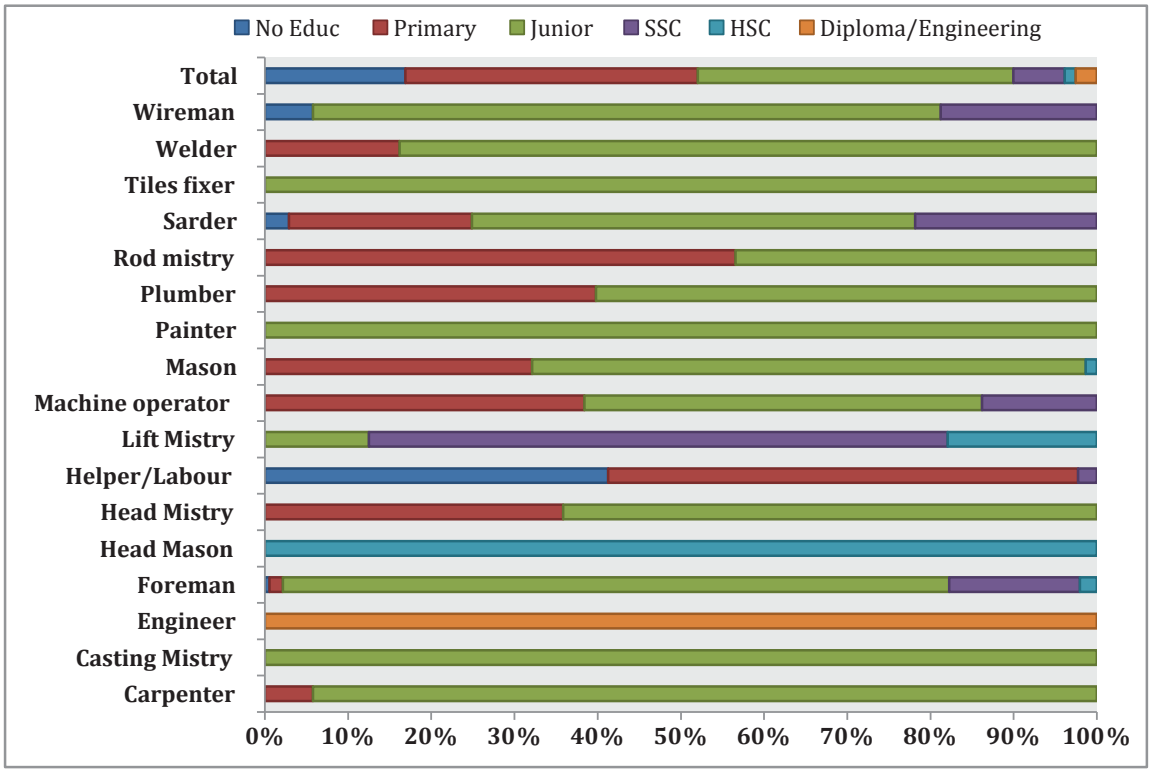
Table 3.8: Female share by skill category

Skill Category	% Female
Skilled	0.26
Semi-Skilled	0.47
Unskilled	0.57
Total	1.30

Source: Construction Enterprise Survey (BIDS, 2016).

Average level of schooling of the construction workers is low. Figure 3.4 presents the information on human capital in terms of schooling of construction workers, obtained from 13 large and medium scale project sites. In the surveyed sample, 52 per cent of the workers in the project sites are either with no schooling or with primary education at most. This is consistent with the LFS 2013, showing that 56.3 per cent of the workers are with primary education or below. However, we find relatively higher proportion with junior secondary schooling compared to LFS 2013, 38 per cent vs. 15 per cent, and lower proportion with SSC (6 per cent vs. 15 per cent) and HSC (2.5 per cent vs. 12 per cent) (Table 3.1 A). If we analyse across the trades, schooling level is lowest among the helper/labour group – 41 per cent of the workers in the helper/labour category are with no schooling and 56.5 per cent are with primary education. Among the trades groups, electrical wireman, welders, tiles fixer, painter, mason, foreman, casting mistry, and plumbers, most are with junior secondary schooling. Majority of the lift workers (56.5 per cent) are with SSC level education, while 19 per cent of the electrical wireman, 22 per cent of sarder, 14 per cent of machine operators and 16 per cent of the foreman have SSC level education. The education level is very high among two groups, head mason and site-engineers, which is expected.

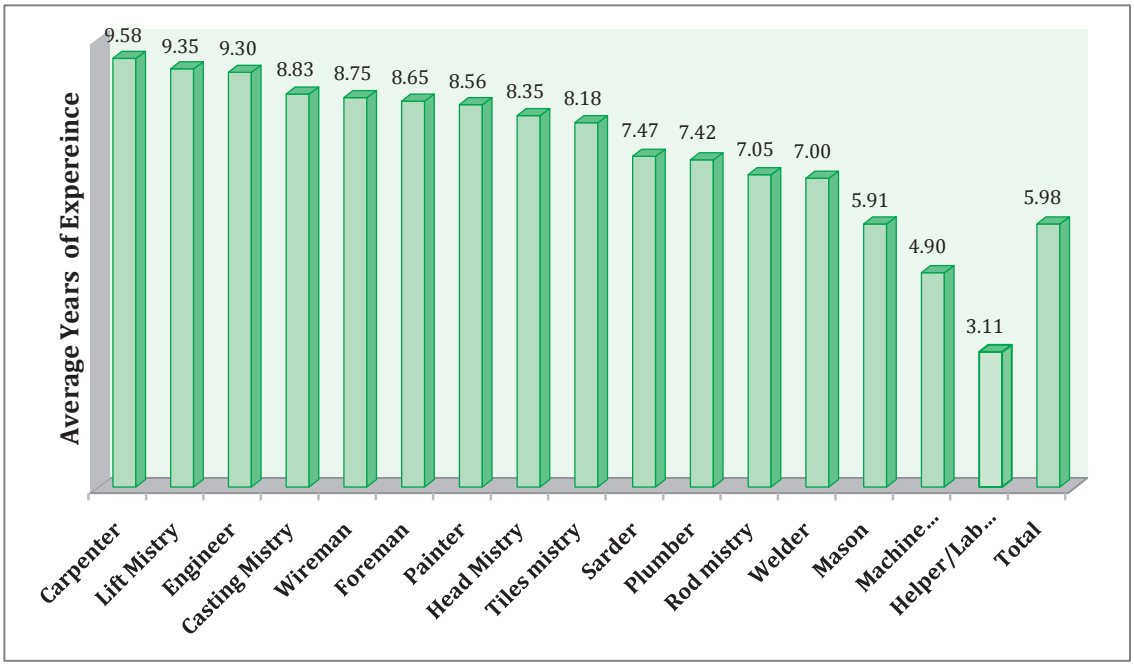
Figure 3.4: Schooling level by trades in the construction sector



Source: Construction Enterprise Survey (BIDS 2016).

Experience of the workers might be another indicator of accumulated human capital of workers employed in the construction sector. Figure 3.5 reveals that, on average, a worker in the surveyed construction sites has an experience of six years. However, there is heterogeneity across trades. The average experience is relatively higher for carpenters, lift-workers, engineers, casting-workers, electrical wireman, and foreman, while experience is relatively lower for helpers/labourers, machine operators and mason. The average experience for helpers/labourers is low(3 years), indicating that such workers start as helper/labour and then gain skills gradually learning from the job to switch into other trades.

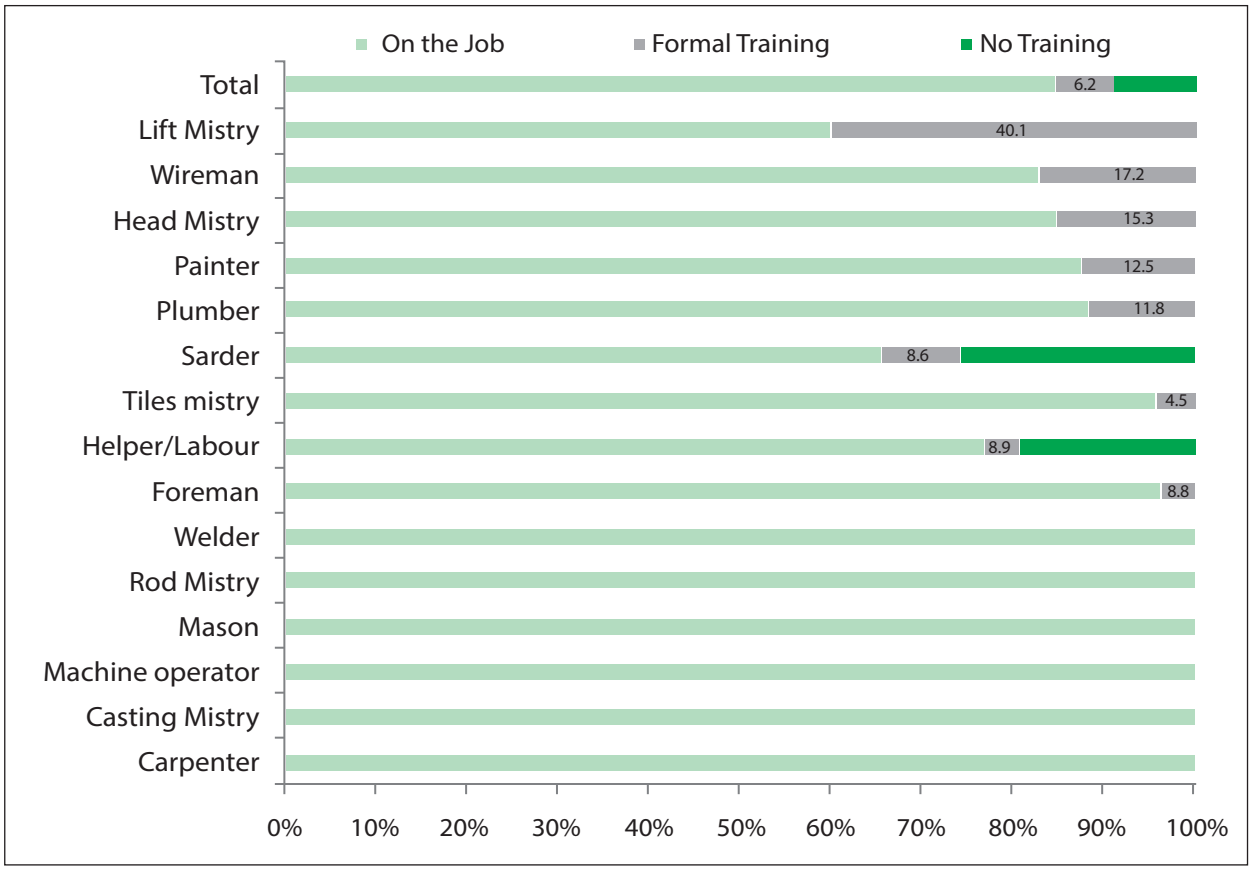
Figure 3.5: Experience of workers by trades/occupations



Source: Construction Enterprise Survey (BIDS 2016).

In general, the construction enterprises revealed that workers in this sector learn from the job and in most of the cases, they do not have any formal training. This is consistent with the picture attained from the survey conducted in 13 project sites. The statistics on training status of the workers obtained from the survey is presented in Figure 3.6. On average, 6.2 per cent of the workers have formal training, while 85 per cent learn from on-the-job training. The training incidence is lower than the national average-approximately 7.4 per cent of the workers in the construction sector have received any formal training. Once we analyse by trades/occupations, workers in several trades display high rate of training incidence. Almost 40 per cent of the lift-workers and 17 per cent of electrical wireman are trained through formal system. Plumbers and painters receive training at a higher rate compared to the national average. All of the welders, masons, rod-workers, machine operators, carpenters and casting-mistry are trained on-the-jobs and have no formal training. We find that 26 per cent of sarders and 19 per cent of helpers/labourers do not have any training, neither on-the-job training nor formal training. Although our survey instrument explicitly investigated on the incidence of TVET training, it failed to find such evidence in any single case. The low incidence of formal training and complete absence of TVET system indicate to the possibly low retention rate of skilled workers within the country.

Figure 3.6: Training status of workers in the construction sector by trade/occupation



Source: Construction Enterprise Survey (BIDS, 2016).

3.5 Skill Gap Analysis: Projection of Demand-Supply of Skills

3.5.1 Projection of the Future Demand for Construction Workers

Projecting the Demand in the Domestic Economy

Several steps are followed in projecting the demand for construction workers up to 2025. In the projection process, real economic growth target set in the seventh five year plan (2015-2020) of the country is considered. First, we estimate the demand for construction workers within the country. The projected figures are reported in Table 3.9. The projection process is explained below.

Step 1: Based on the real GDP growth rate targeted in the Seventh Five-Year Plan (7FYP), we calculate the projected GDP for 10 years, from 2017 to 2025. The projected GDP figure for 2017 comes from the figure estimated by Ministry of Finance (2016).

Step 2: Based on the time series data for the period 1991 to 2015, we estimate the construction value added elasticity of GDP- by what percentage construction value added increases for each one percent increase in GDP. It is assumed that this elasticity remains constant across the projection period. Combining this elasticity with the real GDP growth target gives the implied growth rate of construction GDP.

Step 3: Applying the implied growth rate obtained in step 2 on construction value added target set for the base year (FY2015-2016) by the Ministry of Finance (2016), we project the construction value added for the 2016-2025 period.

Table 3.9 : Projection of demand for construction workers with no change in skill composition

Year	Growth rate of GDP	Projected GDP	Construction elasticity of GDP	Implied growth rate of construction value added	Projected construction value added	Employment elasticity of construction	Implied growth rate of construction workers	Projected demand for construction workers
	%	*crore* taka		%	*crore* taka	%		
2016	7.0	1,729,567	0.885		125754	0.75		31,74,183
2017	7.2	1,857,555	0.885	6.55	133990	0.75	4.91	33,30,091
2018	7.4	1,995,014	0.885	6.55	142765	0.75	4.91	34,93,656
2019	7.6	2,146,635	0.885	6.73	152367	0.75	5.04	36,69,894
2020	8.0	2,318,366	0.885	7.08	163155	0.75	5.31	38,64,765
2021	8.0	2,503,835	0.885	7.08	174706	0.75	5.31	40,69,984
2022	7.5	2,691,623	0.885	6.64	186302	0.75	4.98	42,72,593
2023	7.0	2,880,036	0.885	6.20	197843	0.75	4.65	44,71,109
2024	6.5	3,067,239	0.885	5.75	209224	0.75	4.31	46,64,009
2025	6.0	3,251,273	0.885	5.31	220334	0.75	3.98	48,49,753

Source: Ministry of Finance(1996, 2001, 2006, 2010, 2016),7th Five Year Plan(FY2016-FY2020).

Note: All GDP and value added estimates are at 2015-2016 prices. The base year is 2016. GDP and construction value added estimates for 2016 are directly drawn from reported figures in MOF (2016), while number of construction workers for 2016 calculated based on the LFS 2003-04 and 2013. Growth rates of GDP for the projection period drawn from Seventh Five Year Plan, which helps to project GDP in monetary value. Construction elasticity of GDP is estimated based on historical time series data from 1991 to 2015. Multiplying the growth rate of GDP by construction elasticity of GDP provides us the implied growth rate of construction GDP. Utilising this growth rate on the base year, construction value added gives us the projected construction GDP. Employment elasticity of construction value added is calculated based on the LFS data of 2000 and 2013.Combining the employment elasticity of construction value added with implied growth rate of construction value added projects the implied growth rate of construction workers. Applying this growth rate to labour demand in construction sector in the base year provides us with the final projection on demand for construction workers.

Step 4: Exploiting the change in employment in construction sector and the change in real construction value added during the period of 2000-2013, we estimate the construction-value added elasticity of construction employment. Assuming this elasticity will remain constant throughout the projection period, and combining this with the construction value added growth rate, we obtain the implied growth rate of construction labour during the projection period.

Step 5 : Since the most recent LFS was conducted in 2013, the latest information available on the employed labour force in the construction sector is for 2013. To fill the gap for 2016, we exploit previous rounds of LFS conducted by BBS(2003-04, 2013).The number of construction workers in the total employed labour force increased from 2.05 million to 2.8 million during the last 10 years, which indicates a 3.75 per cent annual growth of construction labour employed. Assuming the same growth rateprevailed, we find that total employed construction workers rise from 2.8 million in 2013 to approximately 3.14 million in 2016. We link this growth rate with the employed construction worker counts in 2016 to project the demand for construction workers during the 2017-2025 period.

The projected demand estimates suggest that aggregate demand for construction workers will rise by approximately 28 per cent, from 3.2 million in 2016 to 4.1 million by the end of 7FYP period. By 2025, the aggregate demand for construction workers will reach at 4.9 million, growing by 59 per cent from the level projected for 2016. Note that this projection for aggregate demand is on the lower side since we assume that throughout the projection period, the share of construction in aggregate GDP will remain constant at the 7 per cent level. Incorporation of the construction of several mega projects (Padma bridge, elevated expressways, several four lanes road construction) in next few years might actually increase the share of construction in GDP.

Skill Composition of the Projected Domestic Demand for Construction Workers

We now figure out the skill composition of the projected aggregate demand for construction workers derived above. The enterprise survey on 13 large and medium scale projects provide us information with the labour requirements, labour types by trade and their skill composition to construct an average size building. In the enterprise survey, we collect information from real estate firms on the skill composition of workers currently working in their projects, and also record the enterprise owners' projection on the change in skill composition of workers who will work in their firms in 2021.

The findings from the enterprise survey suggest that in 2016, an average building construction will employ 31.7 per cent skilled-workers, 31.8 per cent semi-skilled workers and 28.6 per cent unskilled workers that are projected to change into 37 per cent skilled-workers, 41per cent semi-skilled workers, and 22 per cent unskilled workers in 2021. That means the share of skilled and semi-skilled workers will grow by 3.13 per cent and 1 per cent per year respectively, while that of unskilled will shrink by 4.8 per cent per year up to 2026. The projection under scenario two actually incorporates possible technological change with a bias towards skilled and semi-skilled labour.

Exploiting the information revealed by the real estate firms, we made the projection under two scenarios. Scenario one assumes that the projected aggregate construction workers will follow the current skill composition that will stay constant throughout the projection period, while scenario two assumes that share of skilled and semi-skilled workers will grow and that of unskilled workers will decline at the above stated rate. Assuming that the aggregate construction workers in the economy will follow the same skill composition as that of real estate building construction, we distribute the yearly projected number of aggregate construction workers into three skills categories-skilled, semi-skilled, and unskilled. The results are presented in Table 3.10.

Under scenario one, the demand for skilled and semi-skilled workers will rise from 2.3 million to 2.9 million by 2021, and will reach at 3.5 million by 2025. The pattern is almost similar under scenario two-demand for skilled and semi-skilled workers will reach at 2.96 million by 2021 and at 3.52 million by 2025. However, although the share of unskilled labour within a year will shrink, the aggregate demand for unskilled labour will rise from 0.9 million in 2016 to 1.33 million by the end of the projection period. As caveat, if the implicit rates of technological shift towards skill labour change, the projected number under scenario two would change as well. Scenario two captures the possible technological change realistically and we use projected numbers under this scenario in all of the analysis following.

Table 3.10: Skill Composition of projected demand for construction workers

Year	Growth rate of GDP	Projected demand for construction workers	Skilled	Semi-skilled	Unskilled	Skilled	Semi-skilled	Unskilled
		In million workers						
			(i)No Change in Skill Composition			(ii) Change in Skill Composition		
2016	7.0	3.17	1.01	1.26	0.91	1.01	1.26	0.91
2017	7.2	3.33	1.06	1.32	0.96	1.09	1.33	0.91
2018	7.4	3.49	1.11	1.38	1.00	1.14	1.40	0.95
2019	7.6	3.67	1.16	1.45	1.05	1.20	1.47	1.00
2020	8.0	3.86	1.22	1.53	1.11	1.26	1.55	1.06
2021	8.0	4.07	1.29	1 .61	1.17	1.33	1.63	1.11
2022	7.5	4.27	1.35	1.69	1.23	1.40	1.71	1.17
2023	7.0	4.47	1.42	1.77	1.28	1.46	1.79	1.22
2024	6.5	4.66	1.48	1.85	1.34	1.52	1.87	1.27
2025	6.0	4.85	1.54	1.92	1.39	1.58	1.94	1.33

Source: Authors' calculation based on enterprise survey conducted by BIDS (2016); Ministry of Finance (2016); and BBS (2000, 2004, 2010, 2013).

Note: BIDS Enterprise Survey (2016) reports the skill composition of workers, both for currently employed workers as well as for projected workers in 2021. Exploiting this information, we develop two scenarios. Under scenario one, share of construction workers remains the same at the current level. Under scenario two, share of unskilled labour gradually decreases across the years, while that of skilled and unskilled workers increase. However, aggregate demand for construction workers increases as the size of construction value added is increasing.

Projecting the Foreign Demand for Construction Labour

Demand for construction labour from Bangladesh in international market is considerable. Our calculation from BMET data shows that the share of construction labour in total expatriate Bangladeshi workers rise from 12.5 per cent in 2010 to 25 per cent in 2015. The total number of construction expatriates grows by 9 per cent during the last five year that translates into a 1.9 per cent per year growth. While projecting the future demand for expatriate construction workers, we assume that this constant growth rate prevails throughput the projection period.

Workers Skill Composition of the Projected Foreign Demand for Construction

Skill level of an expatriate construction worker is higher than an average expatriate worker. According to the most recent year data from BMET, the skill composition of expatriate workers in 2015 stands at as-59 per cent skilled, 40 per cent semi-skilled and only 1 per cent unskilled, which is quite different from the skill composition of all expatriate workers in 2015 where 40 per cent were skilled, 14 per cent were semi-skilled and 45 per cent were unskilled. However, this is consistent with the enterprise level survey on manpower exporters. Unique Eastern (Pvt.) Ltd. sent approximately 49,000 workers abroad during the last two decades. South Point TTC which trains workers for jobs abroad in the construction sector, sent roughly 38,100 workers during the last 10 years. All workers sent through these two firms were either skilled or semi-skilled.

We split the projected demand for expatriate construction workers into three skill groups assuming the 2015 skill composition will remain constant across the projection period. The yearly projection by skill types is reported in Table 3.11. The demand for skilled workers will rise by 10 per cent from 96,265 workers in 2016 to 105,755 in 2021 at the end of the7FYP, and by 18.5 per cent to 114,024 by 2025. The total demand for skilled and unskilled construction expatriates would rise to 174,144 by 2020, and to 191,328 by 2025.

Table 3.11: Projected expatriate construction workers and their skill composition

Year	Number of expatriates	Number of skilled	Number of semi-skilled	Number of unskilled
2016	163,146	96,256	65,258	1,631
2017	166,246	98,085	66,498	1,662
2018	169,404	99,949	67,762	1,694
2019	172,623	101,848	69,049	1,726
2020	175,903	103,783	70,361	1,759
2021	179,245	105,755	71,698	1,792
2022	182,651	107,764	73,060	1,827
2023	186,121	109,811	74,448	1,861
2024	189,657	111,898	75,863	1,897
2025	193,261	114,024	77,304	1,933

Source: Authors' calculation based on BMET data and Ministry of Finance (2016).

Note: The base year is 2015 and the assumed growth rate of expatriate workers is 1.9%, which is obtained exploiting historical data from 2010 to 2014, and is assumed to be constant across the skill group. The skill composition of expatriate construction workers in 2015 is assumed to prevail during the projection period. Skill composition in 2015: skilled 59%, semi-skilled 40% and unskilled 1%.

Following the description presented in the previous section on 10 major construction trades/occupations that expatriate workers choose, we split the projected demand for workers by major trades/occupation, and the estimates are presented in Table 3.12. The projection is done in several steps. In the first step, exploiting the data on total number of expatriate workers by 10 major trades/occupations during the period 2010-2014, we figure out the share of each of these 10 trades/occupations in total number of expatriate workers in the construction sector. Since these major trades together consist of around 85 per cent of the total expatriate construction workers, and the share of unskilled workers is negligible, we split the total number of projected skilled and semi-skilled workers across these major trades by their respective share[4]. For example, projected number of skilled masons for international market in 2016 is 37,296. We get this number by multiplying the total number of projected skilled workers for 2016(96,256, from Table 3.11) by (i) the average

[4] Since the share of unskilled workers is mostly negligible, we exclude the projection for unskilled workers.

share of masons in total number of expatriate workers during the years 2010-2014, which is approximately 46 per cent, and (ii) the share of these 10 major trades in total number of construction sector expatriates, which is 85 per cent. Note that the skill composition of projected demand for workers across various trades is assumed to be at the same level as that for total expatriate construction workers – 59 per cent skilled and 40 per cent semi-skilled. The underlying assumption is that throughout the projection period, the pattern of international demand for Bangladeshi construction workers will remain constant.

The demand for masonry works, painters, pipe fitters and steel fixers is projected to be very high. The projected numbers suggest that the total demand for skilled and semi-skilled masons will rise by 10 per cent, from 62,600 in 2016 to 68,758 in 2021, and by 18 per cent to 74,100 in 2025. The demand for total number of painters will rise from 21,301 in 2016 to 23,403 in 2021 and to 25,233 by the end of the projection period. As a cautionary note, if there is any shock (e.g. technological change or recession) in the destination countries during the projection period, both the types of construction trades/occupations demanded as well as the skill composition of the projected demand might change.

Table 3.12: Projection of demand for expatriate workers by major construction trades

Year	Skill types	Construction Occupations/Trades										
		Mason	Painter	Pipe fitter	Steel fixer	Plumber	Tillers	Plaster mason	Concreter worker	Formworks installer	Rod binder	Total
2016	Skilled	37,296	12,695	2,899	4,579	4,082	3,615	2,723	927	223	227	69,267
	Semi-Skilled	25,286	8,607	1,966	3,104	2,768	2,451	1,846	628	151	154	46,961
2017	Skilled	38,005	12,936	2,954	4,666	4,160	3,684	2,775	945	227	232	70,583
	Semi-Skilled	25,766	8,770	2,003	3,163	2,820	2,497	1,881	640	154	157	47,853
2018	Skilled	38,727	13,182	3,010	4,755	4,239	3,754	2,828	963	231	236	71,924
	Semi-Skilled	26,256	8,937	2,041	3,223	2,874	2,545	1,917	653	157	160	48,762
2019	Skilled	39,463	13,432	3,068	4,845	4,319	3,825	2,881	981	236	241	73,291
	Semi-Skilled	26,755	9,106	2,080	3,285	2,928	2,593	1,954	665	160	163	49,689
2020	Skilled	40,213	13,687	3,126	4,937	4,401	3,898	2,936	999	240	245	74,683
	Semi-Skilled	27,263	9,280	2,119	3,347	2,984	2,643	1,991	678	163	166	50,633
2021	Skilled	40,977	13,947	3,185	5,031	4,485	3,972	2,992	1,018	245	250	76,102
	Semi-Skilled	27,781	9,456	2,160	3,411	3,041	2,693	2,028	690	166	169	51,595
2022	Skilled	41,755	14,212	3,246	5,126	4,570	4,047	3,049	1,038	250	255	77,548
	Semi-Skilled	28,309	9,635	2,201	3,476	3,098	2,744	2,067	704	169	173	52,575
2023	Skilled	42,549	14,482	3,308	5,224	4,657	4,124	3,107	1,058	254	259	79,021
	Semi-Skilled	28,847	9,819	2,242	3,542	3,157	2,796	2,106	717	172	176	53,574
2024	Skilled	43,357	14,758	3,370	5,323	4,746	4,203	3,166	1,078	259	264	80,523
	Semi-Skilled	29,395	10,005	2,285	3,609	3,217	2,849	2,146	731	176	179	54,592
2025	Skilled	44,181	15,038	3,434	5,424	4,836	4,282	3,226	1,098	264	269	82,053
	Semi-Skilled	29,953	10,195	2,328	3,677	3,278	2,903	2,187	744	179	183	55,629

Source: BMET.
Note: Total demand for expatriate construction workers is distributed across 10 trades/occupations. The occupations/trades headings are reported as has been found in BMET data. The calculation is based on the following assumptions: the 2015 skill composition across skilled and semi-skilled category as well as the share of top 10 trades in total demand will remain constant across the projection years.

Projection of Total Demand for Construction Workers

Combining the projected demand for construction workers in the domestic and international market, we obtain the total projected demand for construction workers for the period of 2016-2025. The numbers presented in Table 3.13 show that total demand for construction workers will rise from 3.34 million in 2016 to 4.04 million in 2020, which will further increase to 5 million in 10 years by the end of 2025. Under scenario two, which realistically captures the potential technological change, the demand for skilled and semi-skilled construction labour will rise from 2.42 million to 2.98 million, and by the end of 2025 it will rise by another 0.74 million to reach at 3.72 million. Note that 85 per cent of the total demand for skilled and semi-skilled construction workers will come from the domestic economy.

Table 3.13: Projection of total demand for construction workers

Year	Scenario one: skill composition in domestic economy does not change			Scenario two: skill composition in domestic economy changes			
	Total skilled (million)	Total Semi skilled (million)	Total unskilled (million)	Total skilled (million)	Total Semi skilled (million)	Total unskilled (million)	Total (million)
2016	1.10	1.32	0.91	1.10	1.32	0.91	3.34
2017	1.15	1.39	0.96	1.19	1.40	0.91	3.50
2018	1.21	1.45	1.00	1.24	1.47	0.96	3.66
2019	1.26	1.52	1.06	1.30	1.54	1.00	3.84
2020	1.33	1.60	1.11	1.37	1.62	1.06	4.04
2021	1.40	1.68	1.17	1.44	1.70	1.11	4.25
2022	1.46	1.77	1.23	1.50	1.78	1.17	4.46
2023	1.53	1.85	1.29	1.57	1.86	1.22	4.66
2024	1.59	1.92	1.34	1.64	1.94	1.28	4.85
2025	1.65	2.00	1.39	1.70	2.02	1.33	5.04

Source: Authors' calculation.
Note: The projected labour demand for the domestic sector, as reported in Table 3.10 and projected demand for expatriate labour, as reported in Table 3.13, are added up to derive the projected total demand for construction workers by year.

Projection of Total Demand for Construction Workers by Trades/Occupations

We split the yearly projection for construction workers into trades/occupations and skill categories for the period 2016-2021, as presented in Table 3.3A in the annex. Based on the information obtained from 13 surveyed project sites, we obtain broad trades/occupation categories as well as share of employment under each of these trades/occupations. Utilising these proportions along with projected demand by skill categories, as reported in Table 3.13 above, we obtain projected demand by trades/occupations under each of the skill categories. The estimation procedure is explained in detail in the annex.

The data reveal that projected labour demand under each occupation/trade category will require some form of skill. Majority of the workers under each occupation/trade, except few cases, are skilled. Trades/Occupations such as machine operator, lift-mechanic, welder, site engineers, foreman, labour-sarder, carpenter, head mason, head-mistry and casting mistry will require completely skilled labour while the semi-skilled workers will mainly concentrate in the trades/occupations such as mason, plumbers, painters, rod binders, tiles fixer, and electrical wireman. On the other hand, unskilled workers will mainly work as helper/labour in most of the production stages[5], as almost every stage requires some form of helpers. However, note that almost 50 per cent of the labour in construction sector is employed as helper/labour and most of these jobs will require some form of skill acquisition. As caveat, similar to the demand projection reported above, this projection is based on a number of assumptions, e.g., constant technology.

3.5.2 Projection of the Future Supply of Construction Workers

Although the working age population in Bangladesh is growing at a faster rate than the population growth rate due to higher share of relatively youth group, it is critical to evaluate if there will be adequate supply to meet the rising demand for workers by the construction sector. The potential supply for construction labour will comprise of several components: existing workers in the construction sector, new entrants in the labour force, and inter-sectoral shift of labour in and out of construction. For simplicity and being conservative, we assume that there will not be any shift out of construction sector. We combine information from several sources to generate an estimate of aggregate supply of workers. The detail estimation procedure is described below and numbers obtained are reported in Table 3.14.

BBS (2011) provides population projection by year and age group for a long time period that covers our projection period 2016-2025. It provides us with a projection of working age population (age 15-64) and the growth rate of working age population by year. The data based on Ministry of Finance (2016 b) show that roughly 61.4 million people aged 15 and above are in the labour force in 2015,out of which 58.7 million are employed.

[5] Some unskilled workers are also found to work as rod binders.

The 2013 LFS data suggest that approximately 3.35 per cent of the labour force, which is around 2.14 million people, is employed in the construction sector. We start from 2013 and assume that the labour supply for the construction will grow by two factors: (i) growth rate of working age population, and (ii) availability of labour shifted from farm-sector to non-farm sector to work in the construction sector. The data from the LFS, 2006 and Ministry of Finance (2016 b) reveal that yearly 0.45 per cent of the employed labour force are shifted from the farm sector to work in the non-farm sector[6]. In number, this stands at around 0.27 million workers per year. We assume that they will be fully available towork in the construction sector[7]. Combining these two factors, we estimate the supply under two different scenarios.

The estimates suggest that labour supply for the construction sector will grow from 3.14 million in 2016 to 4.35 million by 2020 and will reach at a level in the range of 6.12-6.39 million by the end of 2025. Matching this with the aggregate demand estimates, derived in the previous section, it seems that, in general, labour supply will not be a serious problem at the aggregate level - there will be adequate labour force to serve the construction sector. However, in the short term, 2016-2018, the sector might experience some shortage in small magnitude at the aggregate level (in the range of 0.07-0.327 million). Overtime, there will be surplus labour which may reach around 1 million by the end of 2025.

Table 3.14: Projection of supply of construction workers

Year	Population in 15-64 age group	Growth rate of working age population	Aggregate supply of construction workers		Aggregate demand	Surplus/ Shortage	
			Scenario 1	Scenario 2		Scenario 1	Scenario 2
	Million population	(%)	Million population				
2016	94,174	2.56	3.14	3.14	3.34	-0.20	-0.20
2017	96,664	2.81	3.50	3.23	3.50	0.00	-0.27
2018	99,146	2.75	3.87	3.60	3.66	0.20	-0.07
2019	101,680	2.67	4.24	3.97	3.84	0.40	0.13
2020	104,540	2.59	4.62	4.35	4.04	0.58	0.31
2021	107,414	2.33	5.00	4.73	4.25	0.75	0.48
2022	110,280	1.44	5.34	5.07	4.46	0.88	0.61
2023	113,136	1.42	5.68	5.41	4.66	1.03	0.76
2024	115,768	1.39	6.03	5.76	4.85	1.18	0.91
2025	117,430	1.37	6.39	6.12	5.04	1.34	1.07

Source: Authors' calculation based on BBS(2011), LFS 2005-06, 2013, and MOF (2016).

Note: We project the supply under two scenarios: in the first, we assume labour supply will grow by the rate of growth of working age population and newly released labour from farm sector, while, in the second scenario,we assume that construction labour will grow by the growth of working age population. Yearly around 0.27 million labourers are released from the farm sector to work in the non-farm sector. We assume that all of them will be available to work in the construction sector. The labour demand figures are reported from the Table 3.13 to facilitate an assessment of demand supply matching.

3.5.3 Training for Skill Development

This section derives the training need for workers in the construction sector being consistent with the demand scenario presented above. The following discussion then assesses the training capacity in existing technical and vocational institutes on construction related trades to draw a picture on adequacy of training system and opportunities for skill development of construction workers of the country.

Demand for Training

The projection analysis on demand presented above would help project the training need of the workers in construction sector. Following the demand analysis, the training need will come from two sources: training

[6] The share of farm-sector labour in total employed labour force shrinks by 4.7 per cent, from 48.1 per cent in 2005-06 to 43.9 per cent in 2015 that suggests a yearly reduction of 0.47 per cent..

[7] Every year at most around 0.27 million workers will be released from the farm sector to work in the construction sector.

demand from expatriate construction workers, and training demand from construction workers in the local market. We assume that all skilled and semi-skilled workers who will migrate abroad will need training while in the domestic sector the flows- the additional new entrants in a given year in the construction sector in the skilled and semi-skilled category will need training.

Table 3.15 reports the yearly projection on number of workers, by skill category, that need to be trained. We assume that only skilled and semi-skilled workers need to be trained as there will always be demand for some unskilled workers who will mostly perform as helper/labour types of work. As such, the unskilled workers will not need any training and they will mostly gain from "learning by doing."In the next five years(by 2021), 1.22 million workers will need to be trained; 54 per cent of them would be trained as skilled workers. In the next 10 years, 1.6 million workers, in addition to the figure stated above, will have to be trained,with 53 per cent as skilled and 47 per cent as semi-skilled workers. The yearly average training need in the next 10 years will stand at around 0.284 million.

Table 3.15: Number of workers who will need training by year

Year	Skilled workers	Semi-skilled workers	Total Skilled and Semi-skilled workers	Share of Skill training demand by workers going abroad	
				skilled	semi-skilled
2017	178,085	136,498	314,583	0.55	0.49
2018	149,949	137,762	287,711	0.67	0.49
2019	161,848	139,049	300,897	0.63	0.50
2020	163,783	150,361	314,144	0.63	0.47
Total Training Need in 5 Years			1,217,335		
2021	175,755	151,698	327,453	0.60	0.47
2022	177,764	153,060	330,824	0.61	0.48
2023	169,811	154,448	324,259	0.65	0.48
2024	171,898	155,863	327,761	0.65	0.49
2025	174,024	147,304	321,328	0.66	0.52
Total training need in 10 years			2,848,960		

Source: Authors' calculation.
Note: The base year is 2016. Aggregate training need is calculated including both local demand and demand from abroad. We assume that all expatriate workers under skilled and semi-skilled category will need training while the projected addition in demand for skilled and semi-skilled workers (flow of workers) between period t and t+1 will need training. The last two columns report what fraction of the aggregate training need will be exploited by the expatriate workers.

Note that more than 60 percent of the workers who will receive training, in skilled categories will work abroad as expatriates. In contrast, less than 50 per cent of workers who will be trained as semi-skilled workers will migrate outside the country. This is expected if return to skill-training is higher in foreign countries.

Capacity for Training

The Technical and Vocational Education and Training (TVET) in Bangladesh comprises training at three broad levels: (a) Diploma in Engineering, (ii) SSC and HSC level vocational degree, and (iii) short-term training with a duration ranging from few weeks up to one year. Tabel 3.5A TVET system in Bangladesh suggests that there are approximately 7,770 TVET institutes at present with a capacity to train around 0.71 million trainees in a year at various levels,in various trades/technologies. The diversity of trades/technologies in the TVET system is reported in Table 3.6A.One of the most popular courses in the TVET system is the 3-6 month long basic trade course of 360 hours with some 0.16 million students registered in around 2,000 BTEB affiliated institutes. In recent years, TVET system gains popularity. Student admission in TVET system rises from 0.2 million in 2008-09 to 0.56 million by 2015-16, an increase of 124 per cent, i.e., a yearly growth of approximately 16 per cent(DTE, 2016). The private share in the TVET system is 67 per cent with relatively larger share for short-term and certificate courses.

[8] Types of institutions involved are: Polytechnic, Technical school and college, Glass and ceramic, Graphic Arts, Survey Institutes, TTC, Textile institutes, Textile vocational, Agricultural training institute, Marine Technology, SSC Vocational, HSC Vocational and HSC business management (BM). Total number of institutions was 147 in 1995, 2314 in 2003, and 7700 in 2016; total students were 39,650 in 1995, 45,965 in 2003 and 716,990 in 2016. On average, 92 students per institution. Female students share was approximately 24 per cent of total enrolment.

Although information on total TVET training capacity and enrolment is available, such information by trades in construction sector is not available for most of the cases. In order to figure out the proportion of the total candidates who are participating in training on construction related trades, we exploit information on training capacity and enrolment by types of trades from various types of institutes, and derive an estimate of the total training need.

First, from Table 3.5A and Table 3.6A, we identify what courses under TVET are relevant for generating skill-employment in construction sector. Then we identify what trades/technologies under each course fall within the domain of the construction sector. We identify seven courses including Diploma in Engineering, HSC (Vocational), SSC (Vocational), Dakhil (Vocational), Skill Certificate Course, Certificate-in-Vocational Education, National Skill Standard II and III, and National Skill Standard Basic 360 hours that offer construction related trades. At the combined level, 3,205 institutes offer these courses and have a current capacity to train around 0.3 million people. Although the probability of diploma engineers to work in the local construction sector as workers is extremely thin, they are very likely to migrate abroad as highly skilled workers.

Second, the potential training capacity for construction related trades under each of these courses is identified in the next step. The results are presented first in Table 3.16 with a following discussion on estimation procedure starting with Diploma-in-Engineering.

Table 3.16: Total training capacity in civil/construction related courses

Course name	Number of Institutes	Seat capacity	Number of trades		Approximate seat capacity in construction related courses
			Total	Construction	
Diploma-in-Engineering	465	81,200	32	2	11,774
HSC(Vocational)	64	8,370	15	3	1,674
SSC(Vocational)	2,371	190,120	35	6	20,913
Dakhil (Vocational)	285	18,300	35	6	3,137
Skill Certificate Course	01	200			80
Certificate-in-Vocational Education	1	180	8	3	68
National Skill Standard II	09	3,780	22	6	1,031
National Skill Standard III	09	3,780	22	6	1,031
National Skill Standard basic 360 hours	2,199	157,040	38	10	50,677[9]
Total	3,205	305,930			90,385

Source: Authors' calculation based on BTEB, DTE, and BMET data.
Note: This table presents approximate number of construction related trades, number of trainees against each of the vocational course to derive the total training capacity in construction related trades/occupations. Except for skill certificate courses, the training capacity is explained in the following section. For skill certificate course, we do not have information; so we assume that 40 per cent of the total capacities are in construction related courses.

(i) We analyze the Department of Technical Education (DTE) data, as presented in Table 3.17, which reveals that in 114 polytechnic and technical colleges, 8,400 candidates may be trained in any of the three technologies related to civil construction, which is 14.5 per cent of the total capacities of 57,780 trainees[10] . Imposing this rate on the total seat capacities of 81,200 in 465 institutes, we find that 11,774 can be equipped with diploma level training in civil/construction.

9 Although 2,146 private sector TTCs can offer construction related trade courses for 40,102 trainees, once we include TTCs under BMET offering National Skill Standard(NSS) basic 360 hours courses, total seat capacity under this category has been inflated by 10577.

10 First shift exists in all of the 50 Polytechnic Institutes and 64 Technical School and Colleges under DTE, while 2nd shift system mostly exist in the polytechnic institutes.

Table 3.17: Total seat capacities in diploma in civil/construction engineering in institutes under Department of Technical Education (DTE)

Technology	Capacity			%of Total
	Shift One	Shift Two	Total (Shift 1+Shift 2)	
Civil	3,900	3,540	7,440	12.88
Civil wood	60	60	120	0.21
Construction	420	420	840	1.45
Total of Civil, Civil(Wood) and Construction	4,380	4,020	8,400	14.54
Total Seat Capacities	32,340	25,440	57,780	100.00

Source: Department of Technical Education.
Note: the purpose of this exercise is to calculate the construction share of total trainees in 114 polytechnic institutes under DTE, which will then be used to extrapolate the construction share at the Diploma in Engineering(Civil/Construction) level in 465 institutes. Although Civil Wood is partially related to construction, we still include it, and accordingly the estimates are on the upper side.

(ii) We exploit training capacities in construction related trades in 64 Technical schools and colleges (TSC) under DTE to measure the construction share in SSC (vocational) and Dakhil (vocational). As Table 3.18 shows, these institutes together have a capacity to train 33,846 trainees in various trades, out of which 4 per cent can take training in building maintenance, civil construction, plumbing and pipe fitting, 8 per cent in welding and fabrication, and another 17 per cent can take training in general electrician/electrical machine/maintenance. Since training in electrical trades is applicable in many industries, if we assume that one-third of the electricians trained will work in the construction sector, at most 17% of the total capacity would be utilised to cater to the need of the construction sector[11]. Applying this proportion to total seat capacities, it seems that 20,913 at SSC(vocational) and 3,137 at Dakhil (vocational) level will be trained, at maximum, in the construction related trades.

Table 3.18: Training capacity in government TSCs

Trades/Occupations	Grade Nine	Grade Eleven	2nd Shift	Total	Percentage
Building maintenance/civil construction/plumbing & pipe fitting	425	425	425	1,275	4.0
Welding	874	874	874	2,622	8.0
General electrician/ electrical machine maintenance	1,913	1,913	1,913	5,739	17 .0
Total capacity in all trades	11 ,282	11 ,282	11 ,282	33 ,846	
Total in construction	1,930	1,930		3,861	11 .0

Source: Authors' calculation based on data from DTE website (Available at http://www.techedu.gov.bd/).

Note: The purpose of the above Table is to calculate the construction share of total trainees in 64 TSCs, which will then be used to extrapolate the construction share at the SSC/Dakhil(vocational) level. The number for potential trainees in 64 TSCs to be absorbed at the construction sector is calculated as the sum of all workers to be trained in building maintenance/civil construction/plumbing and pipe fitting, all in Welding, and one-third of the trainees in general electrician/electrical machine/maintenance. The percentage column reflects what fraction of all trainees is trained in each trade/occupations

(iii) For HSC (vocational), Certificate-in-Vocational Education, National Skill Standard II & III, we translate the total seat capacity into construction related capacity following the proportion of construction related trades in total number of trades offered[12]. This indicates that 1,674 from HSC(vocational), 1,031 from each of the National Skills Standard II & III, and 68 from vocational education will be trained for occupations in the construction sector[13].

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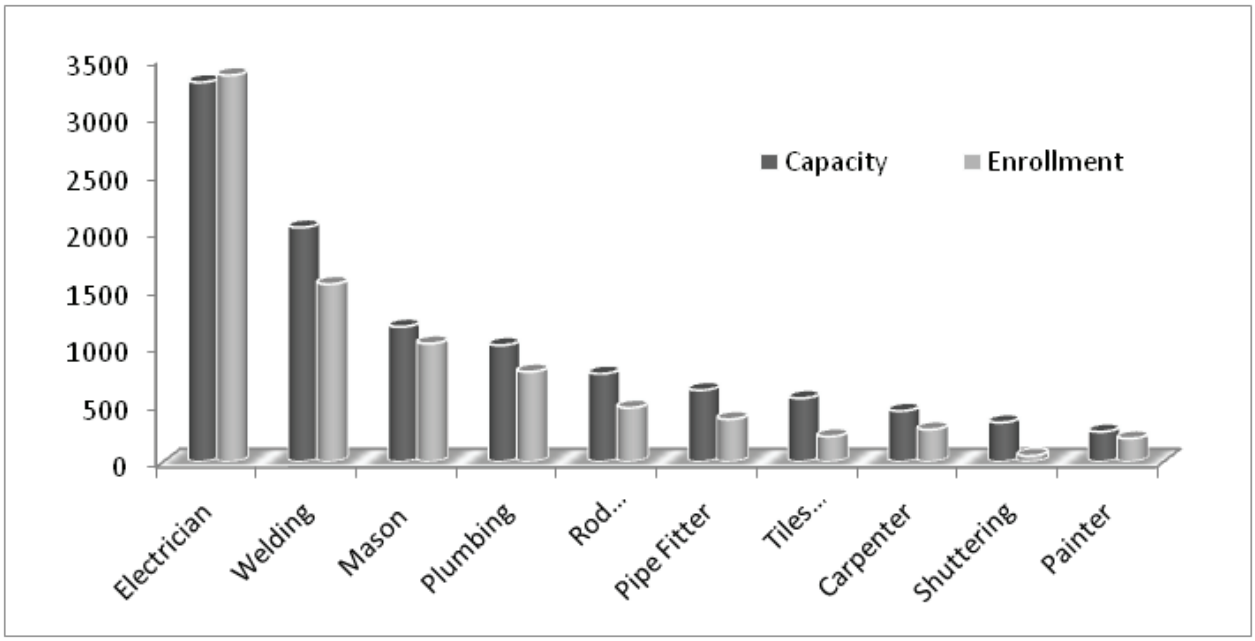
[11] Workers trained at the HSC above level will not be suitable for worker-level jobs in the local construction sector but they are still suitable to take jobs abroad in various skilled trades.

[12] For HSC(voc.) we could have applied the rate obtained from TSCs data, as presented in Table 3.18. But the method that has been actually applied, as noted in (iii), generates a higher estimate.

[13] For skills certificate courses, since the total number of trades are not available, we assume that roughly 40 % will train in the construction sector.

We utilise the BMET data to approximate the share of construction related trades in Basic National Skill Standards 360-hours short courses. There are approximately 53 public TTCs under BMET that provide various short-term training in 46 different trades. Exploring information on 39 TTCs, excluding those specialised in marine technology or exclusively targeting the female, we gather information on training capacity and enrolment in several construction related trades. As Figure 3.7 shows, the top five trades in terms of seat capacity and number of enrolment are electrical works, welding, masonry jobs, plumbing, and rod binding. Table 3.7A in the annex reveals that almost one third of the capacitieslie in electrical trades,only a fraction of whom may work in the construction sector. The total capacity by trade and number of institutes offering the trade have been translated into average seat capacity per trade per institute, which will later be utilised to derive the approximate number of training capacities in construction related short trades courses in all public and private institutes.

Figure 3.7: Capacity and enrolment in public TTCs by construction related trades



Source: Authors' calculation based on data collected from TTCs.
Note: The graph above exploits information collected from 39 TTCs under BMET on types of trades/occupations in which they provide training, and capacity/enrolment.

(iv) There are 2,146 private institutes registered under BTEB that offer National Skill Standard (Basic) 360 hour courses in various trades[14]. As Table 3.19 shows, 13 per cent of these institutes offer at least 1 trade course related to construction. The statistics on course offering by institutes suggests that 10 per cent offer courses in electrical house wiring, 5 per cent in plumbing and pipe-fitting, 4.7 per cent in different types of welding, and 2.9 per cent in masonry and rod binding. Approximating by the average seat capacity per construction related trade in TTCs under BMET, we derive that yearly around 40,000 workers can be trained to work in the construction sector. Note that this estimate is on the high side since we are not sure exactly what fraction of those trained in welding and electrical works will remain in construction.

[14] We identified few other arrangements for such short-duration training courses that we tried to utilise in our analysis as much as possible. For example, BACI has proposed a business plan to train a total of 13,005 trainees in 11 trades with a duration of 2-3 months in three years- 2,600 trainees (20 per cent of the total number of trainees) in the first year, 4,552 (35 per cent) and 5,853(45 per cent) in the second and third year respectively.

Table 3.19: Private institutes offering construction related courses

Trades/ occupations	Number of TTCs offering the course	Percent of TTCs providing training	Approximate training capacity
Electrical house wiring	216	10.07	19,224
Plumbing	1	0.05	63
Plumbing and Pipe fitting	107	4.99	6,229
Welding 4g	14	0.65	1,094
Welding 6g	10	0.47	782
Welding and fabrication	78	3.63	6,096
Masonry and rod binding	64	2.98	4,948
Tiles setting	17	0.79	1,336
Carpeting	6	0.28	330
Total			**40,102**
Number of institutes offering construction related courses			283
Total number of institutes			2,146

Source: Authors' calculation based on BTEB and BMET provided data.

Note: Trades/occupations are as obtained from the data source. The second column shows how many TTCs out of a total of 2,146 private TTCs offer construction related courses. The last column reports training capacity under each trade/occupations. Assuming the average training capacity in the corresponding or related trade/occupation offered in TTCs under BMET, we extrapolate the approximate total training capacity in all private institutes.

Combining all these estimates derived in columns i-v in Table 3.16 reveal that the total capacity of TVET system to train in construction related trades/technologies is 90,385 per year. Note that the utilisation of the seat capacity is highly uncertain. The average capacity utilisation rate for trades offered by BMET affiliated TTCs, as can be seen from Table 3.7A, vary in the range of 19 per cent for shuttering to 96 per cent for electrician[15]. If we assume the average capacity utilisation of 78 per cent in these TTCs, the available training capacity for the construction sector is at most 70,500 per year[16].

Comparing the training capacity with the projected demand scenario, reported in Table 3.15 indicates that this will only satisfy 25 per cent of the training need for 2017. Assuming that training capacity will grow by 10 per cent and 20 per cent and mapping this with the projected demand presented in Table 3.20, we provide a projection of shortage in training capacity. The clear message from this analysis is: the current set-up with moderate growth in training will not be adequate for meeting the demand for skilled and semi-skilled workers in the construction sector.

[15] The utilisation rate is also high for welding, plumbing, and masonry related jobs.

[16] For simplicity, we assume a 100% employability rate of the trained individuals in the construction sector.

Table 3.20: Adequacy of training capacity and demand for training by year

Year	Total number of workers who will need skill training	Projected training capacity assuming different growth rates	
		10% growth	*20% growth*
2016		70,500	70,500
2017	314,583	77,550	84,600
2018	287,711	88,407	101,520
2019	300,897	100,784	121,824
2020	314,144	114,894	146,189
Total in 5 Years	**1,217,335**	**381,635**	**454,133**
2021	327,453	130,979	175,427
2022	330,824	149,316	210,512
2023	324,259	170,220	252,614
2024	327,761	194,051	303,137
2025	321,328	221,218	363,765
Total in 10 Years	**2,848,960**	**1,247,419**	**1,759,588**

Source: Authors' calculation.
Note: For simplicity, we combine the skilled and semi-skilled categories. The base year is 2016 when the effective training capacity is 70,500. The projection on training capacity for the period of 2017-2025 is based on the assumption of two different growth rates – 10 per cent and 20 per cent. The training capacity for the base year is calculated by multiplying the total training capacity (Table 3.16 shows that the total training capacity in 2016 is 90,385) by the average capacity utilisation rate of 78 per cent.

3.6 Concluding Remarks

The most important observations revealed by survey of enterprise are the following:

- During the period of 2000-2016, construction sector went through a significant technological change like introducing tilling, electric rode and wall cutting, imported windows and doors, ready mix, excavator, aluminum framework, cranes, etc. Such changes also demanded more and more skilled workers. Presently, there is a skilled worker shortage in all trades, especially in plumbing, electrical works, masonry, rod binding, painting, tiling etc. In the next 5 years, further technological advancements will permeate production processes in the sector and the total demand for skilled worker will increase more. In the next 5-10 years, skilled worker demand will increase not only for operating small cranes in building construction, but also masons, plumbers, electrical mechanics, rod-binders, painters, tillers, shuttering worker, etc.

- The projected demand suggests that aggregate demand for construction workers will rise by approximately 28 per cent, from 3.2 million in 2016 to 4.1 million by the end of 7FYP period. By 2025, the aggregate demand for construction worker will reach at 4.9 million, growing by 59 per cent from the level projected for 2016. Combining with the demand for construction workers in the international market, total demand for construction workers will rise from 3.34 million in 2016 to 4.04 million in 2020, increasing further to 5 million by the end of 2025.

- Matching the projected working age population with the aggregate demand estimates, we find that, in general, labour supply will not be a serious problem at the aggregate level. However, skilled workers will be a concern. The findings from the enterprise survey suggest that in 2016, an average building construction will involve 31.7 per cent skilled workers, 31.8 per cent semi-skilled workers and 28.6 per cent unskilled workers. This composition needs to evolve into the pattern dictated by technological change involving 37 per cent skilled workers, 41 per cent semi-skilled workers and 22 per cent unskilled workers in 2021.

- We assume that only the skilled and semi-skilled segments of the construction workers need to be trained, as there will always be demand for some 35% unskilled workers who are likely to perform as helpers/low skilled workers. As such, the unskilled workers will not need any training and they will

mostly gain from “learning by doing.”In the next five years (by 2021), 1.22 million workers will need to be trained, 54 per cent of them would be trained as skilled workers. In the next 10-year horizon, additional 1.6 million workers are to be added to the figure stated above. Thus, by 2025, composition of the training need will be divided between 53 per cent skilled and 47 per cent semi-skilled workers. The yearly average training need in the next 10 years will stand around 0.284 million. This may be contrasted with the available training capacity of at 70,500 per year for the construction sector, indicating the enormous challenge of the skill formation for this sector alone.

- Comparison of the training capacity with the projected demand for skills indicates that only 25 per cent of the training need for 2017 may be satisfied with the existing arrangements. This signals severe shortage in training capacity. The clear message from this analysis is: the current set-up with moderate growth in training will not be adequate to meet the demand for skilled and semi-skilled workers in the construction sector in the medium-term. A major rethinking by way of investing in schooling and skilling of the labour force is needed to meet the growing domestic and foreign demand for construction workers and thereby remove one of the key binding constraints to accelerate economic growth in the next decade.

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Annex Tables

Table 3.1 A: Level of education of construction and manufacturing sector

Education status	LFS 2013		
	Construction	Manufacturing	All sectors
Below primary	22.8	13.2	16.5
Primary	33.5	34.5	27.0
JSC	15.3	19.0	19.6
SSC	15.1	19.0	20.0
HSC & above	12.5	13.9	16.3
others	0.8	0.4	0.6
Total	100.0	100.0	100.0
Sample	1,762,034	8,575,834	76,574,511

Table 3.2 A: Received training of construction and manufacturing sector employees

Received training	LFS 2013		
	Construction	Manufacturing	All sectors
Yes	7.4	8.5	5.4
No	92.6	91.5	94.6
Total	100.0	100.0	100.0
Sample	2,143,523	9,500,407	106,265,152

Table 3.3 A: Share of trades/occupations in each skill category

Occupation/ trades	Skilled	Semi -skilled	Unskilled
	percent		
Carpenter	2.0		
Casting Mistry	0.0		
Engineer	0.0		
Foreman	4.0		
Head Mason	0.0		
Head Mistry	1.0		
Helper/Labour	31.0	92.0	100.0
Lift Mistry	1.0		
Machine operator	0.0		
Mason	23.0	2.0	
Painter	7.0	1.0	
Plumber	3.0	1.0	
Rod Binder	14.0	3.0	0.1
Labour -Sarder	1.0		
Tiles Fixer	7.0	1.0	
Welder	2.0		
Electrical Wireman	4.0	1.0	
Total	100 .0	100 .0	100 .0

Source: Authors' calculation based on construction enterprise survey(BIDS, 2016).
Note: The enterprise survey elicited information on labour-days in each of the occupation/trades and what proportion of labour are skilled in each of the trades/ occupations. We convert this information into share of trade/occupation in each skill category.

Annex-2

Projection of Labour Demand by Occupation/Trades: Estimation Procedure

We combine the survey data provided by the enterprises to project the yearly labour demand by trades/ occupations in the construction sector. The results are reported in Table 3.4A, and to explain the numbers reported there, the estimation procedure is detailed out below.

Step One: Based on the information obtained from 13 surveyed project sites, we obtain broad trades/occupation categories as well as proportion of labour under each trades/occupations, which is already discussed in section 3.4 and aided with Figure 3.3.

Step Two: We exploit the information on the skill composition of the men-days employed in 13 project sites surveyed. Firms reported what proportion of employed labour-days is skilled, semi-skilled and unskilled under each trades/occupations. We translate this into information on share of occupation/trades under each of the skill category- skilled, semi-skilled and unskilled, as reported in Table 3.3A.

Step Three: Utilising these proportions obtained in step two with projected demand by skill categories, as reported in Table 3.13 in section 3.5, we obtain projected demand by trades/occupations under each of the skill categories. Precisely speaking, we apply the following formula to derive the employment figures.

$$E_{jst}=P_{jst} * D_{jst,}$$

whereE_{jst} is employment in "j^{th}"trade/occupation in skill category "s" in year t, P_{jst} tis the proportion of the employed workers in skill category "s", in trades/occupation "j" in year "t" while D_{st} is the projected demand for workers in skill category "s" in year "t". The first component is drawn from step 3 while the second is drawn from Table 3.13.

Table 3.4 A: Yearly projection of workers by skill categories and trades/occupations

	Skilled workers (in '000)						Semi-skilled workers (in '000)						Unskilled workers (in '000)					
Trades/Occupation	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021
Carpenter	19	21	22	23	24	25												
Casting Mistry	2	2	2	2	2	3												
Engineer	4	4	4	5	5	5												
Foreman	39	43	44	47	49	52												
Head Mason	0	0	1	1	1	1												
Head Mistry	14	16	16	17	18	19												
Helper/Labour	339	367	382	401	422	444	1214	1288	1352	1416	1490	1563	909	909	959	999	1058	1109
Lift Mechanic/ Mistry	10	11	12	12	13	14												
Machine operator	5	6	6	6	7	7												
Mason	257	278	290	304	320	337	25	26	28	29	30	32						
Painter	82	89	93	97	103	108	12	13	14	14	15	16						
Plumber	28	30	31	33	34	36	7	7	8	8	9	9						
Rod Binder	150	162	169	177	187	196	41	43	45	48	50	52	1	1	1	1	2	1
Labour Sarder	7	8	8	8	9	9												
Tiles Fixer	76	82	85	89	94	99	12	13	14	14	15	16						
Welder	22	24	25	26	27	29												
Electrical Wireman	44	48	50	53	55	58	9	10	10	11	11	12						
Total	1100	1190	1240	1300	1370	1440	1320	1400	1470	1540	1620	1700	910	910	960	1000	1060	1110

Source: Authors' calculation based on construction enterprise survey (BIDS, 2016).
Note: 2016 is the baseline while 2017-2021 is the projection period. Estimation procedure is explained in Annex-2.

Table 3.5 A: Number of Institutes and Seat Capacity by BTEB Course Curriculum

Course name	Duration	Number of Institutes	Seat Capacity
Diploma-in-Technical Education	1 Year	01	120
Diploma-in-Vocational Education	1 Year	01	80
Diploma-in-Engineering	4 Year	465	81,200
Diploma-in-Textile Engineering	4 Year	130	12460
Diploma-in-Agriculture	4 Year	185	12910
Diploma-in-Fisheries	4 Year	49	2538
Diploma-in-Forestry-in-service		2	50
Diploma-in-Forestry	2/3 Year	1	50
Diploma-in-Health Technology	3 Year	226	23,040
Diploma-in-Medical Ultrasound	1 Year	18	720
Diploma-in-Animal Health and Production Technology	2 Year	03	400
HSC (Business Management)	2 Year	1805	189880
HSC (Vocational)	2 Year	64	8370
Diploma-in-Commerce	2 Year	07	616
SSC (Vocational)	2 Year	2371	190120
Dakhil (Vocational)	2 Year	285	18300
Certificate-in- Marine Trade course	2 Year	01	160
Skill Certificate Course	01 Year	01	200
Certificate-in-Vocational Education	1 Year	1	180
Certificate-in-Health Technology	1 Year	156	8010
Certificate in Poultry Farming	1 Year	01	30
Certificate in Animal Health & Production	1 Year	01	30
Certificate-in-Medical Ultrasound	6 month	14	420
National Skill Standard II	1 Year	09	3780
National Skill Standard III	1 Year	09	3780
Professional Diploma-in-Automobile	6 month	01	40
National Skill Standard basic 360 hours	360 hours (3-6 month)	1963	157040
		7770	714524

Source: BTEB and DTE.
Notes: Courses in bold are relevant for generating employment in construction sector.

Table 3.6A: Construction related trades courses offered, duration of the courses, and entry require ment by TVET institutes under BTEB

Duration of course	Name of the Courses	Entry qualification	Trade/ Technology
4 Years	Diploma in Engineering	SSC or Equivalent	Architecture and Interior Design, **Construction,** Garments Design and Pattern Making, Environmental, Instrumentation and Process Control, Mechatronics, Mining and Mine Survey, Telecommunication, Architecture, Civil (Wood), Computer, Electrical, Electronics, Food, Mechanical, Power, Refrigeration and Air-conditioning, Ceramic, Glass, Surveying, Marine, Shipbuilding, Aircraft Maintenance (Aerospace), Aircraft Maintenance (Avionics), Automobile, Chemical, **Civil**, Data Telecommunication and Networking, Computer Science and, Electro-Medical, Printing, Graphic Design
	Diploma in Agriculture	SSC or Equivalent	Agriculture
	Diploma in Textile	SSC or Equivalent	Yarn Manufacturing , Fabric Manufacturing , Wet Processing , Garments & Clothing
	Diploma in Fisheries	SSC or Equivalent	Fisheries
	Diploma in Jute Technology	SSC or Equivalent	Jute
4 Years	Diploma in Health Technology & Services	SSC or Equivalent	Medical , Dental, Laboratory, Physiotherapy , Radiology and Imaging , Pharma , Patient care , Integrated Medical
	Diploma in Forestry	SSC or Equivalent	Forestry

Duration of course	Name of the Courses	Entry qualification	Trade/ Technology
2 Years	SSC &DakhilVocational	Class VIII or Equivalent	Agro Based Food, GeneralElectronics,Automotive,**BuildingMaintenance**,WoodWorking,Ceramic,**CivilConstruction**,Computer& Information Technology,**Civil Drafting with CAD**,Mechanical Drafting with CAD,DressMaking,Dying, Printing and Finishing,Electrical Maintenance Works,FarmMachinery,Fish Culture and Breeding,Food Processing and Preservation,GeneralMechanics,Livestock Rearing and Farming,Machine Tools Operation,Poultry Rearing and Farming,Patient Care Technique,General Electrical Works,**Plumbing and Pipe Fitting**,Refrigeration and Air-conditioning,Glass,Fruit and Vegetable Cultivation,Weaving,**Welding and Fabrication**,**Architectural Drafting with AutoCAD**,Knitting,Shrimp Culture and Breeding,
	SSC Vocational (Textile)	Class VIII or Equivalent	Dress Making,Dying Printing and Finishing,Weaving,Knitting
	HSC Vocational	SSC or Equivalent	Agro-Machinery,Automobile,**Building Maintenance and Construction**,Clothing and Garments Finishing, Computer Operation and Maintenance,**DraftingCivil**,**Electrical Works and Maintenance**,Electronic Control and Communication,Fish Culture and Breeding,Machine Tools Operation and Maintenance,Poultry Rearing andFarming,Refrigeration and Air-conditioning,**Welding and Fabrication**,Industrial Wood Working,WetProcessing,Yarn and Fabric Manufacturing
	HSC BM	SSC or Equivalent	Accounting,Banking,ComputerOperation,EntrepreneurshipDevelopment,Secretarial Science
	Diploma in Commerce	SSC or Equivalent	Secretarial Science,Accounting
1 Year	Diploma in Medical Ultrasound	MBBS	Medical Ultrasound
	Certificate in Vocational Education	SSC or Equivalent	Electrical, Automotive, Refrigeration,Radio-TV, **Carpentry, Machinist, Welding**, Farm Machinery
	Certificate in Health Technology & Services	SSC or Equivalent	Medical , Dental, Laboratory, Physiotherapy , Radiology and Imaging , Pharma , Patient care , Paramedical
3 or 6 Months	Basic Trade	Class VIII or Equivalent	Auto Mechanics,ARCWelding,ARC& Gas Welding,**Building and Architectural Drafting**,ComputerOperator,**Electrical House Wiring,**Aminship,Acting&Presentation,**Masonry And Rod Binding, Rod Binding andMasonry**,ApparelMerchandising,Work Study Production Planning & Control for Apparel Manufacturing, **Drafting Civil**, Bash Bate And PatiShilpo,Pastry And Bakery Production,Travel Tour Operation,**Welding**,Driving Cum Auto Mechanics,Interior Decoration (Gypsum Decoration),**Welding And Fabrication**,HairDressing,Certificate in Pattern Making,SecretarialScience,B**uilding and Architectural Drafting with Auto Cad**,Computer Office Application,Hardware And Networking,ComputerProgramming,DatabaseProgramming,Graphics Design and Multimedia Programming,ShipFabrication,**Welding 4g,Welding 6G**,Industrial Swing Machine and Maintenance,Tig And Mig,**Tiles&Setting**,Air Hostess & Cabin Crew,AviationManagement,Travel Tourism &Ticketing,Diesel Mechanics

Source: BTEB.
Note: Trades related to construction are in bold

Table 3.7 A: Capacity, Enrollment, and Capacity Utilization of TTCs by Trade/Occupations

Trades/Occupations	Number of TTCs Offering the Course	Percent of TTCs providing Training	Average Seat Capacity Per Trade	Capacity	Enrollment	Average Capacity Utilization
Electrician	37	92.5	89	3292	3353	0.96
Welding	26	65	78	2032	1540	0.74
Mason	15	37.5	78	1170	1025	0.82
Plumbing	16	40	63	1010	780	0.76
Rod Binding	10	25	76	763	467	0.49
Pipe Fitter	12	30	52	620	368	0.60
Tiles Fixture	7	17.5	79	550	218	0.25
Carpenter	8	20	55	440	278	0.52
Shuttering	6	15	57	340	50	0.19
Painter	2	5	130	260	200	0.50
Total				10577	8279	0.78

Source: BMET. Note: Data on Enrolment and Capacity is collected from 39 TTCs operating under BMET.

Chapter- 4

Labour Market and Skills Gap Analysis for Light Engineering Sector in Bangladesh

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Light Engineering Sector in Bangladesh

Executive Summary

This report on the skills gap in light engineering sector (LES) is based on findings derived from meetings with the President, Secretary General and other members of Bangladesh Engineering Industry Owners' Association (BEIOA), survey of 10 medium light engineering firms and a number of training providers, reports, policy papers and research works on the LES.

Findings

Light engineering is essentially capital intensive industry. Due to lack of capital, small enterprises scattered throughout the country in various clusters dominate the sector. Ship scraps as main raw materials are used by the LES without testing its composition. At once competing finished products are imported. LES primarily meets the requirements of agriculture, industry and transport sectors of Bangladesh. Its products have a large domestic market as well as foreign market in neighbouring countries. Quality and price of LES products are reasonable.

Most of the small and medium enterprises (SMEs) of LES use conventional technology in the production process. They lag behind their foreign competitors. Most of the machines they use are age-old and are imported from India and Pakistan. Only 15 percent of the entrepreneurs use technical drawings, five percent use process sheets, and only a few use jigs and fixtures. Nonetheless, the effort to upgrade product quality is visible in the clusters. A few entrepreneurs are trying to produce high-quality homogeneous products in large quantity by employing computerized and numerically controlled (CNC) lathes and hiring designers and engineers from India to run the CNC machines, since CNC skilled labour is quite scarce in Bangladesh. Reportedly a few machinists have been successful in selling their products to the government and large private companies by competing with large importers.

This sector primarily employs fresh unskilled workers without any formal technical education. They are developed as skilled workers through on-the-job training. Most of the entrepreneurs are less educated and only a few of them are formally trained and also lack management and innovative skills. Currently, some of the entrepreneurs aspire to install modern CNC technology to target local big corporate houses and international market through improving product quality and quantity. Due to lack of skilled workforce in CNC technology, especially programming, operation and trouble shooting, these entrepreneurs are not able to procure CNC technology.

No single common facility centre (CFC), which is vital to upgrade technological edge of the sector, has been established in any cluster as yet. Further technological improvement is critically necessary so that the LES can reign in the domestic market. LES firms have no research and development (R&D) outfit and facilities necessary for technical improvement and competitiveness, and also lack contacts with international R&D companies. However, they have a huge potential for moving up the national, regional and global value chain. Much of this will depend upon formation and development of future skills in the sector.

Overall, current demand for labour in ten survey enterprises works out to 467 compared to current employment of 299 implying current shortages of skilled workforce to the extent of 35.97 percent. This shortage is most acute in the case of skilled labour (43.3%) followed by highly skilled labour (25%) and semi-skilled labour (19.33%). Skills shortage varies widely across occupations. Shortage of skilled labour is most acute in the case of heat treatment plant operator (66.67%), welder (62.75%), foundry worker (60%), CNC engineer/operator (42.11%), lathe machine operator (36.62%), fitter (35.9%), AC technician (33.33%) and master craftsman (29.41%). Shortage of highly skilled labour is most critical in the case of CNC engineer/operator (50%) and fitter (50%). Skills gap measured in terms of qualitative deficit in skills is also considerable in some occupations. Much of this gap stems from the lack or inadequacy of generic skills to complement technical skills. Reasons for skills shortages are: (i) labour market tightness, (ii) economic, social and institutional conditions; (iii) skills mismatch; and (iv) deficiency in recruitment practices, work organization, wage policies and working conditions. Four major factors cause skills gap: (i) jobs are changing, (ii) educational and training attainment is lagging the market need for skills, (iii) appropriate skilled workforce growth is slowing, and (iv) businesses are not leveraging learning investments effectively.

Over the next ten years, overall labour demand in the LEIS as a whole is projected to 1,039,200 from the current employment 600003 and the current labour demand 698902. Most of the increase in the labour demand will take place for highly skilled labour (76.95%) followed by skilled labour (58.5%). Demand for unskilled and semi-skilled workers will also increase but at a much slower pace. In fact, in some occupations their demand will decline while in others their demand will remain constant. However, in all the occupations demand for skilled and highly skilled workers will increase. Demand for skilled labour shows most notable increase in the case of heat treatment plant operator (119.34%) followed by AC technician (100.95%), master craftsman (98.9%) and milling machine operator (96.72%). Increase in the demand for highly skilled labour figures most prominently for welder (275%) followed by CNC machine operator (119.13%) and industrial electrician (92.87%).

Domestic demand and overseas demand taken together, total demand for skilled workforce (excluding unskilled workers) in the LEIS occupations over the next ten years works out to 1,123,677 persons. Current supply of skilled workers falls short of the demand for them. Current skills gap in the most prominent occupations of light engineering averages 84.19 percent. CNC machine operator figures most prominently (97.68%) in skills gap followed by lathe machine operator (96.45%), AC technician (70.09%) and welder (60.97%). Ten-year projection of the demand for skilled workers in these occupations is estimated at 637,998 (Table-4.13).

Table- 4.13: Current Skills Gap in Light Engineering and 10-Year Projection of Skills Demand

Occupation	Current Demand	Current Supply	Current Gap in Supply		10-Year Projection (including overseas employment)
			Number	%	
CNC Machine Operator	7323	170	7153	97.68	65894
Lathe Machine Operator	46861	1664	45197	96.45	239614
Milling Machine Operator	4430	2134	2296	51.83	62062
Welder	6543	2554	3989	60.97	171412
Electrician	5973	3867	2106	35.26	57072
AC Technician	6085	1820	4265	70.09	41944
All Occupations	77215	12209	65006	84.19	637,998

However, existing training provisions suffer from inadequate market relevance. There is pressing need for active participation of the LES employers in identifying training needs and planning training programs.

Recommendations

Under CFC, one heat treatment facility has to be established so that LES firms are able to treat metal to produce desired characteristics. Entrepreneurs will derive following benefits from CFC: (i) to identify materials of foreign made goods and select proper substitute materials if original materials are not available in the country; (ii) under CFC, one CNC training centre will operate producing skilled workforce in the areas of programming, operation and troubleshooting of CNC technology – adoption of CNC technology will help the cluster to produce quality product on a mass scale; and (iii) heat treatment is a series of treatments in which heat is used to alter the properties of a metal or alloy, most importantly, to control the mechanical properties, esp. hardness, ductility, strength, toughness, and internal stresses. Different types of heat treatment processes (softening, hardening etc.) will be available at the proposed CFC to help entrepreneurs in producing reliable quality of machinery and spare parts.

Indigenous R&D facilities should be developed in collaboration with BUET and BSTI in order to provide solutions more appropriate to the needs of the small engineering enterprises.

Making Skills Training Relevant to Market Needs: Increasing the relevance of skills training can be achieved through (i) involving the private sector in institutional management; and (ii) allowing public and publicly financed institutions greater autonomy.

Improved Access and Equity in TVET: This describes the state where opportunities are available and affordable for all clients. Relevant timely information on training opportunities needs to be made available for prospective beneficiaries.

Improved Assessment and Certification: Professional accreditation plays a key role in the maintenance of quality and standards of skill. There is increased number of TVET graduates with verified/validated competence to perform a particular skill according to quality standards defined by the industry. The registration of certified TVET graduates needs to be readily available to prospective LES employers for employment.

Enhanced Employability of TVET Graduates: This is the environment where TVET graduates can improve access to employment opportunities. Graduates will also have improved prospects for entrepreneurial and self-employment endeavours.

In order to effectively rise to the challenges of LES skills demand, it is recommended that LEISC be revived. LEISC will identify occupational areas where more personnel are needed, and articulate employer and industry requirements. Training institutions that will be eligible for resources will have an advisory council with industry and employer members.

Competency-based training (CBT) provides several advantages over time-based qualifications, but its requirements must be analyzed and addressed including development, teacher training, equipment, and awareness. Industry representative experts should form part of the LEISC that will develop the competency standards. In-service teacher training will need to address the delivery of CBT courses, and selected training institutions need to be provided with adequate training equipment and public awareness campaigns on CBT need to be put in place.

Use of training funds can spur reallocation of resources to high priority skills and clientele, and stimulate competition between public and private training providers. It is recommended that the skills that are immediately needed by the labour market and the relevant training programs be identified, and the training package delivered.

Labour market analysis and tracer studies are important for proper direction and feedback to the training systems. Training programs to be offered need to be based on the requirements of the respective focus occupations. After some training programs have been conducted, tracer studies of the trainees need to be commissioned on a regular basis.

Where reform of training systems is undertaken, the establishment of national qualification frameworks will facilitate labour mobility and more efficient use of training resources. There is a need to complement development of the NTVQF and to support CBT and develop tailor-made CBT curricula.

The following strategies may be followed for skills development training in the LES:

(i) Private Sector-Led and Market-Driven TVET: Strengthened linkages between TVET providers and industry need to be promoted in order to ensure the active participation of private enterprises in the development and provision of quality technical education and skills development opportunities.

(ii) Pro-Active Job-Skills Matching (SEEK-FIND-TRAIN): Enhancement of matching TVET outputs with available jobs need to be addressed through this strategy with the implementation of the following three components: (a) SEEK local LEIS business opportunities and jobs through domestic and international labour market intelligence to pinpoint the exact requirements of the job market; (b) FIND the right people fit for the jobs; and (c) TRAIN the right people for the available jobs using quality standards developed in consultations with the industry. All training programs need to be guided by the job-skill matching paradigm, both in terms of quantity and quality set by LES, especially in critical occupations and areas where there are high demand.

(iii) Competency-based TVET: This would necessitate an entirely new learning environment where the trainers will become facilitators of learning. This strategy should adhere to the following principles: multiple

entry/exit; modular and self-paced; learning and assessment of learners according to actual work to be performed based on industry standards; recognition of prior learning; on- and off-the-job training; and should provide national recognition/ accreditation for acquired technical and generic competencies.

(iv) Enhancing Quality Assurance Mechanisms: This would require the utilization of quality systems, procedures and processes of partners towards producing quality products and services. Continuous development and review of competency standards and assessment and certification processes with the active involvement of the private sector registration and certification of TVET programs need to be pursued particularly by the industry to ensure adherence to defined norms and standards.

One way to expand the supply of people combining technical skills and knowledge with the generic skills which are best gained through work experience would be to develop new models of integrated education and skills training provision.

BEIOA has a plan for training 22328 persons in CAD-CAM & CNC Machine Operation, CNC Machine Operation, CNC Machine Troubleshooter, Industrial Electrician, Refrigeration & Air Conditioning, Lathe Machine Operation, Welder (Arc, TIG & MIG) and Master craftsmanship (Up-skilling) in the LES for the next four years (January 2018 – December 2021). In addition to domestic training plan, BEIOA also plans to train 408 persons in the same occupations for overseas employment during the same period. To this end, BLETI may be provided all possible technical assistance and financial support to build and develop its training capacity to meet the current and emerging demand for skilled workforce in the LEIS. BLETI has the potential for skills training programs that can be institutionalized in the LES.

4.1: Introduction

4.1.1 Background

The economy of Bangladesh is dominated by the private sector which demands a large supply of trained and skilled human resources to maintain high productivity and accelerated growth. Growing demand for skills in industry sectors indicates that: (i) a significant segment of the existing labour force does not have requisite skills demanded by occupations, and (ii) industry sectors may face reduced growth in the future due to lack of appropriate skills. The skills supply system currently not only produces inadequate throughput, but there also exists a mismatch between skills supply and skills demand. There are about 2 million new entrants to the labour market every year, but only 4.3 percent have some type of technical or vocational training with 8.3 percent in the urban and 2.7 percent in the rural areas (BBS 2016). The current skills training systems are also segmented with poor coordination, while their contents need to be more relevant to industry demands. In addition, there is no nationally consistent approach to quality assurance, and current qualifications are not closely aligned with skills standards or levels in industry.

To address issues of producing the skilled labour force, Bangladesh developed the National Education Policy in 2010, emphasizing religion, science and technical education, especially the importance of education for employment. The National Skills Development Policy (NSDP) was also developed in 2011 to ensure the development of policies for skills enhancement and coordination among technical and vocational education and training (TVET). The policies aim to enhance the TVET system to produce skilled workers aligned with industry demands, which in turn will support improved employability for workers, along with better career paths and higher income.

The government of Bangladesh has recently initiated the Skills for Employment Investment Program (SEIP), a multi-tranche financing facility supported by the Asian Development Bank (ADB) and Swiss Agency for Development and Cooperation (SDC).The objective of SEIP is to support reforms in skills development as envisioned in the NSDP and to produce a large number of skilled labour force that meets growing industry demands. In particular, SEIP aims to reform and enhance the national skills development system by involving the private sector and promoting public-private partnerships (PPP) in training and quality assurance, which will ensure the relevance of skills training to industry demands. Tranche 1 of SEIP is now implementing an integrated approach for skills development for new entrants and up-skilling of the existing workforce in, among other nine sectors, light engineering.

4.1.2 Objective of the Study

The objective of the present study is to analyse labour supply and demand over an approximately 10-year period in order to inform the government to better plan the capacity and quality of skills training systems according to projected skills demands from light engineering sector. The skills gap analysis will inform, quantitatively and qualitatively at the micro level, what is needed for the future Bangladesh economy in terms of skilled workforce, especially in priority sectors identified in the national economic development plan and to be supported by SEIP. By examining the current labour force, the analysis will project future skills needs in light engineering in terms of quantity and quality in order for the country to move up the value chain as Bangladesh is increasingly pooled into global and regional value chain.

4.1.3 Scope of the Study

The present study only covers one level of analysis: micro/subsector level analysis. The analysis offers overall economic and sector-wide overview of labour supply and demand, which are disaggregated by skill level to estimate future skills demands in light engineering sector. A thorough analysis of salient characteristics of the labour market in Bangladesh is incorporated.

The micro-level sector/subsector analysis looks at light engineering sector (LES) under SEIP according to the results from macro-level analysis. Based on macro-level analysis, the micro analysis has been carried out for the LES by (i) identifying key categories of occupations and trades; (ii) estimating current and future needs for skilled workers in each of the categories; and (iii) recommending ways to meet the future needs for skills demands in the LES. This skills gap analysis provides a detailed picture of labour demand and supply in the LES by skill level, and suggests how to upgrade or supply future skills needs, including potential skills training programmes that can be institutionalised in the LES.

For the micro-level analysis, the principal output consists of skills gap profiles by detailed occupations/ trades in the LES. These profiles are sufficiently disaggregated by skills level and sex (as much as possible) in order to facilitate the design of training programmes and course materials. The profiles provide quantitative indicators for the LES, which have been used for planning and estimating investments required for training programmes and other aspects of skills development system.

The analysis incorporates the current key features of training and labour market relevant to the LES. These include current recruitment practices by the employers, number of workers who received training from TVET institutions and their contribution to the sector, all of which inform the extent of needs for skills development programmes for the sector. The analysis answers questions such as:

- What are the available institutions that provide skills in the field of light engineering? What specific types of skills training do they provide?
- What are the existing capabilities of the workforce before participating in the training provided by current institutions in the field of light engineering?
- What are the expected skills that the employers in the field of light engineering require?
- What types and levels of training programmes will be needed to meet the skills demands in the LES?

For the analysis, the following aspects have been considered, among other things.

- In projecting the requirement of skilled workforce by occupations/trades, overseas migration of manpower has been considered. Investigation finds a consolidated picture of the number of semi-skilled and skilled manpower in the LES, who migrated to labour recipient countries in the last 5 years (2010-2014), and prepares a projection for the next 5 years.
- On the labour supply side, factors affecting population growth, working age population, labour force participation among males and females, productivity, wages, and costs of education and training have been considered. On the demand side, analysis includes trends in economic growth, wages, productivity, technology, capital intensity of production and domestic demand growth.
- Considerations have also been given to key features of the labour market, such as public and private jobs markets, formal and informal sectors, the nature of female employment, and rural vs. urban labour markets. Underemployment and youth unemployment are critical issues, implying certain loss of productive resources; analysis offers insights on to what extent these issues can be overcome through training. Attention has also been paid to the operation of the labour market, including rigidities, barriers to entry and to exit, bonded labour, child labour, female labour, migrant labour, minimum wages, labour mobility, labour laws, and labour relations and welfare issues.

4.1.4 Methodology of the Study

In addition to quantitative data analysis using census, labour force surveys and other administrative sources, the present study required the collection of data and information by sector and subsector, for instance, from industries, training institutes and trainees. Along with questionnaire-based survey, data/information collection required participatory methods such as focus group discussions (FGD), key informants' interviews (KIIs), job audits and others, which were applied depending on existing information/data and also depending on available time and resources. Qualitative data, gathered from interviews with key informants and other stakeholders, provided essential information for the micro-level skills gap analysis, together with quantitative data analysis, as were expected. The interviews with the president, secretary and members of Bangladesh Engineering Industry Owners' Association (BEIOA), heads of the human resource division of selected establishments and key persons of industry bodies, Light Engineering Industry Skills Council (LEISC), Bangladesh Bureau of Statistics (BBS), Bangladesh Employment Federation, etc. were also completed in the present study.

Qualitative or field data were supplemented by a desk review of reference materials and similar skills gap analyses carried out in Bangladesh and neighbouring countries. Available data from the government, training providers and business sectors were gathered to investigate available jobs, specific skills requirements by occupation, and services provided.

The main steps of this study involved: (i) undertaking macro-level analysis with updated data which fed into additional quantitative and qualitative research at the micro-level skills analysis; (ii) designing and developing detailed research methods for sector/subsector analysis with a set of questionnaire; (iii) mapping out at least 10 medium-sized enterprises in the LES; and (iv) mapping out and implementing a strategy for in-depth reviews of labour market conditions in Bangladesh to indicate the extent of skills gap in the LES.

4.2 An Overview of the Light Engineering Sector

Light engineering is known as the mother of heavy industries. There is no official or universal definition of light engineering industry. It usually refers to the small and medium enterprises (SMEs) with relatively lower capital investment and operating with manual to semi-automated machineries. According to an estimate (PKF 2013; Abdin 2015), there are about 40,000 light engineering entities in Bangladesh with about US$ 14.28 billion investment. About six million people are, directly or indirectly, employed by this sector.

4.2.1 Types of Light Engineering Enterprises

Light engineering enterprises of Bangladesh can be divided into three major categories: (i) foundries, (ii) machine shops, and (iii) repair workshops. Foundries are mainly producing irrigation items like metal casing of pumps, liners for engines, different components of engines, pumps and power tillers, etc; agricultural product processing equipment like rice hullers, oil expellers, paddy threshers, etc. and various types of small spare parts for different engines including automobiles and other industrial machineries. Machine shops cast iron as basic materials and do the machining jobs. Repair workshops are doing different types of repair jobs required mainly by agricultural, industrial and transport sectors.

The SME Foundation (SMEF) has identified 31 light engineering clusters[1] located in 18 districts of Bangladesh with about 7,500 enterprises. It is stated that Dolaikhal and Jinzira could produce anything (if given sample) from rickshaw to airplane. However, light engineering SMEs are not only located at the clusters but also are scattered all around the country, especially beside all bus stations in all district and upazila towns of Bangladesh. Actually, they are producing import-substitute spare parts for almost every industrial/service/household sectors. Light engineering enterprises are producing and repairing thousands of tools, instruments and machinery.

Large amounts of metals are used by the light engineering clusters as raw materials like MS bar, SS bar, cast iron, ship-breaking iron, copper, brush, aluminum, chrome, HI carbon, rubber, glow, CI plat, SS plat, MS plat, welding rod, zinc, pig iron, bearing, carbon cell, plastic glow, plastic nylon, steel, nickel lead, etc. Most of the raw materials are basic metals and are using old machinery imported from India, China and even Japan 10-25 years ago. As a result, productivity and quality are low in light engineering.

4.2.2 Linkages of Light Engineering with Other Industries

Light engineering is an important sub-sector of manufacturing. It provides critical support to industrial, agricultural and other sectors of the economy by manufacturing a wide range of spare parts, casting, molds and dies, oil and gas pipeline fittings, light machinery, etc and by providing repair services. With regard to the spare parts, the light engineering industry sector (LEIS) is known to manufacture spare parts for cement factories, paper mills, jute mills, textile mills, sugar mills, food processing industries, plastic industries, printing industries, fertiliser factories, railway, shipping, marine transport, automobiles, construction related machinery and pharmaceutical industry, just to name a few. Undoubtedly, light engineering industry supports the very basic requirements of industrialisation and plays a key role in keeping other industries running. LEIS may be grouped under the following categories (PKF 2013):

(a) Machine shops: Machine shops use cast iron (foundry products) as basic materials and do the machining jobs. They produce finished form of metal products (machinery and spare parts).

(b) Repair workshops: They do different types of repair jobs required primarily by the agricultural, industrial and transport sector. They either directly contact clients to procure these jobs or receive job orders at their

[1] There is no universal definition of cluster. Different countries, international organisations, and experts have defined it differently based on the socio-economic conditions of respective community/country. Michael Porter, who is recognised as the founder of industrial cluster concept, defined the cluster as “geographic concentration of interconnected businesses and associated institutions in a particular field.” For the first time in Bangladesh, the SME Foundation has defined cluster as “a concentration of 50 or more enterprises producing similar products or services and is situated within an adjoining geographical location of around 5 km radius and having common strengths, weaknesses, opportunities and threats.”

premises. They carry out the activities mostly by themselves. Only in some cases they have to go out for getting some jobs done in foundry or to other process facilitating units like electroplating, adding plastic components makers, etc.

The LEIS has the potency to play a significant role in technological and economical development along with a vast scope of employment generation. The Government of Bangladesh (GoB) has declared the sector as a most priority sector in its Export Policy 2009 and thrust sector in its Industrial Policy - 2010.

In Bangladesh, over 90 percent of light engineering enterprises are serving the local needs of the people. There are strong backward and forward linkages between light engineering and other sectors (e.g. agriculture, industry and automobile) of the Bangladesh economy. There are about 1200 light engineering enterprises presently enlisted in Bangladesh Small and Cottage Industries Corporation (BSCIC),which are producing and supplying various products (e.g. spare parts, equipment, capital machinery) under sub-contracting scheme (PKF 2013).

The product types of LES are: automobile spare parts, railway engine and rail line spare parts, bicycle and cycle rickshaw, machine tools, jute and textiles machines and spare parts, chemical industries machines and spare parts, sugar and food industries machines and spare parts, engineering and metal industries spare parts, ship industries spare parts and agricultural machines accessories and spare parts. The LES of Bangladesh is currently producing more than 10,000 types of quality machinery, spare parts and accessories.

The consumers of light engineering products and services are both the public and the private sector. Currently, the private sector is the major consumer of light engineering products. A number of potential export quality light engineering products are going to foreign market on direct and subcontracting means. These are spare parts of paper and cement factories, bicycle, fancy light fitting, construction equipment, battery, voltage stabiliser, iron chain, cast iron articles, carbon rod, automobile spares, electronics items, and stainless steel wares (PKF 2013; Uddin 2010).

If the GOB policies are changed in favour of local light engineering SMEs, it is estimated that the GDP will grow nearly to 8 percent from present 6.2 per cent. Among other vital issues are product quality improvement and skills development of the existing workforce. In this context, mention can be made of the pressing need for Common Facility Centre (CFC) for Metal Testing, CNC Skill Training and Heat Treatment Facility. In the first phase, attempts should be made to increase the product quality through receiving metal testing and heat treatment services. Side by side, the entrepreneurs should be made aware about the availability of training services in CNC technology under proposed CFC. The steps required here are: (a) providing testing of metal used in the production of light engineering product; (b) offering training in CNC technology; and (c) providing heat treatment services. In the second phase, the focus should be process improvement, targeted for mass production and export. This will require CNC machinery for production of higher quality and quantity. However, this also needs highly trained skilled workforce in CNC technology, which is not currently available in Bangladesh. Therefore, training of workforce in modern methods of production is also a necessity for this sector. For example, a CFC to provide a central facility for metal testing, heat treatment and skills training of technicians is urgently needed. The CFC may be used jointly by the small light engineering units and cluster which cannot afford the expensive machinery and humanpower needed.

Type of activities under CFC may encompass the following: (i) Metal testing facility of CFC will help entrepreneurs to identify materials of foreign-made goods and select proper substitute materials if original materials are not available in the country. (ii) Under the CFC, one CNC training centre will operate. This training centre will produce skilled manpower in different areas of CNC technology. (iii) Different types of heat treatment processes (softening, hardening and surface hardening) will be available at the proposed CFC to help entrepreneurs in producing reliable quality of machinery and spare parts. To this end, BEIOA may become the main initiator and coordinator of this activity. Bangladesh University of Engineering and Technology (BUET) may bring in knowledge and expertise for preparing project profiles and to provide detailed planning for this central facility. They can also provide some skills training. Bangladesh Standards and Testing Institution (BSTI) may provide information and support for quality standardization, particularly that is needed for export and competing with foreign goods in the local market.

4.2.3 Value Chain Analysis for the Light Engineering Sector

Light engineering occupies a unique position in the economy of Bangladesh. It prudently acts as feeder of support industries to all other industries and plays a vital role in the socio-economic development of the country. This sector has huge potentials to make significant contribution towards technological breakthrough along with wide opportunities for employment generation and growth of gross domestic product (GDP). Some key features of light engineering are the following (PKF 2013):

- Around 40,000 light engineering enterprises are operating all over the country, which are engaged in the production and manufacturing of highly value added engineering goods and services with annual turnover amounting to more than TK. 30,0000 million.
- The 7th Five Year Plan has given immense importance to light engineering sector for employment generation and poverty reduction.
- Around 6 lakh people are directly employed in the light engineering sector;
- The Ministry of Commerce has established Light Engineering Product Business Promotion Council and SME Foundation has attached the industry as a booster sector.

Light engineering SMEs are operating in various clusters spread all over the country. According to SME Cluster Mapping Study (SME Foundation 2012), 31 light engineering clusters were identified. Cluster development is seen as a way of addressing the problems faced by the light engineering sector in Bangladesh and rapidly increasing cluster competitiveness.

Since the development of the LES, entrepreneurs are providing its products and services to local market. LES keeps the national economy running through offering cost-effective maintenance services and much-required spare parts and capital machinery. Light engineering industry has two segments of market i.e. local market and export market. In the local demand, there is a secular growth of around 30 percent per year. Size of local market is around US$ 2 billion. In the meantime, local light engineering industry has stepped its presence in export market. The major products include agriculture machinery, motor cycle, metal furniture, AC, construction machinery, iron sheet, G.I. pipe, cast iron articles, aluminum household articles, iron chain, SS ware, machineries, diesel engine, motor parts, bicycle, light fittings, dry cell battery etc. (PKF 2013).

Product Lines of Light Engineering

Agricultural Sector: Seed drill, pedal thresher, auto thresher, shallow tube well, grain dryer, spare parts of power tiller, withering machine, spare parts of tractor, hand pump, centrifugal pump, insecticides sprayer, crankshaft, gear and pinion, piston and piston ring, liner, spare parts of diesel irrigation engine, poultry and fish feed machine and parts, rice mill parts.

Textile Sector: Bobbin pin, cloth support, harness lever bush, beam support connector, shedding shaft, gear pinion, heavy duty under pick plain loom, light duty under pick plain loom, V puli, motor puli, kaflin motor, class plate, class disk, class shape, kapur bush, carbon bush, coupling, shaft, elmer, bracket, lever.

Jute Sector: Truck and rail, hackle bar, overhead machine, lifter bracket, ratchet rod, pressing roller, delivering roller boss, bobbin carrier, returning roller, pinion, shaft, gear.

Tea Sector : VFBV, CTC machine, ghooghi, CFM, rotor vane, withering trough fan, tea carrying conveyor, green leaf shifter, humidifier, axial flow fan , mono rail, cooling system, sorting machine.

Construction Sector: Mixture machine, piling machine, construction crane, soil molding, machine, auto bricks manufacturing machine, brick crasher, stone crasher, concrete mixer machine, vibrator machine.

Automobile Sector: Spring, break dram, bush, puli, piston ring, gijon pin, gijon bush, slip, head sheet valve, auto crankshaft, hanger pin, head seat, gear shaft, nut and bolt, auto valve, auto gas cylinder, connecting bush, shaft, cabling, sit socket, block liner, booster connecting, booster body, booster pin, automobile filter, radiator engine fan, CNG engine fan, motor cycle bearing, chain cover, motor cycle pinion, motor cycle sit cover, motor cycle carrier, motor cycle cylinder, motor cycle paddle.

Paper and Pulp Sector: Manual knife gate valve, agitator, pneumatic valve, compressor pump, gear coupling, felt roll, helical gear, spur gear, herringbone gear, compressor, roller, pump, cutter.

Pharmaceutical Sector: Pharmaceutical blister packing machine, tablet packing machine, tablet steep machine, tray dryer, tablet machine 16 punch, fluid bed dryer machine SS, film cutting machine tablet, liquid filling, sealing and labelling machine, pharmaceutical powder mixer machine, tablet steep machine, malit mill machine, wrapping machine.

Mould and Die Sector: Industrial parts, egg tray, garment hanger, water filter, cookeries, plastic bottle, cosmetic, toy, sanitary and shoe.

Railway Sector: Centre p-boat, brake beam, brake shaft, 2 inc. CI coupling, brake hamper, rail channel pin and cable, bearing, elbow, mini-puli, bolt, cylinder liner, piston, compressor, S.P. cylinder, hanger, horn.

Marine Sector: Marine popular shaft, sugan bush, sugan, head, head valve, ring, fiver bush.

Machine Tools: Lathe machine, power press, shaper, hydraulic press, cooling tower.

Product Map of Light Engineering

In the SME Cluster Mapping Study, 31 light engineering clusters were identified. Cluster development is seen as a way to rapidly increase cluster competitiveness. Major light engineering clusters are located in the district towns including Dhaka Dholaikhal, Chittagong, Kishoreganj, Mymensingh Sadar, Narayanganj Sadar, Jessore Sadar, Khulna City Corporation, Bogra, Pabna Sadar, Srimangal, Moulovibazar, Sayedpur, Nilphamari, Brahmanbaria Sadar, and Gazipur Sadar (Chart- 4.1).

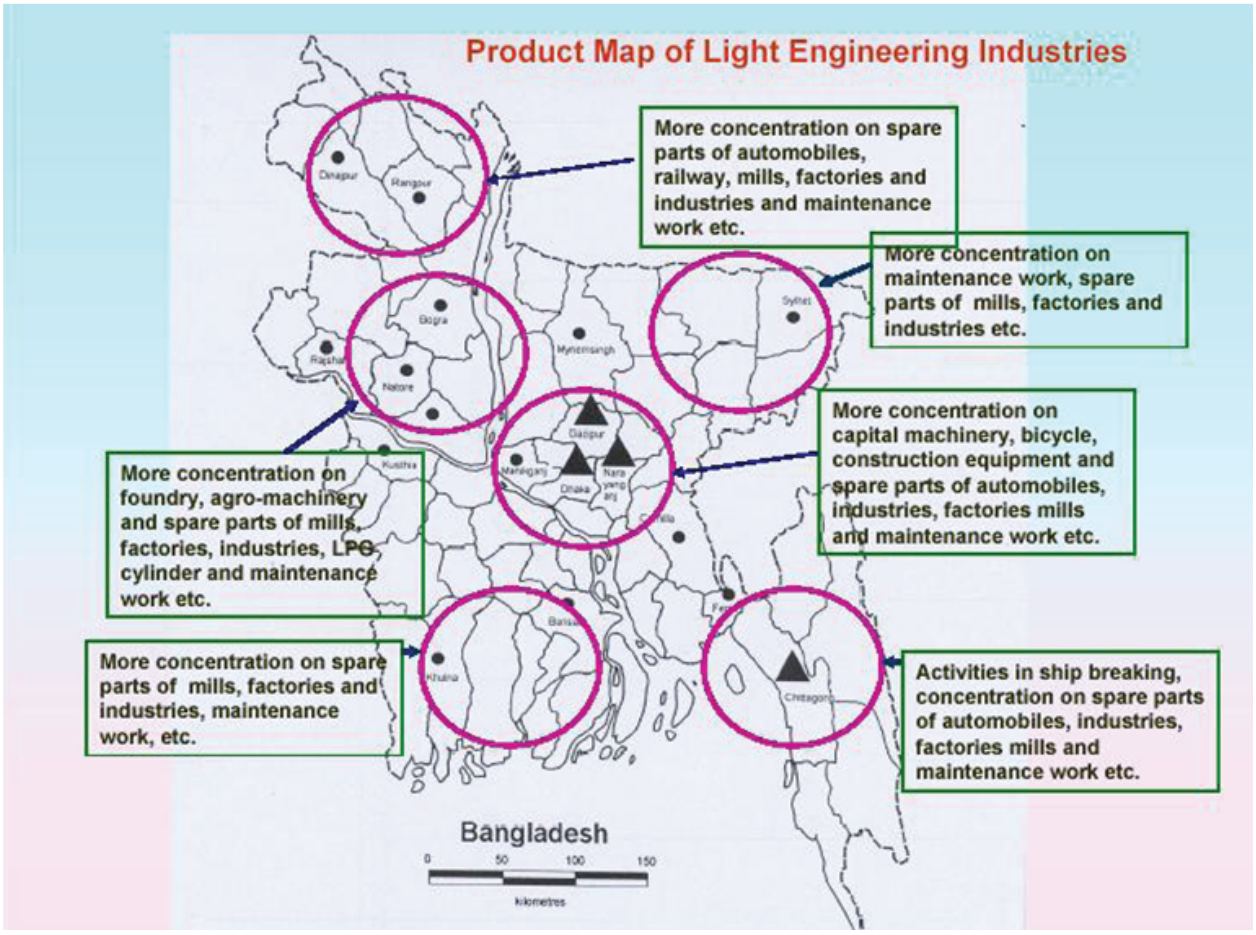


Chart- 4.1: Product Map of Light Engineering
Source: Light Engineering Cluster Mapping by IFC-SEDF in 2007.

Identified Constraints in Dholaikhal Light Engineering Cluster

PKF (2013) identified the following constraints in Dholaikhal light engineering cluster:

(a) Constraints related to absence of CFC

Due to non-existence of CFC at Dholaikhal Dhaka light engineering cluster, the light engineering firms cannot access to necessary services like metal testing, CNC technology training and heat treatment facility. These services are required to ensure quality product on larger scale.

(b) Constraints related to raw materials

- Price hike (sky rocketing) of general raw materials such as scrap, sorted scrap, plain carbon steel, alloy steel, furnace oil, copper alloys, stainless steel, etc.
- Sometimes testing of raw materials is required for some specialised job. Normally, this facility is not available in the Dholaikhal Dhaka light engineering cluster or any other light engineering cluster.

(c) Constraints related to finance

- Lengthy and complicated lending procedure to receive bank loans.
- High interest rate on bank loan.
- Non-availability of sufficient working capital.
- Non-availability of venture capital.

(d) Constraints related to modern technology

Light engineering firms use conventional technology due to lack of availability of skilled manpower in CNC technology.

(e) Constraints related to quality certification

There is no institution to undertake standardisation and testing of LES machinery and spare parts. Even though BSTI provides standard of different products produced in Bangladesh, till now it has made very few standards on light engineering products. Due to lack of quality certification, local machines and spare parts face branding problem compared to imported product.

(f) Constraints related to environmental issues

Ship scraps as raw materials are used for the LES. Ship scraps are procured from ship-breaking yards operating at Sitakunda, Chittagong. Due to absence of central waste treatment, storage & disposal facility at Sitakunda, little care is taken in addressing environmental hazards and human safety aspect.

4.2.4 Major Challenges of the Light Engineering Sector

Major challenges of light engineering sector of Bangladesh are as follows (Abdin 2015):

(i) Limited ability/inability to select appropriate metals/metal composition;
(ii) Limited ability to provide appropriate treatments on the products;
(iii) Limited ability/inability to produce/design mold and dye required for other sub-sectors like plastic;
(iv) Absence of modern technological knowledge and appropriate machineries to increase productivity and product quality;
(v) Absence of product design, research and development centre;
(vi) Complex process of getting electricity, gas connection and load shedding during production hours;
(vii) Free entrance of imported substitutes with under-invoiced price;
(viii) Import dependency of raw materials;
(ix) Scarcity of skilled/trained humanpower; and
(x) Absence of a modern laboratory to ensure quality of manufactured products.

All these challenges reflect widespread inadequacy of skills in the workforce of LEIS.

4.3 Production Processes and Skills Intensity in Light Engineering

Major machineries used in light engineering are lathe machine, milling machine, grinding machine, drilling machine, shaping machine, planner, power press, shaper, hydraulic press, matron steel, leveling machine, diesel engine,white beat, etc. There are a few factories which use modern machineries like CNC machine, rectifier, etc. (Abdin 2015).

The production process of light engineering involves both formal and informal networking. Light engineering needs to have access to various locations. Its supply chain is made up of all the activities required to deliver

products from designing, receiving orders, procuring materials, manufacturing, marketing, logistics and after-sales customer services. Besides, locally operated large and multinational companies seek alliance with light engineering as vendors. For the future growth and development of light engineering, therefore, the key factor is to move up value chain of light engineering through investment in skills, state-of-the-art technology and industrial infrastructure. The production process of light engineering is presented in Chart-4.2.

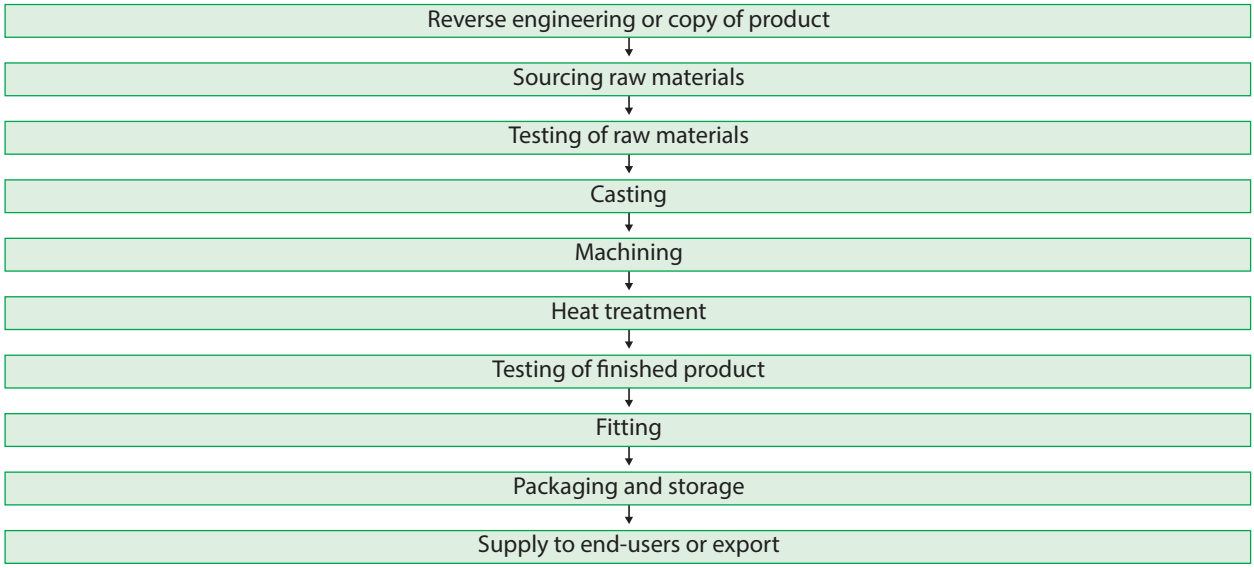


Chart-4.2: Production process of light engineering

This production process of light engineering requires workers of different occupations with a blend of different kinds of skills intensity and skills portfolio.

4.3.1 Mapping and Analysing the Current Occupational and Skills Qualification Characteristics of the Workforce

A measure of the current mixes of the educated and skilled workforce in the light engineering enterprises is important in its own right because it represents the current labour market outcomes of occupations and skills which provide useful information relating to the market for these occupations and skills since these occupations are a natural employment opportunity for people with these skills in this sector. Besides, measures of the education and skill levels of a workforce can be used to measure workforce quality.

Current Mixes of the Skilled Workforce in the Occupations

The enterprise survey reveals that most important occupations in light engineering industry (LEI) are lathe machine operator, welder, milling machine operator, industrial electrician, master craftsman, CNC engineer/operator, AC technician, foundry worker, fitter, shaper, heat treatment plant operator, electrician of discharge machine (EDM), surface grounder, CAD-CAM designer and others (wire cutter, helper, planner and composite materials combiner). Skills intensity measured in terms of the relative share of skilled and highly skilled workers is found very high in the LEI. In all the occupations taken together, skilled and highly skilled workers account for the largest proportion of the total workforce (66.9%), followed by semi-skilled workers (32.1 per cent) and unskilled workers (1 per cent). Across occupations, however, there is wide variation in skills intensity with the highest among foundry workers (100 per cent) followed by industrial electrician (88.9 per cent), milling machine operator (86.4), master craftsman (85.7 per cent), CNC engineer/operator (85.7 per cent), AC technician (85.7 per cent), lathe machine operator (76.3 per cent), shaper (76 per cent) and fitter (75 per cent). The lowest skills intensity is found among heat treatment plant operators (33.3 per cent). It may be noted that there is virtually no female employment in the LEI with a lone case of semi-skilled female worker in fitting occupation.

Table-4.1: Skills intensity in the light engineering industry

Current occupations	Skills level of workers [2]	Current employment		Current demand for labour	Current shortages of skilled workers	Current shortages of skilled workers as % of current demand
		Number	%			
Lathe Machine Operator	Unskilled	-	-	-	-	-
	Semi-skilled	14	23.73	16	2	12.50
	Skilled	45	76.27	71	26	36.62
	Highly skilled	-	-	-	-	-
	Total	59	100.00	87	28	31.18
Welder	Unskilled	-	-	-	-	-
	Semi-skilled	25	56.82	25	-	-
	Skilled	19	43.18	51	32	62.75
	Highly skilled	-	-	-	-	-
	Total	44	100.00	76	32	42.11
Milling Machine Operator	Unskilled	-	-	-	-	-
	Semi-skilled	3	13.64	3	-	-
	Skilled	16	72.73	17	1	5.88
	Highly skilled	3	13.64	3	-	-
	Total	22	100.00	23	1	4.35
Industrial Electrician	Unskilled	-	-	-	-	-
	Semi-skilled	1	11.11	1	-	-
	Skilled	6	66.67	6	-	-
	Highly skilled	2	22.22	2	-	-
	Total	9	100.00	9	-	-
Master Craftsman	Unskilled	-	-	-	-	-
	Semi-skilled	2	14.29	2	-	-
	Skilled	12	85.71	17	5	29.41
	Highly skilled	-	-	-	-	-
	Total	14	100.00	19	5	26.32
CNC Engineer/Operator	Unskilled	-	-	-	-	-
	Semi-skilled	2	14.29	4	2	50.00
	Skilled	11	78.57	19	8	42.11
	Highly skilled	1	7.14	2	1	50.00
	Total	14	100.00	25	11	44.00
AC Technician	Unskilled	-	-	-	-	-
	Semi-skilled	1	14.29	2	1	50.00
	Skilled	6	85.71	9	3	33.33
	Highly skilled	-	-	-	-	
	Total	7	100.00	11	4	36.36
Foundry Worker	Unskilled	-	-	-		
	Semi-skilled	-	-	2	2	100.00
	Skilled	10	100.00	25	15	60.00
	Highly skilled	-	-	-	-	-
	Total	10	100.00	27	17	62.96
Fitter	Unskilled	-	-	-	-	-
	Semi-skilled	10	25.00	13	3	23.08
	Skilled	25	62.50	39	14	35.90
	Highly skilled	5	12.50	10	5	50.00
	Total	40	100.00	62	22	35.48
Shaper	Unskilled	1	4.00	1	-	-
	Semi-skilled	5	20.00	5	-	-
	Skilled	14	56.00	18	4	22.22
	Highly skilled	5	20.00	5	-	-
	Total	25	100.00	29	4	13.79
Heat Treatment Plant Operator	Unskilled	-	-	-	-	-
	Semi-skilled	2	66.67	5	3	60.00
	Skilled	1	33.33	3	2	66.67
	Highly skilled	-	-	-	-	-
	Total	3	100.00	8	5	62.50

[2] (i) Unskilled: No prior experience doing the job. Needs much support from experienced workers.
(ii) Semi-skilled: Has prior experience on- the-job. Can do routine work with some support of more experienced workers.
(iii) Skilled worker: Has much experience on- the- job. Can do routine work self-sufficient. Can teach others on the job.
(iv) Highly skilled worker: Skilled workers with the additional ability to also address non- routine special work problems successfully.

Current occupations	Skills level of workers [2]	Current employment		Current demand for labour	Current shortages of skilled workers	Current shortages of skilled workers as % of current demand
		Number	%			
Electrician of Discharge Machine (EDM)	Unskilled	-	-	-	-	-
	Semi -skilled	2	50.00	4	2	50.00
	Skilled	2	50.00	4	2	50.00
	Highly skilled	-	-	-	-	-
	Total	4	100.00	8	4	50.00
Surface Grounder	Unskilled	-	-	-	-	-
	Semi -skilled	4	44.44	7	3	42.86
	Skilled	5	55.56	7	2	28.57
	iv) Highly skilled	-	-	-	-	
	Total	9	100.00	14	5	35.71
CAD -CAM Designer	Unskilled	2	50.00	2	-	-
	Semi -skilled	-	-	-	-	-
	Skilled	2	50.00	6	4	66.67
	Highly skilled	-	-	-	-	-
	Total	4	100.00	8	4	50.00
Others (wire cutter, helper, planner, composite materials combiner)	Unskilled	-	-	-	-	-
	Semi -skilled	25	71.43	33	5	16.67
	Skilled	10	28.57	27	13	56.52
	Highly skilled	-	-	-	-	-
	Total	35	100.00	60	18	31.58
All Occupations	Unskilled	3	1.00	3	-	-
	Semi -skilled	96	32.11	119	23	19.33
	Skilled	182	60.87	321	139	43.30
	Highly skilled	18	6.02	24	6	25.00
	Total	299	100.00	467	168	35.97

Dynamics of Skilled Employment Evolving over Time in the Occupations

The proportion of highly skilled and skilled workers, which constitutes the nucleus or mainstay of the skilled workers in the shop-floor of the LEI, is overwhelming. Interviews with the employers reveal that changes in the skill demand in the surveyed enterprises have evolved over time primarily due to expansion of the production capacity and changes in technology. There is considerable incidence of vacancies in almost all skilled occupations reflecting that there exists excess demand for skills in these occupations.

The findings also suggest that the average training time required for skilled workers varies widely from 6 months in the case of heat treatment plant operation and composite materials combination to 24 months in CNC engineering and operation and 36 months in the case of lathe machine operation and welding.

Existing National Criteria (NTVQF) for the Qualification Levels of Workers

The Bangladesh National Technical and Vocational Qualifications Framework (NTVQF) introduced in 2011 (MoE, 2011) includes two pre-vocational levels to introduce additional pathways in general education and to cater for the underprivileged and low educated groups in society. It also includes five vocational levels, and one level for diploma level qualifications, as shown in Table- 4.2 Under the NTVQF, training organisations will also be able to issue a Statement of Attainment for specific units of competency when less than the full programme has been completed.

In general education, a new system of dual certification will be introduced so that students who satisfactorily achieve the skills component of vocational education programmes, such as the SSC (Voc), HSC (Voc) and HSC (BM), will receive a NTVQF qualification in addition to, and separate from, the school qualification.

Table- 4.2: Bangladesh national criteria (NTVQF) for the qualification levels of workers

NTVQF Levels	Pre-vocation education	Vocational education	Technical education	Job classification
NTVQF 6			Diploma in engineering or equivalent	Middle Level Manager /Sub Assistant Engr. etc.
NTVQF 5		National Skill Certificate 5 (NSC 5)		Highly skilled worker/ Supervisor
NTVQF 4		National Skill Certificate 4 (NSC 4)		Skilled worker
NTVQF 3		National Skill Certificate 3 (NSC3)		Semi-skilled worker
NTVQF 2		National Skill Certificate 2 (NSC 2)		Basic-skilled worker
NTVQF 1		National Skill Certificate 1 (NSC 1)		Basic worker
Pre-Voc 2	National Pre-Vocation Certificate NPVC 2			Pre-vocation trainee
Pre-Voc 1	National Pre-Vocation Certificate 1 NPVC 1			Pre-vocation trainee

All government agencies that deliver skills training will review their curriculum so that it aligns with the new NTVQF. This will ensure that participants in government funded skills development programmes have the opportunity to receive nationally recognised qualifications for the part of their programme that is based on national industry skill standards. Non-governmental organizations (NGOs) and other providers of non- formal skills training, including the Bureau of Non-Formal Education (BNFE), will also be encouraged to utilise the new standards and support materials so that the skills component of their programmes can be nationally recognised.

To support implementation of the NTVQF, measures will be taken to safeguard the use of qualification titles. A new national logo certifying that training providers and programmes meet national quality standards will also be introduced. Under direction from the NSDC, the BTEB will be responsible for the implementation and periodic review of the NTVQF.

4.3.2 Assessment of the Skill-Intensive Employment Potential in the Occupations

Relative shares of employees in different occupations and skills, presented in Table-4.1 indicate that there is large potential for generating skill-intensive employment in the light engineering sector.

Unlocking the Skill-Intensive Employment Potential

In order to realise the skill-intensive employment potential of the LEIS, it is necessary to stress the importance of innovation, competitiveness, productivity, and the creation of productive jobs and the employability of people. New employment opportunities also require new approaches to education and training to meet the demand for new skills. In this context, there is a need to follow the national qualifications framework to assist enterprises and employment agencies to match skill demand with skill supply, guide individuals in their choice of training and career and facilitate the recognition of prior learning and previously acquired skills, competencies and experience. This framework needs to be made responsive to changing technology and trends in the labour market. By and large, there is a critical need for the implementation of the national framework of skills testing, certification and international accreditation.

Relative Shares of Employees "with" and "without" Formal Skills Credentials

The enterprise survey finds that overwhelming majority of the workers in the LEIS (71.12%) have no formal qualifications and skills credentials. CAD-CAM designer and CNC engineer/operator, however, require formal diploma and advanced diploma degrees. Among other occupations, master craftsman, AC technician, EDM and planners also require either diploma or certificate. All this implies that there is ample room for improving the qualifications and skills credentials of the workers in the LEIS.

Table-4.3: Current qualification profile of workers in the enterprises

Occupation	Total number of workers in each occupation	With diploma/ advanced diploma (%)	With certificate (%)	No formal qualifications (%)
Lathe machine operator	59	-	5.98	94.02
Welder	44	-	9.60	90.40
Milling machine operator	22	-	13.36	86.64
Industrial electrician	9	-	40.00	60.00
Master craftsman	14	57.14	-	42.86
CAD -CAM designer	4	100.00	-	-
CNC engineer/ operator	14	100.00	-	-
AC technician	7	-	57.14	42.86
Foundry worker	10	-	10.00	90.00
Fitter	40	-	10.00	90.00
Shaper	25	-	-	100.00
Heat treatment plant operator	8	-	-	100.00
Electrician of discharge machine (EDM)	4	-	50.00	50.00
Surface grounder	6	-	16.60	83.40
Helper	21	-	-	100.00
Planner	4	-	50.00	50.00
Wire cutter	7	-	-	100.00
Composite materials combiner	4	-	-	100.00
All occupations	302	14.29	14.59	71.12

4.3.3 Current Skills Training Systems – Capacity and Quality

The field survey reveals that all the 10 light engineering enterprises take to on-the-job training in order to meet the skills needs of their workforce. Over a period of 50 training days 10 enterprises are able to train 77 apprentices (Table-4.4).

Table- 4.4: Relative share of on-the-job and off-the-job training in the LEIS

Type	Number of trainees	% of trainees	Number of training days	% of Payroll spent
On -the -job Training	77	100.0	50	-
Off -the -job Training	-	-	-	-
Both types	77	100.0	50	-

There are significant issues related to the quantity, quality and relevance of the TVET system which need to be addressed in order to improve its linkages with and responsiveness to the job market needs. This section addresses these issues and analyses qualification levels assigned by the LEIS companies to fresh TVET graduates.

The enterprise survey reveals that 9 out of 10 enterprises employ TVET graduates. All 10 survey enterprises prefer to recruit TVET graduates (Table- 4.5). According to most of the enterprises, TVET graduates are doing better work. As reported by the enterprises, among the reasons for their doing better work the most important is that they are faster learners. Other important reasons are that they are more polite, productive and accurate and have sound theoretical knowledge.

Table- 4.5: Skills development practices of the LEIS enterprises

	Yes cases	No cases
Does your company currently have its own training unit in place?	-	10
Does the enterprise conduct some structured on -the -job training (some sort of separate training arrangements i.e. instructors, dedicated supervisors, etc. are in place)?	1	9
Would the enterprise be willing to do on -the -job training also for external trainees?	1	9
Does your company have apprentices?	4	6
Does your company employ graduates of the formal TVET system?	9	1
Would you prefer to recruit formal TVET graduates as compared to other untrained youth?	10	-

4.3.4 Assessment of Skills Shortages and Gaps

An assessment of the availability of skills in a national or sectoral workforce typically involves consideration of skill gaps and skill shortages. Skill shortages involve the prospect of the traditional supply source drying up through a shake out in the light engineering industrial sector (LEIS) with a resulting gap to fill for the future, or a lack of trained workers in a particular occupation. Skills gaps in the present context means the skills or attributes which are unavailable to LEIS due to inadequate training, poor skill levels of existing workers or greater opportunities available in other industrial sectors (LSC 2004; Pritchard 2002). Skills shortages from microeconomic perspectives are generated from "excess demand" and the inability of employers to switch their demand composition or substitute factors of production (e.g. sourcing labour from different locations or sectors) in the short run due to asymmetric information on applicants' ability, or due to vested interest in hiring decisions that could lead to risk aversion and hence skills shortages (Chandra and Burke 2003:17; UKCES 2010:4).

Skills shortage also refers to a lack of available skilled people, which results in recruitment difficulties. It arises in a situation in which employers face difficulties in recruiting staff with the skills needed. This can be due to a significant geographical imbalance and shortfall in the number of skilled people (Strietska-Ilina 2008:8). More practically, based on the UK Commission's Employer Skills Survey methodology, "skills shortage vacancies" are hard-to-fill vacancies due to a lack of skills, lack of qualifications and lack of experience. On the other hand, those hard-to-fill vacancies that arise due to poor attitude or personality, lack of motivation, or insufficient number of applicants are not skills-shortage vacancies. Skills-shortage vacancies are, therefore, a subset of hard-to-fill vacancies defined by the three reasons mentioned above.

Table- 4.1 makes an assessment of the current need for and shortages of skilled workforce in the different occupations of the LEIS. Overall, current demand for labour in 10 survey enterprises works out to be 467 compared to current employment of 299, implying current shortages of skilled workforce to the extent of 35.9 percent. This shortage is most acute in the case of skilled labour (43.3 per cent), followed by highly skilled labour (25 per cent) and semi-skilled labour (19.33 per cent). Skills shortage varies widely across occupations. Shortage of skilled labour is most acute in the case of heat treatment plant operator (66.67 per cent), welder (62.75 per cent), foundry worker (60 per cent), CNC engineer/operator (42.11 per cent), lathe machine operator (36.62 per cent), fitter (35.9 per cent), AC technician (33.33 per cent) and Master craftsman (29.41 per cent). Shortage of highly skilled labour is most acute in the case of CNC engineer/operator (50 per cent) and fitter (50 per cent).

The literature on the definition of skills gaps is ambiguous. A skills gap refers to "a situation where employers are hiring workers whom they consider under-skilled or that their existing workforce is underskilled relative to some desired levels" (Chandra and Burke 2003:19). But Strietska-Ilina (2008:8) emphasizes "the existence" rather than "a situation." Skills gaps exist where "employers feel that their existing workforce have inadequate skills types/levels to meet their business objectives," or where new entrants appear to be qualified but actually are not. According to Strietska-Ilina (2007, 2008), skills gaps are "used to describe the qualitative mismatch between the supply or availability of human resources and the requirements of the

labor market." Recruitment difficulties cover all forms of recruitment problems faced by employers, including the situation in which employers cannot hire qualified candidates to perform given tasks even though there is a sufficient supply of labour in the market (Chandra and Burke, 2003:19). "Skills gaps" exist where employers feel that their existing workforce have inadequate skill types/levels to meet their business objectives; or where new entrants to the labour market are apparently trained and qualified for occupations but still lack a variety of the skills required (NSTF 1998).

An understanding of the current skill gaps in the LEIS is important in its own right in order to better plan training initiatives in the sector. To this end, it is useful to make the distinction between two types of skill sets. Those skills which are generic and therefore tend to apply across a range of different occupational groups, and those which are technical, in that they are specific skills needed to do the job/work within an occupation. Generic skills encompass critical thinking, communication, team working, problem solving and associated skills. Technical skills tend to encompass occupation or job specific skills. In addition to these, many employers look for particular individual characteristics in recruits, such as motivation, judgment, leadership skills and so on. Many of the latter are thought to be innate skills or personal attributes. Table- 4.6 reveals that across all occupations technical skills gap of the workers averages 12.7 percent and their basic knowledge shows an average deficit of 28.7 percent. Average deficits in generic skills (which contribute to make the most of technical skills) other than industrial behaviour are much more acute and widespread. Among the occupations, master craftsman and CNC engineer/operator show no skills gap or deficit.

Table- 4.6: Average skills gap among the workforces of the surveyed light engineering enterprises

Occupations	Description of Skills gaps (lacking skills, knowledge, behavior : Scale 0=No skill to 10=Accurate skill)									
	Basic knowledge	Job skill	Accuracy	Knowledge of machine maintenance	Industrial behavior	Troubles shooting	Precision	Manual dexterity	Working speed	Communication
Lathe machine operator	7	9	2	3	9	0	0	0	0	0
Welder	8	9	0	1	4	1	0	1	1	0
Milling machine operator	7	9	6	2	7	0	1	1	0	0
Industrial electrician	7	8	1	2	4	0	0	1	0	0
Master craftsman	9	10	0	0	9	0	1	1	0	0
CAD-CAM designer	9	9	0	0	9	0	0	0	0	0
CNC engineer/ operator	9	10	1	4	0	0	2	0	0	0
AC technician	8	9	0	0	9	0	0	0	0	1
Foundry worker	8	9	0	0	2	0	1	1	0	0
Fitter	8	8	0	0	9	0	0	0	0	0
Shaper	8	9	1	4	0	0	2	0	0	0
Helper	3	6	0	0	2	0	0	0	0	1
Heat treatment Plant Operator	8	9	0	0	9	0	0	0	0	1
Electrician of Discharge Machine (EDM)	8	9	0	0	2	0	1	1	0	0
Surface Grounder	8	8	0	0	9	0	0	0	0	0
All Occupations	7.13	8.73	0.73	1.07	5	0.07	0.53	0.4	0.07	0.2

Among other skill gaps, while lack of accuracy is most predominant in almost all occupations except milling machine operator, lack of precision, manual dexterity or communication skills is most widespread across all occupations. The areas of deficiency underlying reported skill gaps embrace a wide range of practical skills (defined as "ability to carry out job-related tasks") and deficiencies in generic skills areas, such as computer literacy, communication skills, problem-solving skills and "personal skills" (such as "motivation, ability to fit in"). These skills gaps are "concealed" or "latent" indicating qualitative deficits in skills. Thus the quality of skills matters equally as the quantity of skills.

4.3.5 Reasons for Skills Shortages and Gaps

Reasons for skills shortages

Surveyed enterprises report four major reasons for skills shortages in the LEIS. These are: (i) labour market tightness–small labour reserve of desired quality; (ii) economic, social and institutional conditions; (iii) skills mismatch; and (iv) deficiency in recruitment practices, work organisation, wage policies and working conditions (not always directly linked to skill shortages).

First, labour market tightness – small labour reserve linked to high employment levels and unfavourable demographic factors. This reason was reported by most of the enterprises. Currently, significant problems in filling vacancies linked to tightness of labour markets are noted in LEIS.

The second reason for skills shortages reported by the surveyed enterprises is economic, social and institutional conditions. For instance, in large urban conglomerations, where affordable housing is scarce and expensive, it appears a barrier to attracting workers. Demotivating social welfare system is another example oft-cited by the enterprises. Inefficient work of public employment services is also mentioned by some enterprises.

The third type of reasons of skills shortages is skills mismatch by level/field of qualification and/or specific skills and competences (skills gap). In fact, this is the reason for the coexistence of unemployment, including long-term unemployment, and large pools of vacancies, pointing at structural unemployment. Mismatch is reported by majority of enterprises as the main reason or one of the reasons for skills shortages. It is also important to underline that it is the type rather than the level of qualification which matters in the mismatch of the supply of and demand for skilled labour. Specific skills and competences appear more important than levels of qualifications.

The fourth reason mentioned by some employers is deficiency in recruitment practices, work organisation, wage policies and working conditions. It is, however, important to note that this factor plays an important role in recruitment difficulties, to a larger or smaller extent, especially among lower-skill occupations. Whether this has a direct connection with the problem of skill shortages is highly questionable. Nevertheless, this is another indication of the market failure to solve the problem of recruiting the personnel pertinent to the specific business strategies. Table-4.7 shows that most of the current recruitments in the LEIS enterprises are made through informal methods commonly used for hiring base-level recruits who are more likely than other groups to have submitted unsolicited applications – 70 percent chosen from among those “walk-in” applicants whose unsolicited résumés had been retained on file and 21 percent chosen on personal recommendation. It is reported that the vagrants usually enter the workforce of the LEIS and receive on-the-job training and become future skilled workers. Most engineering recruitment difficulties are found to have far more to do with perceived shortcomings in the quality of graduates than any shortfall in their quantity. Protracted recruitment difficulties are more likely to slow down the development of new products than restrict the output of existing products.

Table-4.7: Current recruitment practices of the LEIS enterprises to hire workers

Recruitment practice	%
Walk -in and test	70 .0
Advertisement	-
Labour contractors	2.0
Personal (e.g. through family) recommendations	21 .0
Direct contact with training service providers	1.0
Others (specify)	6.0
All practices	100 .0

All the four reasons of skills shortages noted above are interconnected and sometimes impossible to separate one from another. For instance, the scarce labour reserve due to tightness of the labour market tends to concentrate in certain occupations, where employers complain that they cannot recruit personnel

with suitable qualifications and skills. At the same time, job seekers with other qualifications are available on the market. This is largely contingent upon large-scale migration of skilled workers for overseas employment. Therefore, the situation can eventually be characterised as mismatch. In reality, it is the combination and interplay of different factors, including demotivating welfare system and poor working conditions for certain occupations. By and large, skills shortages from microeconomic perspectives are generated from "excess demand" and the inability of employers to switch their demand composition or substitute factors of production (e.g. sourcing labour from different locations or sectors) in the short run due to asymmetric information on applicants' ability, or due to vested interest in hiring decisions that could lead to risk aversion and hence skills shortages.

Reasons for skills gaps

According to the survey enterprises, four major factors cause skills gap: (i) jobs are changing, (ii) educational and training attainment is lagging the market need for skills, (iii) appropriate skilled workforce growth is slowing, and (iv) businesses are not leveraging learning investments effectively.

Jobs are changing: Today's employees need a higher level of technical and professional skill. Demand for higher skills increases due to: (a) economic shifts, (b) growth in service sector, and (c) new technologies.

Educational and training attainment is lagging the market need for skills – education and training not keeping pace: Leveling off in educational and training attainment is taking place due to projected deceleration in the growth of a given educational and training attainment. Projected shortfall in workers with educational and training experience indicates mismatch in education and training with job growth.

Appropriate skilled workforce growth is slowing: Retiring people leave the workforce and management positions. Fewer workers with marketable and portable skills enter labour force.

Businesses are not leveraging learning investments effectively: Companies usually do not invest in employee learning and skills development. They do not demonstrate and measure efficiency and effectiveness. Nor do they align learning with business strategy. They do not have formal and informal learning opportunities. They do not involve senior leaders in learning. Nor do they devote resources to improving performance of the employees. Besides, companies' internal skill gaps may widen due to increased competitive pressures in production processes and product markets. One indicator of rising skill requirements is the changes over time in occupational structure which have recently taken place in the LEIS, e.g. in CNC machine operation.

4.4 Assessment of Future Demand for and Supply of Skilled Workforce in the Industrial Occupations

With fairly stable skill sets in the LEIS, and reasonable scenarios about the national economy into the future, time series analyses of historical skill demand could be used to predict the numbers for each occupation, and the demand could then be calculated. However, industrial skills do not represent a stable skill set and, historically, have been very difficult to predict due especially to lack of time-series data and rapid changes in technology. There are large fluctuations in the rate of growth of demand for industrial skills, making prediction based on historical information problematic. More importantly, due to time and budget constraints this method could not be used for our present exercise. Instead, we have listened to the employers and consulted HRD personnel of the survey enterprises in order to derive estimates for the various occupational components of skills demand for the next 5 and 10 years. Information gleaned from interviews and focus groups with industry representatives and other knowledgeable persons has given good reason to work out future skill demand in different occupations.

4.4.1 Factors Affecting Future Demand for Skills

Labour Turnover

Labour turnover constitutes an important factor contributing to both current and future demand for skilled workers. This demand, however, is associated with replacement demand. Overall, labour turnover is quite significant in the survey enterprises at 6.69 percent, ranging from 5.3 percent in welding to 24.4 percent in lathe machine operation (Table- 4.8). There is no evidence of labour turnover among milling machine operator, industrial electrician, master craftsman, CNC engineer/operator, AC technician, heat treatment plant

operator, electrician of discharge machine (EDM) and surface grounder. Leakage of skills through labour turnover constitutes a barrier to investment in training. Because exit of trained workers due to retirements, deaths, change of occupation, sickness, going overseas, etc. results in externalities from inability to recoup training investments.

When accounting for the costs (both real costs, such as time taken to select and recruit a replacement, and also opportunity costs, such as lost productivity), the cost of employee turnover becomes significant for the companies. There are both direct and indirect costs. Direct costs relate to the leaving costs, replacement costs and transitions costs, while indirect costs relate to the loss of production, reduced performance levels, unnecessary overtime and low morale.

Capacity Expansion

The demand for skills arising out of the expansion of production capacity of the enterprises is an expansion demand emanating from growth. Capacity expansion with a given technical know-how will require expansion of kindred skill sets existing in the LEIS enterprises. The enterprise survey finds that 8 (80 per cent) out of 10 survey enterprises are planning to expand their production capacity within the next 5-10 years. This will greatly contribute to an increase in their future demand for skilled workers. For all practical purposes, wide skill base of the workforce is a critical component of the expansion of physical capital and its productive capacity.

New Technology

According to the enterprise survey, 4 out of 10 enterprises are expecting to introduce new technology in their production processes. This will result in combining existing skills with required new skills through the interaction of new/advanced technology with each component of skill in order to see the enterprises' relative use of high-ability workers and high-experience workers. The comprehensive measures of skill reveal that advanced technology interacts with each component of skill quite differently: firms that will use advanced technology are more likely to use high-ability workers, but less likely to use high-experience workers.

More types of jobs are being increasingly automated in the LEIS, yet a shortage of skilled workers is looming sector-wide despite its increasing pool of labour. New technology also makes it possible for employers to redesign and disaggregate work, and to reassign routine tasks to lower-skilled employees. These and other changes are part of the larger disruptive forces which are fundamentally reshaping the skills requirements of the LEIS. The labour market, meanwhile, has steadily bifurcated, with menial low-wage jobs on the one end and high-skill, high-wage jobs on the other. Technology and competition from the emerging markets have undermined those in the middle. Yet, at the same time, there is a skills gap: nearly two-thirds of the enterprises surveyed report having positions for which they cannot find qualified and competent applicants.

Better Product Quality

Product quality matters greatly in the competitiveness of the LEIS enterprises. Five out of 10 surveyed enterprises are planning to improve the quality of their products. This will require improvement in the skills of the existing workforce. Employability skills in the LEIS will include a mix of core (vocational/technical) and non-core (generic) skills. Generic skills may be acquired from the marketplace but, more realistically, the industry is likely to focus on securing highly qualified people to ensure that core accreditation/specific quality assurance certifications are in place and take an ad hoc approach to other skills development needs.

The key issue is to what extent the existing skills translate into fulfilling future skill requirements. To address this issue, two components of the future flow of skills need to be considered: The first is the role of the existing stock of skills in providing future skills and the second is the degree to which the enterprise can provide new skills to meet the net demand requirement in the future. Significant changes in the stock of skills are likely to be associated with dominant occupations within the LEIS, while a dependency on the current stock of skills to feed future skills supply needs raises some issues, especially around retraining/up-skilling and the relevance/compatibility of existing skills to the new skill needs.

New Entry

There is no systematic information on the extent of exit and new entry of enterprises in the LEIS. Anecdotal evidence, however, suggests that there is considerable new entry of light engineering enterprises every year. This needs to be taken into account while planning for skills development programmes in the LEIS.

4.4.2 Assessment of Future Demand for Skilled Workforce in the Survey Enterprises

Available evidence suggests that the LEIS would continue to grow, aim to improve its competitiveness primarily in import substitution. Naturally, future demand for skilled and educated workforce of the LEIS will continue to grow. As reported by the surveyed enterprises, the future demand for skills will consist in the occupations/trades detailed in Table-4.8. As expected, skills in all the occupations/trades in future demand relate to respective production activities of the LEIS.

Table- 4.8: Assessment of future demand of the 10 LEIS survey enterprises for skilled workforce in the next 5 and 10 years

Current occupations	Skill level	Current employment	Current labour demand	Projected labour demand in next 5 years		Projected labour demand in next 10 years		Average staff turnover annually	Average staff turnover as % of current employment
				Projected demand	% Increase over current demand	Projected demand	% Increase over 5 year demand		
Lathe Machine Operator	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	14	16	16	-	16	-	-	-
	Skilled	45	71	133	87.32	179	34.59	11	24.44
	Highly skilled	-	-	-	-	-	-	-	-
	TOTAL	**59**	**87**	**135**	**55.17**	**181**	**34.07**	**11**	**18.64**
Welder	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	25	25	25	-	25	-	-	-
	Skilled	19	51	73	43.14	101	38.36	1	5.26
	Highly skilled	-	-	10	1000.00	10	-	-	-
	TOTAL	**44**	**76**	**108**	**42.11**	**136**	**25.93**	**1**	**2.27**
Milling Machine Operator	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	3	3	12	300.00	35	191.67	-	-
	Skilled	16	17	35	105.88	47	34.29	-	-
	Highly skilled	3	3	-	-	-	-	-	-
	TOTAL	**22**	**23**	**47**	**104.35**	**82**	**74.47**	**-**	**-**
Industrial Electrician	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	1	1	1	-	1	-	-	-
	Skilled	6	6	7	16.67	12	71.43	-	-
	Highly skilled	2	2	4	100.00	4	-	-	-
	TOTAL	**9**	**9**	**12**	**33.33**	**17**	**41.67**	**-**	**-**
Master Craftsman	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	2	2	-	-	-	-		-
	Skilled	12	17	49	188.24	83	69.39	-	-
	Highly skilled	-	-	-	-	-	-	-	-
	TOTAL	**14**	**19**	**49**	**157.89**	**83**	**69.39**	**-**	**-**
CNC Engineer/ Operator	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	2	4	-	-	-	-	-	-
	Skilled	11	19	37	94.74	70	89.19		
	Highly skilled	1	2	-	-	-	-	-	-
	TOTAL	**14**	**25**	**37**	**48.00**	**70**	**89.19**		
AC Technician	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	1	2	3	50.00	4	33.33		
	Skilled	6	9	19	111.11	36	89.47		
	Highly skilled	-	-	-	-	-	-	-	-
	TOTAL	**7**	**11**	**22**	**100.00**	**40**	**81.82**	**-**	**-**
Foundry Worker	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	-	2	-	-	-	-	-	-
	Skilled	10	25	39	56.00	60	53.85	1	10.00
	Highly skilled	-	-	-	-	-	-	-	-
	TOTAL	**10**	**27**	**39**	**44.44**	**60**	**53.85**	**1**	**10.00**
Fitter	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	10	13	13	-	16	23.08		
	Skilled	25	39	64	64.10	93	45.31	3	12.00
	Highly skilled	5	10	10	-	14	40.00	-	
	TOTAL	**40**	**62**	**87**	**40.32**	**123**	**41.38**	**3**	**7.50**

Current occupations	Skill level	Current employment	Current labour demand	Projected labour demand in next 5 years		Projected labour demand in next 10 years		Average staff turnover annually	Average staff turnover as % of current employment
				Projected demand	% Increase over current demand	Projected demand	% Increase over 5 year demand		
Shaper	Unskilled	1	1	-	-	-	-		
	Semi-skilled	5	5	4	-20.00	5	25.00		
	Skilled	14	18	31	72.22	50	61.29		
	Highly skilled	5	5	8	60.00	12	50.00	1	20.00
	TOTAL	**25**	**29**	**43**	**48.28**	**67**	**55.81**	**1**	**4.00**
Heat Treatment Plant Operator	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	2	5	8	60.00	11	37.50		
	Skilled	1	3	6	100.00	9	50.00		
	Highly skilled	-	-	-	-	-	-		
	TOTAL	**3**	**8**	**14**	**75.00**	**20**	**42.86**		
Electrician of Discharge Machine (EDM)	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	2	4	7	75.00	10	42.86		
	Skilled	2	4	8	100.00	12	50.00		
	Highly skilled	-	-	-	-	-	-		
	TOTAL	**4**	**8**	**15**	**87.50**	**22**	**46.67**		
Surface Grounder	Unskilled	-	-	-	-	-	-	-	-
	Semi-skilled	4	7	9	28.57	9	-		
	Skilled	5	7	11	57.14	18	63.64		
	Highly skilled	-	-	-	-	-	-		
	TOTAL	**9**	**14**	**20**	**42.86**	**27**	**35.00**		
CAD-CAM Designer	Unskilled	2	2	-	-	-	-		
	Semi-skilled	-	-	-	-	-	-		
	Skilled	2	6	12	100.00	18	50.00		
	Highly skilled	-	-	-	-	-	-		
	TOTAL	**4**	**8**	**12**	**50.00**	**18**	**50.00**		
Others	Unskilled	-	2	3	50.00	5	66.67		
	Semi-skilled	25	30	39	30.00	71	82.05	3	12.00
	Skilled	10	23	25	8.7	45	80.00		
	Highly skilled	-	-	4	400.00	7	75.00		
	TOTAL	**35**	**55**	**71**	**29.09**	**128**	**80.28**	**3**	**7.69**
All Occupations	Unskilled	3	3	3	-	10	233.33		
	Semi-skilled	96	119	137	15.13	203	48.18		
	Skilled	182	321	613	90.97	833	35.89		
	Highly skilled	18	24	36	50.00	47	30.56		
	TOTAL	**299**	**467**	**789**	**68.95**	**1093**	**38.53**	**20**	**6.69**

Projected labour demand for the 10 medium-sized LEIS surveyed enterprises in the next 5 years works out to be 789 as against the current demand of 467 persons, indicating 68.95 percent increase of the current demand. Over the next ten years projected labour demand for these 10 enterprises increases to 1093 persons slowing down the rate of increase at 38.53 percent in the anticipation that much of the demand for skilled and highly skilled labour would be satisfied within the immediate five years.

Most notable projected demand for labour in the next 5 years is the highly skilled welder followed by skilled milling machine operator, skilled master craftsman, skilled industrial electrician, skilled AC technician, skilled heat treatment plant operator and skilled electrician of discharge machine (EDM). Over the next 10 years, the demand for the highly skilled welder no longer exists and the demand for other occupational skill categories slows down.

4.4.3 Ten-Years Projection of Demand for Skilled Workforce by Major Occupations for the Whole Light Engineering Sector

In projecting the demand for skilled workforce by major occupations for 10 years for the whole light engineering sector, 10 years demand for skilled workforce by major occupations for the ten LEIS survey enterprises has been blown up in keeping with the growth of occupational demand pattern indicated by the BEIOA. Due to lack of time-series hard data primarily on the growth of enterprises, employment and contribution to GDP of the LEIS as a separate category, demand projection for the skilled workforce in the entire sector remains conservative.

Table-4.9: Ten years projection of demand for skilled workforce by major occupations for the whole light engineering sector

Occupations	Skill level	Current employment	Current labour demand	10 years projected labour demand	
				Projected demand	% Increase over current demand
Lathe Machine Operator	Unskilled	-	-	-	-
	Semi-skilled	21099	24053	30099	25.14
	Skilled	93627	137534	208382	51.51
	Highly skilled	-	-	-	-
	TOTAL	114726	161587	238481	47.59
Welder	Unskilled	-	-	-	-
	Semi-skilled	32967	35961	41967	16.70
	Skilled	67253	70800	100880	42.49
	Highly skilled	2	4	15	275.00
	TOTAL	100222	106765	142862	33.81
Milling Machine Operator	Unskilled	-	-	-	-
	Semi-skilled	3956	3960	4945	24.87
	Skilled	22418	26300	48836	96.72
	Highly skilled	3956	4500	7587	68.60
	TOTAL	30330	34760	61368	83.78
Industrial Electrician	Unskilled	-	-	-	-
	Semi-skilled	1319	1330	1319	-0.83
	Skilled	7912	11505	16868	56.42
	Highly skilled	2637	2890	5574	92.87
	TOTAL	11868	15725	23761	58.55
Master Craftsman	Unskilled	-	-	-	-
	Semi-skilled	2637	3001	4837	61.18
	Skilled	22418	25669	51056	98.90
	Highly skilled	-	-	-	-
	TOTAL	25055	28670	55893	94.95
CNC Engineer/ Operator	Unskilled	-	-	-	-
	Semi-skilled	5275	5512	5275	-4.3
	Skilled	25055	31778	54045	70.07
	Highly skilled	2637	3000	6574	119.13
	TOTAL	32967	40290	65894	63.55
AC Technician	Unskilled	-	-	-	-
	Semi-skilled	2637	2839	3596	26.66
	Skilled	11868	17751	35670	100.95
	Highly skilled	-	-	-	-
	TOTAL	14505	20590	39266	90.70
Foundry Worker	Unskilled	-	-	-	-
	Semi-skilled	2637	2798	3569	27.56
	Skilled	32967	36754	40692	10.71
	Highly skilled	-	-	-	-
	TOTAL	35604	39552	44261	11.91
Fitter	Unskilled	-	-	-	-
	Semi-skilled	17143	17143	17143	-
	Skilled	51428	53007	89999	69.79
	Highly skilled	13187	15000	26274	75.16
	TOTAL	81758	85150	133416	56.68
Shaper	Unskilled	1319	1319	1200	-9.02
	Semi-skilled	6593	6419	5274	-17.83
	Skilled	23736	25022	41538	66.01
	Highly skilled	6594	7504	12188	62.42
	TOTAL	38242	40264	60200	49.51

Occupations	Skill level	Current employment	Current labour demand	10 years projected labour demand	
				Projected demand	% Increase over current demand
Heat Treatment Plant Operator	Unskilled	-	-	-	-
	Semi-skilled	6593	6711	8242	22.81
	Skilled	3956	4509	9890	119.34
	Highly skilled	-	-	-	-
	TOTAL	10549	11220	18132	61.60
Electrician of Discharge Machine (EDM)	Unskilled	-	-	-	-
	Semi-skilled	5274	5723	6593	15.20
	Skilled	5275	6942	13188	89.97
	Highly skilled	-	-	-	-
	TOTAL	10549	12665	19781	56.19
Surface Grounder	Unskilled	-	-	-	-
	Semi-skilled	9231	9231	9231	-
	Skilled	9231	13564	20770	53.13
	Highly skilled	-	-	-	-
	TOTAL	18462	22795	30001	31.61
CAD-CAM Designer	Unskilled	-	-	-	-
	Semi-skilled	-	-	-	-
	Skilled	5330	7111	9328	31.18
	Highly skilled	-	-	-	-
	TOTAL	5330	7111	9328	31.18
Others	Unskilled	5274	5312	6329	19.15
	Semi-skilled	39561	40132	47473	18.29
	Skilled	25000	26312	42750	60.19
	Highly skilled	1	2	4	100.00
	TOTAL	69836	71758	96556	34.08
All Occupations	Unskilled	6593	6631	7529	13.54
	Semi-skilled	156923	164813	189563	15.02
	Skilled	404835	494558	783892	58.50
	Highly skilled	31652	32900	58216	76.95
	TOTAL	600003	698902	1039200	48.69

Over the next 10 years, overall labour demand in the LEIS is projected to 1,039,200 from the current employment 600,003, as reported by various secondary sources and macroeconomic estimate, and from the current labour demand 698,902 as reported by the survey enterprises. Most of the increase in the labour demand will take place for highly skilled labour (76.9 per cent) followed by skilled labour (58.5 per cent). Some jobs in certain occupations require unskilled and semi-skilled workers. Demand for them will also increase but at a much slower pace. In fact, in some occupations, e.g. shaper, industrial electrician and CNC machine operator, their demand will decline while in others their demand will remain constant (Table-4.9). However, in all the occupations demand for skilled and highly skilled workers will increase. Demand for skilled labour shows most notable increase in the case of heat treatment plant operator (119.3 per cent) followed by AC technician (100.9 per cent), master craftsman (98.9 per cent) and milling machine operator (96.7 per cent). Increase in the demand for highly skilled labour figures most prominently for welder (275 per cent) followed by CNC machine operator (119.1 per cent) and industrial electrician (92.9 per cent).

4.4.4 Migration of Skilled Workforce for Overseas Employment

Information on the overseas migration of professionals and skilled workers from the LEIS during the last 5 years (2010 - 2014) is not readily available. However, a recent study (Mondal 2014) gives some indication of the extent of overseas migration of skilled workers in some LEIS occupations to six study countries and their projection for the next 10 years. It shows that in seven LEIS occupations on average 2,125 skilled workers migrated to six study countries annually during 2005-2013.Overseas migration to these six countries is projected to grow on average at around 3.67 percent during the first five years and slow down to around 2.95 percent during the terminal five years depending upon the anticipated changes in the demand for skilled workers in different occupations in these countries. Demand for AC technicians, however, is projected to steadily grow from 11.11 percent to 12.5 percent, that of welders from 5.55 percent to 10.11 percent and that of industrial electricians from 5.37 percent to 11.61 percent over the 10 year period (Table-4.10).

Table- 4.10: Projection of overseas employment for Bangladeshis in six study countries by LEIS occupations in the next 10 years

Occupation	Average*	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Industrial Electrician	335	353	370	390	412	435	478	528	582	646	721
Welder	90	95	101	110	115	122	135	148	163	178	196
AC Technician	27	30	33	36	40	43	47	53	59	64	72
Lathe Machine Operator	831	848	865	882	900	917	945	973	1003	1,033	1,064
Milling Machine Operator	296	305	315	325	335	345	360	377	394	411	429
Master Craftsman	196	205	215	225	235	246	266	288	312	306	292
Fitter	350	366	384	402	421	441	479	522	570	548	506
All Occupations	2,125	2,202	2,283	2,370	2,458	2,549	2,710	2,889	3,083	3,186	3,280

Note: * indicates average overseas employment of 3-year moving averages during the last 9 years.
Source: Based on BMET data. Culled from Mondal (2014).

As in February 2016, as many as 9.8 million workers are employed in 157 countries around the world and every year about 0.6 million new workers are going abroad (MoEWOE Website). The overseas employment rate is much higher than the domestic employment rate in the country and in many cases overseas employment is more attractive. The government has already recognised the overseas employment as a special priority sector (thrust sector). With a view to promoting economic development of the country, MoEWOE has been continuing its relentless efforts through a host of overseas employment support programmes. In this context, overseas employment will continue to grow in the future and will continue to claim on and deplete domestic supply of skilled workforce.

According to BMET sources, total overseas employment in the study LEIS occupations amounted to 52,860 during 2010-February 2015, as detailed in column 2 of Table-4.11. If we blow up total overseas employment in these occupations on the basis of six study countries (Table-4.10), over the next 10 years total overseas employment in these occupations works out to 92,006 (Table-4.11).

Table- 4.11: Projection of overseas employment for Bangladeshis in LEIS occupations in the next 10 years

Occupation	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Industrial Electrician	16,540	17,429	18,366	19,354	20,397	21,621	23,048	24,892	27,132	29,846	33,311
Welder	14,466	15,270	16,117	17,013	17,959	18,959	20,210	21,625	23,571	25,928	28,550
AC Technician	903	1,003	1,115	1,239	1,376	1,529	1,705	1,903	2,125	2,380	2,678
Lathe Machine Operator	903	921	940	959	978	997	1,019	1,042	1,069	1100	1133
Milling Machine Operator	507	522	538	555	572	589	607	626	645	665	694
Master Craftsman	409	428	447	468	489	511	526	541	547	540	510
Fitter	19,132	20,007	20,922	21,876	22,871	23,901	24,857	25,602	26,114	26,013	25,130
All Occupations	52,860	55,580	58,445	61,464	64,642	68,107	71,972	76,231	81,203	86,472	92,006

Source: Based on BMET data (2010-February 2015).

Domestic demand and overseas demand taken together, therefore, total demand for skilled workforce (excluding unskilled workers) in the LEIS occupations over the next 10 years works out to 1,123,677 persons (Table-4.12). Any skills development programme for Bangladesh therefore needs to address how to make both ends meet.

Table- 4.12: Projection of total demand for skilled workforce in LEIS occupations in the next 10 years

Occupation	Domestic	Overseas	Total
Industrial Electrician	23,761	33,311	57,072
Welder	142,862	28,550	171,412
AC Technician	39,266	2,678	41,944
Lathe Machine Operator	238,481	1,133	239,614
Milling Machine Operator	61,368	694	62,062
Master Craftsman	55,893	510	56,403
Fitter	133,416	25,130	158,546
CNC Engineer/Operator	65,894	-	65,894
Foundry Worker	44,261	-	44,261
Shaper	59,000	-	59,000
Heat Treatment Plant Operator	18,132	-	18,132
Electrician of Discharge Machine	19,781	-	19,781
Surface Grounder	30,001	-	30,001
CAD -CAM designer	9,328	-	9,328
Others	90,227	-	90,227
All occupations	1,031,671	92,006	1,123,677

Source: Based on Table-4.9 and Table-4.11.

4.4.5 Available Institutions which Provide Skills Training in Light Engineering

Training capacity including the trades of available institutions which provide skills training for light engineering is anybody's guess. No secondary information on the total supply of trained graduates by trades of all the technical training institutions in the country is readily available. For obtaining a comprehensive picture of total supply of trained graduates in all these training institutions, a complete census is required, which remains outside the purview of the present exercise. However, for the purpose at hand, we resorted to snowball sampling to identify, locate and interview potential training providers for LEIS. In what follows, we attempt to assess the total current output of major showcase training institutes which produce graduates in LEIS-relevant occupations. Among the public sector institutes, mention can be made of 50 polytechnic institutes and VTTI under the Directorate of Technical Education (DTE) which provide diploma level training in electrical, mechanical and refrigeration and air-conditioning relevant to the LEIS with an annual supply of about 20,000 graduates in these trades. Similarly, 64 technical schools and colleges under DTE provide LEIS-relevant certificate level training for 2,967 persons in welding/general mechanics,2,313 in refrigeration and air-conditioning, 6,192 in general electrician/electrical machine/maintenance and 1,941inmachine tools operator/machinist/turner annually (BANBEIS, 2016). These graduates, however, rarely enter the labour market and do not essentially contribute to the supply of skilled workers in the LEIS. We could identify five showcase training providers who provide LEIS relevant training. Most important among them is BMET under the Ministry of Expatriates' Welfare and Overseas Employment (MoEWOE). Currently, BMET has 70 TTCs which offer LEIS-relevant short-term training and certificate courses in refrigeration and air-conditioning (3,489 persons), general mechanics (571 persons), electrical machine maintenance (3,938 persons), auto CAD and graphic design (2,844 persons), welding (1,808 persons), machine tools and mechanical fitter (500 persons) every year. Similarly, Bangladesh Industrial and Technical Assistance Center (BITAC), under the Ministry of Industries(MoI), also conducts mid-term training courses (4-6 Weeks) in CNC lathe operation and practice (4 persons), CNC milling machine operation and practice (4 persons), CNC machining centre operation and practice (4 persons) and long-term training courses (14 Weeks) in machine shop (25 persons), welding (25 persons), electrical maintenance (20 persons), auto-electricity (10 persons), heat treatment (5 persons) and foundry (5 persons). BITAC produces 54 lathe machine operators, 115 electricians, 26 welders and 8 CNC machine operators annually. Also, Underprivileged Children's Educational Programs (UCEP) has an annual intake of 1,300 welders, 720 machinists, 2012 electricians, 25 CNC machine operators and 540 RAC for training in light engineering. MAWTS also contributes to the supply of skilled workers relevant to LEIS. It trains 400 machinists, 200 electricians, 60 welders and 12 CNC machine operators annually. PROGOTI workshop also produces skilled graduates interalia about 10 CNC machine operators annually. On top of all these training provisions in light engineering, BEIOA-Light

Engineering Training Institute (BLETI) is currently implementing a training programme on CAD-CAM design course under Skills for Employment Investment Programme (SEIP) supported by the Ministry of Finance. Two batches of trainees – 15 in each batch – started the course on 01 April 2016 projected to end on 30 September 2016 with the course duration for six months. All these training providers contribute to the current supply of skilled workers in light engineering as shown in Table-4.13. Besides, on-the-job training in the LEIS adds to the total supply of skilled workers in this sector. The quantum of on-the-job training, however, remains unknown.

As shown in Table-4.13, current skills gap in the most prominent occupations of light engineering averages 84.2 percent. CNC machine operator figures most prominently (97.7 per cent) in skills gap followed by lathe machine operator (96.5 per cent), AC technician (70.1 per cent) and welder (60.9 per cent). Ten-year projection of the demand for skilled workers in these occupations is estimated at 637,998.

Table- 4.13: Current skills gap in light engineering and 10-Year projection of skills demand

Occupation	Current demand	Current supply	Current gap in supply		10-Year projection (including overseas employment)
			Number	%	
CNC Machine Operator	7,323	170	7,153	97.68	65,894
Lathe Machine Operator	46,861	1,664	45,197	96.45	239,614
Milling Machine Operator	4,430	2,134	2,296	51.83	62,062
Welder	6,543	2,554	3,989	60.97	171,412
Electrician	5,973	3,867	2,106	35.26	57,072
AC Technician	6,085	1,820	4,265	70.09	41,944
All Occupations	77,215	12,209	65,006	84.19	637,998

Source: Based on Table-4.9, Table-4.12 and survey of training providers.

However, according to earlier studies (Mondal 2014; Mondal et al.2015), the quality and effectiveness of current training is impeded by (a) a lack of trained teachers due to low output by teacher training institutions, a lack of in-service training opportunities, and poor in centives; (b) about a 50 percent vacancy rate for teaching positions in public training institutions; (c) overemphasis on theory in teaching and testing rather than on practical instruction; (d) inadequate financing to maintain facilities, replace old equipment, and consumables and training materials for training; and (e) a need for government rules to delegate powers, particularly to public training institutions, to generate earnings, hire trainers and resource persons with industry experience, offer market responsive flexible courses, and enter into partnerships with employers and enterprises to make training relevant and place graduates in jobs. The point that needs to be made here is that in the private sector student-teacher ratio is 27, while in the public sector it is 36, indicating greater learning outcome in the private sector training institutions.

By and large, there exists weak institutional arrangements and coordination among existing training institutions. Training programmes are characterised by (i) poor quality of skills acquisition not tailored to match skills requirements of the industry; (ii) lack of standardisation, certification and quality assurance; (iii) most emphasis on time-base than on competency-base; (iv) theory-oriented assessment of training; (v) inadequacy in the number and quality of teachers; and (vi) poor and outdated training equipment and facilities. These are the outcomes of inadequate industry participation, policy, planning and needs assessment as well as of inadequate finance.

4.4.6 Areas of Potential Interventions to Improve the Supply of Required Skill Competencies

As evident, there is supply of some skills which does not match market demand. Therefore, the areas for interventions to make the skills supply responsive to skills demand will encompass filling existing skills gaps and shortages as well as create new skills by recasting existing skills training system of Bangladesh. While three out of 10 enterprises indicate labour market as the first choice of skills replenishment, all the 10 enterprises opt for TVET system in which fresh training of the unskilled youths and migrant labour is most desirable. All this implies that there is a crucial need for improving the labour market flexibility and the TVET system. The lead-times involved in craft and technician apprentice training are very often too long for the

expansion of such training to help employers to cope with immediate shortages of skilled labour. In this context, it is fair to argue that the long-run trends in training levels and recruitment difficulties that have been seen in the last three decades reflect structural rather than merely cyclical weaknesses in the system of light engineering training in Bangladesh.

4.5 Findings and Recommendations

4.5.1 Findings

Light engineering industry has a huge potential for moving up the national, regional and global value chain. Much of this will depend upon growth and development of future skills in the sector in terms of quantity and quality.

Overall, current demand for labour in 10 survey enterprises works out to be 467 compared to current employment of 299, implying current shortages of skilled workforce to the extent of 35.97 percent. This shortage is most acute in the case of skilled labour (43.3 per cent) followed by highly skilled labour (25 per cent) and semi-skilled labour (19.3 per cent). Skills shortage varies widely across occupations. Shortage of skilled labour is most acute in the case of heat treatment plant operator (66.7 per cent), welder (62.7 percent), foundry worker (60 per cent), CNC engineer/operator (42.1 per cent), lathe machine operator (36.6 per cent), fitter (35.9 per cent), AC technician (33.3 per cent) and master craftsman (29.4 per cent). Shortage of highly skilled labour is most acute in the case of CNC engineer/operator (50 per cent) and fitter (50 per cent).Skills gap measured in terms of qualitative deficit in skills is also considerable in some occupations. Much of this gap stems from the lack or inadequacy of generic skills to complement technical skills. Reasons for skills shortages are: (i) labour market tightness, (ii) economic, social and institutional conditions; (iii) skills mismatch; and (iv) deficiency in recruitment practices, work organisation, wage policies and working conditions. Four major factors cause skills gap: (i) jobs are changing, (ii) educational and training attainment is lagging the market need for skills, (iii) appropriate skilled workforce growth is slowing, and (iv) businesses are not leveraging learning investments effectively.

Over the next 10 years, overall labour demand in the LEIS as a whole is projected to 1,039,200 from the current employment 60,0003, as reported by various secondary sources and macroeconomic estimates and from the current labour demand 698,902 as reported by the surveyed enterprises. Most of the increase in the labour demand will take place for highly skilled labour (76.9 per cent) followed by skilled labour (58.5 per cent). Some jobs in certain occupations require unskilled and semi-skilled workers. Demand for them will also increase but at a much slower pace. In fact, some occupations, e.g. shaper, industrial electrician and CNC machine operator, demand will decline while in others demand will remain constant (Table-4.9). However, in all the occupations demand for skilled and highly skilled workers will increase. Demand for skilled labour shows most notable increase in the case of heat treatment plant operator (119.3 per cent) followed by AC technician (100.9 per cent), master craftsman (98.9 per cent) and milling machine operator (96.7 per cent). Increase in the demand for highly skilled labour figures most prominently for welder (275 per cent), followed by CNC machine operator (119.1 per cent) and industrial electrician (92.9 per cent).

Domestic demand and overseas demand taken together, total demand for skilled workforce (excluding unskilled workers) in the LEIS occupations over the next 10 years works out to1,123,677 persons. Current skills gap in the most prominent occupations of light engineering averages 84.2 percent. CNC machine operator figures most prominently (97.7 per cent) in skills gap followed by lathe machine operator (96.5 per cent), AC technician (70.1 per cent) and welder (60.9 per cent). 10 year projection of the demand for skilled workers in these occupations is estimated at 637,998 (Table-4.13).

Existing training programmes suffer from inadequate market relevance. There is pressing need for focusing equally on generic skills in technical training packages in order to reduce skills gap and active participation of the LEIS employers in identifying training needs, developing training curriculum and planning training programmes.

4.5.2 Recommendations

- Establishing common facility centres (CFCs) in all light engineering clusters with facilities of metal testing, CNC training and heat treatment that will be jointly used by cluster engineering firms.
- Setting up specialised institutes/training centres to train up light engineering entrepreneurs/workers on metal selection, composition, different treatments, and mold dye designing,etc. Modern testing laboratory could be established to inspire light engineering entrepreneurs for producing international standard products.
- Developing adequate skilled manpower in CNC technology and create special fund for cluster engineering firms to procure modern machinery.
- For testing and certification to meet the quality standards of locally manufactured agro machines, there is need to strengthen BSTI with new technology and skilled manpower to prepare quality standards and conduct testing.
- Making skills training relevant to market needs through (i) involving the private sector in institutional management; and (ii) allowing public and publicly financed institutions greater autonomy.
- Improving linkages between TVET and enterprises to ensure that employers' and workers' representatives participate in the national TVET policy development committees and employers' representatives are appointed to the skills standards drafting committees and qualifications development committees.
- Improving access and equity in TVET: This describes the state where opportunities are available and affordable for all clients. Relevant timely information on training opportunities needs to be made available for prospective beneficiaries.
- Improving assessment and certification: Professional accreditation plays a key role in the maintenance of quality and standards of skill. There is increased number of TVET graduates with verified/validated competence to perform a particular skill according to quality standards defined by the industry. The registration of certified TVET graduates needs to be readily available to prospective employers for employment.
- Enhancing employability of TVET graduates: This is the environment where TVET graduates have improved access to employment opportunities. Graduates will also have improved prospects for entrepreneurial and self-employment endeavours.

In order to effectively rise to the challenges of LEIS skills demand, it is recommended that LEISC shall be revived. LEISC will identify occupational areas where more personnel are needed, and articulate employer and industry requirements. Training institutions that will be eligible for resources will have an advisory council with industry and employer members.

Competency-based training (CBT) provides several advantages over time-based qualifications, but its requirements must be analysed and addressed including development, teacher training, equipment, and awareness. Industry representative experts should form part of the LEISC that will develop the competency standards. In-service teacher training will need to address the delivery of CBT courses, and selected training institutions need to be provided with adequate training equipment. Simultaneously, public awareness campaigns on CBT need to be put in place.

Use of training funds can spur reallocation of resources to high priority activities and clientele, and stimulate competition between public and private training providers. It is recommended that the skills that are immediately needed by the labour market and the relevant training programmes be identified, and the training package delivered.

Labour market analysis and tracer studies are important for proper direction and feedback to the training systems. Training programmes to be offered need to be based on the requirements of the respective focus industries. After some training programmes have been conducted, tracer studies of the trainees need to be commissioned.

Where reform of training systems is undertaken, the establishment of national qualification frameworks will facilitate labour mobility and more efficient use of training resources. There is a need to complement development of the vocational qualifications framework and to support CBT and develop tailor-made CBT curricula.

It is recommended that the following strategic directions be followed in overall skills development programme for the LEIS:

(i) Private sector-led and market-driven TVET: Strengthened linkages between TVET providers and industry needs to be promoted in order to ensure the active participation of private enterprises in the development and provision of quality technical education and skills development opportunities.

(ii) Pro-Active Job-Skills Matching (SEEK-FIND-TRAIN): Enhancement of matching TVET outputs with available jobs need to be addressed through this strategy with the implementation of the following three components:

(a) SEEK local LEIS business opportunities and jobs through domestic and international labour market intelligence to pinpoint the exact requirements of the job market;
(b) FIND the right people fit for the jobs; and
(c) TRAIN the right people for the available jobs using quality standards developed in consultations with the industry. Programmes and support services need to be provided such that the TVET system effectively contributes to putting people to work and keeping them wage employed or self-employed.

(iii) Competency-based TVET: This would necessitate an entirely new learning environment where the trainers will become facilitators of learning. This strategy should adhere to the following principles: multiple entry/exit; modular and self-paced; learning and assessment of learners according to actual work to be performed based on industry standards; recognition of prior learning; on- and off-the-job experience; blending technical skills training with generic skills training; and provide national recognition/ accreditation for acquired technical and generic competencies.

(iv) Enhancing quality assurance mechanisms: This would require the utilisation of quality systems, procedures and processes of partners towards producing quality products and services.Continuous development and review of competency standards and assessment and certification processes with the active involvement of the private sector registration and certification of TVET programmes need to be pursued, particularly by the industry, to ensure adherence to defined norms and standards.

One way to expand the supply of people, combining technical skills and knowledge with the generic skills which are best gained through work experience, would be to develop new models of integrated education and training provision.

By and large, all training programmes need to be guided by the job-skill matching paradigm, both in terms of quantity and quality set by LEIS, especially in critical occupations and areas where they are in high demand. This requires individually tailor-made training programs (made for a particular purpose, situation, or need). From comprehensive portfolio of training capabilities and services of the training providers, clients need to be consulted on their tailored training needs to ensure that the training solutions fully meet particular skills requirements and challenges of the industry. Tailor-made training caters directly to the needs of each client. This means that courses can be organised for groups of various sizes. They can be designed to upgrade knowledge and skills, to introduce new technologies, or to strengthen sector performance, to name but a few options.

The training providers should work with the industry at various levels of training programme design, from lightly tailored content or in-company delivery, through to fully customized and complex training solutions in close collaboration with subject matter experts – incorporating exceptional subject specific knowledge into training solutions. Their flexibility and versatility will enable them to deliver the majority of their public access courses as bespoke solutions, either delivered in their training facilities or in-company at the client's preferred location. The training solution can be provided as either a stand-alone course or as part of a learning and development corporate strategy – combined with technical advisory services to ensure that the training solution is tailored to shape industry's future skills requirements. In addition to their academic training provision, the training providers should also be able to offer support with on-the-job training or a combination of the two. Due to the complex nature of on-the-job enquiries in LEIS, all requests should be handled on a case by case basis and may involve, with prior arrangement, attachment in the industry.

BEIOA indicates the domestic training needs, as detailed in Table- 4.14 and plans skills development programme in the LES for the next 4 years (January 2018 – December 2021).

Table- 4.14: BEIOA domestic training needs/plan in LEIS for the next four years (January 2018 to December 2021)

Sl. No.	Name of the course	Duration of the Course	1st Year (2018) Target	2nd Year (2019) Target	3rd Year (2020) Target	4th Year (2021) Target	Total Four Years Target
1	CAD-CAM and CNC machine operation	1 Year	30	30	30	30	120
2	CNC machine operation	6 Months	60	60	60	60	240
3	CNC machine troubleshooter	6 Months	20	20	20	20	80
4	Industrial electrician	4 Months	216	216	216	216	864
5	Refrigeration and Airconditioning	4 Months	216	216	216	216	864
6	Lathe machine operation	6 Months	120	120	120	120	480
7	Welder (Arc, TIG &MIG)	6 Months	120	120	120	120	480
8	Master craftsmanship (Up-skilling) All over Bangladesh	2 Weeks 12 Days (36 Hours)	4,800	4,800	4,800	4,800	19,200
Total			5,582	5,582	5,582	5,582	22,328

In addition to domestic training plan, BEIOA also plans training for overseas employment, as detailed in Table-4.15 subject to availability of adequate fund.

Table-4.15: BEIOA overseas employment training plan in LEIS for the next four years (January 2018 to December 2021)

SL No.	Trade name	Training target for next four years (Tranche 2)	2018	2019	2020	2021	Total
1	Welder	480	10	10	10	10	40
2	Lathe operator	480	10	10	10	10	40
3	CNC machine operator	240	5	5	5	5	20
4	Refrigeration and Airconditioning technician	864	20	20	20	20	80
5	Electrician	864	20	20	20	20	80
6	CAD-CAM designer	120	2	2	2	2	8
7	Master craftsmanship	19,206	30	30	40	40	140
Total		22,254	97	97	107	107	408

To this end, BLETI may be provided all possible technical assistance and financial support to build and develop its training capacity to meet the current and emerging demand for skilled workforce in the LEIS. BLETI has the potential for skills training programmes that can be institutionalised in the LEIS.

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CHAPTER- 5

Labour Market and Skills Gap Analysis for the ICT Sector in Bangladesh

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ICT Sector in Bangladesh

Executive Summary

The Bangladesh government envisioned to create a “Digital Bangladesh” by 2021 which has become the buzzword of development. The widespread use of the term clearly signals the government's emphasis on the development of the ICT sector. In 2002 Bangladesh identified ICT as a "thrust sector" as it represents potential for quick wins in reforms, job creation, industry growth, improving governance and facilitating inclusion, and it has high spillover effects to other sectors. In this pursuit, the government formed a separate ministry in 2011 and employed a huge amount of resources for the development of the sector. Bangladesh’s ICT sector comprises of IT (software), ISP, Call centers, Telecommunications and hardware sectors. Excluding telecommunications and hardware, the market size of the IT sector is about US$ 450 million in Bangladesh. Most of the IT firms are small in size and about 70% are domestic market oriented. The industry started growing since after 2000 when the government liberalized the market to a greater extent. Currently, the industry employs over 0.2 million people of which roughly 50% are IT professionals. The sector also supplies a good number of IT professionals to the overseas market; however, a precise figure of overseas employment of the Bangladeshi IT professionals is not available.

The number of IT professionals working in Bangladesh is now about 0.20 million, which is expected to reach 0.44 million by 2025. The majority of this workforce excels in pure technical tasks such as programming and networking. Every year about 6-10 thousands IT graduates enter into the market; however, most of them are not acquainted with the industry need due to the lack of proper training and industry oriented education. Our purposive survey reveals that there exists a gap of around 40% of the required IT professionals, and among the existing pool of IT workforce, 60% are skilled and the rest are semi or non-skilled.

Most of the software, ISP and call centers are SMEs in size in Bangladesh employing less than 100 people. Programmers/software engineers and Networking engineers have the highest concentration in the IT/ITeS and ISP firms. On the other hand, non-technical non-graduate staffs have the highest concentration in the call centers and outsourcing firms.

The key findings on skills gaps in the ICT sector can be outlined as follows:

(i) Fresh graduates are not adequately trained to enter into the industry due to the outdated curriculums followed by the educational institutions and the lack of linkages between the industry and academia;
(ii) Our projections suggest that the labor demand in the ICT sector would be doubled in the next 10 years and the demand for training will also be enhanced which has to be met with appropriate policies to facilitate the growth of the economy;
(iii) The industry faces shortage of a strong pool of mid-level product/project managers that hampers the expected growth of the industry;
(iv) Most of the existing IT training institutions impart sub-standard training programs, which could not fulfill the skill requirements and therefore it is important to streamline their curriculum and ensure standard of training in these institutions;
(v) The need for developing standardized and uniform IT training curriculums has been felt enormously by the industry stakeholders so that a minimum level of quality of training can be ensured;
(vi) It is also strongly demanded by the concerned stakeholders to establish some centers of excellence in IT training to mitigate the skills gap in the ICT sector; and
(vii) It is also observed that existing training programs offered by respective institutes do not give due diligence to the emerging thrusts of the IT sector.

As already discussed, the development of the ICT sector is important to enhance overall development of the country through technology acquisition in various sectors and facilitating the employment and growth. Moreover, the ICT industry itself has the huge potential to grow. However, the development of the ICT sector critically hinges upon availability of proper human capital. Based on the above skills related issues, we recommend that the SEIP project of the government could take the following measures to address the skills constraints in the ICT sector:

1 The project (SEIP) could create or support at least three IT training institutes under the aegis of three associations: BACCO, ISPAB and BCC/BCS. It is also important to upgrade the capacity of the BITM. The curriculum of these institutes must be aligned with the industry needs;

2. The project could provide support through different institutions (both training, research and academic) to create a strong pool of mid-level managers;

3. Under the SEIP supported training programs, conditionality could be attached to provide job facilities to a certain proportion of the trainees;

4. It is also important to create a strong pool of IT trainers through arranging proper ToT (training of trainers) programs. This could be done by providing support to appropriate institutions to arrange local and foreign ToT trainings on a regular basis. Provisions could be made to invite foreign experts as trainer in these training programs.;

5. As stakeholders suggest, training durations should not be less than 3 months and it is better if 6-month duration training programs can be designed and implemented;

6. The study findings suggest that to enhance the development of the ICT sector, the following groups should be targeted to be trained properly: Programmers and software engineers, Mid-level product/project managers, Networking engineers, IT-BPO professionals and hardware engineers;

7. The ICT Industry related people often claim that university and training institutes' curriculum are outdated and could not meet the demand for the industry and hence these need to be updated and upgraded. In this regard, the project (SEIP) could take initiative through UGC and the Ministry of Education to upgrade and modernize the relevant curriculums.

8. Considering the lack of training on BPO, the SEIP project could enter into a collaborative engagement with various public and private universities to start a one-semester IT-BPO course targeting the call centers and outsourcing firms' skills requirements;

9. Another important area of concerns for the ICT sector is the deficiencies of soft-skills of the workforce. Therefore, quality training programs on soft-skills such as English language proficiency, management skills, business communications etc. need to be designed and administered; and

10. Finally, new training programs on emerging thrusts of the sector such as IoT, Gaming, Mobile applications, Cyber security, Artificial intelligence etc. need to be designed and implemented.

5.1 INTRODUCTION

The importance of the Information and Communication Technology (ICT) industry[1] is now widely recognised as a vehicle for achieving quick growth and development of a country through technological advancement and innovation. The ICT helps many other sectors in the growth process of the economy including the services and manufacturing sectors. Many scholars argue that ICT could provide an opportunity for developing countries to "leapfrog" into the industrialised economy status by skipping the stages of development (Perez and Soete 1988). The rapid expansion of telecommunication over the last decade facilitates the delivery of ICT services from a remote location and consequently it has led to the emergence of the offshore/outsourcing industry. The market size of the global offshore/outsourcing industry has been increasing rapidly, from US$252 billion in 2010 (CGGC Report, 2010) to US$484 billion in 2014 (Everest Group 2015). Globally, the IT outsourcing (ITO) captures the major share of the outsourcing market (63 per cent), followed by BPO (33 per cent) and KPO (4 per cent). While ITO witnesses a compound annual growth (CAGR) of 5.3 per cent, BPO witnesses 6.5 per cent and KPO witnesses 12 per cent growth (Asia Pacific Outsourcing Summit 2013). India, Brazil, Malaysia, and some East European countries have already captured a substantial portion of the outsourcing business. Some developing countries including Bangladesh have the potential to gain from this industry due to the availability of trained and educated human capital and technologies in these countries as the industry heavily relies on these inputs. The comparative advantages lead low-income economies to build IT capabilities much faster and push trajectories in more relevant directions.

The Bangladesh government envisioned, more than half a decade ago, to create a "Digital Bangladesh" which has become the buzzword of development. The widespread use of the term clearly signals the government's emphasis on the development of the ICT sector as ICT is the backbone of any digital initiative. The Seventh Five Year Plan (7FYP) of the government underscored the need for human capital development in the areas of ICTs to foster economic development. In 2002 Bangladesh identified ICT as a "thrust sector" as it represents potential for quick wins in reforms, job creation, industry growth, improving governance and facilitating inclusion, and it has high spillover effects to other sectors. In the pursuit, the government formed a separate ministry in 2011 and employed huge amount of resources for the development of the sector. Bangladesh's ICT sector comprises of IT (software), ISP, call centres, telecommunications and hardware sectors. Excluding telecommunications and hardware, the market size of the IT sector is about US$ 450 million in Bangladesh. Most of the IT firms are small in size and about 70 per cent are domestic market oriented. The industry started growing since 2000 when the government liberalized the market to a greater extent. Currently, the industry employs over 0.2 million people, of which roughly 50 per cent are IT professionals. However, a precise figure of the overseas employment of the Bangladeshi IT professionals is not available—the figures provided by BMET appear to have been under reported.

Two factors, the phenomenal growth of the mobile phone service and "digital Bangladesh" initiative of the government, have been instrumental to the current growth of the ICT service sector. Mobile phone penetration in Bangladesh is one of the highest in the developing economies with a teledensity of over 40 percent. The internet penetration rate is estimated to be 7 percent in 2012 and 22 percent in 2013, with most people using mobile internet. The use of international bandwidth has increased by 200 percent in 2011 with capacity upgrades for international bandwidth of over 500 percent underway (UNCTAD2016).

These are strength for development of the ICT service sector.With various initiatives of the government and private sector, usability of ICT enabled services by the people has been growing steadily over time. The number of users of Internet, mobile and fixed telephone and the amount of investments in ICTs have been expanding over time. However, to reap the benefits of ICTs at its full potential, it is necessary to put appropriate policies in place.

The importance of skilled manpower for the growth of the ICT sector is well established in the literature. Although reaching an initial level of development of the IT sector is possible with the availability of human

[1] ICT is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. According to the OECD, ICT in manufacturing and service industry means that the industry must either perform information processing and communications by electronic means or use electronic processing to measure or control a physical process (OECD2000: 7).

capital, further growth of this sector is not possible without improving the dynamic capabilities of the firms. Dynamic capabilities of firms, reliant on skilled manpower, enabled firms to use changing opportunities to carve out a niche in the export of outsourced services as well as to understand which product market or business model best utilises the internal and external assets of the firms (Athreye 2005). Mid-level managerial skill is key to achieve various goals through their dynamic and innovative capabilities. Therefore, availability of skilled workforce is the key for achieving expected growth in the ICT sector.

The purpose of the present study is to assess the current situation of skills/employment in the ICT industry and evaluate the means to integrate the ICT sector as a dynamic sector in the economy by overcoming the existing skills constraints and by articulating proper strategy for facilitating the development of the ICT sector to contribute effectively to the objective of the growth of the economy. However, the study has the following specific objectives:

i. Assess the current level of skills and the gap in skills in terms of availability and quality,
ii. Assess the supply side capacity of the academic and training institutions to mitigate the gap in skills,
iii. Estimate demand for skilled workforce in the next five years considering the growth of the industry,
iv. Identify the emerging thrusts of the ICT sector, and
v. Assess the training needs and ways of implementing the training programmes.

The chapter is structured as follows. After introduction, section 5.2 discusses the methodology and approaches adopted in the study. Section 5.3 highlights the current status of the ICT sector in Bangladesh and Section 5.4 discusses the employment and skill matrix in the sector. Section 5.5 analyses the availability of IT professionals and Section 5.6 gives a brief account of IT education and training in Bangladesh. Section 5.7 analyses skill gap in the sector while Section 5.8 concludes the chapter.

5.2 Methodology and Approaches

The study undertook a mix of both qualitative and quantitative approaches for assessing the skill gap. The data collection method includes a sample survey of 15 ICT firms, which were selected purposively, and the focus group discussions (FGDs) with various industry associations, such as BASIS, ISPAB, BACCO, and BCS. The distribution of firms surveyed and FGDs is shown in Table 5.1.

Table 5.1: Surveyed firms and FGDs

Sector	No. of firms surveyed	No. of FGDs conducted
IT/Software	8	1 (BASIS & BITM)
ISP	3	1 (ISPAB)
Call center and BPO center	2	1 (BACCO)
Hardware	2	1 (BCS)
Total	15	4

In addition to the survey and FGDs, relevant literature and documents are reviewed to assess the skill gap in the ICT industry. The telecommunications sector has not been included in the analysis. The findings are drawn mainly for IT, ISP,call centres and, to some extent, for hardware sector as it mainly consists of assembling and repairing services.

The projection of labour demand in ICT sub-sectors as well as occupation-wise labour demand has been made using the annual growth rates of labour demand estimated in the macro study of skills gap conducted by BIDS (Rahman 2016). However, in the projection, the base year estimates are taken from the survey findings. The demand for training has also been estimated in this study.

5.3 An Overview of the ICT Sector

With various initiatives of the government and private sector, usability of ICT enabled services by the people has been growing steadily over time (Table-5.2). Internet users, mobile and fixed telephone users, teledensity and investment in ICTs have been expanding over time. As Table-5.2 shows, the number of users of internet and investments in the sector have been more than doubled over the last 7 years.

Table 5.2: ICT development indicators in Bangladesh, 2009-2015

Indicator / Year	2009	2010	2011	2012	2013	2014	2015
Internet users (per 100 people)	3.10	3.70	4.5	5	6.63	9.60	n.a.
Secure internet servers (per 1 million people)	0.19	0.31	0.64	0.73	0.77	0.86	1.32
Telephone mainlines/ fixed Telephone subscription (per 100 people)	0.82	0.85	0.65	0.62	0.691	0.615	n.a.
Mobile phone subscribers (million)	46.41	70.34	59.98	87.7	98.6	115.63	123.7
Teledensity (%)	34.05	44.6	47.8	61	64.64	77.81	79.3
Investment in telecoms with private participation (in million US$)	372.00	520.50	494.00	412.00	662.00	657.10	n.a.

Sources: World Development Indicators, The World Bank. BTRC Bangladesh; n.a.- Not Available; Digital Bangladesh Report 2015, Ministry of Finance, Bangladesh

The National ICT Policy 2009 was formulated to facilitate materialising "Digital Bangladesh" which the government pledged to build within 2021. Very recently the government has approved the National ICT Policy, 2015.The highlights of the ICT Policy towards the development of the ICT sector are as follows:

- Build ICT infrastructure facilities in educational institutions
- Decentralise ICT growth outside the capital
- Improve education quality in IT, Mathematics and English
- Improve Internet availability and reliability
- Create supportive legal framework for IPR protection, online document sharing, transactions and payments
- Establish a Government Interoperability Framework to be adhered to by all government ICT projects
- Promote the use of cost-effective, open source and open architecture solutions

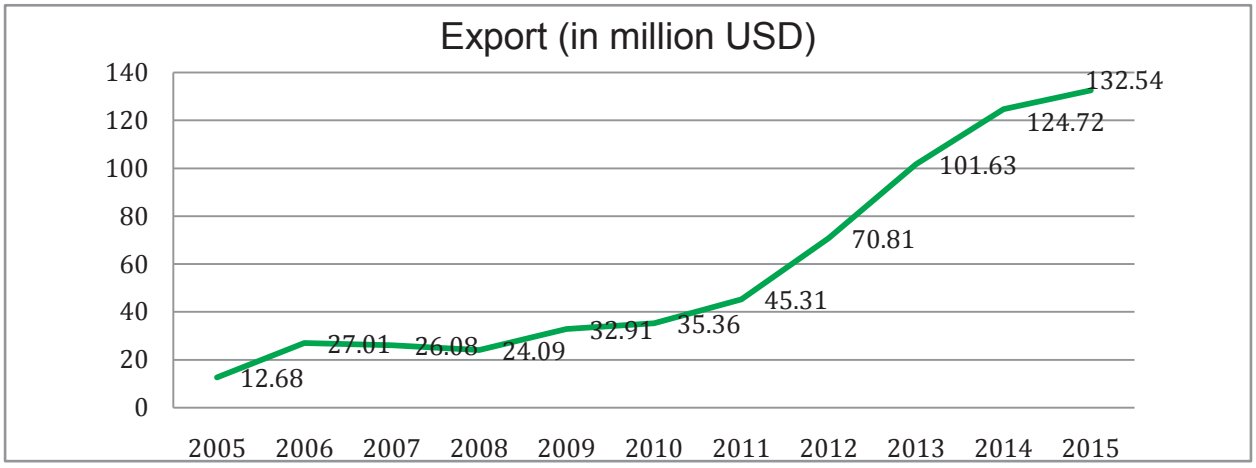
The ICT sector of Bangladesh comprises of about 1500 software firms (997 firms are registered with BASIS), 2,000 Internet Service Provider firms (557 got license from BTRC and the rest are operating without license, but only 64 firms are registered with ISPAB), 282 licensed call centres (only 76 call centres are registered with BACCO), 10 mobile phone operators, 37 IIG (International Internet Gateway Service), 4 NTTNs (Nationwide Telecommunication Transmission Network) firms, 12 PSTN (Public Switched Telephone Network) operators, 65 VSAT, 26 Interconnection Exchange (ICX) Services and 2,500 hardware sales and servicing centers. According to industry leaders, the domestic market for ICT services has been expanding rapidly, and currently the size is estimated to be about US$ 450 million excluding the telecom sector.

Software Firms:

Most of the software firms (about 70 per cent) are domestic market-oriented and about 30 percent of the firms export software and ITES and they earned about US $132 million in 2015. Domestic demand for ICT services mainly comes from the financial, telecom, health and garment sectors and for exporting firms, services in ERP (Enterprise Resource Planning)are at the higher end of the value chain, followed by GIS

and digital contents, graphics, e-commerce, website development and BPO services (Hossain et al. 2012).The software and ITES exports registered rapid growth after 2010 at a CAGR of 37 per cent (Figure 5.1). The software and ITES companies are currently exporting their products and services to over 30 countries. The United States remains the top destination of software exports, followed by UK, Canada, Australia, Denmark, etc.

Figure 5.1:Export of software and ITES



Source: BASIS, 2015.

The performance of the Bangladeshi IT freelancers has been very impressive with around 200 percent annual growth. About 30,000 freelance programmers are now working from their homes in Bangladesh for different global companies[2] and they roughly earn a sum of around US$15 million per year (IER 2012). There are discrepancies in the number of freelancers as, according to industry stakeholders, it is much higher than the reported one.Of the freelancers, 43 percent were involved in IT programming, 24 percent in designs and multimedia, 16 percent in sales and marketing, 10 percent in administration support, 5 percent in writing and translation and 2 percent in miscellaneous jobs. The freelancers were hired mainly from USA, Canada, UK, Australia and Singapore. About two-thirds of the freelancers from Bangladesh find work order through oDesk[3] a global job marketplace for remote workers. Bangladesh is competing with India, Pakistan and some Eastern European countries for freelance work, with its high caliber pool of Bangladeshi IT professionals.[4] Freelancers earn about US$15 to US$20 per hour on average for technical work, and US$5 to US$10 for administrative or non-technical work. While Bangladeshi freelancers did 2 percent of the total work of oDesk in 2009, it rose to 12 percent in 2012 (BASIS 2013).

The Ministry of Information and Communication Technology (MoICT) has already trained about 9,000 people on freelancing skills, such as SEO, animation, graphics, video editing, etc. The target was set to increase the number to 15,000 by 2015. The ICT ministry has taken some projects through which they will train people to become freelance entrepreneurs. The training module will include skills in advanced IT, business and communicative English.[5] Moreover, an initiative is now ongoing to establish an Institute for freelancers at Natore, Rajshahi.

Regarding employment, about 35,000 IT professionals are engaged in the software industry and about 30,000 or more are working as freelancers (BASIS 2016). More than 95 universities and 200 polytechnic/ technical institutes are now producing around 6,000 IT/computer graduates every year. However, this amount of graduates does not appear to be sufficient to cater to the needs of the sector given the prospects of higher growth. Capacity building of IT institutes to produce more qualified IT graduates could be an important agenda for further development of this service sector.

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2 According to AKM Fahim Mashroor, former president of BASIS; Daily Star, 3 December 2012.
3 Elance and oDesk have merged.
4 Matt Cooper, vice-president of oDesk, The Daily Star, Dhaka, May 27, 2012
5 Md. Nazrul Islam Khan, Secretary of Ministry of ICT.

Internet Service Providers (ISPs)

Mobile phone penetration in Bangladesh is one of the highest in the developing world with a teledensity of over 79 percent in 2015. The internet penetration rate is estimated to be 12 percent in 2012 and 27.8 percent in 2015, with most people using mobile internet (Digital Bangladesh Report, 2015). The use of international bandwidth has increased by 200 percent in 3 years to 2011, with capacity being upgraded recently for international bandwidth of over 500 percent. These are the strengths for the development of the ICT service sector.

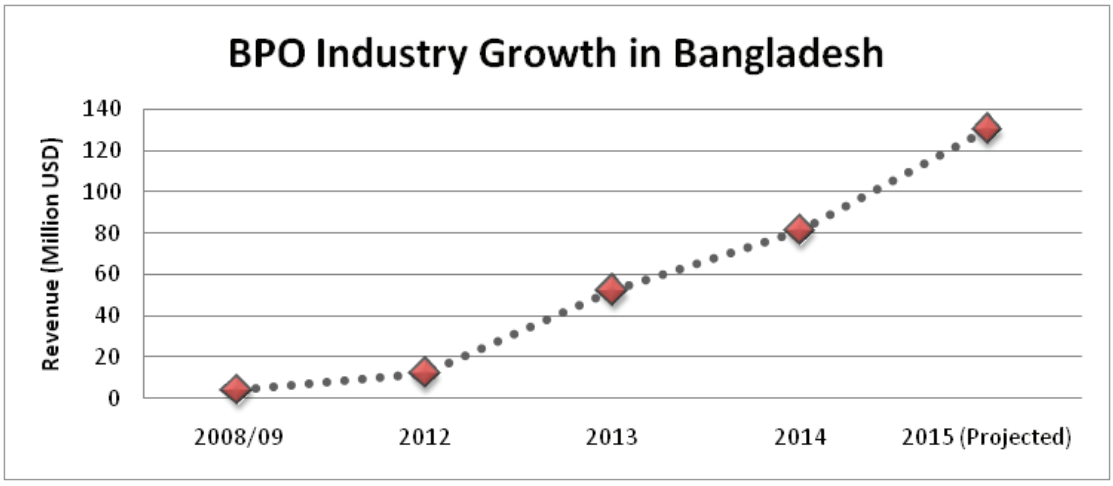
According to ISP Association of Bangladesh (ISPAB) officials, currently more than 2,000 ISPs are operating in Bangladesh, of which 550 took licenses from BTRC. Only about 90 ISPs are registered with ISPAB. About 40,000 people are now involved with the ISPs. Of the workforce, 30-50 per cent are IT professionals and the rest are non-IT but they do have basic computer/IT literacy. The bigger ISPs having employees of about 400 (nearly 10-20 firms) are amalgamated with ISP and Software services.

The importance of ISPs in the ICT sector can be highlighted by the extent of bandwidth usage. In Bangladesh, the bandwidth of about 225 GBPs are being used per month, of which around 60 million mobile phone subscribers use 70-75 GBPs, while only 4 million ISP subscribers use the rest 140 GBPs. The size of the market for broadband internet is about Tk. 500 million and about 0.8 million customers are added every year to the broadband customer base. Currently, two NTTNs are providing cable/connectivity (transmission) services to ISPs which appears to be inadequate for the ISPs.A large section of the people could be brought under broadband connectivity if last mile connectivity through optical fiber network is attained.Thus, the ISP sector appears to have huge potentials to grow.

Call Centre and BPO Services

About 80 call centres are now operating in Bangladesh, employing about 30,000 people in the sector. Of the call centers, 80-85 per cent are voice and the rest 15-20 per cent provide non-voice outsourcing services, mainly knowledge process outsourcing (KPO) services in the areas of accounting, human resource management and legal services. Most of the centres are domestic market-oriented. Bangladesh Association of Call Center and Outsourcing (BACCO) claims that BPO services have earned over US$150 million revenue in recent days. The BPO/call centre services does not require highly educated people, rather they need professionals having HSC exam pass or undergraduate level qualification with excellent command on soft skills including proficiencies in English. According to BACCO officials, though the country has huge potentials of BPO services, it could not tap the potentials due to the dearth of trained and qualified people with soft skills and IT-BPO skills. This is an area where further interventions are required to tap the potentials of the BPO market.

Figure 5.2: BPO industry growth in Bangladesh



Source: BPO Summit Keynote 2015, BACCO, Bangladesh.

The BPO industry has been experiencing a staggering growth in the last 6-7 years. While the size of the market was US$ 4 million in 2008-09, it reached US$ 150 million in 2015, registering a phenomenal compound annual growth of about 500 per cent. Considering the growth prospects and the requirements of low level educational qualification of employees, the industry has huge growth potentials if proper policies, particularly human resource development policies, are put in place.

Hardware Sector

The hardware segment of the IT industry appears to have the largest number of firms, approximately 10,000 but it also appears that this sector is intensely amalgamated with assembling and repairing services. Most of these firms sell computer and computer related accessories and roughly 60,000 PCs and laptops are sold per month in Bangladesh. The industry stakeholders suggest that the hardware sector has a current employment of about 2,500 hardware/system engineers having diploma or some other training on computer hardware systems. Most of these professionals have completed HSC exams with a few exceptions of having higher degrees. Most of them are trained in BIOS editing, BGA installation, Micro-chip and basic computer knowledge. With estimates of around 3 million laptops/PCs being available in the country and a population of over 750,000 computer savvy users, it is a big plus for the Bangladesh IT/ITES industry. Though repairing and assembling services of computers/laptops are adequately placed, Bangladesh could not yet step into the manufacturing of computer parts and accessories. Thus, the demand for hardware engineers in this sector is somewhat stagnant.

5.4 Employment in the ICT Sector and Skill Matrix

The current employment in the ICT sector has been estimated and projected for the next 10 years in Table 5.3 based on the information given by the industry stakeholders. The projected figures are estimated considering the current level of growth of the industry as well as considering the existing gap in the required IT professionals. For example, the software industry has set a target of achieving US$1 billion exports by 2018 under “One Bangladesh Vision.” The BPO industry also sets a target to achieve US$1 billion by 2021. Therefore, these sectors roughly have to increase their output by 150 per cent annually and the consequent increase of employment would be roughly 20-25 per cent per year. However, as the macro study on skill gap estimated the annual growth of labour demand at around 10 per cent or below considering the current growth of the industry, the projections of labour demand have been made here considering the same growth rates (Table 5.3).

Table 5.3: Employment status of IT professionals in the ICT sector in Bangladesh

Sl.	Sector and sub-sectors	Total employment (current)
1.	Software	
	a. Software firms	35,000
	b. Freelance	30,000
	c. Other private, public and NGOs	50,000
2.	ISPs	50,000
3.	Call centres and BPO centres	30,000
4.	Hardware (IT professionals)	2500
5.	Others (NTTN, PSTN, IIG etc.)	20,000
	Total	**2,17,500**

Source: Focus Group Discussions with Industry Leaders

As Table 5.3 shows, currently, the ICT industry employs about 0.22 million people and considering this figure as the base, we have projected manpower demand for the next 10 years in Table 5.4. It is projected that labor demand for the ICT sector (excluding telecommunications) would be about 0.44 million by 2025. Our estimates differ from the one done in the macro study based on the LFS 2013 data because of the differences in the base year estimates of IT manpower.

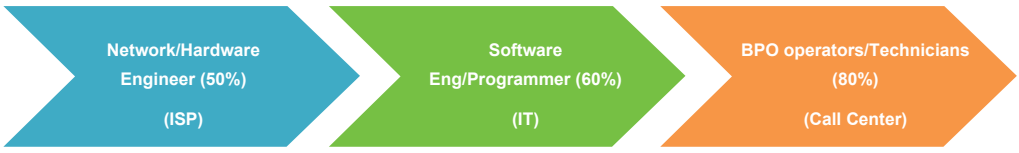
Table 5.4: Projected labour demand in the ICT sector, 2016-2025 (million)

	2016 (Base)	2017	2018	2019	2020	2021	2022	2023	2024	2025
Annual growth rates of labour demand*	0.11	0.10	0.09	0.08	0.10	0.09	0.08	0.08	0.07	0.05
Software & others	0.14	0.15	0.16	0.17	0.19	0.21	0.23	0.24	0.26	0.27
ISPs	0.05	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10
Call centers	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06
Hardware	0.003	0.003	0.003	0.003	0.004	0.004	0.005	0.006	0.006	0.007
Total labour	**0.22**	**0.24**	**0.26**	**0.28**	**0.31**	**0.34**	**0.36**	**0.39**	**0.42**	**0.44**
Total Labour projected in the macro study, BIDS 2016	0.14	0.155	0.17	0.185	0.2	0.22	0.24	0.26	0.28	0.3

Notes: * Annual growth rates of labor demand in the ICT sector are taken from the Macro study on ICT skill gap analysis conducted by BIDS in 2016; However, in this study as the base-year (2016) estimate of labour demand has been made on the basis of FGD with stakeholders, it differs with the figures estimated in the Macro study using the Labour Force 2013 data.

It is observed that the four different ICT sub-sectors (Software, ISP, Call centers and Hardware firms) require different sets of IT professionals based on the nature of their jobs. The distribution of the existing pool of IT professionals according to job category suggests that the majority of the IT professionals in a typical software firm are either programmers or software engineers (about 60 per cent). Only about 10 per cent of total employees are mid-level product/project manager. In ISP firms, among the professionals,majority are networking or hardware engineers(50 per cent) and about one-quarter belong to each of the manager and programmer categories. For call centres and outsourcing businesses, 80 per cent of the staffs are BPO operators/technicians and only about 15 per cent belong to management category. For hardware firms, 75 per cent belong to the managerial job category and 25 per cent to the hardware engineer category (Table 5.5).

Figure 5.3: Concentration of existing pool of IT professionals



It is observed that among the IT professionals, managers are the most experienced professionals. While the product/project managers do have experiences of about 5 years on average, most other professionals do have experiences of about 3 years. The operators and technicians are relatively less experienced as their tenure ranges between 1 and 2 years.

Table 5.5: Percentage distribution of IT staff in different sectors by job category

Categories	Software (%)	ISP (%)	Call centre (%)	Hardware (%)	Average experience
Project/ product manager	10.0	23.0	15.0	75.0	5 years
Programmers/system analysts/software engineer	60.0	25.0	5.0		3 years
Database administrator	6.0	2.0			3 years
Hardware/system/ networking	-	50.0	-	25.0	3 years
Web developers	7.0				3 years
Graphic designer	4.0				3 years
Quality & assurance	5.0				3 years
Operator/ technician	8.0		80.0		2 years

Source: BIDS Survey, 2016.

Based on the estimated proportion of labour in each of the occupations of the subsectors, given in Table 5.5, projections of manpower demand for different occupations are made in Table 5.6, assuming that the same proportion will continue over the next ten years. Though this is a conservative assumption and estimates are based on linear projections, the projections can be improved with increased number of samples. However, the projected estimates of labour demand for various occupations will likely to make sense, if there is no big structural change in the ICT sector,

Table 5.6: 10 (Ten) years projection of manpower demand by major occupations for the ICT sector (million)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Software										
Product/ project manager	0.014	0.015	0.017	0.019	0.021	0.024	0.027	0.031	0.035	0.035
Programmers/ system analyst/software engineer	0.081	0.090	0.099	0.113	0.126	0.144	0.162	0.185	0.207	0.211
Database Administrator	0.008	0.009	0.010	0.011	0.013	0.014	0.016	0.018	0.021	0.021
Web developer	0.009	0.011	0.012	0.013	0.015	0.017	0.019	0.022	0.024	0.025
Graphic designer	0.005	0.006	0.007	0.008	0.008	0.010	0.011	0.012	0.014	0.014
Quality & assurance	0.007	0.008	0.008	0.009	0.011	0.012	0.014	0.015	0.017	0.018
Operator/ Technician	0.011	0.012	0.013	0.015	0.017	0.019	0.022	0.025	0.028	0.028
ISP										
Product/ project manager	0.012	0.013	0.014	0.016	0.018	0.020	0.023	0.026	0.029	0.030
Programmer/ system analyst/software engineer	0.013	0.014	0.015	0.017	0.019	0.022	0.025	0.028	0.032	0.033
Database administrator	0.010	0.011	0.012	0.014	0.016	0.018	0.020	0.023	0.026	0.026
Hardware/ networking	0.025	0.028	0.031	0.035	0.039	0.044	0.050	0.057	0.064	0.065
Call Centre										
Product/ project manager	0.005	0.005	0.006	0.006	0.007	0.008	0.009	0.010	0.012	0.012
Programmer/ system analyst/software engineer	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.004
Operator/ technician	0.024	0.027	0.029	0.033	0.037	0.043	0.048	0.055	0.061	0.063
Hardware										
Product/ project manager	0.0019	0.0021	0.0023	0.0026	0.0029	0.0033	0.0038	0.0043	0.0048	0.0049
Hardware/ networking	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011	0.0013	0.0014	0.0016	0.0016

Source: Author's own estimates.

Training Demand Projection for 10 years

Occupation-wise training demand has been estimated in Table 5.7. For the estimation, first, the need for training of the existing pool of labour has been assessed through our survey results on the performance of the employees in a 5-scale performance ranking (see Annex table 5.3A and Figure 5.5). It is assumed that the proportion of employees whose performance is evaluated as good or below will need further training. The proportion was then plugged into the estimated labour demand, given in Table 5.4, to get the desired demand for training of the IT professionals.

Table 5.7: Occupation-wise training demand projection for 10 years (in million)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Product/ project manager	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.004
Programmer/system analyst/software engineer	0.030	0.033	0.036	0.041	0.046	0.052	0.059	0.067	0.075	0.077
Database administrator	0.003	0.004	0.004	0.005	0.006	0.006	0.007	0.008	0.009	0.009
Web developer	0.006	0.008	0.008	0.009	0.010	0.012	0.013	0.015	0.016	0.017
Graphic designer	0.002	0.003	0.003	0.004	0.004	0.005	0.005	0.006	0.007	0.007
Quality & assurance	0.004	0.005	0.005	0.005	0.007	0.007	0.008	0.009	0.010	0.011
Operator/ technician	0.008	0.008	0.009	0.011	0.012	0.013	0.015	0.018	0.020	0.020

Source: Author's own estimates.

Female Employment in the Sector

Gender wise breakdown of existing employees in different sub-sectors of the ICT industry is given in Table 5.8 based on secondary data. The results suggest that except for call centers, the proportion of female employee is less than 20 per cent in most of the categories of occupations.

Table 5.8: Female employment in the ICT sector (percentage)

Sectors	Male (%)	Female (%)
Software development and Research	83.0	17.0
Graphics designing	78.0	22.0
Animation	96.0	4.0
E-commerce	75.0	25.0
Networking	93.0	7.0
IT consultancy services	80.0	20.0
Hardware	96.0	4.0
Call centres	51.0	49.0
BPOs	81.0	19.0
Different IT training institutes	84.0	16.0

Source: Bangladesh Computer Council & Ministry of Post, Telecommunications and IT, 2015.

Educational Qualifications and Training Certifications

Educational qualifications of IT professionals are reported in Table 5.9.Except managers and graphic designers, all other IT professionals have Bachelors and/or Masters degrees. Though most of the IT professionals have engineering degrees (CSC/CSE/EEE/SE/ETE), about 20 per cent have non-engineering bachelor's degrees but undertook various industry certification trainings. About 45 per cent of managers have non-engineering degrees, particularly those are involved in ISP, call centres and hardware firms. The operators and technicians are required to have only diploma/HSC certificates. Among the graphic designers, about 29 per cent have non-engineering degrees (Table 5.9). The findings suggest that though majority of the employees in the ICT sector do have IT/engineering degrees, a certain proportion (about 20 per cent) of employees engaged in the sector without having such degrees. Non-IT professionals are reportedly acquainted with IT issues by undertaking various professional IT trainings.

Table 5.9: Educational Qualifications of IT Professionals

	Bachelors-Engineering	Bachelors- Non Engineering	Masters-Engineering	Masters-Non Engineering	Diploma/ HSC	Other trainings
Project/product manager	32.14	23.86	25.0	20.29		
Programmer	60.0	20.0	20.0			
System analyst	40.0	10.0	50.0			
Database administrator	75.0		25.0			
Software engineer	50.0	16.67	33.33			
Hardware/system engineer	58.33	16.67			25.0	
Web developers	75.0	25.0				
Graphic designers	71.43			28.60		
Quality and assurance	70.0	30.0				
Operators/ technicians					70.0	30.0

Source: BIDS Survey, 2016.

Percentage of Employee Undertake Training

Table 5.10 provides information on the proportion of employees receives training from different training institutes. Survey results reveal that about 67 per cent of the firms offer apprenticeship/internship facilities for fresh graduates, the duration of which ranges between 3 and 6 months (Table 5.10). After successful completion of the programme, outstanding participants are also offered jobs in the firm. "On-the-job" training is required for almost all newly recruited staffs. About 75 per cent of the IT staff undertook training from external training institutes, mainly those are offered by the government and industry associations. About 25 per cent of the employees receive training from firms' own training institutes.

Table 5.10: Percentage of IT Employees who Undertake any Training

	% IT employee undertook training	Average duration
Apprenticeship/internship	67.0	3-6 months
On the job training	100.0	Week to month
Training from training institute	75.0 (Mainly from govt. and industry assoc. initiatives)	3-7 days
Internal training institutes	25.0	3-15 days

Note: Findings are based on only IT, ISP and Call centers.

Skill Matrix

The need for specific types of skills required for professionals engaged in software, ISP, call centre and IT consultancy and networking is assessed in Table 5.11. For software firms, the most commonly required IT skills include JAVA, Net, HTML5, ASP, JSP, Ruby, Python, C/C++/VC, CSS3, Mongo DB, Postgre SQL, Node JS, Big Data, other database software/applications (MS SQL, Oracle, UNIX/Linux/Solaris, XML), and mobile applications (Android, iOS, J2ME) as these are recognised by most of the surveyed firms (Table 5.11).For ISP and call centre professionals, they mainly require knowledge on basic computer literacy, C/C++, JAVA, HTML5 and database applications. According to industry stakeholders, these are the areas on which more training programs need to be designed and administered.

Table 5.11: Specific types of skills required according to major activities (in percentages)

Types of skills	Software (%)	ISP (%)	Call centre (%)
Software			
Basic computer knowledge	12.5	33.3	75.0
C/C++/VC	37.5	33.3	-
JAVA	75.0	33.3	25.0
Net	75.0	33.3	25.0
HTML 5	100.0	33.3	25.0
ASP	50.0	-	
PHP	75.0	-	25.0
JSP	50.0	-	-
Java Beans	12.5	-	-
CGI Perl	12.5	-	-
Node JS	37.5	-	-
Python	50.0	-	-
Ruby	62.5	-	-
Scala	12.5	-	-
CSS 3	37.5	-	-
JS	25.0	-	-

Mongo DB	37.5	-	-
Pouch DB	12.5	-	-
Big Data	37.5	-	-
Postgre SQL	37.5	-	-
No SQL	25.0	-	-
C Sharp	12.5	-	-
Realm	12.5	-	-
Database			
MS SQL	75.0	66.7	-
MS Access/ Fox pro	12.5	66.7	-
Oracle	50.0	33.3	-
My SQL	75.0	66.7	25.0
MS NT 2000, 2006	37.5	33.3	-
UNIX/ Linux/ Solaris	62.5	66.7	-
Lotus Notes	-	33.3	-
XML	50.0	-	-
UML	37.5	-	-
Mobile Applications			
Android	100.0	33.3	-
iOS	75.0	33.3	-
J2ME	25.0	-	-
Action script 3	12.5	-	-

Source: BIDS Survey, 2016.

Level of Skills

The level of skills of IT professionals, as recognized by their employers, is reported in Table 5.12. In the case of software/IT firms, e-governance and mobile-based applications suffer from a dearth of highly skilled professionals while other sectors have been able to acquire a majority of highly skilled professionals to their credit. It is also evident that a certain proportion of semi-skilled professionals are engaged in graphics and mobile phone applications. For ISP and call/BPO centres, majority of the staffs are skilled (about 60 per cent). For hardware assembling and repairing services, majority of staffs are reportedly highly skilled (67 per cent) and one-third are just skilled.

Table 5.12: Level of skills according to the types of activities (in percentages)

Software	E-commerce	E-Governance	GIS/ GPS	BPO	Data entry	Website	Graphics	Multimedia	EPR	Mobile application
Highly skilled (%)	60.0	33.3	66.7	-	66.7	100.0	66.78	100.0	50.0	40.0
Skilled (%)	40.0	66.7	33.3	100.0	-	-	-	-	50.0	40.0
Semi-skilled (%)	-	-	-	-	33.3	-	33.3	-	-	20.0

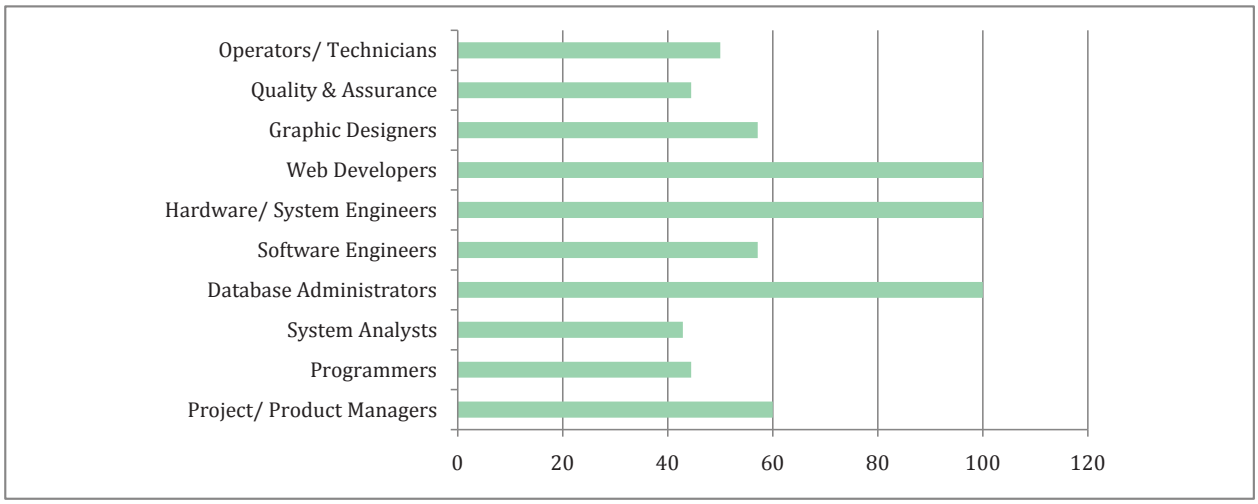
Level of skills	IT-BPO and call centers	ISP	Hardware	
			Assembling	Repairing
Highly skilled (%)	5.0	25.0	66.7	66.7
Skilled (%)	67.0	60.0	33.3	33.3
Semi-skilled (%)	28.0	15.0	-	-

Source: BIDS Survey, 2016

5.5 Availability of IT professionals According to Skills Category

The ICT industry basically requires about 10 categories of professionals, namely project/product manager, programmer, system analyst, database administrator, software engineer, hardware/system engineer, web developer, graphic designer, quality and assurance (Q&A) and technician/operator. The availability of these categories of professionals is assessed in this study. The owners/CEOs of the firms were requested to assess the availability in a 5-scale availability ranks (scarce, moderate, highly available, etc.).Based on the survey results, the proportion of availability of professionals of each category has been estimated and plotted in figure 5.4. The results suggest that there is a huge need for programmers/system analyst/software engineers and Q&A as the existing pool can meet up only over 40 per cent of the required demand. Similarly, existing supply of project/product managers (mid-level professionals) and graphic designers can meet up only about 50 per cent of the current demand. On the other hand, there is adequate supply of web developers, database administrators and hardware/system engineers. However, there is scarcity of trained operators and technicians in the industry.

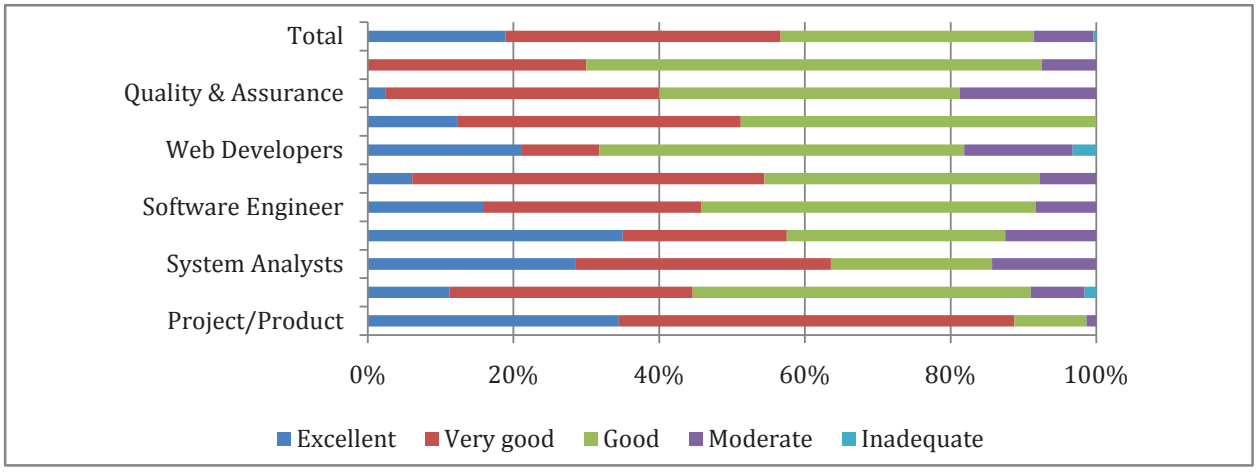
Figure 5.4. Availability of IT professionals



Source: BIDS Survey, 2016.

In terms of performance, only about 20 per cent are ranked as “Excellent”, 35 per cent as “Very Good,” 35 per cent as “Good” and the rest as “Moderate” (Figure 5.5). About 35 per cent of product/project managers and database administrators were ranked as “Excellent” and less than 20 per cent of the other categories were ranked as “Excellent”. Most of the categories of professionals fall in the “Good” and “Very Good” rankings. The findings suggest that despite the scarcity of professionals, 45 per cent of the existing categories of professionals (almost 45 per cent excepting those that are excellent and very good) need further training to improve their performances.

Figure 5.5: Performance level of the professionals



Source: BIDS Survey, 2016.

5.6 A Brief Account of IT Education and Training in Bangladesh

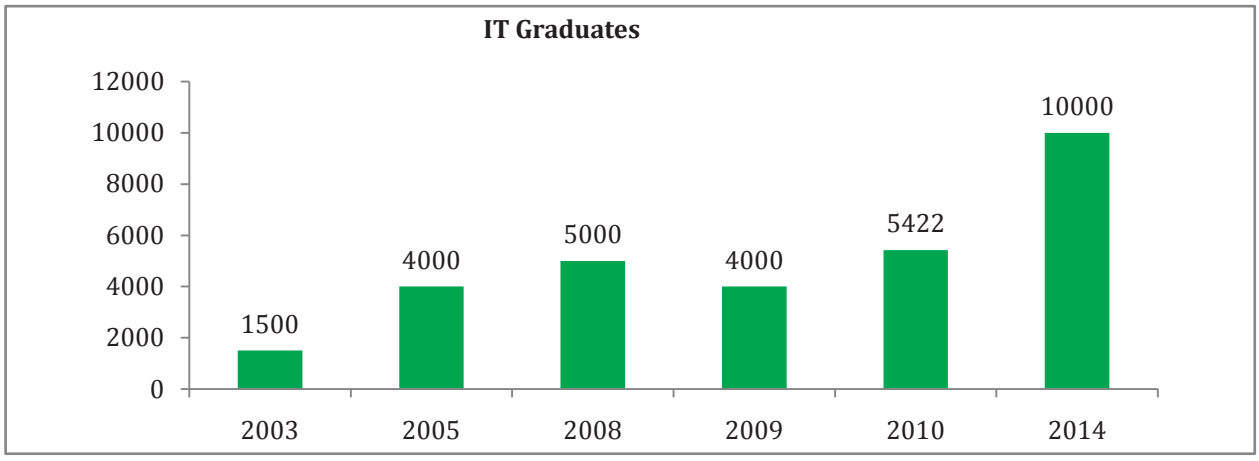
In recent times, both public and private universities have been producing 6-10 thousand IT graduates every year in Bangladesh (Figure 5.6). The students pursuing IT education in the country have shown tremendous potential over the years by winning international programming contests and developing various software. In addition to the universities, there are a quite good number of diploma/vocational institutions in the country which provide IT training and education (Table 5.13). Currently, around 71 universities, 40 colleges and institutions and 300 IT centres have been offering various IT related training courses in the country (Digital Bangladesh Report, 2011/2015). These institutions mainly offer engineering and computer science degrees at the university level as well as short-term IT courses and industry certification courses namely CISCO, Apple, SUN, JAVA and other certified courses. However, the interviews with the stakeholders revealed that the training facilities in these institutes are inadequate and the types of training provided do not commensurate with the industry requirements. Most of the training institutions provide training on basic computer skills. Only a few institutions (NIIT, Aptech, Base, etc.) provide advanced level of training courses. However, they lack the relevance to the actual needs of the software companies. Professionals have the option to acquire certifications provided by Microsoft Certified Partners. To overcome the deficiency of the institutional training facilities, almost all companies develop in-house training programs. Moreover, they strongly recommended foreign companies coming to Bangladesh to do the same.

Table 5.13: IT Education and training institutes

	2010	2011	2012	2013	2014	2015
Public universities (including Science and Technology)	19	19	19	22	22	22
Private universities	51	54	58	67	76	83
Polytechnic institutes	171	171	218	218	300	337
Technical Training Centres	43	43	81	81	81	134
Technical institute	29	29	29	33	33	33
Technical vocational institutes	50	50	50	50	50	50

Source: MoE (BANBEIS) Education Statistics 2015; Bangladesh Economic Review 2015, MoF.

Figure 5.6: Number of IT graduates joined the labour force, 2003-2014



Source: Digital Bangladesh Report 2015, Ministry of Finance.

To mitigate the skills gap in the industry, the BASIS started its own training institute in 2012, namely the BASIS Institute of Technology & Management (BITM) with support from the World Bank. BITM was established with a view to address skills gaps of the fresh IT graduates and make them ready to be absorbed into the industry. The BITM is now receiving various supports from the Skills for Employment Investment Program (SEIP) of the government to train up to 23,000 IT professionals over the period of 3 years. A total of 5,000, 9,000 and 9,000 trainees will be trained in the 1st, 2nd and 3rd year respectively.

BITM has been offering 12 IT and one soft-skill training courses for the new entrants and the duration of the courses ranges between 1 and 3 months (Table 5.14).

Table 5.14: Existing training courses offered by BITM

SL.	Name of the Course	Duration(Month)
1.	Web design course	3
2.	Graphic design	3
3.	Online marketing	1
4.	Web application development – PHP	3
5.	Web application development - Dot Net	3
6.	Practical SEO	1
7.	Mobile application development (Android)	3
8.	Server administration and cloud management	2
9.	IT support technical	3
10.	Affiliate and e-commerce marketing	3
11.	Customer support and service	1
12.	IT sales management	1
Soft Skill Training - Up skilling		
13.	English and business communication	1

Source: BITM

Considering the future demand of the Industry, BITM has been planning to offer some other 13 new IT courses and 5 soft-skill training courses (The list is shown in the Appendix).The management of BITM and trainees feel that the duration of training (up to 3 months), which is being currently offered, is inadequate and thus the training duration needs to be extended up to 6 months.

Emerging Areas/Thrusts of IT Skills

Though BITM has designed a list of new courses to be undertaken in the future program through stakeholder consultations survey reveals that some more new courses need to be designed and offered in line with the emerging thrusts of the IT sector.The demand for IT skills is likely to be emerged in the future from the following areas: Internet of Things (IoT), Cyber security, Artificial intelligence (AI), Gaming, Cloud Computing, etc. (Table 5.15).The BACCO officials strongly argued that if an IT-BPO course(possible a one-semester course) is designed for the students of business studies, it will create a huge boost to the supply of professionals for the emerging BPO sector. At present, no such courses are offered in Bangladesh though this course is available in many countries including the Philippines. All the three sectoral Associations admitted that the IT professionals in the country suffer from the deficiencies of soft-skills, such as English proficiency and business communications. Therefore, complementary training courses on soft-skills could be made mandatory along with the regular IT training courses.

Table 5.15: Emerging thrusts of the ICT sectors

Software (IT/ITeS)	ISP	Call centre and BPO	Hardware
Internet of Things (IoT) Cyber Security Artificial Intelligence (AI) Mobile Platform Cloud Computing Big Data Search Engine Optimization Gaming Soft skills	Transmission & Networking Cloud Computing Data Centre Routing Soft skills	Soft skills IT-BPO	Bios Editing BGA installation, Micro -chip installation and repairing

Source: BIDS Survey, 2016.

5.7 Skills Gap Analysis

The analysis of skills gap in the IT profession is not straight forward and requires a multi-dimensional approach. The gap can be assessed from three perspectives: (i) weaknesses of the existing pool of IT professionals, (ii) mismatch between current skills and future demand and (iii) capacity needs of IT training institutes.

a. Weaknesses of the existing pool of IT professionals

Considering the current supply of IT professionals/graduates, there is no particular gap in the quantity demanded and supplied. However, as far as quality is concerned, there has been a huge gap/dearth of skilled IT professionals. Based on the availability and skill level information obtained from the survey findings, a summary of skills gap has been shown in Table 5.15. The results show that about 60 per cent of the existing pool are skilled/highly skilled and there is a gap of 40 per cent skilled professionals in the industry. In terms of availability, there is a huge need for programmers/system analyst/software engineer and Q&A as the existing pool can meet up only about60 per cent of the required demand. Similarly, existing supply of project/product managers (mid-level professionals) and graphic designers can meet up only about 60 per cent of the current demand (Table 5.16).

Though the academic institutes and other vocational and IT training institutes produce roughly 6,000 IT professionals every year, many of them are absorbed in non-IT professions and some remain unemployed. The situation can be explained by both demand and supply-side problems. The IT industry has been facing problems in getting adequate projects from both domestic and foreign markets due to stiff competition, which is attributable to various other causes like problems in public procurement policies, IT infrastructure bottlenecks, tax/VAT policies, etc. On the other hand, the graduates supplied by the formal educational institutions lack proper skills required for the industry. The main reasons behind under-supply of required skilled graduates are, inter alia, lack of linkages between industry and academia, lack of up-to-date IT curriculum, and the shortage of R&D labs.

Therefore, most of the newly recruited IT staffs need to go through on-the-job training and other trainings offered by the employers, which incurs huge costs to the employers. Moreover, as there has been a substantial gap of skilled employees, the mobility of the trained staff is also high which costs them significantly as well.

Table 5.16: Skills gap analysis

A. Skill level				
		Skilled/Highly skilled (%)	Non-skilled (%)	Comment
	Overall	60.0	40.0	In terms of quality
B. Availability (occupation-wise)				
		Available	Gap	
	Programmers/ system analyst/software engineer and Q&A	60.0	40.0	In terms of supply
	Project/ product manager and graphic designer	60.0	40.0	In terms of supply
New entrants (fresh graduates)	Entry level Programmers/ system analyst/software engineer and Q&A		100.0	On the job training is required

Source: BIDS Survey, 2016.

b. Mismatch between current skills and future demand

There are two concerns regarding future demand for IT professionals.

(i) The shortage of skilled manpower, and
(ii) The shortage of required professionals for the emerging thrusts of the IT sector.

Since the country currently faces a shortage of about 40 per cent of the required skilled manpower in the sector, industry growth and investments are likely to be severely affected in the future. Proper policies and training programmes thus need to be adopted to mitigate this gap of skilled manpower in the ICT sector.

On the other hand, as the existing pool of IT professionals is not adequately trained in new emerging IT issues, therefore, the academia need to adjust their curriculum towards the emerging thrust sectors/issues (as highlighted in Table 5.15).This shortage of skilled IT professionals restricts Foreign Direct Investment (FDI) inflow in this sector to a great extent.

c. Capacity building of IT training institutes

Many training institutes have been offering various IT training courses in the country. However, they mainly offer basic computer literacy trainings except for a few who offer quality IT training. Academic institutions provide degrees on IT and related fields; however, such curriculum does not fit into the requirements of the industry. Currently, BITM has been offering some training courses taking into consideration the industry needs and it receives support from the government and donors. However, it could accommodate only 1,500 trainees in each quarter with the duration ranging between 1 and 3 months. This training institute receives huge attention from the potential trainees and therefore its capacity needs to be enhanced. Similar types of institutes need to be established under the aegis of other associations, such as BACCO and ISPAB. Hardware related training programmes is another neglected area in Bangladesh. Some of the hardware professionals undertook training from India by their own efforts. So the BCS or the BCC could be given the responsibility to organise training programs on hardware aspects.

Table 5.17: Supply-side problems of IT skills

Problems	Importance of the labour supply side problems			
	Less important (%)	Neutral (%)	More important (%)	Total (%)
Lack of up -to-date IT related curriculum	-	42.9	57.2	100.0
Lack of industry - academia linkage	11.1	-	88.9	100.0
Shortage of quality teachers/ trainers	44.4	11.1	44.4	100.0
Lack of quality and facilities in IT training institutes	20.0	30.0	50.0	100.0
Shortage of R&D labs	12.50	12.50	75.0	100.0
Limited range of courses offered by IT training institutes	33.33	33.33	33.33	100.0

Source: BIDS Survey, 2016.

5.8 Conclusions and Recommendations: Way Forward

The core strengths of the Bangladesh's ICT sector can be recognised by the abundance of human capital with intellectual aptitudes. However, the main challenge is to train them and prepare them as per the need of the industry. As already mentioned, though initial human capital is required to move the industry forward, the further growth of the industry depends on the dynamic capability of the mid-level managers/professionals. The industry is now in need of a strong pool of mid-level experienced professionals.

The number of IT professionals working in Bangladesh is now about 0.20 million, which is expected to reach 0.44 million by 2025. The majority of this workforce excels in pure technical tasks such as programming and networking. Every year about 6-10 thousands IT graduates enter into the market, however, most of them are not prepared to be absorbed in the industry due to lack of proper training and industry oriented education. The purposive survey reveals that there exists a gap of around 40 per cent of the required IT professionals, and among the existing pool of IT workforce, 60 per cent are skilled and the rest are semi-skilled or non-skilled.

Most of the software, ISP and call centres are SMEs in size in Bangladesh and employ less than 100 people. Programmers/software engineers and networking engineers have the highest concentration in the IT/ITeS and ISP firms. On the other hand, non-technical non-graduate staffs have the highest concentration in the call centres and outsourcing firms.

The key findings on skills gaps in the ICT sector can be outlined as follows:

1. Fresh graduates are not adequately trained to enter into the industry due to the outdated curriculums followed by the educational institutions and the lack of linkages between the industry and academia.
2. Our projections suggest that the labour demand in the ICT sector would be doubled in the next 10 years and the demand for training will also be enhanced, which has to be met with appropriate policies to facilitate the growth of the sector as well as the economy.
3. The industry faces shortage of a strong pool of mid-level product/project managers that hampers the expected growth of the industry.
4. Most of the existing IT training institutions impart sub-standard training programmes, which could not fulfill the skills requirements and therefore it is important to streamline their curriculum and ensure certain standard of training in these institutions.
5. The need for developing standardized and uniform IT training curriculums has been felt enormously by the industry stakeholders so that a minimum level of quality of training can be ensured.
6. It is also strongly demanded by the concerned stakeholders to establish some centres of excellence in IT training to mitigate the skills gap in the ICT sector and
7. It is also observed that existing training programmes offered by respective institutes do not give due diligence to the emerging thrusts of the IT sector.

As already discussed, the development of the ICT sector is important to enhance overall development (ICT4D) of the country through technology acquisition in various sectors and facilitating the employment and growth. Moreover, the ICT industry itself has the huge potential to grow. However, the development of the ICT sector critically hinges upon availability of proper human capital base. Based on the above skills related issues, we recommend that the SEIP project of the government could take the following measures to address the skills constraints in the ICT sector:

1. The project (SEIP) could create or support at least three IT training institutes under the aegis of three associations: BACCO, ISPAB and BCC/BCS. It is also important to upgrade the capacity of the BITM. The curriculum of these institutes must be aligned with the industry needs;
2. The project could provide support through different institutions (both training, research and academic) to create a strong pool of mid-level managers;
3. Under the SEIP supported training programmes, conditionality could be attached to provide job facilities to a certain proportion of the trainees;
4. It is also important to create a strong pool of IT trainers through arranging proper ToT (training of trainers) programmes. This could be done by providing support to appropriate institutions to arrange local and foreign ToT trainings on a regular basis. Provisions could be made to invite foreign experts as trainer in these training programs.;
5. As stakeholders suggest, training durations should not be less than 3 months and it is better if 6-month duration training programmes can be designed and implemented;
6. The study findings suggest that to enhance the development of the ICT sector, the following groups should be targeted to be trained properly: Programmers and software engineers, mid-level product/ project managers, networking engineers, IT-BPO professionals and hardware engineers;

7. The ICT industry related people often claim that university and training institutes curriculum are outdated and could not meet the demand for the industry and hence these need to be updated and upgraded. In this regard, the project (SEIP) could take initiative through University Grants Commission (UGC) and the Ministry of Education to upgrade and modernise the relevant curriculums.
8. Considering the lack of training on BPO, the SEIP project could enter into a collaborative engagement with various public and private universities to start a one-semester IT-BPO course targeting the call centres and outsourcing firms' skills requirements;
9. Another important area of concerns for the ICT sector is the deficiencies of soft-skills, of the workforce. Therefore, quality training programs on soft-skills such as English language proficiency, management skills, business communications, etc., need to be designed and administered; and
10. Finally, new training programmes on emerging thrusts of the sector such as IoT, gaming, mobile applications, cyber security, artificial intelligence etc. need to be designed and implemented.

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Appendices

Table 5.1A: Number of licensed firms

Type of BTRC operators	Categories	No. of licensed firms	Associations
Internet Protocol Telephony Service Provider(IPTSP)	IPTSP Nationwide	33	
	IPTSP Central	7	
	IPTSP Zonal	3	
	Total	43	
Internet Service Provider(ISP)	ISP Nationwide	119	Internet Service Providers Association Bangladesh (ISPAB)
	ISP Central	65	
	ISP Zonal	47	
	ISP A	228	
	ISP B	31	
	ISP C	67	
	Total	557	
Call Centres	Call Centres	203	Bangladesh Association of Call Center and Outsourcing (BACCO)
	Hosted Call Centre	41	
	Hosted Call Centre Service Provider	36	
	International Call centre	2	
	Total	282	
Mobile Telecom Operators	2G	6	Association of Mobile Telecom Operators of Bangladesh (AMTOB)
	3G	4	
	Total	10	
International Internet Gateway Services (IIG)	Total	37	International Internet Gateway Association of Bangladesh (iiGAB)
International Gateway (IGW) Services	Total	25	IGW Operators Forum (IOF)
National Internet Exchange (NIX)	Total	2	
Broadband Wireless Access (BWA)	Total	2	
Interconnection Exchange (ICX) Services	Total	26	Association of Mobile Telecom Operators of Bangladesh (AMTOB)
VSAT	User	48	
	Provider	12	
	Provider with HUB	5	
	Total	65	
International Terrestrial Cable (ITC) Services	Total		
Nationwide Telecommunication Transmission Network (NTTN) Service Provider	Total	4	
Vehicle Tracking Services	Vehicle Tracking Service Licensee	17	
	Vehicle Tracking Service Approval	3	
	Total	20	
Public Switched Telephone Network (PSTN) Operator	National	4	
	Zonal	7	
	Rural	1	
	Total	12	

Table 5.2 A: Associations and their current members.

Name	Current members
Bangladesh Association of Software and Information Services (BASIS)	997
Bangladesh Association of Call Center and Outsourcing (BACCO)	76
Internet Service Providers Association Bangladesh (ISPAB)	64
Bangladesh Computer Samity (BCS)	1452 (till March 2016)
Association of Mobile Telecom Operators of Bangladesh (AMTOB)	General Member: 6
	Associate Member: 2
International Internet Gateway Association of Bangladesh (IIGAB)	36
IGW Operators Forum (IOF)	28

Table 5.3 A: Performance evaluation of the employees (%)

	Excellent	Very good	Good	Moderate	Inadequate	Training required
	1	2	3	4	5	[3+4+5]
Project/ product	34.5	54.3	9.9	1.3	0.0	11.2
Programmer/ system analysts	28.6	35.0	22.1	14.3	0.0	36.4
Database administrator	35.0	22.5	30.0	12.5	0.0	42.5
Web developers	21.2	10.7	50.0	14.9	3.2	68.2
Graphic designer	12.4	38.8	48.8	0.0	0.0	48.8
Quality and assurance	2.5	37.5	41.2	18.8	0.0	60.0
Operator/ technician	0.0	30.0	62.5	7.5	0.0	70.0
Others	100.0	0.0	0.0	0.0	0.0	0.0
Hardware/system	6.11	48.3	37.8	7.8	0	45.6

Table 5.4 A: Availability of employees according to job categories.

Job Categories	Availability of employees					
	Highly scarce (%)	Scarce (%)	Moderate (%)	Available (%)	Highly available (%)	Total (%)
Project/ product manager	26.7	13.3	40.0	13.3	6.7	100.0
Programmer	22.2	33.3	33.3	11.1	-	100.0
System analyst	14.3	42.9	14.3	28.6	-	100.0
Database administrators	-	-	80.0	20.0	-	100.0
Software engineer	28.6	14.3	28.6	28.6	-	100.0
Hardware/ system engineer	-	-	44.4	55.6	-	100.0
Web developers	-	-	60.0	40.0	-	100.0
Graphic designers	28.6	14.3	28.6	28.6	-	100.0
Quality and assurance	33.3	22.2	44.4	-	-	100.0
Operators/ technicians	-	50.0	-	50.0	-	100.0

Table 5.5 A: Skill level of the employees in the ICT sector

Level of skill	E-commerce	E-Governance	GIS/ GPS	BPO	Data entry	Website	Graphics	Multimedia	EPR	Mobile application
Highly skilled (%)	60.0	33.3	66.7	-	66.7	100.0	66.78	100.0	50.0	40.0
Skilled (%)	40.0	66.7	33.3	100.0	-	-	-	-	50.0	40.0
Semi-skilled (%)	-	-	-	-	33.3	-	33.3	-	-	20.0
Unskilled (%)	-	-	-	-	-	-	-	-	-	-
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Existing Level of skills	IT-BPO and call centers	ISP	Hardware	
			Assembling	Repairing
Highly skilled (%)	5.0	25.0	66.7	66.7
Skilled (%)	67.0	60.0	33.3	33.3
Semi-skilled (%)	28.0	15.0	-	-
Unskilled (%)	-	-	-	-
Total (%)	100.0	100.0	100.0	100.0

Table 5.6 A: Overseas employment in the IT sector from Bangladesh (2010-2015)

Job Category	2010	2011	2012	2013	2014	2015
Computer engineer		1		4	3	1
Computer operator		2		2	8	2
Software developer	1			1	3	
Software engineer				1	4	7
System analyst			1	1	1	1
Web developer/ programmer	2	2	5	6	7	2
IT consultant			1		1	
QA/ QC engineer	68	1785	35,632	2	31	197
Data entry operator			5	1		2

Source: Migration from Bangladesh by occupation [Bureau of Manpower, Employment and Training, BMET.

CHAPTER- 6

Labour Market and Skills Gap Analyses for the Shipbuilding Sector in Bangladesh

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Shipbuilding Sector in Bangladesh

Executive Summary

Introduction

Bangladesh has a strong background in building ships since ancient times. It is one of the early industries developed in Bengal based on its old business of building boats and sea vessels. Bangladesh, a coastal country abundant with rivers, has more than 100 shipbuilders and shipbuilding yards. In addition, Bangladesh is currently contributing to the shipbuilding industries globally through its exported workforce. These facts do not speak only of a heritage but of an inbuilt ability of shipbuilding of people of this region which had been for ages dependent on waters. With global shipbuilding orders of very large vessels increasing everyday, a market is emerging in Bangladesh for shipbuilding yards that can concentrate on producing smaller sea-going vessels as the industry leaders like China, South Korea and Vietnam go for the larger container ships, bulkers and tankers. So it is important to analyze skills gap situation in the shipbuilding industries for further improvement in this sector.

Objectives

The specific objectives are as follows:

- To review and assess the current status and emerging needs of the Shipbuilding sector in terms of skilled workforce
- To project future skills needs-in terms of quantity and quality-in order for the country to move up the value chain as Bangladesh is increasingly pulled into global and regional value chains by examining the current labour force.

Methodology

The present study tries to provide skills gap in the shipbuilding sector in Bangladesh. To meet objectives we have selected 10 large shipbuilding firms in Bangladesh.

Quantitative and Qualitative Methods

This study has applied a mix of both quantitative and qualitative methods to address the research questions.

Questionnaire Survey

Quantitative data has been collected through questionnaire survey from 10 large firms (where a minimum of 50 staffs are employed). In addition, the study team has collected data and information from training institutes and trainers.

Qualitative Methods: KIIs & FGDs

In addition to questionnaire survey, 10 KIIs (key informants' interviews) have been conducted with a checklist to understand the sector, its skill needs, future labour and skills demand etc. The interviews with the members of industry associations, heads of the human resource division of selected industries, top level managers have provided relevant information. Field data has been supplemented by a desk review of reference materials and similar skills gap analyses carried out in Bangladesh and neighboring countries. Available data from the government, training providers, and business sectors have been gathered to investigate available jobs, specific skills requirements by occupation, and services provided. FGDs have been conducted with firm and in addition to the surveys and FGDs, we have done KIIs with head and other relevant persons of four training institutes (one private training institution and three branches of BIMT) in this sector to understand the nature of training provided inside the country.

Findings

Assessment of the current skill need for workforce

It has revealed from the survey data that highest numbers of the shipbuilding industries depend on walk-in test for hiring workers. Almost 41 per cent follow the walk-in test process. In 23 per cent cases they follow the advertisement process. They (enterprises) employ 9 per cent employee from the direct contract with the

training service providers. 22 per cent employees are employed in this sector through labour contractor. Survey data proves very poor connection between employer and training providers for employee recruitment practices.

Current skills

It has revealed from the interviews with the employers that changes in the skill requirement in the surveyed enterprises have evolved over time primarily due to expansion of the production capacity and changes in technology. The two major occupations in the shipbuilding sector are Welder and Electrician where the unskilled workers proportions are around 40 per cent and 39.21 per cent. At the time of interview the entrepreneurs opined that they badly needed skilled workers as Welder and Electrician for future growth of their industries. Survey data shows that on an average highest number workers (387 in each industry) are employed as Welder and the second highest numbers are employed as Fitter. In terms of employment Electricians has the third highest employment in shipbuilding industry.

Skills gap analysis (Firm's perceptions)

The enterprises survey shows that there are a number of skills gaps in workers from different occupations. Most important amongst them is the lack of basic knowledge and lack of precision. These skills gaps are most prominent among Helper, Cutter man, Fitter and Sand Blaster in shipbuilding sector. Among other skills gaps, while lack of accuracy is most predominant for Cutter men, Grinder and Helper workers.

Projection

We have already done a projection of future labour demand by using gross value added and GDP (projected) data. From the projection, it can be concluded that over the years total demand of labour in every category will be increased.

Training

A strong demand for skills is being created in the field of shipbuilding technology. Some training centers like Bangladesh Industrial and Technical Assistance Center (BITAC) and Bangladesh Oxygen Company (BOC) provide upgrading courses in some specialist trades. Some industries have their in-house training arrangement for upgrading of skill.There are two types of training available in Bangladesh – formal and informal. Skills training at the Certificate levels are delivered by the 37 Technical Training Centres(TTCs). The Ministry of Expatriates' Welfare and Overseas Employment supervises the Institute of Marine Technology (BIMT) at Narayangonj and 11 Technical Training Centers (TTCs).All the 37 TTCs are operationally supervised by the Bureau of Manpower, Employment and Training (BMET). There are some Training programmes supervised by BMET for Diploma in Shipbuilding Engineering. Besides these Association of Export Oriented Shipbuilding Industries of Bangladesh (AEOSIB) is a top most exportation shipbuilding association of Bangladesh directed and under the guidance of Skills for Employment Investment Program (SEIP) of Bangladesh Ministry of Finance took a programme to create skilled labour.

We interviewed four training institutes who provided and are providing training for the employees of shipbuilding industries. On an average the surveyed training institutes take 48-90 students per year. At the time of the KIIs, head/representative of the training institutes agreed that their 50 per cent students are employed overseas and rest 50 per cent are employed in Bangladesh. All of the training institutes agreed that their syllabus cover the basic need of the market. 50 per cent of their training modules are based on practical and rest 50 per cent cover theoretical part. As a result almost 70 per cent of their student get job immediate after training.

Overseas Employment

Although BMET data show that painter as the highest number of overseas employment, but it is difficult to say that all of them are employed in shipbuilding sector. Construction and other sectors (like light engineering) also employ painter, welder and electrician like shipbuilding sector. But at the end of the day it can be said that there is a good prospects for overseas employment in shipbuilding sector in Bangladesh.

Conclusion and Recommendations

This study has provided estimates of demand for skills at present and arrived at some projections for next five/ten years. It has examined whether there are skills gaps in some major occupations. It has also discussed the role of the existing training system in meeting the skills requirement of the country. The survey of shipbuilding firms also indicates that there are a number of skills gaps in workers from different occupations in shipbuilding sector. This sector has high potential for growth, competitiveness and export capabilities. Future demand for skilled and educated workforce of the sector will be needed. As the country's cargo and oil products are transported by small ships, cargo vessels and tugs through its coastal and inland waterways and people use ferries and steamers to travel from one part of Bangladesh to another, most of these vessels are built in the country, and the shipbuilding industry is aiming to win orders from abroad, it is expected to create many thousands of jobs. Based on the study findings we recommend that the government could take the following measures to address the skills constraints in the shipbuilding sector:

- Set up proper employee training institutes for the new comers to save time during work as well as increase productivity;
- Develop standardized quality training curriculums;
- Build centers of excellence in training;
- Supports for backward linkages of the industry;
- Create opportunities for employment expansion, higher revenue earnings, etc.
- Take steps to encourage the technological advancement for sustainable development of the industry;
- Integrate shipbuilding expansion plan as strategic development programme of the country and the sector needs a favorable regulatory framework to support the industry;
- Should improve its employee benefit scheme such as: performance bonus, festival bonus and medical allowance as these allowances can motivate employees;
- Take steps to link the private sector in institutional management; and permitting the publicly financed institutions greater autonomy and improved connections between TVET and enterprises.

6.1. Introduction

6.1.1 Background

Bangladesh has a strong background in building ships since ancient times. It is one of the early industries developed in Bengal based on its old business of building boats and sea vessels. Many countries of Asia and Europe regularly bought ships built in Chittagong. It is quite natural that Bangladesh has more than 200 rivers with a total length of about 22,155km plus a long coast line on the Bay of Bengal. It is little known today that Bangladesh was the centre of building ocean-going vessels in Asia between the 15th and 17th century[1].

Bangladesh, a coastal country abundant with rivers, has more than 100 shipbuilders and shipbuilding yards. Out of these shipyards, approximately 80 per cent are located in and around Dhaka. These yards are mainly engaged in building and repairing of inland and coastal vessels, up to 3,500 DWT (Dead Weight Tonnage).According to World Trade Organization (WTO), global shipbuilding market size is US$ 1,600 billion. If only 1 per cent market share can be captured by Bangladesh, it will be worth US$ 16 billion. If we can grab 1 per cent of the global order for only small ships market, the amount will be worth US$ 4 billion. Bangladesh is suitable for small and medium combine cargo vessel, multipurpose vessel and oil tanker up to 15,000 DWT and some extend to 25,000 DWT. However, it predicts that small cargo and containership market will also be feasible for Bangladesh in the coming years.[2]

A number of diversified types of vessels are built in various shipyards around Bangladesh, such as multipurpose vessel, fast patrol boat, container vessel, cargo vessel, tanker, dredging barge, ferry, passenger vessel, landing craft, tourist ship, tug boat, supply barge, deck loading barge, pleasure craft/hatch, crane boat, speed boat, deep sea trawler, self-propelled barge, inspection vessel, cargo coaster, troops carrying vessel, double decker passenger vessel, hydrographic survey boat, pilot boat, hospital ship, water taxi, etc.By 2012, Bangladeshi component manufacturers could manufacture 50 per cent of the total material, machinery and equipment of the inland/ coastal vessels built. This proportion for an international classed vessel to be built in Bangladesh is at present 10 per cent and there is a strong need to build the backward linking industry if the Bangladeshi shipbuilding sector is to gain a higher world share of all new buildings.[3]

In a long term perspective, shipbuilding is both a promising and a challenging industry. Until very recently the average increasing rate of ships in tonnage was approximately 21 million GT (Gross Tonnage) per year. Considering US$ 7,620 as construction cost per GT, total market size is US$ 1,600 billion.[4]

Present Status

Shipbuilding in Bangladesh has been considered as the most promising industry in recent time and the country is dreaming to emerge as a middle income country within a short time by maintaining the upward trend of this sector. However, due to global nature and the long- term sustainability of this shipbuilding industry, an investigation of competitiveness in terms of global standard is of prime importance. There are more than 50 shipyards in Bangladesh and a hundred of shipbuilders or contractors and marine workshops are actively involved in shipbuilding activities. 70 per cent of the shipyards are located in and around Dhaka, 20 per cent are in Chittagong and 10 per cent are in Khulna and Barisal. Almost all inland/coastal/bay crossing ships are constructed and repaired locally in these shipyards. Most of the shipyards are operating under individual management with nominal supervision of government. All inland and coastal ships are built by local shipyards, and the number of vessels built per year counts an average of 250. Recently few local shipyards have attained the capability to manufacture the ships of 10,000 DWT. Nearly 50,000 skilled workers and 100,000 semi-skilled workers, are now working in these industries.[5] There are eleven local shipyards of international standard capable of making ships up to 10,000 DWT.[6]

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1 Ship Building Industry of Bangladesh, available at:http://boi.portal.gov.bd/sites/default/files/ files/boi.potal.go.bd/page/2b88bf02_bb3c_4466_82ef_fd1b799546f3/Ship-Building-Ind%20(1).pdf, accessed on 06 June 2016

2 Shipbuilding Industry, available at: http:// www.globalsecurity.org/military/world/bangladesh/shipbuilding.htm , accessed on 03 June 2016

3 A Report on Ship Building Industry of Bangladesh, available at: http://jbbc.co.jp/wp-content/uploads/2014/08/A-Report-on-Shipbuilding-Industry-of-Bangladesh.pdf, accessed on 02 June 2016

4 Ship Building Industry of Bangladesh, op.cit

5 N.M.G. Zakaria, M.T. Ali and K.A. Hossain, "An Overview of Bangladeshi Shipbuilding in the Light of Competitive Parameters", Journal of Shipping and Ocean Engineering1 (2011) 8-19, 2011.

6 Shipbuilding Industry,available at: http://en.banglapedia.org/index.php?title=Shipbuilding_Industry , accessed on 28 May 2016

6.1.2 Rationale

Bangladesh is presently contributing to the shipbuilding industries globally through its exported workforce. These facts do not speak only of a heritage but of an inbuilt ability of shipbuilding of people of this region which had been for ages dependent on waters. Shipbuilding, an ancient assembling industry producing tailored products, accordingly having the largest human input per unit of produce, is always moving to countries with lower wages of required skills. Bangladesh has comparatively a lower cost of human inputs and can offer the best combination of cost, quality and productivity with its fast growing young workforce.

Unfortunately, the shipyards in Bangladesh are facing exorbitantly high financing charges as compared to foreign yards. Unlike other manufacturing industries, the product takes two years to be delivered and requires high cost finances over a long period.This weakens the competitiveness of Bangladeshi yards. However, in general, government policy in Bangladesh is to encourage and attract foreign investments. More than 100,000 skilled workers and 150,000 semi-skilled workers are employed in the shipbuilding industry. At present more than 10,000 inland/coastal ships are plying all over the country, carrying more than 90 per cent of total oil transportation,70 per cent of total cargo transportation and 35 per cent of all passenger transportation.[7]

With global shipbuilding orders of very large vessels increasing everyday, a market is emerging in Bangladesh for shipbuilding yards that can concentrate on producing smaller sea-going vessels as the industry leaders like China, South Korea and Vietnam go for the larger container ships, bulkers and tankers. So it is important to analyse skills gap situation in the shipbuilding industry for further improvement in this sector.[8]

6.1.3 Objectives

Bangladesh government needs a proper assessment of the demand and supply situation of skills in the labour market in order to plan for skills development for the medium to longer term requirements of the economy. This is needed at the sectoral level, suitably projected for the next 10-20 years. The analysis is carried out for shipbuilding sector by (i) identifying key categories of occupations and trades; (ii) estimating current and future needs for skilled workers in each of the categories; and (iii) recommending ways to meet the future needs for skills demands in the sector.

The specific objectives are as follows:

- To review and assess the current status and emerging needs of the shipbuilding sector in terms of skilled workforce;
- To project future skills needs—in terms of quantity and quality—in order for the country to move up the value chain as Bangladesh is increasingly pulled into global and regional value chains by examining the current labour force.

The analysis incorporate the key features of training and labour market characteristics and include current recruitment practices, number of workers who received training from TVET institutions/other training institutes and their contribution to the sector, all of which can inform the extent of needs for skills development programmes for the sector.

6.1.4 Scope

Bangladesh has some comparative advantage which makes the country a good place to attract foreign investment in the shipbuilding sector:

- Cost-effective human resources in comparison with other shipbuilding nations
- Simple importation facility of raw materials
- Duty free market and access for Bangladeshi ships to other countries, etc.
- Enthusiastic entrepreneurs willing to invest in shipbuilding industry

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7 Shipbuilding Industry, *op.cit*
8 Ship Building Industry of Bangladesh, *op.cit*

The study has tried to cover the following aspects:

- project the requirement of skilled workforce, through finding a consolidated picture of the number of semi-skilled and skilled manpower in shipbuilding sector in the present time and preparing a projection for the next 5 - 10 years.
- determine the types and levels of training programmes which are needed to meet the skills demands in the shipbuilding sector.
- determine the expected skills that the employers in these fields require.
- provide a possible picture of labour demands and supply in shipbuilding sector by skills level, and suggest how to upgrade or supply future skills needs, including through new skills training programmes.

6.2. Methodology

The present study tries to provide skills gap in the shipbuilding sector in Bangladesh. The following methodology has been adopted for data collection:

6.2.1 Sample selection

As we are supposed to select 10 large shipbuilding firms, we have considered some criteria for enterprise selection. For example, Highspeed Shipbuilding with its Japanese partners was able to build vessels according to international classification for meeting national requirement. To mention a few achievements, this yard constructed five deep-sea fishing trawlers and participated in an international tender floated by the FAO (Food and Agricultural Organization, UN) to build eight grain carriers. ASSL (Ananda Shipyard and Shipways Ltd.) and WMS (Western Marine Shipyard)are the two most modern and largest shipyards in Bangladesh. Ananda Builders (ASSL), an engineering firm, established a shipbuilding yard on the Buriganga River in 1983. With growing volume of business the yard was shifted in 1985 to its present location on the river Meghna, an hour's drive from the capital city Dhaka. Western Marine Shipyard Ltd. (WMShL) started shipbuilding activities since 1994. Finally the company was founded with its own shipways in 2000[9]. It is located in Chittagong, the major port city of Bangladesh. Considering all these we have selected following 10 shipbuilding firms.

Table 6.1: Sampled shipbuilding firms in Bangladesh

No	Name of the Shipbuilding Firm	Location (District)
1	Western Marine Shipyard Ltd	Chittagong
2	Karnafuly Shipyard Private Ltd.	Chittagong
3	Chittagong Marine Dockyard	Chittagong
4	Chittagong Dry Dock Ltd	Chittagong
5	Highspeed Shipbuilding and EngineeringCompany Ltd.	Dhaka; Yard: Gozaria, Munshiganj
6	Khan Brothers Shipbuilding	Dhaka
7	Meghna Shipbuilders & Dockyard	Dhaka
8	Ananda Shipyard and Shipways Ltd.	Dhaka Yard: Meghna, Sonargaon, Narayanganj
9	Dockyard and Engineering Works Ltd.	Narayanganj
10	Khulna Shipyard Limited	Khulna

6.2.2 Quantitative and Qualitative Methods

This study has applied a mix of both quantitative and qualitative methods to address the research questions outlined above.

9 Does-Bangladesh-have-a-booming-shipbuilding-industry, available at: https://www.quora.com/Does-Bangladesh-have-a-booming-shipbuilding-industry , accessed on 25 May 2016

Questionnaire Survey

Quantitative data have been collected through a questionnaire survey from the above 10 firms (where a minimum of 50 staffs are employed). In addition, the study has collected data and information from training institutes and trainers.

Qualitative Methods: KIIs & FGDs

In addition to a questionnaire survey, 10 KIIs (key informants' interviews) have been conducted with a check list to understand the sector, its skill needs, future labour and skills demand. The interviews with the members of industry associations, heads of the human resource division of selected industries and top level managers have provided relevant information.

Field data has been supplemented by a desk review of reference materials and similar skills gap analyses carried out in Bangladesh and neighbouring countries. Available data from the government, training providers, and business sectors have been gathered to investigate available jobs, specific skills requirements by occupation, and services provided. Focus group discussion(FGD) have been conducted with firm and in addition to the surveys and FGDs, we have done KIIs with head and other relevant persons of four training institutes (one private training institution and three branches of BIMT) in this sector to understand the nature of training provided inside the country.

Table 6.2: KIIs with training institution

Name of the Institution	Location
Bangladesh Institute of Marine Technology(BIMT), Sirajganj	Sirajganj
Bangladesh Institute of Marine Technology(BIMT),Munshiganj	Munshiganj
Bangladesh Institute of Marine Technology(BIMT),Narayanganj	Narayanganj
National Institute of Engineering & Technology (NIET)	Dhaka

6.2.3 Instruments

The following sets of instruments have been developed and utilised for collecting data. The instruments include quantitative questionnaires and in-depth interviews with key respondents.

The questionnaire for survey data has been prepared keeping in mind the following basic areas, but not limited to:

(1) Current and future demand of the shipbuilding sector.
(2) Existing capabilities of the workforce before participating in the training provided by current institutions.
(3) Available institutions which provide skills training in the fields.
(4) Specific types of skills training are provided by existing institutions.
(5) Types and levels of training programmes will be needed in future to meet the skills demands in each sector.

6.2.4. Methods of Analysis

Descriptive statistical analysis has been performed to understand the sector and its labour demand. The results of the quantitative data have been triangulated with qualitative data generated through KIIs and FGDs.

6.3. Skills Gap Analysis: Findings from the Survey

Skill development plays a critical role in the economic and social development of a country. Skilled manpower is the key to leveraging the opportunities in the global economy. A developing economy such as Bangladesh requires a large and skilled workforce to achieve Sustainable Development Goals (SDGs). The availability of (skilled) manpower is an important factor in determining the competitiveness of the shipbuilding industry. The primary quantitative demand data were collected from selected firms.Following labour demand, current skills and skills gap are observed from the industry survey data.

6.3.1 Assessment of the Current Skills Need for Workforce

It is necessary to understand the nature of current working force of the surveyed enterprises. Survey data show that on an average 339 employees are working in each surveyed industries. Among them 100 per cent are local or Bangladeshi (Table-6.3). about 71 per cent of the employees are working as technical or production staff and only 29 per cent are working as administrative or management staff.

Table 6.3: Average management, administrative and technical staff of firms

Staff type	Male		Female	
	Local	Foreign	Local	Foreign
Management	25	0	8	0
Administrative	44	0	22	0
Technical/ Production	240	0	0	0

Source: BIDS Shipbuilding Firm Survey,2016.

It has revealed from the survey data that highest number of shipbuilding industries depend on walk-in and test for hiring workers. Almost 41 per cent follow the walk-in and test process. In 23 per cent cases, they follow the advertisement process. They (enterprises) employ 9 per cent employee from the direct contact with the training service providers (Table 6.4). Twenty-two per cent employees are employed in this sector through labour contractor. Survey data proves very poor connection between employer and training providers for employee recruitment practices.

Table 6.4: Current recruitment practices of the enterprises to hire workers

Recruitment practice	% (Round Figure)
Walk -in and test	41.0
Advertisement	23.0
Labour contractors	22.0
Personal (e.g. through family) recommendations	5.0
Direct contact with training service providers	9.0
Others	0.0
All practices	100.0

Source: BIDS Shipbuilding Firm Survey, 2016.

6.3.2 Understanding the Current Level of Gaps in Skill and Future Demand for Skilled Workforce

Current skills

An understanding of current skills gaps is important in its own right in order to better plan training initiatives. Enterprises survey data indicate that skilled workers account for 67.3 per cent of total employment in the shipbuilding sector, where skill consists of highly skilled, skilled and semi-skilled employment. The proportion, of course, varies between occupations. Carpenter and grinder have the highest proportion of skilled workers, whereas the lowest proportion of skilled workers work as painter in shipbuilding industries (Table 6.5). It has revealed from the interviews with the employers that changes in the skill requirement in the surveyed enterprises have evolved over time primarily due to expansion of the production capacity and changes in technology. The two major occupations in the shipbuilding sector are welder and electrician where the unskilled workers proportions are around 40 per cent and 39.2 per cent. At the time of interview the entrepreneurs opined that they badly needed skilled workers as welder and electrician for future growth of the industries.

Table 6.5: Current employment in the enterprises by occupation and skills levels

Current Occupation (main workers)	Number of actual employment (average)	Number of vacant post (average)	Number of existing labour demand (average)	Number of workers with identifiable skills levels(average)			
				Highly skilled	Skilled	Semi-skilled	Un-skilled
Welder	387	30	417	16	89	111	144
Fitter	278	22	300	17	84	60	97
Electrician	110	10	120	4	36	22	40
Mechanist/Machine man	87	12	99	6	28	18	27
Painter	67	18	85	5	13	17	28
Cutter man	48	2	50	0	26	14	5
Grinder	35	2	37	0	10	20	0
Plumber	42	7	49	4	5	11	15
Carpenter	30	11	41	2	28	0	0
Helper	64	20	84	20	28	8	4
Operator	25	5	30	0	15	5	5
Gas Cutter	32	5	37	5	25	1	1

Source: BIDS Shipbuilding Firm Survey, 2016.

Note:
Unskilled: No prior experience doing the job. Needs much support from experienced workers.
Semiskilled: Has prior experience on- the-job. Can do routine work with some support of more experienced workers.
Skilled worker: Has much experience on- the- job. Can do routine work self-sufficiently. Can teach others on-the-job.
Highly skilled worker: Skilled workers with the additional ability to address non- routine special work problems successfully.

Availability of cheap human input is the main strength of a country, and this is one of the main determinants in allowing this labour-intensive industry to flourish. Shipbuilding lifecycle around the world has shifted from Europe to Asia and the single most driving force behind this phenomenon is lower labour cost. Bangladesh is in very much an advantageous position in this respect as labour cost is the cheapest among other many shipbuilding countries around the world. The number of available graduates, skilled supervisors, foreman, specialised welders, cutters, fitters, machine operators and other technical skilled manpower that are required for shipbuilding and allied industries are far less than the minimum requirement. Survey data show that on an average highest number of workers (387 in each industry) are employed as welder and the second highest numbers are employed as fitter. In terms of employment Electricians has the third highest employment in ship building industry (Table 6.5).

Projected labour demand according to firm's perceptions

The projection of demand/requirement of skilled workers is ideally based on employers own assessment of current requirement and future requirement. The entrepreneurs were asked to identify the future demand of the unskilled, semi-skilled, skilled and highly skilled labours in different trades of their industries. Eighteen per cent highly skilled welders will be needed in the next 5 years and 20 per cent for the next 10 years. Seven per cent highly skilled fitter will be needed in this sector for the next 5 years and 23 per cent in the next 10 years. In terms of future demand gas cutter has the highest percentage of unskilled (85 per cent in the next 5 years and 250 per cent in the next 10 years) and semi-skilled (64 per cent in next 5 years and 107 per cent in next 10 years) labour demand for thenext 5 and 10 years respectively (Table 6.6).

Table 6.6: Demand for skilled workers in next 5 and 10 years

Current Occupations (Main workers)	Skill level	Increase in % of projected labour demand in 5 years (Average)	Increase % of projected labour demand in 10 years (Average)
Welder	Unskilled	16.0	23.0
	Semi-skilled	13.0	22.0
	Skilled	10.0	17.0
	Highly skilled	18.0	20.0
Fitter	Unskilled	16.0	24.0
	Semi-skilled	12.0	21.0
	Skilled	10.0	13.0
	Highly skilled	7.0	13.0
Electrician	Unskilled	26.0	44.0
	Semi-skilled	17.0	33.0
	Skilled	19.0	27.0
	Highly skilled	12.0	20.0
Mechanist/Machine man	Unskilled	30.0	46.0
	Semi-skilled	17.0	28.0
	Skilled	14.0	22.0
	Highly skilled	11.0	19.0
Painter	Unskilled	45.0	58.0
	Semi-skilled	38.0	47.0
	Skilled	28.0	41.0
	Highly skilled	17.0	18.0
Cutter man	Unskilled	5.0	8.0
	Semi-skilled	6.0	13.0
	Skilled	6.0	13.0
	Highly skilled	5.0	12.0
Grinder	Unskilled	0.0	0.0
	Semi-skilled	4.0	8.0
	Skilled	4.0	8.0
	Highly skilled	0.0	0.0
Plumber	Unskilled	29.0	35.0
	Semi-skilled	11.0	17.0
	Skilled	9.0	14.0
	Highly skilled	11.0	17.0
Carpenter	Unskilled	35.0	50.0
	Semi-skilled	42.0	71.0
	Skilled	41.0	89.0
	Highly skilled	14.0	21.0
Helper	Unskilled	14.0	16.0
	Semi-skilled	9.0	10.0
	Skilled	9.0	12.0
	Highly skilled	11.0	14.0
Operator	Unskilled	15.0	25.0
	Semi-skilled	10.0	15.0
	Skilled	10.0	15.0
	Highly skilled	0.0	0.0
Gas Cutter	Unskilled	85.0	250.0
	Semi-skilled	64.0	107.0
	Skilled	46.0	52.0
	Highly skilled	20.0	30.0

Source: BIDS Shipbuilding Firm Survey, 2016.

6.3.3 Skills Gap Analysis (Firm's Perceptions)

The survey shows that there are a number of skills gaps in workers from different occupations. Most important among them is the lack of basic knowledge and lack of precision. These skills gaps are most prominent among helper, cutter man, fitter and sand blaster in the shipbuilding sector (Table 6.7). Among other skill gaps, while lack of accuracy is most predominant for cutter men, grinder and helper workers.

Table 6.7 : Frequency distribution of occupations by areas of current skills gaps of the workers

Current Occupations (workers)	Description of skills gaps (lacking skills, knowledge, behaviours: Scale 0=No skill to 10=Accurate skill)									
	Basic knowledge	Job skill	Accuracy	Knowledge of machine maintenance	Industrial behaviour	Troubles shooting	Precision	Manual dexterity	Working speed	Communication
Welder	6	5	5	5	5	5	5	6	6	6
Fitter	5	5	5	5	5	5	4	6	6	6
Electrician	5	5	5	5	5	5	5	5	5	5
Mechanist/ machine man	5	5	6	5	5	4	5	6	6	6
Painter	6	6	5	5	6	5	6	4	6	6
Cutter man	4	5	4	5	5	4	4	6	7	5
Grinder	6	5	4	5	5	4	4	7	7	5
Plumber	7	5	5	6	6	6	6	6	6	6
Carpenter	6	6	6	6	6	6	6	6	6	6
Helper	5	4	4	4	6	4	3	4	4	4
Operator	5	5	5	4	5	5	4	5	5	4
Gas cutter	5	6	5	7	4	5	5	7	6	5
Coal/crane driver	8	5	5	5	6	4	3	5	5	5
Sand blaster	4	2	3	1	2	2	5	3	1	2
Docker	7	6	6	6	6	7	7	7	7	7
Drill man	9	5	5	5	6	7	8	6	9	7
Foreman	9	6	4	8	4	5	6	7	8	7
Riger	6	5	6	5	6	4	5	6	7	4
Others	7	3	6	3	4	5	7	8	7	6

Source: BIDS Shipbuilding Firm Survey, 2016.

6.3.4 Projection of Future Labour Demand using Gross Value Added and GDP (projected) Data

The gross value added (GVA) data and employment data (with skilled, semi-skilled, unskilled) have been collected from the Survey of Manufacturing Industries (SMI) data (2005-06, 2012) of Bangladesh Bureau of Statistics (BBS), while the GDP (projected) data have been collected from the Seventh Five Year Plan (7FYP) of Bangladesh(2016-2020). We have assumed constant elasticity for the projection purpose. First, we have calculated the arch elasticity of value added of shipbuilding sectors with respect to GDP using the two point data of 2005-06 and 2012(SMI). The value added elasticity stands at 4.82, while the employment (total) in shipbuilding sector elasticity with respect to the value added of shipbuilding sector is 0.74. The result indicates that if national GDP increases by 1 per cent, value added in the shipbuilding sector also increases by 4.82 per cent and if gross value added in shipbuilding industry increases by 1 per cent, overall employment in this sector increases by 0.74 per cent. It means that as the economy bulges, the shipbuilding industry also thrives and provides people with jobs. To dig into employment, it is easy to be interested to know that which skills category dominates in this employment. So, in line with the above technique, we have calculated the skilled labour elasticity with respect to the GVA of shipbuilding sector, which scores 0.72 per cent, meaning that a 1 per cent increase in the value added in this sector leads to a rise of 0.72 per cent skilled labour demand in this sector. On the other hand, the semi-skilled labour and unskilled labour elasticity stands at 0.95 per cent and 0.60 per cent respectively.

Since we have the actual data for 2012, we have filled the data of FY2015 using the compound growth rate formula for FY2006 to FY2012. The compound growth rate for GVA and total employment are 51.82 per cent and 27.91 per cent respectively. Now, since we have filled the data for FY2015 using the compound growth rate (assuming it to be constant), we then project the rest of the years up to FY2025 using the elasticity formula where the constant elasticity assumption is inherent.

For projection from FY2016 to FY2025, we have used the following formula of elasticity (assuming it to be constant) after a little bit rearrangements which stands then

$$GVA_{Fy\ t+1} = GVA_{Fy\ t} + \beta\left(\frac{GDP_{Fy\ t+1} - GDP_{Fy\ t}}{GDP_{Fy\ t}}\right).GVA_{Fy\ t}$$

where β is the elasticity of GVA with respect to GDP. To be more concrete, for the projection of GVA of FY16 this formula stands:

$$GVA_{Fy16} = GVA_{Fy15} + \beta\left(\frac{GDP_{Fy16} - GDP_{Fy15}}{GDP_{Fy15}}\right).GVA_{Fy15}$$

Using this formula recursively, we have projected the GVA of the shipbuilding industry upto FY2025.

Now, we have projected the GVA of the shipbuilding industry and with this projected GVA figures, we have projected the total employment in the shipbuilding sector up to FY2025. In calculating this, we have assumed that the labour elasticity with respect to GVA is constant. After a little bit rearrangement of the elasticity formula yields

$$\text{Labour}_{Fy\ t+1} = \text{Labour}_{Fy\ t} + \delta\left(\frac{GVA_{Fy\ t+1} - GVA_{Fy\ t}}{GVA_{Fy\ t}}\right).\text{Labour}_{Fy\ t}$$

where δ is the elasticity of labour employment with respect to GVA of shipbuilding industry. Recursively using this formula, we have projected Total labour demand up to FY2025.Now, we have divided the total labour demand into skilled, semi-skilled and unskilled assuming the constant proportion of skills category prevails as that of 2012 which are approximately 9 per cent, 41 per cent and 49 per cent respectively. Elasticity calculation is presented in Annex Table 6.2 A.

Shipbuilding Industry: Macro table

The projection of shipbuilding sector can be made considering GDP growth rate and value added (mentioned earlier).The projection of macro table of shipbuilding is given below. From the Table, it can be concluded that over the years total demand of labour in every category will be increased.

Table 6.8: Macro table

Fiscal year	GDP growth rate(%)	GDP (10^12Tk.)	Shipbuilding value added (tk.)	Total labour (persons)	Skilled labour (persons)	Semi-skilled labour (Persons)	Unskilled labour (persons)
FY2015	6.5	16,225	940,73,08,853.38	24,596	2,239	10,155	12,202
FY2016	6.6	17,296	1240,16,23,082.32	30,389	2,767	12,547	15,075
FY2017	6.8	18,472	1646,76,23,126.70	37,762	3,438	15,591	18,733
FY2018	7.2	19,802	2218,49,87,174.64	47,463	4,321	19,596	23,546
FY2019	7.6	21,307	3031,54,23,104.08	60,335	5,493	24,910	29,932
FY2020	8.0	23,011	4200,60,58,727.79	77,553	7,061	32,019	38,473
FY2021	8.0	24,852	5821,13,72,236.82	99,693	9,077	41,160	49,456
FY2022	7.5	26,716	7926,46,44,473.66	126,374	11,506	52,176	62,693
FY2023	7.0	28,586	10601,79,15,781.83	157,938	14,380	65,207	78,351
FY2024	6.5	30,444	13924,55,01,608.25	194,568	17,715	80,331	96,523
FY2025	6.0	32,271	17953,99,49,926.33	236,233	21,509	97,533	117,192

Occupational Analysis

For the construction of the table of 12 occupations, we have used the data of the 10 surveyed firms. First, we have summed up all skilled labour demand irrespective of the occupations. Then, we have found out specific occupation weight in the skilled category labour demand. After that, we have found out a specific occupation skilled labour demand from the projected skilled labour demand for a specific year multiplying the respective occupation weight and that of total skilled labour demand of that year. By this process, we have projected the skilled labour demand for all occupations. By the same token, we have projected the semi-skilled and unskilled labour demand for the all occupations. After rearrangement, we have located the all skilled, semi-skilled and unskilled labour demand up to FY2025 for a specific occupation. Full information i.e. year-wise information is given in Annex Table 6.1 A.

Table 6.9: Projection for 2025 (Major occupation wise)

Occupation	Unskilled	Semi-skilled	Highly skilled
Welder	46,108	37,722	4,846
Fitter	31,059	20,390	4,662
Electrician	12,808	7,476	1,846
Mechanist/machine Man	8,645	6,117	1,569
Painter	8,966	5,777	831
Cutter man	1,601	4,758	1,200
Grinder	-	6,797	462
Plumber	4,803	3,738	415
Carpenter	-	-	1,385
Helper	1,281	2,719	2,215
Operator	1,601	1,699	692
Gas cutter	320	340	1,385

6.4. Training and Overseas Migration related Information

A strong demand for skills is being created in the field of shipbuilding technology. These trades primarily relate to: shipbuilding and repairing, ship conversion, marine engine operation, engine repair and maintenance. The demand for trained personnel in the shipbuilding sector has been assessed by the industry. There is also a considerable demand for retraining programmes and skills recognition. Some training centres like Bangladesh Industrial and Technical Assistance Center (BITAC) and Bangladesh Oxygen Company (BOC) provide upgrading courses in some specialist trades. Some industries have their in-house training arrangement for upgrading of skill.

There are two types of training available in Bangladesh: Formal and informal. Formal training is provided by the educational, vocational and technical training institutes and informal training is imparted through on-the-job training, in plant training and apprenticeship training. Skills training at the certificate levels is delivered by the 37 technical training centres (TTCs). Presently 26 TTCs are under the Ministry of Labour and Employment with the intake capacity of 26,000. While the Ministry of Expatriates' Welfare and Overseas Employment supervises the Institute of Marine Technology (BIMT) at Narayangonj and 11 TTCs. All the 37 TTCs are operationally supervised by the Bureau of Manpower, Employment and Training (BMET). Six TTCs are reserved exclusively for women. TTCs offer a 2-year course (SSC voc.) in 31 different basic engineering trades; while the BIMT offers 4-year diploma courses. Besides regular courses, many evening skills upgrading courses, on request of employers, are also conducted at TTCs. There are some training programmes supervised by BMET for diploma in shipbuilding engineering[10]. Besides these Association of Export Oriented Shipbuilding Industries of Bangladesh (AEOSIB) is a top most exportation shipbuilding association of Bangladesh directed and under the guidance of Skills for Employment Investment Program (SEIP) of Ministry of Finance, took a programme to create skilled labour (Course: welding and fabrication, electrical and navigation equipment installation, machine and tools operation).

[10] Availability of Data related to Technical and Vocational Education and Training (TVET) in Bangladesh, available at:http://www.bmet.org.bd/BMET/resources/Static%20PF%20and%20DOC/ publication/Data%20on%20TVET%20available%20in%20Bangladesh.pdf , accessed on 16 July 2016

6.4.1 Current Training Information in the Enterprises and Training Centers

At the beginning of the study enterprises were asked few questions related to training programme and trained staffs. Then we interviewed four training institutes who provided and are providing training for the employees of shipbuilding industries. Among this four training institutes, three are BIMT and the rest one is private training institute (NIET).

On-the-job training is one of the major key elements which can help the employees to upgrade their skills. Sixty per cent enterprises have the facility of on-the-job training (Table 6.10). But none of the enterprise agreed to provide on-the-job training for outsider. Ninety per cent enterprises have apprentices programme. All of the surveyed industries agreed that they employ TVET graduates in their company and prefer to employ TVET graduates than non-trained people (Table 6.10).

Table 6.10: Skills development practices of the enterprises

	Yes cases	No cases
Does your company currently have its own training unit in place?	6	4
Does the enterprise conduct some structured on-the-job training (some sort of separate training arrangements i.e., instructors, dedicated supervisors, etc. are in place)?	6	4
Would the enterprise be willing to do on-the-job training also for external trainees?	0	10
Does your company have apprentices?	9	1
Does your company employ graduates of the formal TVET system?	8	2
Would you prefer to recruit formal TVET graduates as compared to other untrained youth?	10	0

Source: BIDS Shipbuilding Firm Survey, 2016.

As mentioned earlier, we have conducted KIIs with head and other relevant persons of four training institute (one private training institution and three branches of BIMT) in this sector to understand the nature of training provided inside the country.

Bangladesh Institute of Marine Technology (BIMT), a technical institute of higher learning, was established in 1958. The main function of this institute is to offer a number of industry specific courses to produce highly competent professionals for the maritime industry. Its permanent campus is strategically located in Bandar, Narayanganj, popularly known as the home base of one of the centres for maritime industry in Bangladesh.

BIMT offers four-year courses such as Diploma in Engineering Marine Technology and Diploma in Engineering Shipbuilding Technology equivalent to undergraduate engineering. It also offers two-year trade courses: Marine Diesel Engine Artificer (equivalent to H.S.C.); Ship Fabrication (equivalent to H.S.C.); Shipbuilding and Mechanical Draftsmanship (equivalent to H.S.C); and Shipbuilding Welding (equivalent to H.S.C)

On an average, the surveyed training institutes take 48-90 students per year. At the time of the KIIs, head/representative of the training institutes agreed that their 50 per cent students are employed overseas and the rest per cent are employed in Bangladesh. For a sector like shipbuilding, practical experience is a basic need for the students at the time of their training. All of the training institutes agreed that their syllabus cover this basic need of the market. Fifty per cent of their training modules are based on practical and the rest 50 per cent cover theoretical part. As a result, almost 70 per cent of their students get job immediate after training (Table 6.11).

Table 6.11: Information of the Training Institutions

Diploma in Shipbuilding Technology (student -annual intake per year)	48-90
Destination of employment of the trainees	Export=50% , Local=50%
How the training module (theoretical, practical) organised in terms of percentage?	Theoretical=50%, Practical=50%
Did this training institute help trainees getting a job (domestic or external)?	Yes=100%
What percentage of the trainee was employed right after the training (last year and last five years)?	Last Year=70%, Last 5 years=60% (Not yet completed in two institutions that are surveyed)
What types and levels of training programmes will be needed to meet the skills demands in Shipbuilding sector?	Theoretical and practical knowledge, computer literacy, etc.
How for these trainings can match the demand from employees (%)?	90%
Did trainers receive any formal training? Code:1=yes, 2=no	Yes=100%

Source: BIDS Training Institution Survey, 2016.

6.4.2 Overseas Employment

About 1.5 million manpower is adding every year to the labour force in Bangladesh. Out of this huge number of labour force, a large numbers are not being able to get wage employment due to lack of available job opportunities within the country. If this population can be trained-up in the skills development programme, they will be able to get employment, either in the country or abroad[11]. There is an opportunity to get overseas employment in the shipbuilding sector. Data collected from BMET show that most of the employees who got overseas employment in shipbuilding sector are fitter and their number was highest in 2011 (Table 6.12). Although BMET data show that painter as the highest number of overseas employment, but it is difficult to say that all of them are employed in the shipbuilding sector. Construction and other sectors (like light engineering) also employe painter, welder and electrician like shipbuilding sector. But at the end of the day it can be said that there is a good prospect for overseas employment in the shipbuilding sector in Bangladesh.

Table 6.12: Overseas migration

Occupation	2010	2011	2012	2013	2014	2015
Fitter	2,236	4,604	3,166	2,073	2,085	1,765
Fitter Grade-A	-	39	31	13	-	-
Fitter Grade-B	-	3	1	-	-	-
Pipe Fitter	501	1,181	791	136	169	67
Pipe Fitter(Structural)	1	3	9	-	1	-
Pipe Fitting Labour	-	6	2	-	-	5
Pipe Welder	4	68	4	-	19	2
Pipe Worker	-	12	2	5	221	468
Ship Fitter	-	-	6	11	4	-
Shipping Labour	-	-	1	-	-	-
Welder Grade-A	253	1,422	770	286	422	330
Welder Grade-B	12	212	115	15	15	14
Electrician	2,806	3,214	1,925	2,190	2,902	2,573
Painter	5,001	8,674	7,272	8,507	6,694	4,239
Plumber	798	511	679	1,945	2,654	2,114

Source: BMET.

[11] Skill Development Training for Overseas Employment, available at:http://www.bmet.org.bd/BMET/resources/Static%20PDF%20and%20DOC/publication/Skill%20development%20training.pdf ,accessed on 15 July 2016

6.5. Conclusion and Recommendations

Bangladesh has the potentiality to evolve herself into a hub of shipbuilding in the global context for small and medium-sized vessels within short time if the current trend of generating revenue continues. This study has provided estimates of demand for skills at present and arrived at some projections for the next 5 - 10 years. It has examined whether there are skills gaps in some major occupations. It has also discussed the role of the existing training system in meeting the skills requirement of the country. The survey of shipbuilding firms also indicates that there are a number of skills gaps in workers in different occupations in the shipbuilding sector. This sector has high potential for growth, competitiveness and export capabilities. Future demand for skilled and educated workforce of the sector will be needed. As the availability of cheap labour provides advantage, proper training will be needed for further improvement. Bangladesh has a high proportion of working age population. This demographic dividend can be fruitful if qualitative skill profile of the labour force is enhanced through skills training interventions. Bangladesh has to develop skills in line with the industry's need. But this points to the need for remaining alive to any possible market failures in skills training as well as the need to correct for them by the government. As the country's cargo and oil products are transported by small ships, cargo vessels and tugs through its coastal and inland waterways and people use ferries and steamers to travel from one part of Bangladesh to another, most of these vessels are built in the country, and the shipbuilding industry is aiming to win orders from abroad, it is expected to create many thousands of jobs. Based on the study findings we recommend that the government could take the following measures to address the skills constraints in the shipbuilding sector:

- Set up proper employee training institutes for the new comers to save time during work as well as increase productivity;
- Develop standardised quality training curriculums;
- Build centres of excellence in training;
- Provide support for backward linkages of the industry;
- Create opportunities for employment expansion, higher revenue earnings, etc.
- Take steps to encourage the technological advancement for sustainable development of the industry;
- Integrate shipbuilding expansion plan as strategic development programme of the country and the sector needs a favourable regulatory framework to support the industry;
- Should improve its employee benefit scheme such as performance bonus, festival bonus and medical allowance as these allowances can motivate employees;
- Take steps to link the private sector in institutional management; and permitting the publicly financed institutions greater autonomy and improved connections between TVET and enterprises.

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Annexure

Annex Table-6.1 A: Occupational table (FY 2015-2025)

Fiscal year	Welder			Fitter			Electrician		
	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled
FY2015	4,801	3,927	505	3,234	2,123	485	1,334	778	192
FY2016	5,931	4,852	623	3,995	2,623	600	1,648	962	237
FY2017	7,370	6,030	775	4,965	3,259	745	2,047	1,195	295
FY2018	9,264	7,579	974	6,240	4,097	937	2,573	1,502	371
FY2019	11,776	9,634	1,238	7,933	5,208	1,191	3,271	1,910	472
FY2020	15,137	12,384	1,591	10,196	6,694	1,530	4,205	2,454	606
FY2021	19,458	15,919	2,045	13,107	8,605	1,967	5,405	3,155	779
FY2022	24,666	20,179	2,593	16,615	10,908	2,494	6,852	4,000	988
FY2023	30,827	25,220	3,240	20,765	13,632	3,117	8,563	4,998	1,234
FY2024	37,976	31,069	3,992	25,581	16,794	3,840	10,549	6,158	1,521
FY2025	46,108	37,722	4,846	31,059	20,390	4,662	12,808	7,476	1,846

Fiscal year	Mechanist/machine man			Painter			Cutter man		
	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled
FY2015	900	637	163	933	601	86	167	495	125
FY2016	1,112	787	202	1,153	743	107	206	612	154
FY2017	1,382	978	251	1,433	923	133	256	761	192
FY2018	1,737	1,229	315	1,801	1,161	167	322	956	241
FY2019	2,208	1,562	401	2,290	1,476	212	409	1,215	306
FY2020	2,838	2,008	515	2,943	1,897	273	526	1,562	394
FY2021	3,648	2,581	662	3,784	2,438	351	676	2,008	506
FY2022	4,625	3,272	840	4,796	3,091	444	856	2,545	642
FY2023	5,780	4,090	1,049	5,994	3,862	555	1,070	3,181	802
FY2024	7,121	5,038	1,293	7,384	4,758	684	1,319	3,919	988
FY2025	8,645	6,117	1,569	8,966	5,777	831	1,601	4,758	1,200

Fiscal Year	Grinder			Plumber			Carpenter		
	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled
FY2015	0	708	48	500	389	43	0	0	144
FY2016	0	874	59	618	481	53	0	0	178
FY2017	0	1,086	74	768	598	66	0	0	221
FY2018	0	1,366	93	965	751	83	0	0	278
FY2019	0	1,736	118	1,227	955	106	0	0	354
FY2020	0	2,231	152	1,577	1,227	136	0	0	455
FY21	0	2,868	195	2,027	1,578	175	0	0	584
FY22	0	3,636	247	2,569	2,000	222	0	0	741
FY23	0	4,544	309	3,211	2,499	278	0	0	926
FY24	0	5,598	380	3,956	3,079	342	0	0	1,140
FY25	0	6,797	462	4,803	3,738	415	0	0	1,385

Fiscal year	Helper			Operator			Gas cutter		
	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled	Unskilled	Semi-skilled	Highly skilled
FY2015	133	283	231	167	177	72	33	35	144
FY2016	165	350	285	206	219	89	41	44	178
FY2017	205	435	354	256	272	111	51	54	221
FY2018	257	546	445	322	341	139	64	68	278
FY2019	327	694	566	409	434	177	82	87	354
FY2020	420	893	727	526	558	227	105	112	455
FY2021	541	1,147	935	676	717	292	135	143	584
FY2022	685	1,454	1,185	856	909	370	171	182	741
FY2023	856	1,818	1,481	1,070	1,136	463	214	227	926
FY2024	1,055	2,239	1,825	1,319	1,399	570	264	280	1,140
FY2025	1,281	2,719	2,215	1,601	1,699	692	320	340	1,385

Annex Table-6.2 A: Elasticity calculation

Fiscal year	Year	Gross value added(GVA) in shipbuilding	Total employed persons in shipbuilding	GDP value, national	GDP value (in billion =10^9)
2011-12	2011	268,79,59,927	11752	6884900000000.00	6,884.9
2005-06	2005	21,94,51,000	2683	4823400000000.00	4,823.4
	Difference	246,85,08,927	9069	2061500000000.00	
	Average	145,37,05,464	7217.5	5854150000000.00	
	Elasticity(value added, GDP)=4.822			4.822128579	
	Elasticity(labour, value Added)=0.74			0.73997037	

Fiscal year	Year	Gross value added (GVA) in shipbuilding	Total skilled persons employed in shipbuilding	GDP value, national	GDP value (in billion =10^9)
2011-12	2011	268,79,59,927	1,070	688490,00,00,000.00	6,884.9
2005-06	2005	21,94,51,000	257	482340,00,00,000.00	4,823.4
	Difference	246,85,08,927	813	206150,00,00,000.00	
	Average	145,37,05,464	6,63.5	585415,00,00,000.00	
	Elasticity(value added, GDP)=4.82			4.822128579	
	Elasticity(Skilled labour, value Added)=0.72			0.721591384	

Fiscal year	Year	Gross value added in shipbuilding	Total Semi-skilled persons employed in shipbuilding	GDP value, national	GDP value (in billion =10^9)
2011-12	2011	268,79,59,927	4,852	688490,00,00,000.00	6,884.9
2005-06	2005	21,94,51,000	529	482340,00,00,000.00	4,823.4
	Difference	246,85,08,927	4,323	206150,00,00,000.00	
	Average	145,37,05,464	2,690.5	585415,00,00,000.00	
	Elasticity(value added, GDP)=4.82			4.822128579	
	Elasticity(Semi-Skilled labour, value Added)=.946			0.946224001	

Fiscal year	Year	Gross value added (GVA) in shipbuilding	Total Unskilled persons employed in shipbuilding	GDP value, national	GDP value (in billion =10^9)
2011-12	2011	268,79,59,927	5,830	688490,00,00,000.00	6,884.9
2005-06	2005	21,94,51,000	1,897	482340,00,00,000.00	4,823.4
	Difference	246,85,08,927	3,933	206150,00,00,000.00	
	Average	145,37,05,464	3,863.5	585415,00,00,000.00	
	Elasticity(value added, GDP)=4.82			4.822128579	
	Elasticity(Unskilled labour, value Added)=.599			0.599493875	

CHAPTER- 7

Labour Market and Skills Gap Analysis for the Leather Goods Sector in Bangladesh

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Leather Goods Sector in Bangladesh

EXECUTIVE SUMMARY

Leather Industry is the fourth largest exporting sector of Bangladesh. In fact the Leather products and Footwear sector has been tagged as one of the highest priority sectors of Bangladesh in the Export Policy and Industrial Policy due to its high value added and export potentials. This sector exports products like Leather Shoes, Belts, Travel Bags, Wallets and other finished Leather products to a number of multi-dimensional destinations including Italy, France, UK, USA, Belgium, Spain, Germany, Netherlands, Canada and Poland. There has been gradual and steady rise in the export value of the Leather industry and the Leather footwear industry.

Thus leather industry will continue to play a notable role in the growth path of Bangladesh Economy. In this study we will mostly concentrate on the skill needs in the leather goods sector.

The Bangladesh government needs a proper assessment of the demand and supply situation of skills in the labour market in order to plan for skill development for the medium to longer term requirements of the economy. This is needed at the sectoral level, suitably projected for the next 10-20 years. The analysis is carried out for leather goods sector by (i) identifying key categories of occupations and trades; (ii) estimating current and future needs for skilled workers in each of the categories; and (iii) recommending ways to meet the future needs for skills demand in the sector.

The specific objectives are as follows:

i. Assess the current level of skills and the gap in skills in terms of availability and quality
ii. Assess the supply side capacity of the academic and training institutions to mitigate the gap in skills
iii. Estimate demand for skilled workforce in the next five to ten years considering the growth of the industry
iv. Identify the emerging thrusts of the Leather Goods sector, and
v. Assess the training needs and ways of implementation of the training programs.

The analysis can incorporate the key features of training and labour market characteristics and include current recruitment practices, number of workers who received training from TVET institutions/other training centers, and their contribution to the sector, all of which can inform the extent of needs for skills development programs for the sector.

Methodology

This study has applied a mix of both quantitative and qualitative methods. The analysis is based on data from both primary and secondary sources. Among the secondary sources, data from the Survey of Manufacturing Sector (SMI)[1] and Statistical Yearbook of Bangladesh have been analysed. Moreover Quantitative and qualitative data has been collected from:

i) Questionnaire survey of large leather goods enterprises;
ii) Discussion with key informants including academia, representatives of the industry and policy makers;
iii) Interview of training providers (both government and private).

The study mainly relies on the sample survey of 10 large firms which were selected purposively and on the focus group discussions (FGDs) with various industry associations (such as LFMEAB[2] and BFLLFEA[3]) and human resources officers, managers and workshop supervisors of the industries. The distribution of firms surveyed and FGDs is shown below. 10 selected firms were surveyed using structured questionnaire. Checklists were used for FGDs and KIIs.

Findings

Enterprise survey reveals that 75 per cent of the large surveyed firms are export oriented and 16.7 per cent produce for national market. These enterprises produce footwear, bag, wallet, belt and mat as finished leather goods. It is necessary to understand the nature of current working force of the surveyed enterprises.

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1 Previously known as Census of Manufacturing Industries (CMI)
2 Leathergoods & Footwear Manufacturers & Exporters Association of Bangladesh (LFMEAB).
3 Bangladesh Finished Leather, Leathergoods and Footwear Exporters' Association (BFLLFEA).

Survey data shows that a total of 26836 employees are working in those enterprises. On an average 269 employees are working in each of the surveyed industries. Among them 99.72 per cent are local or Bangladeshi and only 0.28 per cent are foreigner. Ninety nine per cent of the employees are working as technical or production line and only 1per cent are working as administrative or management staffs.

Most of the leather goods industries depend on walk-in and test for hiring workers. Almost 85.5 per cent follow the walk-in and test process. They (enterprises) employ 3.7 per cent employee from the direct contract with the training service providers. Survey data proves very poor connection between employer and training providers for current leather goods employee recruitment practices.

It is observed from survey data that in terms of skill mix, in all types of employment categories, skilled and highly skilled employees dominate. This situation refers that leather goods sector mostly needs skilled and highly skilled employees for various categories of employment. Highly skilled employees heavily dominate managerial activities, supervisors and line leaders and also in case of quality control operators. Thus future growth of this sector should be associated with skill training facilities.

One of the major objectives of this study is to understand the future skills gap of leather goods industries in Bangladesh. At the time of enterprise survey entrepreneurs were asked to project the future demand of the unskilled, semi-skilled, skilled and highly skilled employees in different categories of employment. Overall, there will be around 3 per cent growth in demand for employees in the surveyed leather goods enterprises in next 5 years and another 3 per cent in 5 years after that. Demand for skilled manpower will be highest in the categories of Sewing Operator and Lasting, Setting & Assembling Operator in next 5 years and 10 years.

According to the entrepreneurs, the highest percentage of skilled manpower will be needed in Multi-Machine dimension operator in next 5 (4.30%) and in next 10 years (6.10%).

Combining findings from the survey with the macroeconomic data on potential GDP growth, we may project demand for persons with different levels of skills in various occupational varieties in the leather goods sector. The methodology for this projection is presented in detail in Appendix A.

The arch elasticity of value added of leather goods sectors with respect to GDP has been calculated using respective data for two years 2005-06 and 2012 (the years for which manufacturing sector survey data are available). The value added elasticity in leather goods sector stands 0.19 while the employment (total) elasticity in this sector with respect to the value added of the respective sector is 6.18. These results indicate that if national GDP increases by 1 per cent, value added in the leather goods sector increases by 0.19 per cent and if GVA in Leather goods sector increases by 1 per cent, overall employment in this sector increases by 6.18 per cent. It means that as the economy grows, the leather goods industry also thrives and provides people with more jobs. To dig into the type of employment generation by this sector, it is interesting to know the nature of changes in demand for persons with different skill categories. The skilled labour elasticity with respect to the GVA of leathergoods sector scores 8.82 per cent meaning thata 1 per cent increase in the value added in this sector leads to a 8.82 per cent rise of demand for skilled persons in this sector. It is to be noted here the skilled category in this calculation include both skilled and highly skilled categories. In the same method, the semi-skilled labour and unskilled labour elasticity estimates stand 10.28 per cent and 5.58 per cent respectively.

To understand various skill needs for different occupational categories, we have utilized the proportion of skill mix in various occupational categories found from the enterprise survey under this study with the macro data of value added and employment in leather goods sector (detail methodology is given in Annex A). It is noted from macroeconomic analysis that unskilled persons will be employed in leather goods sector more than semi-skilled and skilled persons. This projection differs from the findings from the survey which project more demand for skilled persons. However it is noted that in terms of total demand for employees and in terms of demand for skilled and semi-skilled persons three occupational categories dominate. Those are sewing operator, cutting operator and lasting, setting and assembling operator. Thus training opportunities need to be created more for these sectors.

It has been revealed from the enterprise survey that employers prefer trained worker than non-trained worker. Immediate question arise then how much money is needed for each type of training. Training cost depends on the duration and type of training. Survey data shows that for quality controller 68 days training

is needed which cost BDT 6750 per person. Training duration varies from 38 days to 88 days and cost varies from BDT 5730 to BDT 9000 (Table 7.18). This estimate will help to design future training program for the workers in leather goods sector.

Bangladesh Institute of Leather Engineering & Technology (ILET) is providing bachelor degrees of 120 students per year in three basic engineering courses namely Leather Engineering, Footwear Engineering and Leather Goods Engineering, where they recruit 40 students in each course. All of their student have to comply written and viva exam after HSC to get entry to the course. On the other side Center of Excellence for Leather Skill Bangladesh Ltd. (COEL) intakes 519 students in Leather Sewing Operator course, 84 students in Leather Cutting Operator course and 589 students in Table Operation in Leather Goods course for three months. Their students have to complete class eight to get entry to the course.

At the time of the KIIs head of the ILET agreed that their 10 per cent students are employed overseas and rest 90 per cent are employed in Bangladesh. And COEL said that their 100 per cent students are employed in Bangladesh. For a sector like leather goods practical experience is a basic need for the students at the time of their training. When we discussed about the cost of the training ILET director opined that they could not run an Analytical Lab which is necessary for fourth year engineering students. They need around 50 crore BDT to purchase the instruments for that lab and need 1 crore BDT for the running cost in every year. As discussed earlier that Ahsania Mission (a private training institute) had to stop their leather goods training program in 2006-07 due to financial and technological crisis. So, a huge amount of money needed to start and continue leather goods sector skill training programme. That is why the current institutional training programme in Bangladesh can be compared as peanut in this sector, which proves the very poor conditions of the supply side of skilled labour force in this sector.

Conclusion and recommendations

The survey of leather goods firms indicates that there are a number of skills gaps in workers in different occupations in the leather goods sector. This sector has high potential for growth but this will require that the identified skill gaps and shortages are adequately addressed. Prevailing training facilities are not enough to meet demand for skilled persons in this sector. The following steps could be taken to encourage improvements in skills in this sector:

1. Establishment of more private sector training institutes to meet the demand of the leather goods sector should be encouraged. In this connection training facilities should be given more for leather sewing operators, cutting operators and lasting, setting and assembling operator.
2. Not only capital is a big constraint for establishing leather testing lab, but also availability of technicians is a constraint. Therefore skill training facilities are required for technicians.
3. As there is dominance of small and micro enterprises in case of leather goods industry (specially for leather footwear), it is necessary to conduct survey on the small and micro enterprises.

Currently the leather goods export enjoys cash subsidy. Competitiveness of this sector needs to be enhanced by increasing productivity, so that country can save resources, which is spent on for cash subsidy.

7.1. Introduction

7.1.1 Background

Leather processing is an old manufacturing sub-sector in Bangladesh with a long heritage of over six decades. Availability of indigenous raw material (hides and skins) facilitated the setting up of the industry in the early 1940s in the then East Bengal. During Pakistan period (1947-1971), the industry was dominated by non-Bengali migrants from India, who had the knowledge and the know-how of leather processing industry. At that time, leather processing was limited to the production of wet blue leather (semi-processed tanned leather) and the non-Bengali traders exported a large part of the produce to West Pakistan for further processing and production of leather goods. A few small tanning units belonged to Bengali entrepreneurs who processed leather mainly for the domestic market.

After the independence of Bangladesh, the government took over the tannery industry abandoned by the departing non-Bengali entrepreneurs but had limited success in operating them under the public sector. Export of processed leather consisted almost entirely of wet blue leather till 1980-81. After 1981, a number of policy support measures aimed at raising the level of value addition in the industry provided incentive for new private investment in leather industry. The ban on export of wet blue leather in June 1990 led to the setting up of modern leather tanning units for the production of crust leather (tanned leather after further processing of wet blue leather) and finished leather and this was followed by new investment in leather goods industry. Leather industry in Bangladesh has undergone significant transformation during the past two decades from a low value addition tanning activity to a producer of leather footwear and leather goods along with high value added crust and finished leather.

There are three broad components of the leather industry (i) leather tanning, (ii) leather footwear and (iii) other leather products such as handbags, carry bags, wallets, cases etc. A varied amount of skill is needed in these categories for the following purposes: administrative; managerial; secretarial; engineering and quality controlling; machine operating; inventory, material selection and compliance operating; computer system and data analysing; design and pattern engineering (software basis); multi-machine dimension operating; packing and finishing; sales etc.Considering the future prospect of this high priority industrial sector, it is important to do a sweep of the existing skills in this industry and also find the places for further skill improvisation.

7.1.2 The Leather Sector

In the recent growth trend it is noticed that the leather goods sector has high opportunities in generating value added, employment and entrepreneurship by increasing export of higher value added products by utilising locally made raw materials. According to the Survey of Manufacturing Industries (SMI) 2012, there are a total of 930 manufacturers of leather and related products. The number of enterprises is reported to be much higher if we consider micro enterprises, which are not covered by the SMI. According to Leather Service Centre (2012), the leather sector includes 220 tanneries, 3,500 micro small and medium enterprises and 110 large enterprises of leather goods. The gross value added of leather and leather products was Tk. 22 billion according to SMI 2012. This value includes Tk.11billion worth of value addition from Tanning and dressing of leather; dressing and dyeing fur, manufacture of luggage, handbags and the like, saddler and harness. There is also Tk. 11 billion worth of value addition from manufacturing of footwear.

Table 7.1: Gross value added of the leather and leather products

Leather and related products	Gross value added (In million Tk.)
Tanning and dressing of leather; dressing and dyeing fur,manufacture of luggage, handbags and the like, saddler and harness:	11,111
Manufacturing of footwear	11,069
Total	22,180

Source: Survey of Manufacturing Industries, 2012.

The Quantum index of industrial production depicts the average growth of production of different manufacturing industries. It is observed that both tanning and finishing leather sector and the leather footwear sector are rapidly growing in recent years.

Table 7.2: Quantum index of industrial production (manufacturing) by the leather industries (Base:1988-89=100)

Industry	Weight in total industrial production	Year						
		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Tanning & Finishing Leather	2.49	66.72	44.58	53.48	88.14	89.79	85.48	160.4
Manufacture of Footwear	1.6	431.4	451.86	457.35	474.56	478.66	511.45	546.08

Source: Statistical Year Book Bangladesh, 2013

According to SMI 2012, in the 930 manufacturing units of leather and related products, 75,524 people work, among whom 53,057 or 70 per cent are male employees and the remaining 22,467 or 30 per cent are female. Among these employees, most are working in the production related tasks, followed by clerical and sales related tasks, administrative and managerial tasks, temporary labourers, working owners/ proprietors/ partners, and family helpers. Other than the category of the family helpers, in all other categories male employees are noted to be more in numbers than the female employees (SMI, 2012). According to Leather Service Centre (2012), the leather and leather goods sector, including the micro enterprises, generates direct and indirect employment for about 850,000 people. A significant number of women are also working in the leather sector, particularly in the leather goods industries.

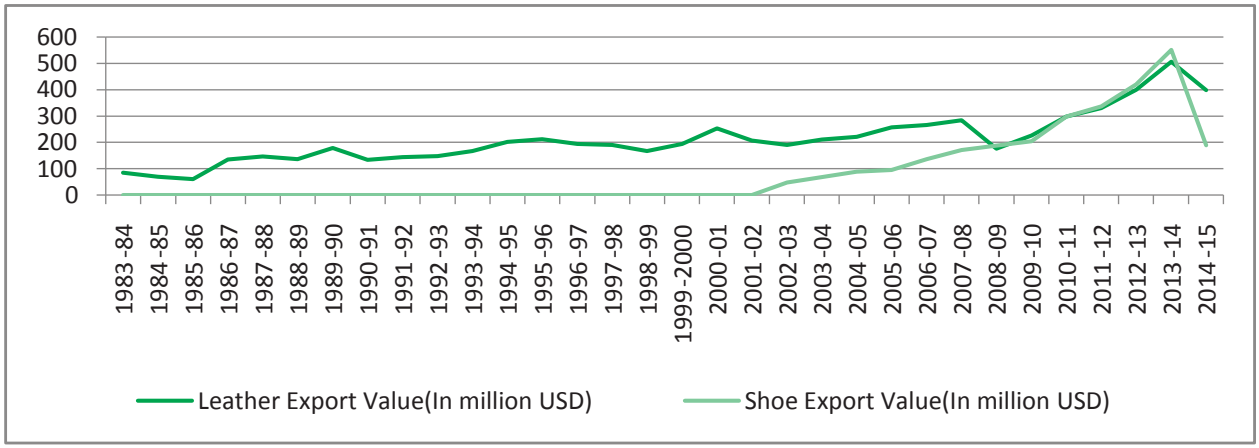
Table 7.3: Total persons employed by the leather industry (2 digits BSIC) and category wise employment

Employment category	Total persons employed	Male	Female
Administrative and managerial	5,290	5,168	122
Clerical and sales worker	6,118	5,811	307
Production and related workers	60,519	39,173	21,346
Working owner/proprietor/ partner	1,024	945	79
Temporary labourer	1,990	1,701	289
Family helper	585	260	325
Total	75,524	53,057	22,467

Source: Survey of Manufacturing Industries, 2012.

Leather Industry is the fourth largest exporting sector of Bangladesh. In fact, the leather products and footwear sector has been tagged as one of the highest priority sectors of Bangladesh in the Export Policy and Industrial Policy due to its high value added and export potentials. This sector exports products like leather shoes, belts, travel bags, wallets and other finished leather products to a number of multi-dimensional destinations including Italy, France, UK, USA, Belgium, Spain, Germany, Netherlands, Canada and Poland. There has a been gradual and steady rise in the export value of the leather industry and the leather footwear industry.

Figure 7.1: Export earnings of the leather industry



Source: Export Promotion Bureau and Bangladesh Bank.

At present the leather industry accounts for 3-4 per cent of total export earnings. Only 45 per cent of the total hides and skins is now processed into finished leather, which includes 18 per cent low grade for local consumption and 27 per cent for export either in the form of finished leather or leather goods. Only a few tanneries are capable of producing export quality finished leather for export. There are about 15 export-oriented footwear manufacturing units located mostly in and around Dhaka city. Only 6-7 producers are responsible for 40 per cent of footwear exports, while over 2,000 footwear making units (mostly micro and small enterprises) take care of domestic demand. Leather and leather products have the potential to make a major contribution to export earnings and to the economic development of the country.

Bangladesh has a long established tanning industry, which produces around 2-3 per cent of the world's leather from a ready supply of raw materials, making the country an attractive location to source and outsource the manufacture of finished leather products.[4] About 95 per cent of leather and leather products of Bangladesh are marketed abroad, mostly in the form of crushed leather, finished leather, leather garments, and footwear. Value addition in these exports averages 85 per cent(local) and 15 per cent (foreign).

Thus leather industry will continue to play a remarkable role in the growth path of Bangladesh economy. This study mostly concentrates on the skill needs in the leather goods sector.

7.1.3 Objectives of the study

Bangladesh government needs a proper assessment of the demand and supply situation of skills in the labour market in order to plan for skill development for the medium to longer term requirements of the economy. This is needed at the sectoral level, suitably projected for the next 10-20 years. The analysis is carried out for leather goods sector by (i) identifying key categories of occupations and trades; (ii) estimating current and future needs for skilled workers in each of the categories; and (iii) recommending ways to meet the future needs for skills demand in the sector.

The specific objectives are to:

i. Assess the current level of skills and the gap in skills in terms of availability and quality
ii. Assess the supply side capacity of the academic and training institutions to mitigate the gap in skills
iii. Estimate demand for skilled workforce in the next 5 to 10 years considering the growth of the industry
iv. Identify the emerging thrusts of the leather goods sector, and
v. Assess the training needs and ways of implementation of the training programmes.

The analysis can incorporate the key features of training and labour market characteristics and include current recruitment practices, number of workers who received training from TVET institutions/other training centres, and their contribution to the sector, all of which can inform the extent of needs for skills development programs for the sector.

4 Board of Investment 2012.

7.2 Methodology

This study has used a mix of both quantitative and qualitative methods. The analysis is based on data collected from both primary and secondary sources. Among the secondary sources, data from the Survey of Manufacturing Sector (SMI)[5] and Statistical Yearbook of Bangladesh have been analysed. Moreover, quantitative and qualitative data have been collected from:

i) Questionnaire survey of large leather goods enterprises;
ii) Discussion with key informants including academia, representatives of the industry and policymakers;
iii) Interview of training providers (both government and private).

The study mainly relies on a sample survey of 10 large firms which were selected purposively and on the focus group discussions (FGDs) with various industry associations (such as LFMEAB[6] and BFLLFEA)[7] and human resources officers, managers and workshop supervisors of the industries. The distribution of firms surveyed and FGDs is shown in Table 7.4.Ten selected firms were surveyed using structured questionnaire. Checklists were used for FGDs and Key Informant Interviews (KIIs).

Table 7.4: Distribution of surveyed enterprises and FGDs

Sector	No. of firms surveyed	FGDs	KIIs
Footwear	9	1 (LFMEAB)	3 (*Institute* of *Leather* Engineering &*Technology* (ILET), Center of Excellence for Leather Skill Bangladesh Ltd. (COEL) and Vocational Training Institute, Ahsania Mission)
Bag	4	1 (BFLLFEA)	
Wallet	2	10 (Human resources officers, managers and workshop supervisors)	
Belt	2		
Mat	1		
Total	10	12	3

To understand the nature of training provided inside the country, KIIs were conducted heads and other relevant persons of three training institutes in this sector.

7.3 Understanding the Skill Gaps in the Leather Goods Industry

7.3.1 Nature of Surveyed Enterprises

Enterprise survey reveals that 75 per cent of the large surveyed firms are export-oriented and 16.7 per cent produce for national market. These enterprises produce footwear, bag, wallet, belt and mat as finished leather goods.

Table 7.5: Distribution of product market

Number of enterprises	Products	Market	%
9	Footwear	Local – in the area	8.3
4	Bag	National	16.7
2	Wallet	Export	75.0
2	Belt	-	-
1	Mat	-	-
10	-	-	100.0

5 Previously known as Census of Manufacturing Industries (CMI)
6 Leather goods & Footwear Manufacturers & Exporters Association of Bangladesh (LFMEAB).
7 Bangladesh Finished Leather, Leather goods and Footwear Exporters' Association (BFLLFEA).

7.3.2 Assessment of the Current Skill Need for Workforce

It is necessary to understand the nature of current working force of the surveyed enterprises. Survey data show that a total of 26,836 employees are working in those enterprises. On an average 269 employees are working in each of the surveyed industries. Among them 99.7 per cent are local or Bangladeshi and only 0.28 per cent are foreigner (Table 7.6). Ninety-nine per cent of the employees are working as technical or production line and only 1 per cent are working as administrative or management staff.

Table 7.6: Total management, administrative and technical staff of the enterprises

Staff type	Number of male		Number of female		Total employees	
	Local	Foreign	Local	Foreign	Local	Foreign
Management	129	6	-	-	129	6
Administrative	102	-	15	-	117	-
Technical/ production	7,842	59	18,748	12	26,590	70
All	8,073	59	18,763	12	26,836	77

Foreign nationals working in leather goods sector are mostly skilled (39 per cent) and highly skilled (61 per cent) persons (Table 7.7).Nearly 31 per cent of them are employed as Deputy General Manager followed by Manager (30 per cent) and General Manager (17 per cent).

Table 7.7: Status of employment of foreign nationals in the surveyed enterprises (by occupations and skills levels)

Current occupations	Number of foreign nationals working in leather goods sector		Total	Skill level of foreign nationals working in leather goods sector			
	Male	Female		Unskilled	Semi-skilled	Skilled	Highly skilled
Managing Director	1	0	1	0	0	0	1
Executive Director	2	0	2	0	0	0	2
Senior General Manager	4	0	4	0	0	0	4
General Manager	12	1	13	0	0	0	13
Deputy General Manager	21	3	24	0	0	0	24
Manager	17	6	23	0	0	23	0
Assistant General Manager	8	2	10	0	0	7	3
Total	65	12	77	0	0	30	47

Note:
Unskilled: No prior experience doing the job. They need much support from experienced workers.
Semi-skilled: Has prior experience on- the-job. Who can do routine work with some support of more experienced workers.
Skilled worker: Has much experience on-the-job. Who can do routine work of a particular professional activity self-sufficiently.They can teach others on the job.
Highly skilled worker: Skilled workers with the additional ability to address non-routine special work problems successfully.

Most of the leather goods industries depend on walk-in and test for hiring workers. Almost 85.5 per cent follow the walk-in and test process. In 7.3 per cent cases they follow the advertisement process. They (enterprises) employ 3.7 per cent employee from the direct contact with the training service providers (Table 7.8). Survey data proves very poor connection between employer and training providers for current leather goods employee recruitment practices.

Table 7.8: Current recruitment practices of the enterprises to hire workers

Recruitment practice	Percentage of the total
Walk-in and test	85.5
Advertisement	7.3
Labour contractors	0.0
Personal (e.g. through family) recommendations	3.5
Direct contact with training service providers	3.7
Others	0.0
All practices	100.0

7.3.3 Understanding the Current Level of Gaps in Skill and Future Demand for Skilled Workforce

It is natural that enterprises will demand skilled workers for every category of employment. It is observed from Table 7.9 and Table 7.10 that the surveyed enterprises are employing 26,893 employees, 70 per cent of whom are females and the rest are males. Thus females dominate in leather goods production. In terms of skill mix, in all types of employment categories, skilled and highly skilled employees dominate. This situation indicates that leather goods sector mostly needs skilled and highly skilled employees for various categories of employment. Highly skilled employees heavily dominate managerial activities, supervisors and line leaders and also in case of quality control operators. Thus future growth of this sector should be associated with skill training facilities.

Table 7.9: Current employment in the surveyed enterprises by occupations and skills levels

Current occupations	Employment (number) by sex		Total	Employment (number) by Skill			
	Male	Female		Unskilled	Semi-skilled	Skilled	Highly skilled
Managerial	135	-	135	0	0	8	127
Engineer and other professionals	1,182	65	1,247	68	103	588	488
Secretarial /clerical	233	16	249	18	47	91	93
Supervisors and line leaders	241	37	278	0	0	29	249
Sewing Operators	1,054	10,130	1,1184	560	1,255	6,243	3,126
Machine operator and welder/ electrician	224	208	455	23	62	207	163
Cutting Operator and aged colours	1,692	2,720	4,412	434	752	1,957	1,269
Lasting, setting and assembling operator	1,441	3,282	4,723	198	685	2,813	1,027
Inventory, material selection and compliance operator	515	810	1,325	87	271	590	377
Advanced CAD design and pattern making operator	487	495	982	81	224	380	297
Quality controller operator	190	303	493	0	33	161	299
Finishing and packing	724	686	1,410	0	248	751	411
Total	8,118	18,752	26,893	1,469	3,680	13,818	7,926

Note:
Unskilled: No prior experience doing the job. They need much support from experienced workers.
Semi-skilled: Has prior experience on- the-job. Whocan do routine work with some support of more experienced workers.
Skilled worker: Has much experience on-the-job. Who can do routine work of a particular professional activity self-sufficiently. They can teach others on-the-job.
Highly skilled worker: Skilled workers with the additional ability to address non-routine special work problems successfully.

Table 7.10: Skill mix in different categories of employment (%)

Current occupations	% unskilled persons in total employment	% semi-skilled persons in total employment	% skilled persons in total employment	% highlyskilled persons in total employment	Total employed persons (number)
Managerial	0.0	0.0	5.9	94.1	137
Engineer and other professional	5.5	8.3	47.2	39.1	1,249
Secretarial/clerical	7.2	18.9	36.5	37.3	249
Supervisor and line leader	0.0	0.0	10.4	89.6	279
Sewing operator	5.0	11.2	55.8	28.0	11,201
Machine operator and welder/electrician	5.1	13.6	45.5	35.8	457
Cutting operator and aged colours	9.8	17.0	44.4	28.8	4,417
Lasting, setting and assembling operator	4.2	14.5	59.6	21.7	4,727
Inventory, material selection and compliance operator	6.6	20.5	44.5	28.5	1,326
Advanced CAD design and pattern making operator	8.2	22.8	38.7	30.2	987
Quality controller operator	0.0	6.7	32.7	60.6	494
Finishing and packing	0.0	17.6	53.3	29.1	1,416
Total	5.5	13.7	51.4	29.5	26,939

One of the major objectives of this study is to understand the future skills gap of leather goods industries in Bangladesh. At the time of enterprise survey entrepreneurs were asked to project the future demand of the unskilled, semi-skilled, skilled and highly skilled employees in different categories of employment. Overall, there will be around 3 per cent growth in demand for employees in the surveyed leather goods enterprises in the next 5 years and another 3 per cent in 5 years after that. Demand for skilled manpower will be highest in the categories of sewing operator and lasting, setting & assembling operator in the next 5 years and 10 years (Table 7.11).

Table 7.11: Demand for different skills in different categories of employment in the next 5 and 10 years (as projected by surveyed enterprises)

Current occupation	Skill level	Projected percentage increase in demand for employees in 5 years (from the current level)	Projected percentage increase labour demand in 10 years (from the level after 5 years)
Managerial	Unskilled	0.00	0.00
	Semi-skilled	0.00	0.00
	Skilled	1.60	1.75
	Highly skilled	1.95	1.95
	Total	0.89	0.93
Engineer and other professional	Unskilled	0.00	0.00
	Semi-skilled	1.40	1.20
	Skilled	4.25	3.70
	Highly skilled	0.95	0.90
	Total	1.65	1.45
Secretarial/Clerical	Unskilled	0.00	0.00
	Semi-skilled	1.00	0.95
	Skilled	1.35	1.00
	Highly skilled	1.25	1.25
	Total	0.90	0.80

Current occupation	Skill level	Projected percentage increase in demand for employees in 5 years (from the current level)	Projected percentage increase labour demand in 10 years (from the level after 5 years)
Supervisor and line leader	Unskilled	0.00	0.00
	Semi-skilled	0.50	0.60
	Skilled	2.60	2.85
	Highly skilled	0.95	0.90
	Total	1.01	1.09
Sewing operator	Unskilled	1.50	1.70
	Semi-skilled	2.30	2.85
	Skilled	40.35	40.50
	Highly skilled	2.15	1.75
	Total	11.58	11.70
Machine operator & welder/electrician	Unskilled	0.15	0.20
	Semi-skilled	1.05	0.90
	Skilled	5.10	5.40
	Highly skilled	1.50	1.20
	Total	1.95	1.93
Cutting operator & aged colours	Unskilled	0.65	0.95
	Semi-skilled	1.40	1.25
	Skilled	4.55	4.40
	Highly skilled	0.75	1.35
	Total	1.84	1.99
Lasting, setting & Assembling Operator	Unskilled	0.75	1.00
	Semi-skilled	2.63	3.00
	Skilled	10.75	10.50
	Highly skilled	1.13	1.00
	Total	3.81	3.88
Inventory, material selection & compliance operator	Unskilled	0.63	0.50
	Semi-skilled	0.50	1.00
	Skilled	1.63	1.36
	Highly skilled	0.63	0.63
	Total	0.84	0.87
Advanced CAD design & Pattern making operator	Unskilled	0.65	0.50
	Semi-skilled	0.70	1.10
	Skilled	3.65	2.75
	Highly skilled	0.75	1.20
	Total	1.44	1.39
Quality controller operator	Unskilled	0.00	0.00
	Semi-skilled	0.63	1.00
	Skilled	2.63	3.75
	Highly skilled	1.25	0.50
	Total	1.13	1.31
Finishing & packing	Unskilled	0.45	0.45
	Semi-skilled	0.65	1.05
	Skilled	3.80	3.40
	Highly skilled	0.80	0.65
	Total	1.43	1.39
Total	Unskilled	0.39	0.43
	Semi-skilled	1.03	1.17
	Skilled	7.18	7.06
	Highly skilled	1.20	1.18
	Grand Total	2.45	2.46

The entrepreneurs were also asked to project future demand for some categories of professionals those will be needed in an increasing number with potential changes in technology in future. According to the respondents, the requirement will take place mostly in relation to computer and information technology related activities in this sector. Survey data show that highest percentage of skilled manpower will be needed in multi- machine dimension operator in the next 5 (4.30 per cent) and 10 years (6.10 per cent) (Table 7.12).

Table 7.12: Future occupations and employment in the enterprises

Future occupations	Skill level	Projected % increase in demand of various skills in 5 years	Projected % increase in demand of various skills in 10 years
Computer system &data analyst	Unskilled	0.0	0.0
	Semi-skilled	0.0	0.0
	Skilled	2.30	1.90
	Highly skilled	1.30	2.70
	Total	0.90	1.15
Quality assurance engineer	Unskilled	00	00
	Semi-skilled	00	00
	Skilled	2.40	3.00
	Highly skilled	1.50	1.90
	Total	0.97	1.23
Multi-machine dimension operator	Unskilled	4.70	3.30
	Semi-skilled	2.20	1.90
	Skilled	4.30	6.10
	Highly skilled	1.10	2.00
	Total	3.07	3.33
Design &pattern engineer (software basis)	Unskilled	1.30	1.10
	Semi-skilled	1.70	0.80
	Skilled	3.40	3.70
	Highly skilled	2.30	2.30
	Total	2.17	1.98
Total	Unskilled	1.50	1.10
	Semi-skilled	0.97	0.68
	Skilled	3.10	3.68
	Highly skilled	1.55	2.23
	Total	1.78	1.92

7.3.4 Assessing Skill Needs on the Basis of Macro Data

Combining findings from the survey with the macroeconomic data on potential GDP growth, we may project demand for persons with different levels of skills in various occupational varieties in the leather goods sector. The methodology for this projection is presented in detail in Annex A.

The arch elasticity of value added of leather goods sectors with respect to GDP has been calculated using respective data for two years,2005-06 and 2012 (the years for which manufacturing sector survey data are available). The value added elasticity in leather goods sector stands at 0.19, while the employment (total) elasticity in this sector with respect to the value added of the respective sector is 6.18. These results indicate that if national GDP increases by 1 per cent, value added in the leather goods sector increases by 0.19 per cent and if gross value added (GVA) in leather goods sector increases by 1 per cent, overall employment in this sector increases by 6.18 per cent. It means that as the economy grows, the leather goods industry also thrives and provides people with more jobs. To dig into the type of employment generation by this sector, it is interesting to know the nature of changes in demand for persons with different skill categories. The

skilled labour elasticity with respect to the GVA of leather goods sector scores 8.82 per cent meaning that a 1 per cent increase in the value added in this sector leads to a 8.82 per cent rise of demand for skilled persons in this sector. It is to be noted here the skilled category in this calculation includes both skilled and highly skilled categories. In the same method, the semi-skilled labour and unskilled labour elasticity estimates stand at 10.28 per cent and 5.58 per cent respectively.

Table 7.13: Projection of value added and employment in the leather goods sector (based on available macro data)

Fiscal year	GDP growth rate(%)	GDP (billion Tk.)	Leather goods value added (billion tk.)	Total persons to be required for anticipate value added	Skilled persons to be required for anticipate value added	Semi-skilled persons to be required for anticipate value added	Unskilled persons to be required for anticipate value added
FY2015	6.5	16,225	18.5	93,307	7,799	7,558	77,949
FY2016	6.6	17,296	18.7	100,539	8,404	8,144	83,990
FY2017	6.8	18,472	19.1	108,565	9,075	8,794	90,696
FY2018	7.2	19,802	19.2	117,744	9,842	9,538	98,364
FY2019	7.6	21,307	19.5	128,252	10,720	10,389	107,142
FY2020	8.0	23,011	19.8	140,295	11,727	11,365	117,203
FY2021	8.0	24,852	20.1	153,475	12,829	12,432	128,213
FY2022	7.5	26,716	20.4	166,991	13,958	13,527	139,505
FY2023	7.0	28,586	20.6	180,716	15,106	14,639	150,971
FY2024	6.5	30,444	20.9	194,508	16,259	15,756	162,493
FY2025	6.0	32,271	21.1	208,214	17,404	16,867	173,943

Source: Calculated on the basis of GDP data of Statistical Yearbook,Bangladesh.

To understand various skill needs for different occupational categories, we have utilised the proportion of skill mix in various occupational categories found from the enterprise survey under this study with the macro data of value added and employment in leather goods sector (detail methodology is given in Annex A). It is noted from Table 7.13, Table 7.14 and Table 7.15 that unskilled persons will be employed in leather goods sector more than semi-skilled and skilled persons. This projection differs from the findings from the survey which projects more demand for skilled persons. However it is noted that in terms of total demand for employees and in terms of demand for skilled and semi-skilled persons,three occupational categories dominate. Those are sewing operator, cutting operator and lasting, setting and assembling operator. Thus training opportunities need to be created more for these sectors.

Table 7.14: Projection of requirement of unskilled persons for different occupational categories

Fiscal year	Mana gerial	Engineer and Other Professionals	Secreta riate/	Super viser and line leader	Sewing Operator	Machine operator and welder/ electrician	Cutting operator and aged colours	Lasting, setting and assembling Operator	Inventory, material selection & compliance Operator	Advanced CAD design & pattern making operator	Quality control operator	Finis hing & Pac king	**Total demand for Unskilled persons**
FY2015	0	3,608	955	0	29,715	1,220	23,029	10,506	4,616	4,298	0	0	**77,949**
FY2016	0	3,888	1,029	0	32,018	1,315	24,814	11,321	4,974	4,631	0	0	**83,990**
FY2017	0	4,198	1,111	0	34,574	1,420	26,795	12,225	5,371	5,001	0	0	**90,696**
FY2018	0	4,553	1,205	0	37,497	1,540	29,061	13,258	5,825	5,424	0	0	**98,364**
FY2019	0	4,960	1,313	0	40,844	1,678	31,654	14,441	6,345	5,908	0	0	**107,142**
FY2020	0	5,425	1,436	0	44,679	1,835	34,626	15,797	6,941	6,463	0	0	**117,203**
FY2021	0	5,935	1,571	0	48,876	2,007	37,879	17,281	7,593	7,070	0	0	**128,213**
FY2022	0	6,458	1,709	0	53,181	2,184	41,215	18,803	8,262	7,692	0	0	**139,505**
FY2023	0	6,988	1,850	0	57,552	2,364	44,603	20,349	8,941	8,324	0	0	**150,971**
FY2024	0	7,522	1,991	0	61,944	2,544	48,007	21,902	9,623	8,960	0	0	**162,493**
FY2025	0	8,052	2,131	0	66,309	2,723	51,390	23,445	10,302	9,591	0	0	**173,943**

Table 7.15: Projection of requirement of semi-skilled persons for different occupational categories

Fiscal year	Mana-gerial	Engineer and other profes-sionals	Secre tariate /Cleri cal	Sup ervis or and line lead er	Sewing operat or	Machine operator and welder/ electrician	Cutting operator and aged colours	Lasting ,setting and assem bling operat or	Inventory, material selection & compliance operator	Advanced CAD design & pattern making operator	Quality control operator	Finishing &packing	Total demand for Semi-skilled persons
FY2015	3	298	60	13	3,239	116	1,170	1,511	372	261	84	432	**7558**
FY2016	4	322	64	13	3,490	125	1,261	1,628	401	281	90	465	**8144**
FY2017	4	347	69	15	3,768	135	1,362	1,758	433	304	98	502	**8794**
FY2018	4	377	75	16	4,087	147	1,477	1,907	469	329	106	545	**9538**
FY2019	5	410	82	17	4,452	160	1,608	2,077	511	359	115	593	**10,389**
FY2020	5	449	90	19	4,870	175	1,759	2,272	559	392	126	649	**11,365**
FY2021	6	491	98	21	5,327	191	1,925	2,485	612	429	138	710	**12,432**
FY2022	6	534	107	22	5,797	208	2,094	2,704	666	467	150	772	**13,527**
FY2023	7	578	115	24	6,273	225	2,266	2,926	720	505	162	836	**14,639**
FY2024	7	622	124	26	6,752	242	2,439	3,150	775	544	175	900	**15,756**
FY2025	8	666	133	28	7,227	259	2,611	3,372	830	582	187	963	**16,867**

Table 7.16: Projection of requirement of skilled (including high skilled) persons for different occupational categories

Fiscal year	Mana gerial	Engineer and other profes-sionals	Secre-tariate/ Clerical	Super visor and line leader	Sewing operator	Machine operator and welder/ electrician	Cutting operator and aged colours	Lasting, setting and assembling operator	Inventory, material selection & compliance operator	Advanced CAD design & pattern making operator	Quality control operator	Finishing & Packing	**Total demand for Highly skilled persons**
FY2015	125	480	92	245	3,076	160	1,249	1,011	371	292	294	404	**7,799**
FY2016	135	517	99	264	3,314	173	1,346	1,089	400	315	317	436	**8,404**
FY2017	145	559	106	285	3,579	187	1,453	1,176	432	340	342	471	**9,075**
FY2018	158	606	115	309	3,882	202	1,576	1,275	468	369	371	510	**9,842**
FY2019	172	660	126	337	4,228	220	1,716	1,389	510	402	404	556	**10,720**
FY2020	188	722	138	368	4,625	241	1,878	1,520	558	439	442	608	**11,727**
FY2021	206	790	151	403	5,060	264	2,054	1,662	610	481	484	665	**12,829**
FY2022	224	859	164	439	5,505	287	2,235	1,809	664	523	527	724	**13,958**
FY2023	242	930	177	475	5,958	311	2,419	1,957	719	566	570	783	**15,106**
FY2024	261	1001	191	511	6,412	334	2,603	2,107	773	609	613	843	**16,259**
FY2025	279	1072	204	547	6,864	358	2,787	2,255	828	652	657	902	**17,404**

7.4 Current Training/Education Infrastructure for Leather Goods Industry

At the beginning of the study enterprises were asked few questions related to training programme and trained staffs. Then we interviewed three training institutes which provided and are providing training for the employees of leather goods industries. Among this three training institutes, Ahsania Mission had to stop their leather goods training programme in 2006-07 due to financial and technological crisis. Currently, Institute of Leather Engineering &Technology (ILET) is providing bachelor degrees of 120 students per year in three basic engineering courses, namely leather engineering, footwear engineering and leather goods engineering. For each course it recruits 40 students under University of Dhaka. It has very limited number of training programme (only one week or so) for the workers who are or will be employed in leather goods industries in Bangladesh. Center of Excellence for Leather Skill Bangladesh Ltd. (COEL) has the programme on industry-led apprenticeship, NTVQF machine operations (footwear) level 1, soft skill training, designing and pattern making, and compliance audit and consultancy.

On-the-job training is one of the major key elements which can help the employee to upgrade their skills; 100 per cent enterprises have the facility of on the job training (Table 7.17). But none of the enterprise agreed to provide on-the-job training for outsider. Sixty per cent enterprises have apprentices programme.

All of the surveyed industries agreed that they employ TVET graduates in their company and prefer to employ TVET graduates than non-trained people (Table 7.17).

Table 7.17: Skills development practices of the enterprises

	Yes cases	No cases
Does your company currently have its own training unit in place?	10	0
Does the enterprise conduct some structured on -the-job training (some sort of separate training arrangements i.e., instructors, dedicated supervisors, etc. are in place)?	10	0
Would the enterprise be willing to do on -the-job training also for external trainees?	0	10
Does your company have apprentices?	6	4
Does your company employ graduates of the formal TVET system?	10	0
Would you prefer to recruit formal TVET graduates as compared to other untrained youth?	10	0

It has been revealed from the enterprise survey that employers prefer trained workers than non-trained workers. Immediate question arise then how much money is needed for each type of training. Training cost depends on the duration and type of training. Survey data show that 68 days training is needed for quality controller which costs BDT 6,750 per person. Training duration varies from 38 days to 88 days and cost varies from BDT 5,730 to BDT 9,000-Table 7.18. This estimate will help to design future training programme for the workers in leather goods sector.

Table 7.18: Training and cost of training

Designation (type of worker)	Skill level	On-the-job training needed		Satisfaction with skill level	Training Duration (no of days)	Training cost per person (In Tk.)
		Yes	No			
Quality controller	Unskilled	-	-	-	-	-
	Semi-skilled	-	-	-	-	-
	Skilled worker	6	-	4.0	68	6,750
	Highly skilled worker	-	-	-	-	-
	Total	6	-	4.0	68	6,750
Junior technician	Unskilled	-	-	-	-	-
	Semi-skilled	6	-	3.2	83	6,783
	Skilled worker	-	-	-	-	-
	Highly skilled worker	-	-	-	-	-
	Total	6	-	3.2	83	6,783
Junior operator	Unskilled	0	-	-	-	-
	Semi-skilled	10	-	3.2	77	5,730
	Skilled worker	-	-	-	-	-
	Highly skilled worker	-	-	-	-	-
	Total	10	-	3.2	77	5,730
Senior operator	Unskilled	-	-	-	-	-
	Semi-skilled	-	-	-	-	-
	Skilled worker	10	-	4.0	71	6,470
	Highly skilled worker	-	-	-	-	-
	Total	10	-	4.0	71	6,470
Supervisor	Unskilled	-	-	-	-	-
	Semi-skilled	-	-	-	-	-
	Skilled worker	2	-	4.8	38	9,000
	Highly skilled worker	-	-	-	-	-
	Total	2	-	4.8	38	9,000

Designation (type of worker)	Skill level	On-the-job training needed		Satisfaction with skill level	Training Duration (no of days)	Training cost per person (In Tk.)
		Yes	No			
Junior finishing &packing	Unskilled	-	-	-	-	-
	Semi-skilled	6	-	3.1	88	6,667
	Skilled worker	-	-	-	-	-
	Highly skilled worker	-	-	-	-	-
	Total	6	-	3.1	88	6,667
Helper	Unskilled	10	-	2.0	88	4,230
	Semi-skilled	-	-	-	-	-
	Skilled worker	-	-	-	-	-
	Highly skilled worker	-	-	-	-	-
	Total	10	-	2.0	88	4,230
Total	Unskilled	10	-	2.0	88	4,230
	Semi-skilled	22	-	3.2	81	6,273
	Skilled worker	18	-	4.1	66	6,844
	Highly skilled worker	-	-	-	-	-
	Total	50	-	3.3	77	6,070

7.4.1 Findings from KIIs with Training Institutes

As mentioned earlier, we have done KIIs with head and other relevant persons of three training institutes (two private training institutions and one government) in this sector to understand the nature of training provided inside the country. Among these training institutes Bangladesh Institute of Leather Engineering &Technology(ILET) is providing bachelor degrees of 120 students per year in three basic engineering courses, namely leather engineering, footwear engineering and leather goods engineering, where it recruits 40 students in each course. All of their student have to comply written and viva exam after HSC to get entry to the course. On the other side Center of Excellence for Leather Skill Bangladesh Ltd. (COEL) intakes 519 students in leather sewing operator course, 84 students in leather cutting operator course and 589 students in table operation in leather goods course for three months. Its students have to complete class eight to get entry to the course.

At the time of the KIIs, head of the ILET agreed that their 10 per cent students are employed overseas and the rest 90 per cent are employed in Bangladesh. And COEL said that their 100 per cent students are employed in Bangladesh. For a sector like leather goods, practical experience is a basic need for the students at the time of their training. All of the training institutes agreed that their syllabus covers this basic need of the demand. Eighty per cent of their training modules are based on practical and the rest 20 per cent cover theoretical part. As a result, almost 95 per cent of their students get job immediate after their training (Table 7.19). When we discussed about the cost of the training, ILET director opined that they could not run an Analytical Lab which is necessary for fourth year engineering students. They need around 50 crore BDT to purchase the instruments for that lab and need 1 crore BDT for the running cost in every year. As discussed earlier, that Ahsania Mission (a private training institute) had to stop their leather goods training programme in 2006-07 due to financial and technological crisis. So, a huge amount of money needed to start and continue leather goods sector skill training programme. That is why the current institutional training programme in Bangladesh can be compared as peanut in this sector, which proves the very poor conditions of the supply side of skilled labour force in this sector.

Table 7.19: Information of the training institutions

Leather Engineering (Student- Annual intake per year)	40
Footwear Engineering (Student- Annual intake per year)	40
Leather Goods Engineering (Student - Annual intake per year)	40
Leather Sewing Operator	519
Leather Cutting Operator	84
Table Operation in Leather Goods	589
Destination of employment of the trainees	Export=5% , Local=95%
How the training module (theoretical, practical) organised in terms of percentage?	Theoretical=20%, Practical=80%
Did this training institute help trainees getting a job (domestic or external)?	Yes=100%
What percentage of the trainee was employed right after the training (last year and last five years)?	Last Year=85%, Last 5 years=80%
How for these trainings can match the demand from employees (%)?	95%
Did trainers receive any formal training? Code:1=yes, 2=no	Yes=100%

7.5 Conclusion, Recommendations and Way Forward

The survey of leather goods firms indicates that there are a number of skills gaps in workers in different occupations in the leather goods sector. This sector has high potential for growth but this will require that the identified skill gaps and shortages are adequately addressed. Prevailing training facilities are not enough to meet the demand for skilled persons in this sector. The following steps could be taken to encourage improvements in skills in this sector:

1. Establishment of more private sector training institutes to meet the demand of the leather goods sector should be encouraged. In this connection training facilities should be given more for leather sewing operators, cutting operators and lasting, setting and assembling operators.
2. Not only capital is a big constraint for establishing leather testing lab, but also availability of technicians is a constraint. Therefore, skill training facilities are required for technicians.
3. As there is dominance of small and micro enterprises in the case of leather goods industry (especially for leather footwear), it is necessary to conduct survey on the small and micro enterprises.
4. Currently, the leather goods export enjoys cash subsidy. Competitiveness of this sector needs to be enhanced by increasing productivity, so that the country can save resources, which is spent on for cash subsidy.

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Annex A

Methodology for projection of skill needs

First of all, the gross value added (GVA) data and employment data (skilled, semi-skilled, unskilled employees) for leather goods sector have been taken from the SMI, 2005-06 and SMI, 2012). The GDP values till 2020 have been projected on the basis of the yearly growth rates mentioned in theSeventh Five-Year Plan. GDP values from 2021 to 2025 have been projected on the basis of compound growth rates of GDP from 2016 to 2020.

Constant elasticity is assumed for the projection purpose. First, the arch elasticity of value added of leather sector with respect to GDP has been calculated using the two point data of 2005-06 and 2012. The value added elasticity in leather goods sector stands at 0.19, while the employment (total) elasticity in leather goods sector with respect to the value added of the respective sector is 6.18. These results indicate that if national GDP increases by 1%, value added in the leather goods sector increases by 0.19 per cent and if gross value added in leather goods sector increases by 1 per cent, overall employment in this sector increases by 6.18 per cent. It means that as the economy grows, the leather industry also thrives and provides people with more jobs. To dig into the type of employment generation, it is interesting to know thenature of changes in demand for persons with different skill categories. Following the above technique, we have calculated the skilled labour elasticity with respect to the GVA of leathergoods sector, which scores 8.82 per cent meaning that a 1 per cent increase in the value added in this sector leads to a 8.82 per centrise of demand for skilled persons in this sector. It is to be noted here the skilled persons in this calculation include both skilled and highly skilled persons. In the same method, the semi-skilled labour and unskilled labour elasticity estimates stand at 10.28 per cent and 5.58 per cent respectively.

Since we have the actual data of value added and employment for 2012, we have estimated the data of FY2015 using the compound growth rate of the respective variables between FY2006 and FY2012. The compound growth rates for GVA and total employment were found to be 1.13 per cent and 7.30 per cent respectively. Now, since we have filled the data for FY2015 using the compound growth rate (assuming it to be constant), we then project the values for rest of the years up to FY2025 using the methodology for calculating elasticity where the constant elasticity assumption is inherent.

For projection from FY2016 to FY2025, we have used the following formula of elasticity (assuming it to be constant) after a little bit rearrangements which stands then

$$GVA_{Fy\,t+1} = GVA_{Fy\,t} + \beta\left(\frac{GDP_{Fy\,t+1} - GDP_{Fy\,t}}{GDP_{Fy\,t}}\right).GVA_{Fy\,t}$$

where β is the elasticity of GVA with respect to GDP. To be more concrete, for the projection of GVA of FY16 this formula stands:

$$GVA_{Fy16} = GVA_{Fy15} + \beta\left(\frac{GDP_{Fy16} - GDP_{Fy15}}{GDP_{Fy15}}\right).GVA_{Fy15}$$

Using this formula recursively, we have projected the GVA of the leather industry upto FY25.

Now, we have projected the GVA of the leather industry and with this projected GVA figures, we have projected the total employment in the leather sector upto FY2025. In calculating this, we have assumed that the labour elasticity with respect to GVA is constant. After a little bit rearrangement of the elasticity formula yields

$$\text{Labor}_{Fy\,t+1} = \text{Labor}_{Fy\,t} + \delta\left(\frac{GVA_{Fy\,t+1} - GVA_{Fy\,t}}{GVA_{Fy\,t}}\right).\text{Labor}_{Fy\,t}$$

Where δ is the elasticity of labour employment with respect to GVA of leather industry. Recursively using this formula, we have projected total labour demand upto FY2025.

Now, we have divided the total labour demand into skilled, semi-skilled and unskilled assuming the constant proportion of skill category prevails as that of 2012 which are approximately 8 per cent, 8 per cent and 83 per cent respectively.

Projection of demand for employees at different occupational categories

For the construction of the sectoral table of 12 occupations, we have used the survey data of the 10 firms. First, we have summed up all skilled labour demand irrespective of the occupations. Then, we have found out specific occupation weight in the skilled category labour demand. After that, we have found out a specific occupation skilled labour demand from the projected skilled labour demand for a specific year multiplying the respective occupation weight and that of total skilled labour demand of that year. By this process, we have projected the skilled labour demand for all occupations. By the same token, we have projected the semi-skilled and unskilled labour demand for the all occupations. After rearrangement, we have located the all skilled, semi-skilled and unskilled labour demand upto FY2025 for a specific occupation.

CHAPTER- 8

Labour Market and Skills Gaps Analysis of Hospitality and Tourism Sector in Bangladesh

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Hospitality and Tourism Sector in Bangladesh

Executive Summary

The study analyses the Hospitality and Tourism Sector (HTS) of Bangladesh from the following perspectives: (i) the structure and contribution of HTS under the current levels of skills composition, shortages, and gaps, (ii) the nature and extent of skill shortage, skill gaps, and recruitment difficulties in the HTS together with the proximate causes and consequences, and (iii) projection of the requirement of different compositions and skill categories of employees, and the training needs by skill categories. It has been carried out by reviewing existing literature and secondary information to provide comprehensive overview of the sector in terms of its dynamics in growth and employment. After completion of the secondary research, a primary survey with key informants of eleven hotels and resorts have been carried out across Chittagong, Cox's Bazar, Dhaka, and Sylhet.

The number of establishments in Bangladesh grew at a rate of 22.73 per cent between 2003 and 2010 and employment in HTS increased by 32.29 per cent between 2003 and 2010. HTS spent Tk. 734 million in 2003 on employment costs (payments of wages, salaries, and bonuses, etc.), which increased to Tk. 18.1 billion in 2010 (annual growth rate 47.38% after adjusting for inflation).Total gross value added at factor costs of the HTS were Tk. 1.38 billion in 2003, which increased to Tk. 27.74 billion in 2010 (growth rate 43.21 per cent between 2003 and 2010).

The direct contribution (visitor exports, domestic expenditures, and purchases by HTS providers,) of HTS to GDP was TK. 296.5 billion (1.9 per cent of total GDP) in 2014 and grew by 5.9 per cent in 2015, and is forecast to rise by 6.1 per cent, from 2015-2025, to Tk. 566.3 billion (2.0 per cnet of total GDP) in 2025. Visitor grew by 3.7 per cent in last year, and the country is expected to attract 463,000 international tourist arrivals in next five years.

The primary survey was intended to capture the existing skill compositions, skill shortages, recruitment difficulties and skill gaps in HTS. The HTS experienced 3-4.5% growth pa in the number of guests since 2008. The proportions of international to total guests are higher in Chittagong and Cox's Bazar than that in Sylhet. Besides, these destinations have higher percentage of stay with purpose of leisure tourism compared to Dhaka. The survey findings also imply that visitors with purpose of leisure tourism have higher inclination toward small hotels/resorts while visitors with official/business purpose use large and medium hotels/resorts more frequently.

The survey was designed to capture skill composition across different departments within a typical hospitality unit in Bangladesh. More than 65 per cent of total workforce is concentrated in Food and Beverage department whereas House-keeping comes to next with share of 21.69 per cent. The findings of the primary survey show a highly skewed distribution towards skilled and semi-skilled workers except for housekeeping and food and beverage (production) departments. Housekeeping and Food and Beverage are mostly concentrated with unskilled labor with share of 73 per cent and 71 per cent respectively.

Six out of eleven firms responded to have no labor shortage at all. However, the availability of labor supply varies across regional dimensions. The types of recruitment difficulties include the reluctance of good quality employees (trained in Dhaka or in any other reputed training institute) to work far away from capital, the practice of employing local people (with little or even no knowledge of hospitality services) and training these people to work competently. Another major issue is the expectations of higher salary by the graduates from public or private universities.

The respondents reported prevalence of "normative skill gap" with regard to recruiting fresh graduates. All the respondents expressed their reluctance in recruiting fresh graduates as skilled labor across the departments. The average skill gap for skilled labour pool came out to be two years of more training across all the departments. The preference of the employers to recruit experienced employees as semi-skilled labor was heavily skewed toward two to four years of experience. The unskilled labour force seemed to possess the lowest level of skill gap within any of the departments. The average skill gap for unskilled labour pool came out to be six months of more training across all the departments.

The average projected growth of demand for HTS services (number of guests in hotel/resorts, etc.), as stated by the respondents, came out to be 7% pa in next 5 years (Figure 8.3). Higher growth at 8% pa for Chittagong and Cox's Bazar and lower growth at 6% pa for Sylhet were projected over the 5-year horizon. In contrast, 10% pa was projected over the next 10 year horizon.

The study carried out projections of GDP, the value added of the HTS, total labour demand, skill gaps and training needs from 2016 to 2025 across occupations as well as skill category. To achieve the desired levels of HTS value added, the number of workers will have to be increased to 336 thousand persons by 2020 and to 392 thousands by 2025. Assuming distribution of skills to remain constant, the projected employment implies that 43 thousand skilled and 73 thousand semi-skilled workers will be required by 2020, which will increase to 50 thousands and 89 thousands by 2025.

The labour market of HTS in 2016 experiences shortage of 136 thousand labour across different occupations and skill. The maximum shortage exists in Food and Beverage (Production) department where employers expect to employ 54 thousands of quality employees.

Lack of practical training, inadequate and inappropriate training on IT skill, lack of proper training on language skill (English Proficiency), preference toward overseas employment in HTS as well as to other employments except HTS, reluctance of bachelor graduates to work at periphery, expectation of high salary by bachelor graduates, attitude problem by bachelor graduates in workplace, social stigma are the main reasons of skill mismatch in HTS labor market.

Skills trainings are necessary to minimize the gaps as current pools of workers will hardly be able to perform the tasks efficiently and accurately. However, not all of the workers, especially unskilled and to some extent semi-skilled workers, who have skills gaps would require to undergo in-house (on-the-job), institutional training. Thus, the primary target should be the skilled workers. These erstwhile trainees would, after completion of their training, be in-house (on-the-job) trainers to impart training to the unskilled workers with skills gaps. The training needs during 2016-2025 would vary between 126 thousands and 168 thousands.

In case of any government intervention to upgrade the skill level of existing supply of labor of HTS, Food and Beverage (Production) should be regarded as the first and foremost priority area. Both the demand and supply side actors reported about the need of improving culinary skills among the existing labour pool considering the substantial contribution of Food and Beverage (Production) department to domestic as well as overseas employment in HTS. Apart from this, the students should be provided with the opportunity to visit the hotel/resorts that will help them align the theoretical knowledge with practical applications. In this regard, these institutes can be provided with the facility of “Application Hotel Program” through which each of the institutes can be tagged with specific hotel for practical experience.

8.1 Introduction

8.1.1 An Overview of the Hospitality and Tourism Sector

It is usually a common practice to treat hospitality and tourism sector (HTS) under the same umbrella even though the two industries, albeit complementary, have distinct characteristics and objectives. Hospitality industry provides services to tourists in the form of accommodations, restaurants, resorts, pubs along with other necessary amenities of daily life. In contrast, tourism industry facilitates the travelers with travel routes, transports, arranging activities for tourist attraction, etc. Hence, these two different industries can be considered as a composite sector of service where increase in supply of services by one industry can raise the demand for the other. Investment with enhanced facilities for increased tourist attractions will eventually increase the demand of hospitality whereas a good quality supply of hospitality might increase the demand of tourists to some extent. This interdependency often makes it difficult to separate out the individual impacts of these two industries.

Despite a large pool of unemployed workers, employers continue to struggle to find skilled talent to fill the growing number of job openings in the country. It is not just individual firms or the HTS sector that is feeling the consequences of the skills gap. Communities, regions, and entire nation pay a heavy price when they cannot find or equip workers with the right skills for critical jobs. A large number of HTS businesses rate the aggregate skill levels of their critical staff as less than optimal, or there is an overall skills gap among employees. In addition to industry skills gaps, employers observe a lack of critical soft skills-such as communication, collaboration, creativity, and critical thinking in today's workforce even though these soft skills are important to support business continuation let alone expansion.

The impact of the skills gap is far reaching and varied, with effects on human capital development, and business performance. Bangladesh economy is likely to slow its climb into higher value-added industries and see millions of low-skilled workers trapped in subsistence agriculture or urban poverty.

Government plays an important role in helping organizations find knowledgeable, skilled workers; helping individuals access the training and education they need to get a job; and assisting industries through funding and by setting policies for partnerships to develop the skills of the current and future workforce. Government agencies need to simplify and standardise processes for accessing public sector training funds so that stakeholders can navigate them more easily, and better coordinate their use of its training programmes. Educational as well as technical and vocational training institutions at all levels should continue to development partnerships with employers to advise on the skill needs for their students. With all of these partners helping, individuals can obtain the skills they need for engaging, challenging, and well-paid work, while fulfilling their responsibilities to further their development. By connecting to and partnering with all levels of government and accessing training resources, organisations benefit by attracting skilled, knowledgeable, and adaptable workers.

Against this backdrop, a modest attempt has been made to analyse the HTS of Bangladesh from the following perspectives: (i) the structure and contribution of HTS under the current levels of skills composition, shortages and gaps, (ii) the nature and extent of skill shortage, skill gaps and recruitment difficulties in the HTS together with the proximate causes and consequences, and (iii) projection of the requirement of different compositions and skill categories of employees, and the training needs by skill categories. Once these issues are analysed the findings can help the HTS sector in recruiting quality workforce and providing satisfactory services to their guests and eventually creating a win-win situation for themselves, the workers and the government exchequer.

8.1.2 Objectives of the Study

The objectives of the study are to analyse the contribution of the HTS to the GDP of Bangladesh and employment of total labour force as well as the dynamics of the labour market of HTS in Bangladesh with a particular focus on the nature and extent of skill gap given the current supply of labour. The study attempts to project the future skill needs in terms of quantity and quality considering the recent trend as well as employers' perceptions of the future trend growth of the sector. The specific objectives of the study are: (i) identifying key categories of occupations and trades of this sector; (ii) estimating current and future needs

for skilled workers in each of the categories; and (iii) recommending ways to meet the future needs for skills demands in the sector. To that end the study intends to address two major research questions: (a) what are the existing capabilities of the workforce before participating in the training provided by current institutions in the field of tourism and hospitality? and (b) what are the expected skills that the employers demand from the workforce to operate their institution properly?

8.1.3 Methodology of the Study

The study has been carried out by reviewing existing literature and secondary information on the economic impact of this sector to total economy in order to realise the contribution of this sector in employment generation. The secondary research also included a comprehensive overview of the sector in terms of its dynamics in growth and employment. Both published and online resources including Travel & Tourism Economic Impact 2015 and 2016, Annual Establishments and Institutions Survey, 1992-93 and 2002-03, Hotel and Restaurant Survey, 2010 in Bangladesh, Labour Force Survey in Bangladesh, 2010 and 2013, and Bangladesh Economic Review have been heavily drawn on for data and information.

After completion of the secondary research, a primary survey with key informants of eleven hotels and resorts have been carried out across Chittagong, Cox's Bazar, Dhaka, and Sylhet. The key informants have been asked with specific issues regarding the skill shortages, recruitment difficulties, and skill gaps in the existing and future labour markets in the HTS. The survey also reveals information on other aspects; for instance, the recent trend of international tourism, purpose of visits and the projection on labour demand based on the projection on growth of this sector.

8.2 HTS and Bangladesh Economy

8.2.1 Structure of the HTS

Bangladesh is a rapidly growing market based economy where half of the GDP is generated in the service sector. HTS is one of the 15 major sectors that are used to estimate the GDP of the country. In the 1990s and early 2000s, the structure of the HTS was estimated based on the periodically conducted Annual Establishments and Institutions Surveys (AEISs). However, the BBS conducted an independent Hotel and Restaurant Survey in 2009-10. Based on these surveys, the dynamic structure of the HTS is presented in Table 8.1.

Table 8.1: Dynamic structures of hospitality sector in Bangladesh

Year/ number, costs, receipts	Number of establishments	Persons engaged	Employment costs (Tk. 10^6)	Industrial costs (Tk. 10^6)	Non-industrial costs (Tk. 10^6)	Gross value added at factor Costs (Tk. 10^6)
2002-03	4,102	22,031	734	996	459	1,378
2009-10	17,207	156,194	18,059	24,388	10,864	27,740
GR 2003-10	22.73	32.29	47.38	47.28	46.56	43.21

Source: BBS (2013): Hotel and Restaurant Survey, 2009-10.

It may be noted that the number of establishments in Bangladesh grew at a rate of 22.73 per cent per year between 2003 and 2010. However, there had been no change in the composition of the pattern of these establishments; 99 per cent of these establishments have been owned by the private sector under individual ownership.

The number of persons engaged increased from 220 thousands in 2003 to 1561 thousands in 2010.[1] Thus, employment in the HTS increased by 32.29 per cent per year between 2003 and 2010 after inflation adjustment.[2] The higher growth rate may be attributed to both growth of the establishments as well as the number of persons engaged per establishment in the later period. Persons engaged per establishment increased from 5.4 in 2003 to 9.1 in 2010.

[1] The statistics on the number of persons engaged reported in the Hotel and Restaurant Survey, 2010 for 2009-10 may be contrasted with 832 thousands reported in BBS Labour Force Survey, 2010 under the rubric of "Accommodation and Food Services."

[2] Comparison of statistics between LFS, 2005-06 and LFS, 2010 imply an annual growth of employment at 3.97%. Given this annual rate of growth, the proportion of employment in "Accommodation and Food Service Industries" to employment in all industries has been constant at around 1.5% since 2005-06.

In the 1990s and 2000s, this sector was dominated by male employment; about 98-99 per cent of the employees were male. The biasness against female has not decreased much over the next 10 years; about 95 per cent of the employees were male in 2010. Besides, the composition of workers between wage and non-wage employees has changed to some extent: the share of wages and salaried workers to total persons engaged increased from 40 per cent in 2003 to 59 per cent in 2010.

The HTS spent Tk. 734 million in 2003 on employment costs (payments of wages, salaries, and bonuses, etc.), which increased to Tk.18.1 billion in 2010. Even after adjusting for inflation, the estimates of employment costs imply an annual growth rate of 47.38 per cent. However, as argued earlier, much of the jump could be attributed to increased base (the number of establishments) as yearly average per person employment costs increased from Tk. 33.31 thousands in 2003 and to Tk.115.62 thousands in 2010.

The total industrial costs[3] increased from Tk. 996 million in 2003 to Tk. 24,388 million in 2010. The non- industrial costs[4] increased from Tk. 459 million in 2003 to Tk. 10684 million in 2010. Inflation adjusted non-industrial costs grew at 46.56 per cent per year between 2003 and 2010. On a per establishment basis, the non-industrial costs increased from Tk. 242.81 thousands in 2003 to Tk.1417.33 thousands in 2010. The per establishment non-costs estimates implies annual growth at 19.92 per cent per year.

Given the above cost estimates the industrial and non-industrial costs, the total gross value added at factor costs (GVA-FC)[5] of the HTS were Tk. 1,378 million in 2003, which increased to Tk. 17,026 million in 2010. The jump between 2003 and 2010 implies an inflation adjusted growth rate of 43.21 per cent per year during the period.

8.2.2 Contribution of the HTS to the Economy

Following the Tourism Satellite Account: Recommended Methodological Framework (TSA:RMF 2008), approved by the UN Statistics Division, the total contribution of HTS is composed of direct,[6] indirect,[7] and induced[8] contributions on economy. Figure 8.1 shows the schematic flows of contribution of the HTS to the economy. It may be noted that direct contribution is limited to (i) commodities such as accommodation, transportation, entertainment, etc. catered by related industries in which visitors spend their money. The indirect contribution arises of the investment spending on communications both by the private sector and the government as well as HTS' purchases from suppliers. The induced contribution originates in vacation and ancillary spending by the tourists.

From these perspectives, the contribution of HTS to Bangladesh economy can be analysed from its contribution to: (i) GDP, (ii) employment generation, (iii) capital investment, and (iv) exports. Table 8.2 presents the contribution of the HTS in its direct and indirect (and induced) contributions to GDP, investment, and employment generation.

It may be noted that direct contribution of the HTS consists of visitor exports, domestic expenditures, purchases by HTS providers, etc. The direct contribution of HTS to GDP was TK. 296.5 billion (1.9 per cent of total GDP) in 2014 and grew by 5.9 per cent in 2015, and is forecasted to rise by 6.1 per cent per year, from 2015 to 2025, to Tk. 566.3 billion (2 per cent of total GDP) in 2025. Much of the direct contribution originates in domestic expenditures including individual government spending. The domestic expenditure was Tk. 488.7 billion and grew by 5.9 per cent in 2015 and forecasted to rise to nearly one trillion in 2025. Contribution from visitor exports has always been meager to the tune of a few billion taka. These gross contributions are partly drawn down by purchases of providers of the HTS from domestic and foreign sources; it was around Tk. 200 billion and forecasted to grow to Tk. 370 billion in 2025.

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3 Industrial costs include costs of materials and supplies that have been physically incorporated or used in the products and by-products, costs of fuel and electricity use for manufacturing purpose as well as payments for works done by others.

4 The non-industrial costs include payment for water charges, printing and stationery, advertising, insurance, postage, telegraph and telephones, banking, legal and accounting services rendered to the establishment, and also amount paid for technical know-how and consultative services. However, it excludes interests paid to bank.

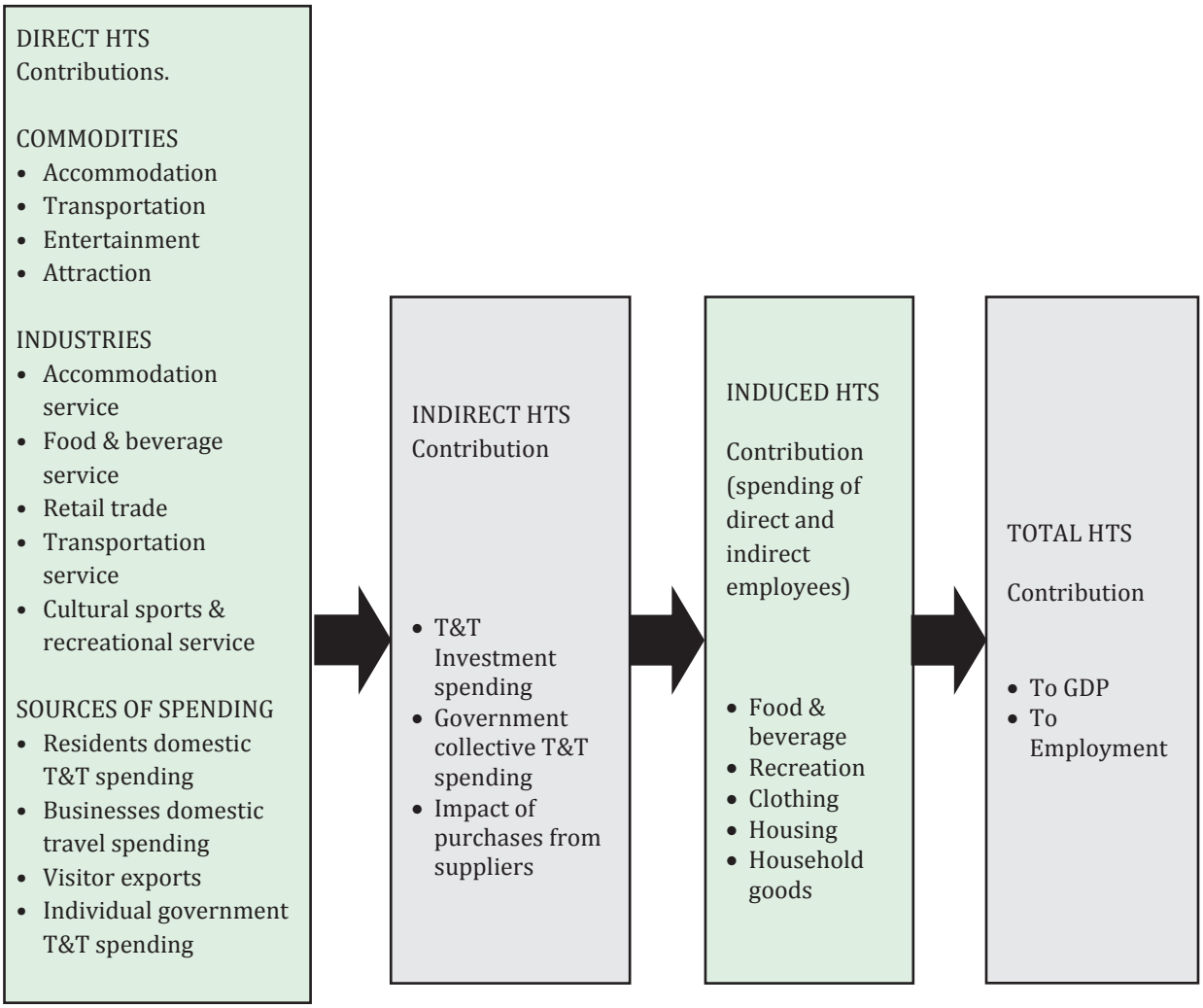
5 Gross value added at factor costs is estimated as the difference between gross output and industrial and non-industrial costs, and indirect taxes net of subsidies.

6 The direct contribution of HTS to GDP includes three different components: visitors' spending on Travel & Tourism, government's individual spending and purchases by tourism providers.

7 The 'indirect' contribution includes the GDP and jobs supported by HTS investment spending, Government 'collective' spending and domestic purchases of goods and services by the sectors.

8 The 'induced' contribution measures the GDP and jobs supported by the spending of those who are directly or indirectly employed by the HTS.

Figure 8.1: Schema of HTS Contribution to the Economy



Source: World Travel and Tourism Council, 2015.

Visitor exports, one of the key components to measure the direct contribution of HTS in Bangladesh, generated Tk.10.2 billion in 2014. In 2015, the growth had been 3.7 per cent, and the country is expected to attract 463,000 international tourist arrivals in the next 5 years. By 2025, international tourist arrivals are forecasted to be total 652,000, generating expenditure of Tk. 18.4 billion, an increase of 5.7 per cent per year.

Investment in HTS came to be Tk. 60.9 billion (1.4 per cent of total investment) in 2014. It then increased by 2.7 per cent in 2015, and expected to rise by 7.8 per cent per year over the next 10 years to Tk. 132.1 billion in 2025 (1.6 per cent of total investment).

The government's interest to expand the hospitality and tourism sector is reflected by the gradual surge in spending in this sector. The direct contribution of government (individual spending) is increased from Tk. 383.3 billion in 2009 to Tk. 517.7 billion in 2015. The spending is expected to increase up to Tk. 918 billion in 2025.

Besides direct contributions, there are several indirect contributions in the form of domestic supply chain, capital investment by the HTS service providers, government's collective spending, (e.g., tourism marketing and promotion, aviation, administration, security services, resort area, sanitation services, etc.) as well as "induced" contribution to the GDP and jobs supported by the spending of those who are directly or indirectly employed by the HTS. The indirect contribution of HTS to GDP was TK. 331.3 billion in 2014 and grew by 6.1 per cent in 2015, and is forecasted to rise by 6.9 per cent per year, from 2015 to 2025, to Tk. 686.6 billion in 2025. The impetus originates from domestic supply chain and induced spending; the sectors contribute about 85 per cent of indirect spending. The collective spending by the government was Tk. 10.6 billion in 2009 which then increased to Tk. 16.2 billion in 2015 and expected to grow to Tk. 30 billion in 2025.

Table 8.2: Economic contribution[9] of HTS

Year/Indicator	2009	2010	2011	2012	2013	2014	2015	2025
Direct Impacts (Tk. 10^9 at 2014 Prices)								
1. Visitor exports	7.8	8.2 (5.6)	8.2 (0.0)	8.7 (6.1)	9.7 (11.0)	10.2 (5.8)	10.6 (3.7)	18.4 (5.7)
2. Domestic expenditure (including government individual spending	383.3	397.9 (3.8)	420.8 (5.8)	442.1 (5.1)	463.9 (4.9)	488.7 (5.3)	517.7 (5.9)	917.8 (5.9)
3. Purchase by HTS providers including imports	-156.6	-164.9 (5.3)	-179.0 (8.6)	-187.8 (4.9)	-193.6 (3.1)	-202.4 (4.5)	-214.2 (5.8)	-370.0 (5.6)
4. Direct contribution to GDP (=1+2-3)	**234.5**	**241.2 (2.9)**	**250 (3.6)**	**263 (5.2)**	**280 (6.5)**	**296.5 (5.9)**	**314.1 (5.9)**	**566.2 (6.1)**
Indirect and Induced Impacts (Tk. 10^9 at 2014 Prices)								
5. Domestic supply chain	121.3	124.8 (2.9)	129.3 (3.6)	136.1 (5.2)	144.9 (6.5)	153.4 (5.9)	162.5 (5.9)	293.0 (6.1)
6. Capital investment	49.4	52.0 (5.3)	55.3 (6.3)	59.4 (7.4)	60.8 (2.2)	60.9 (0.2)	62.5 (2.7)	132.1 (7.8)
7. Government collective spending	10.6	11.4 (7.4)	12.1 (5.9)	13.1 (8.1)	14.2 (8.3)	15.1 (6.6)	16.2 (6.8)	29.9 (6.3)
8. Imported goods from indirect spending	-19.1	-22.7 (6.4)	-28.3 (8.6)	-30.0 (5.6)	-29.6 (4.5)	-30.3 (5.0)	-30.8 (5.0)	-47.2 (5.7)
9. Induced spending	108.8	107.5 (-1.1)	108.1 (0.5)	116.0 (7.3)	125.2 (8.0)	132.2 (5.6)	141.2 (6.8)	278.8 (7.0)
10. Indirect and induced contribution to GDP (=5+6+7-8+9)	**271.0**	**273.0 (0.7)**	**276.5 (1.3)**	**294.6 (6.5)**	**315.5 (7.1)**	**331.3 (5.0)**	**351.6 (6.1)**	**686.6 (6.9)**
11. Total contribution to GDP (4+10)	**505.5**	**514.4 (1.7)**	**526.5 (2.4)**	**557.6 (5.9)**	**595.4 (6.8)**	**627.9 (5.5)**	**665.6 (6.0)**	**1,252.8 (6.5)**
Employment Impact ('000 persons)								
12. Direct contribution to employment	854.3	849.9 (-0.5)	845.2 (-0.6)	862.4 (2.0)	881.9 (2.3)	903.5 (2.5)	922.8 (2.1)	1,061.8 (1.4)
13. Indirect contribution to employment	1065.5	1034.2 (-2.9)	1003.6 (-3.0)	1033.7 (3.0)	1063.3 (2.9)	1080.6 (1.6)	1105.7 (2.3)	1430.6 (2.6)
14. Total contribution to employment (12+13)	**1,919.8**	**1,884.1 (1.9)**	**1,848.8 (-1.9)**	**1,896.1 (2.6)**	**1,945.2 (2.6)**	**1,984.1 (2.0)**	**2,028.5 (2.2)**	**2,492.4 (2.1)**

Source: World Travel and Tourism Council, 2015.

In view of the direct and indirect contributions, the total contribution of HTS to GDP was Tk. 627.9 billion (4.1 per cent of GDP) in 2014, and grew by 6 per cent in 2015, and is forecasted to rise by 6.5 per cent per year to Tk. 1,252.8 billion (4.4 per cent of GDP) in 2025.

However, the overall contribution of this sector is mostly driven by the domestic side. Domestic travel spending generated 97.9 per cent of direct HTS GDP in 2014 compared with 2.1 per cent for visitor exports. Domestic travel spending grew by 5.9 per cent in 2015 to Tk. 517.7 billion, and is forecast to rise by 5.9 per cent per year to Tk. 917.8 billion in 2025. Moreover, leisure travel spending (inbound and domestic) generated 78 per cent of direct HTS GDP in 2014 (Tk. 389.0 billion) compared with 22 per cent for business travel spending (Tk.110.0 billion). Leisure travel spending grew by 5.6 per cent in 2015 to Tk. 410.9 billion, and is expected to rise by 6.2 per cent per year to Tk. 747.6 billion in 2025. Business travel spending grew by 6.7 per cent in 2015 to Tk. 117.4 billion, and is expected to rise by 4.9 per cent per year to Tk. 188.6 billion in 2025.

The direct contribution of HTS to employment was about 900 thousand persons in 2014 and grew by 2.1 per cent in 2015, and is forecasted to rise by 1.4 per cent per year, from 2015 to 2025, to more than one million in 2025. Similarly, the indirect contribution of HTS to employment was about one million persons in 2014 and grew by 2.3 per cent in 2015, and is forecasted to rise by 2.6 per cent per year, from 2015 to 2025, to close to one and a half million in 2025. It may be noted that majority of the employment is generated through indirect contributions mostly by the backward and occasionally the forward linkage sectors. Throughout the period considered, the direct contribution hovered around 40-45 per cent and remained mostly stagnant.

[9] It should be noted that Table 8.2 describes the contribution of HTS as a whole including different components of direct, indirect and induced effects whereas Table 8.1 depicts the dynamics of hospitality sector (accommodations as direct impacts in Figure 8.1) only. Hence, different indicators of both the tables are not directly comparable.

Consequent of the direct and indirect contribution to employment, the total contribution to employment was 1.9 million persons in 2014 and grew by 2.2 per cent and is forecasted to grow at 2.1 per cent between 2015 and 2025 to reach 2.5 million in 2025.

8.2.3 Bangladesh HTS in the Region

WTTC (2015) reports a comparative scenario on the share of HTS in GDP of different economies including Bangladesh. Thailand seems to be heavily dependent on HTS where the sector comprises 19 per cent of total GDP (Table 8.3). The report shows that despite the lowest contribution of travel and tourism in 2014 among all the listed countries, Bangladesh experienced a growth of 6 per cent of contribution of this sector from 2014 to 2015.

Tourism and hospitality industry plays a major role in employment generation. Tourism has substantial contribution in total employment generation in Thailand and Malaysia. Around 19 per cent and 15 per cent of total jobs are offered through travel and tourism in Thailand and Malaysia respectively where the world average comes to 9.4 per cent. Bangladesh stands far away (only 3.6 per cent) from creating job opportunities in this sector compared to the world average.

Around 10 per cent of Vietnam's total capital investment is accumulated in travel and tourism. The share is also significant for Thailand (7.4 per cent) and Malaysia (6.8 per cent). The share is 1.4 per cent for Bangladesh and the growth of capital investment from 2014 to 2015 is 2.7 per cent.

Table 8.3: Contribution of HTS of selected countries (per cent share) in 2014

Sectors	Contribution of travel and tourism (%) to				Contribution of visitors export to total exports (%)
Countries/ Regions	GDP	Direct employment generation	Total employment generation	Total capital investment	
South Asia					
Bangladesh	**4.1 (6.0)**	**1.6 (2.1)**	**3.6 (2.2)**	**1.4 (2.7)**	**1.4 (3.7)**
India	6.7 (7.5)	5.5 (1.9)	8.7 (1.8)	6.2 (9.3)	4.1 (5.2)
Nepal	8.9 (5.8)	3.5 (4.0)	7.5 (4.4)	3.6 (12.0)	25.2 (1.1)
Sri Lanka	11.1 (2.5)	4.3 (-2.6)	10.0 (-2.4)	4.1 (8.3)	23.1 (-1.6)
Southeast Asia					
Indonesia	9.3 (7.0)	2.9 (2.3)	8.4 (3.3)	5.3 (5.7)	5.6 (5.5)
Malaysia	14.9 (5.3)	5.3 (3.5)	13.0 (3.1)	6.8 (5.3)	8.6 (5.8)
Myanmar	4.8 (6.7)	1.8 (6.2)	4.0 (2.9)	0.7 (3.2)	9.5 (8.1)
Thailand	19.3 (3.2)	5.8 (0.2)	14.1 (1.0)	7.4 (5.4)	14.4 (3.3)
Vietnam	9.3 (8.0)	3.7 (3.6)	7.7 (3.6)	10.0 (7.1)	4.8 (7.4)
China	9.4 (7.5)	3.0 (1.2)	8.6 (3.3)	2.9 (7.8)	2.4 (2.2)
World	9.8 (3.7)	3.6 (2.0)	9.4 (2.6)	4.3 (4.8)	5.7 (2.8)

Note: Figures in parentheses are growth rates (%) between 2014 and 2015.
Source: World Travel and Tourism Council, 2015.

Money spent by foreign visitors to a country (or visitor exports) is a key component of the direct contribution of HTS. In 2014, share of visitor exports[10] in total exports was 25 per cent and 23 per cent in Nepal and Sri Lanka respectively. Only 1.4 per cent of total exports come from spending of foreign tourists in Bangladesh.

Table 8.4: Ranking of Bangladesh in HTS among 184 countries

	Absolute size in 2014/2015	Relative size (contribution to GDP in 2014/2015)	Growth(2015/2016 forecast)	Long term growth (forecast 2015-25/2016-26)
WTTC, 2015	68	168	23	12
WTTC, 2016	60	165	11	18

Sources: World Travel and Tourism Council, 2015, 2016.

[10] Visitor exports means spending by foreign tourists within the host country.

Table 8.4 shows the relative ranking of Bangladesh HTS among 184 countries, as reported in WTTC (2015 and 2016). It may be noted that Bangladesh ranked 68th in terms of absolute contribution in 2015, which improved to 60th the following year. However, in terms of HTS contribution to GDP the country ranked very low at 168th in 2015, which marginally improved to 165th the following year. In terms of annual growth (11th), Bangladesh is close to top 10 countries in the list in 2016, with a huge jump from the 23rd place last year. The euphoria is a bit muted as the country is forecasted to slide down the scale in terms of long-term growth from 12th to the 18th between 2025 and 2026.

Bangladesh's tourism and hospitality industry is in its nascent stage and yet a burgeoning one. The country's tourist attractions include archaeological sites, historic mosques and monuments, resorts, beaches, picnic spots, forest and wildlife. Bangladesh offers opportunities for angling, water-skiing, river cruising, hiking, rowing, surfing, yachting, sea bathing, etc. as well as rich in wildlife and game birds. The country with its natural beauty, history and teeming hospitable millions and its booming economy hold out the needs and opportunities of a great tourism and hospitality industry. Given the potential of the HTS, the constraints in terms of skill shortages, recruitment difficulties, and skill gaps need to be assessed both for the current situation and for the coming years.

8.3 Skills Compositions, Skills Shortages, Recruiting Difficulties, and Skills Gaps in HTS

8.3.1 Description of the Sample Firms

As mentioned earlier, a sample survey with key informants of 11 hotels and resorts was conducted across the three tourist locations of the country, Chittagong, Cox's Bazar, and Sylhet together with the capital, Dhaka. Both size distribution and spatial distribution of the sample was purposive based information from the major operators in the capital as well as the best guess of the authors. However, the interviews were rigorous and comprehensive so that some of the interviews took even a whole day as it was decided to have a look at the actual efficiency of the employees instead of relying on the numbers provided by the key informants based on internal documents and perceptions. Table 8.5 characterises some of the features of the firms across the locations. It may be noted visitors with purpose of leisure tourism have higher inclination toward small hotels/resorts while visitors with official/business purpose use large and medium hotels/resorts more frequently.

Table 8.5: Characteristics of firms surveyed

Locations	Size[11]	Number of hotels/ resorts	Average increase of guests per year since 2008 (%)	Purpose of stay (%)		Ratio of international guests to total guests (%)	Average number of staff
				Business/ Official	Tourism		
Chittagong & Cox's Bazar	Large	4	5.0	68.0	32.0	6.0	270
	Small (Eco resort)	1	4.0	5.0	95.0	30.0	45
	All size	5	4.5	78.0	22.0	18.0	225
Dhaka	Large	1	2.5	99.6	0.4	21.0	210
	Medium	1	3.5	98.8	1.2	15.0	120
	All size	2	3.0	99.2	0.8	18.0	165
Sylhet	Large	1	2.0	94.0	6.0	6.5	215
	Medium	2	5.0	81.0	19.0	10.0	114
	Small	1	7.1	57.0	43.0	0.9	44
	All size	4	4.8	55.4	44.6	5.8	122
All Locations	Large	6	4.0	78.0	22.0	9.0	251
	Medium	3	4.5	86.9	13.1	11.7	116
	Small	2	6.0	31.0	69.0	15.0	45
	All size	11	4.0	72.0	28.0	11.0	117

Source: BIDS Skill Gap Survey, 2016.

[11] The size of the firms depends on the number of guests that can be accommodated at a time. Large firms can accommodate above 300 guests, medium firms 120-300 guests, and small firms below 120 guests.

It is evident that the HTS experienced a 3-4.5 per cent growth per year in the number of guests since 2008. The proportions of international to total guests are higher in Chittagong and Cox's Bazar than that in Sylhet. Dhaka also has a greater percentage but this high proportion is entirely driven by official/business. In contrast, Chittagong, Cox's Bazar and Sylhet have higher percentage of stay with purpose of leisure tourism compared to Dhaka. While larger hospitality units employ more than 200 personnel, the medium ones employ around 100 staff. The smaller ones (including resorts, cottages and motels) employ only about 50 staff per unit. However, the smaller hospitality units employ more than their medium and large counterparts as they are several times higher in numbers than the other two categories.

8.3.2 Skill Compositions in the HTS

For the purpose of this study, skill compositions have been defined as follows: (i) Skilled labour has much experience on-the-job, whose job responsibility includes supervising and training minimum two semi-skilled workers and has the decision making authority within a defined limit; (ii) Semi-skilled labour has prior experience on-the-job and whose job responsibility includes supervising and training unskilled workers; and (iii) Unskilled labour has no prior experience doing the job and needs much support from experienced workers. These skill compositions within different departments have been defined considering the experience and intensity of job responsibility required for a worker to function with accuracy and efficiency. Table 8.6 shows the definitions of skill compositions of different departments within a typical hospitality unit in Bangladesh.

Table 8.6: Skills definitions in the HTS

Section	Skilled	Semi-skilled	Unskilled
Front Office	- Manager - Assistant Manager	- Team Leader - Executive Bell Captain	- Bell Man
Food & Beverage (Service)	- Manager - Banquet Manager - Restaurant Manager	- Supervisor - Bar Manager - Captain - Senior Waiter	- Bar Tender - Waiter - Junior Waiter
Food & Beverage (Production)	- Executive Chef - Sous Chef De Cuisine - Chef De Partie	- Demi Chef De Partie	- Commee 1 - Commee 2 - Commee 3 - Boucher - Dish Washer
Housekeeping	- Executive House keeper - Assistant Executive Housekeeper	- Supervisor	- Room Attendant - House Man
Accounts	- Manager in Accounts - Income Auditor	- Accounts Executive	
IT	- Manager	- Assistant IT officer	
Engineering & Maintenance	- Chief Engineer - Manager Engineering	- Boiler Operator - Technician (Chillier) - Senior Technician (Electrical & Electronics)	

Note: Since Accounts, IT and Engineering & Maintenance are not HTS related skills, the departments are not included in the subsequent analyses.

Source: BIDS Skill Gap Survey, 2016.

The primary survey was designed to depict the composition of labour across levels of skill and different departments. Table 8.7 describes the average proportions of skilled, semi-skilled and unskilled labour across different departments of the respective hotels and resorts. Food and Beverage (production) seems to be heavily labour abundant department, with a share of 39.69 per cent of total labour. Food and Beverage (service) stands second with a share of 28.57 per cent .House-keeping also consists of significant portion (21.69 per cent) of total labour.

In the context of skill level, housekeeping is concentrated with unskilled labour with a share of 73 per cent. Food & Beverage (production) also has a substantial share (71 per cent) of unskilled workforce to total composition of labour. More than 40 per cent of total labour of front office and more than 50 per cent labour of Food & Beverage (Service) are counted as unskilled labour force.

Table 8.7: Proportion of labour across levels of skills and departments

Departments	Levels of skills	Percentage of labor
Front Office	Skilled	21.05
	Semi-skilled	36.84
	Unskilled	42.11
	Total	10.06
Food & Beverage (Service)	Skilled	11.11
	Semi-skilled	31.48
	Unskilled	57.41
	Total	28.57
Food & Beverage (Production)	Skilled	13.33
	Semi-skilled	16.00
	Unskilled	70.67
	Total	39.69
House Keeping	Skilled	9.76
	Semi-skilled	17.07
	Unskilled	73.17
	Total	21.69
All Departments	Skilled	12.00
	Semi-skilled	21.50
	Unskilled	61.00
	Total	**100.00**

Source: BIDS Skill Gap Survey, 2016.

Hence, the findings of the primary survey reveal a highly skewed distribution towards skilled and semi-skilled workers except for food and beverage production department. However, the skill definitions within the hospitality sector portray a misleading picture about the actual number of employees across the skill categories. Survey findings at the bottom row of the table show that even the skilled and semi-skilled categories together cannot make up even half of the total employees. The distribution of actual workforce is even more skewed towards unskilled workers in the tourism sector. Thus, skill related constraints affect at best only half of the workforce in the HTS sector.

8.3.3 Skills Shortages and Recruitment Difficulties

A shortage occurs when the demand for workers for HTS is greater than the supply of workers who are qualified, available and willing to work under existing market conditions (Shah and Burke 2003). A shortage may be evident only in particular specialisations in the HTS, it does not have to be across the whole occupation. Furthermore, it may be restricted to particular geographical locations, especially outside the capital. Over time, the market might adjust in a number of ways, including price and/or quantity adjustment, and the imbalance clears.

In practical work, shortages have always been interpreted or even defined directly, in terms of difficulties in filling vacancies. In general, a shortage in an occupation is the aggregation of hard-to-fill vacancies across firms. These vacancies are those that remain unfilled after a certain time in spite of all reasonable efforts by the firm. Employers may report shortages of particular workers, or difficulties in filling vacancies, either because there are not enough of them or else those who are available do not possess skills now deemed necessary by employers, such as computer literacy (OPERA). Employers may face other recruitment difficulties when they cannot fill vacancies in spite of an adequate supply of workers. The reasons for this may be varied. They could include such things as relatively low remuneration being offered, poor working

conditions, poor image of the industry, unsatisfactory working hours, location hard to commute to, ineffective recruitment effort by the firm or skills needs that are very specific to the firm. In practical terms, recruitment difficulties are also hard-to-fill vacancies but they are experienced by a limited number of firms only, and thus do not amount to a market-wide shortage.

Table 8.8: Skills shortage across levels of skills and departments

Department	Levels of skills	% of Skill shortage
Front Office	Skilled	57.40
	Semi-skilled	49.00
	Unskilled	15.00
Food & Beverage (Service)	Skilled	68.00
	Semi-skilled	60.00
	Unskilled	22.00
Food & Beverage (Production)	Skilled	77.60
	Semi-skilled	72.40
	Unskilled	8.60
Housekeeping	Skilled	74.00
	Semi-skilled	68.00
	Unskilled	12.00
All Departments	Skilled	69.25
	Semi-skilled	62.35
	Unskilled	14.40

Source: BIDS Skill Gap Survey, 2016.

The above definitions of skill shortages and recruitment difficulties are the one adopted in this analysis. Skill shortage came to be prevalent to some extent in the context of specific specialisations and expectation or remuneration. Respondents were asked if they find any mismatch between the expected quality and eligibility of the applicants across different departments in pre-interview and post-interview phase (Table 8.8). Intra- department comparison of skill suggests that skill gap is greatest in skilled labour in any of the departments. Food and Beverage (production) department holds the highest shortage across all the departments for skilled (78 per cent) and semi-skilled (72 per cent) labor, while skill shortage is maximum in food and beverage (service) for unskilled labour.

Table 8.9: Recruitment difficulties in the HTS

Types of recruitment difficulties	Chittagong and Cox's Bazar	Dhaka	Sylhet	Total
Qualified applicants from Dhaka or any other places do not want to stay at the periphery	4(5)	0(2)	1(4)	5(11)
Qualified graduates have a tendency to look for jobs in the capital right after they start working	4(5)	0(2)	1(4)	5(11)
Sometimes employers are constrained to employ and keep local people (even with poor quality) to minimise the hazards of turnover of workers	2(5)	0(2)	0(4)	2(5)
Expectations of higher salary	4(5)	0(2)	1(4)	5(11)

Source: BIDS Skill Gap Survey, 2016.

The respondents were asked if there is any shortage of labour in terms of availability and about six out of eleven firms responded to have no labour shortage at all. The recruitment process sometimes even becomes cumbersome with excess supply of applicants. However, the availability of labor supply varies across regional dimensions. The respondents in Dhaka and Sylhet stated to have adequate supply of labour throughout the year, while the respondents in Chittagong and Cox's Bazar commented about the difficulties of finding qualified labour as well as sustaining the willingness of these labours to work for a longer period (Table 8.9). The types of difficulties include the reluctance of good quality employees (trained in Dhaka or in any other reputed training institute) to work far away from the capital, the practice of employing local people

(with little or even no knowledge of hospitality services) and training these people to work competently. Another major issue is the expectations of higher salary by the graduates from public or private universities.

8.3.4 Skills Gaps and Firms' Mitigation Measures

The literature on the definition of skills gaps is ambiguous. A skills gap refers to "a situation where employers are hiring workers whom they consider under-skilled or that their existing workforce is under skilled relative to some desired levels" (Shah and Burke 2003). But Strietska-Ilina (2008) emphasizes "the existence" rather than "a situation". Skills gaps exist where "employers feel that their existing workforce have inadequate skills types/levels to meet their business objectives," or where new entrants appear to be qualified but actually are not. According to Strietska-Ilina (2008), skills gaps are "used to describe the qualitative mismatch between the supply or availability of human resources and the requirements of the labour market".

HTS employers may express concerns about skills when an actual shortage, in terms of the number of workers available and willing to work, does not exist but they are hiring workers they consider under-skilled or that their existing workforce is under-skilled relative to some desired level (Green, Machin and Wilkinson 1998). This situation is referred to as skills deficiency or as skills gaps. Skills gaps do not simply relate to formal qualifications. Employees in HTS may possess the necessary vocational qualification relevant to their occupation, but may lack generic skills such as computer literacy (OPERA), customer relations or inter- personal communication skills. Another aspect of a skills gap is one that Roy, Henson and Lavoie (1996) call the normative skills gap. It is the gap between *what is* and *what should be*. In some instances, skills gap may be latent. This can occur when employers do not perceive there is a problem because they are not fully aware of skills needed for optimal production.

The key informants were asked to express their perceptions on the existence of skills gaps within their hotels/resorts. The respondents delineated the prevalence of "normative skills gaps" stating their considerations on recruiting fresh graduates. They were asked if they consider fresh graduates to be recruited as skilled, semi-skilled and unskilled labour in the respective departments as well as minimum experience required in the case of preferring experienced employees over fresh graduates.

Table 8.10: Skills Gaps across Levels of Skills and Departments

Departments	Level of skills	If skills gaps exists (Yes=1)	Minimum experience for entry (No. of months)		
			06 to 24	25 to 48	above 48
Front Office	Skilled	100.00		45.45	54.55
	Semi-skilled	84.85	50.00	39.29	10.71
	Unskilled	40.00	100.00		
Food & Beverage (Service)	Skilled	100.00		66.67	33.33
	Semi-skilled	100.00		72.73	27.27
	Unskilled	66.67	95.45	4.55	
Food & Beverage (Production)	Skilled	100.00	3.03	72.73	24.24
	Semi-skilled	100.00	27.27	72.73	
	Unskilled	63.64	88.57	11.43	
Housekeeping	Skilled	100.00	18.18	72.73	9.09
	Semi-skilled	100.00	45.45	54.55	
	Unskilled	84.85	89.29	10.71	
All Departments	Skilled	100.00	4.55	65.45	30.00
	Semi-skilled	94.95	23.40	60.64	15.96
	Unskilled	67.94	91.01	8.99	0.00

Source: BIDS Skill Gap Survey, 2016.

Table 8.10 describes the existence of skills gaps across level of skills and departments of the eleven hotels/resorts under the survey. All the respondents expressed their inertia on recruiting fresh graduates as skilled labour across all the departments. Except for Front Office, more than 65 per cent of respondents expressed their preference toward workers with two to four years of experience across all the departments. Hence, the average skill gap for skilled labour pool can be considered as two years of more training across all the departments.

In the case of semi-skilled labour, the employers showed their reluctance to recruit fresh graduates across all the departments except for the Front Office. The preference of the employers to recruit experienced employees was heavily skewed towards two to four years of experience.

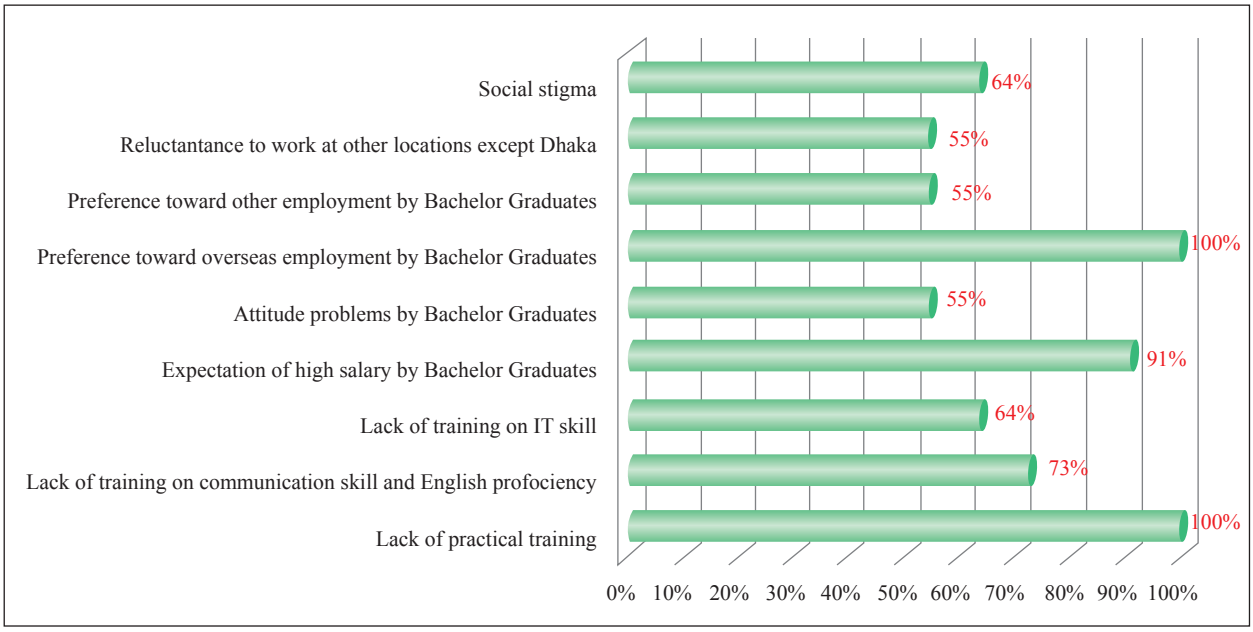
The unskilled labour force seemed to possess the lowest level of skill gap within any of the departments. Housekeeping department has the highest level of skills gaps (85 per cent of respondents reported to have skills gaps in unskilled labor for housekeeping) among the unskilled labor group across all the departments. The average skilled gap is also lowest within this category; more than 88 per cent of respondents stated the need of minimum six months of more training across all the departments.

The existing skills gaps in the labour market are mitigated to some extent by the in-house training mechanisms of the hotels and resorts. The employers in this sector provide on-the-job training to each of the unskilled, semi-skilled or even skilled (in some cases) workers. These trainings include instructions on a daily basis by supervisors and team leaders, practice of following the instructions of standard operational procedure (SOP) of distinct hotels/resorts, weekly or monthly training programmes, etc. Some of the hotels even maintain a roaster to train up each of the divisions to provide a full-fledged training programme with more practical orientations.

8.3.5 Some Proximate Reasons for Skill Mismatch in the HTS Labour Market

There are a number of training institutes that provide trainings on Hospitality Management and Tourism in the country. For instance, National Hotel and Tourism Training Institute (NHTTI) offers diploma courses on different branches of hospitality and tourism management while a few public and private universities offer bachelor degree courses on this discipline. Besides, there are multiple training institutes that provide short-term training on specific trades of hospitality and tourism management services. Considering the existing skill shortage and skill gap in the HTS labour market, the apparently visible well-equipped set up of developing an efficient workforce for hospitality and tourism sector seems to possess certain limitations which eventually result in less skilled and less efficient pool of labour. Some of the shortcomings revealed are shown in figure 8.2.

Figure 8.2: Labor demand and supply mismatch in the HTS



- None of the training institutions provides adequate practical training on hospitality management. NHTTI provides three months internships in different hotels/resorts at the termination stage of diploma programme. The universities and training institutes do not have the "lab facility" where the students can have access to practical environment. Overwhelming emphasis on theoretical knowledge and relatively low concerns to practical orientation end up with less skilled labor supply. In cognizance of the current

skills gaps, the supply-side actors (universities and training institutes) insisted on providing practical training in an "Application Hotel" right after completion of a particular module of the course.

- Most of the training institutes fail to develop a well communication skill as well as good command over English among their students. These students face difficulties to communicate articulately as well as show hospitable and approachable attitudes in their workplaces. The respondents stated that around 95 per cent of the graduates face difficulties to communicate in English.
- Most of the training institutes fail to provide adequate IT skill to the students. For example, in most cases, the graduates are expected to operate OPERA software as this software is regarded as the fully equipped software for carrying out any function in hospitality management. But the students are not trained to be well acquainted with this software. According to the supply side actors, provision of modern and advanced IT technology to facilitate practical training often seems to be costly for the institutions.
- The bachelor degree holders from public or private universities possess a high expectation regarding the emolument from employers. In most cases, the students from these institutions want to be recruited as skilled labor with high salary structure. However, the employers do not prefer to employ these students with higher job responsibility for two major reasons. First, these students neither have any prior experience nor have any practical training to function as skilled labour. Second, considering the level of skill and practical orientation, the employers do not prefer to provide these students high salary demanded by them since the same task can be done by other applicants with lower payment structure.
- The employers also reported to face attitude problems of the students with bachelor degree with their co-workers. The so-called differentiations between "bachelor" and "diploma" degree sometimes act as negative factor for these students to follow the norms and values at the workplace.
- Majority of the bachelor graduates prefer overseas employment for lucrative salary structure and other facilities. A significant proportion of these bachelor graduates are reluctant to work at hospitality and tourism industry and eventually change their career path towards different professions. According to the supply side actors, around 65 per cent of bachelor graduates of HTS get involved in other professions (preferably banks); another 25 per cent of them seek overseas employment. Hence, only 10 per cent of the students find their interests in their own disciplines. The main reason of their reluctance toward HTS includes low emolument in the sector compared to many other sectors that often offer lucrative benefits.
- The graduates from Dhaka seem to be reluctant to work at other locations in the country. As mentioned before, around 50 per cent of total respondents in the survey stated that the qualified applicants from Dhaka or any other places do not want to stay at the peripheral locations.
- The training on Food and Beverage (Production) seems to have the highest shortcomings among all other sections. The employers reported that the training on this section does not provide adequate training to have the expertise of preparing varieties of cuisine.
- Social stigma towards the status of professionals working at hotels/resorts is one of the crucial concerns in attracting good quality students to study as well as to develop their career in this sector, as HTS is still considered as a residual career choice.

8.4 Projections of Labour Demand by Skills Gaps and Training Needs

The projections of skills gaps and consequent training needs require estimates of (i) growth rates projections of GDP; (ii) elasticity of sectoral value added of HTS with respect to the GDP; (iii) the employment elasticity of HTS with respect to its value added; (iv) the estimates of the current composition of employees across skilled, semi-skilled and unskilled categories as well as the future changes in such composition; and (v) the current levels of skills gaps across skilled, semi-skilled, and unskilled workers as well as the future changes, given the number and quality of HTS training institutions. All these five parameters need to be considered together so that the projections of skill gaps become bounded and consistent with the growth of the economy. In what follows is an attempt to such an exercise.

The projection of Bangladesh's GDP at constant FY2015 prices till the year 2025 is made using various growth assumptions for the period FY2016-FY2025. In the present GDP projection exercise, variable growth rates have been assumed following the Seventh Five Year Plan (7FYP) and other latest plan documents. As mentioned earlier, projections of HTS value added need estimate of elasticity of the sectoral value added

with respect to GDP. Historical data from FY1992 to FY2015 were exploited to estimate the long-run elasticity of the HTS value added with respect to GDP. The elasticity estimate was 1.415 based on the double logarithmic OLS regression.[12] The estimates imply that value added of the HTS is elastic with respect to changes in GDP.

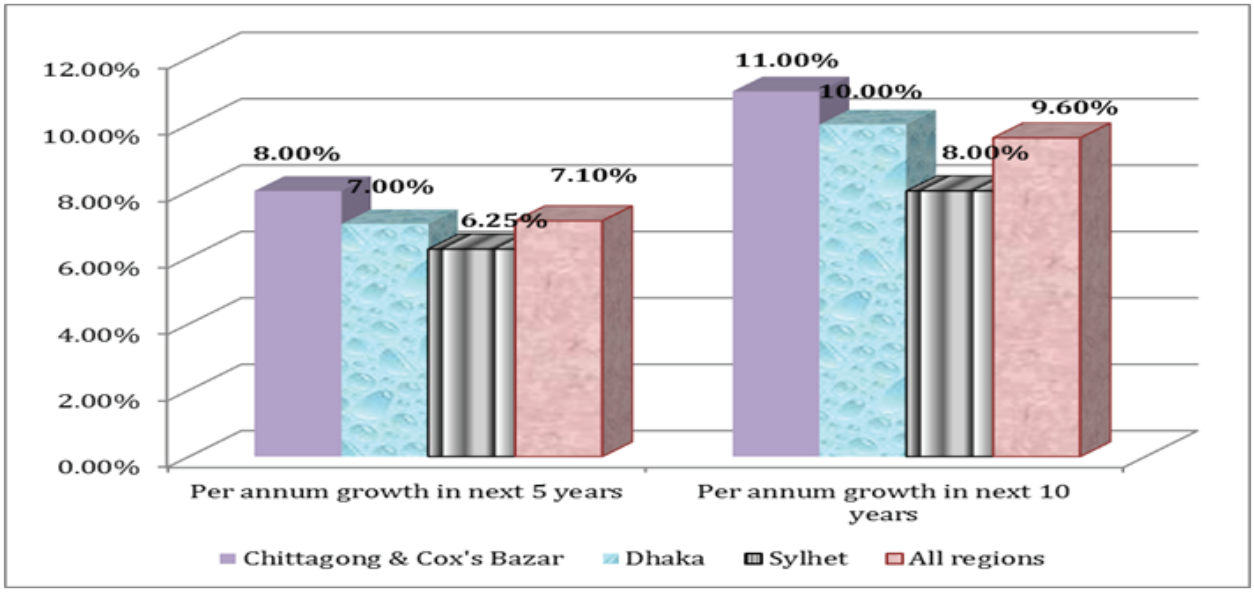
In order to link employment with output, the employment elasticity of gross value added was calculated for total (salaried and non-salaried) number of workers. The elasticity is estimated based on the data on GVA-FC (adjusted for inflation) and persons engaged for 2002-03 and 2009-10, as reported in Table 8.1, came to be 0.89. The estimates imply that total employment is inelastic with respect to changes in value added of the HTS.

The respondents stated their projections on growth of the sector. The average projected growth of demand for HTS services (number of guests in hotel/resorts, etc.) in this sector came to be 7 per cent per year in the next 5 years (Figure 8.3). Higher growth at 8 per cent per year for Chittagong and Cox's Bazar and lower growth at 6 per cent per year for Sylhet were projected over the 5-year horizon. In contrast, 10 per cent per year growth rate was projected over the next 10 year horizon. It may be noted that the relative rankings of the two tourist destinations (Cox's Bazar and Sylhet) and Dhaka remain unchanged.

None of the respondents stated to operate their units with full occupancy. In fact, the average occupancy of the eleven firms surveyed came out as 56 per cent. If safety and security of tourists are not ensured together with improvement of conventional tourist amenities, labor demand in the HTS will not increase more than 5 per cent per year in the next 10 years unless the existing firms expand their capacity and new entrants come to the fore as well as the current growth of (per capita) income continues to grow as envisaged.

The projection exercise was recursive: (i) the projected growth of GDP and elasticity of HTS with respect to GDP as well as the initial (2016) value of HTS value added was used to project the value added series for HTS for 2017-2025; (ii) the projected growth of HTS value added and elasticity of HTS employment with respect to its value added as well as the initial (2016) level of wage employment in the HTS was used to project the number of persons engaged in HTS for 2017-2025 (iii) skill composition proportions were imposed to decompose the total number of persons engaged in different skill categories; (iv) the skills gaps proportions were imposed on the decomposed skill categories; and (v) training needs were estimated based on the occupancy rates and the fact that the trained skilled and semi-skilled groups would impart training to the unskilled category.

Figure 8.3: Projected growth of HTS in next 5-10 years



[12] The following OLS regression model was estimated: ln(hotrestt) = -3.24 + 0.51 (lngdpt); where lnhotrestt is the logarithm of value added of hotel and restaurant sector at year t, lngdpt is the logarithm of total GDP at year t. The regression was run with constant 1995-96 prices as published in the Bangladesh Economic Review, Ministry of Finance, Government of Bangladesh. The coefficient estimates are statistically significant.

Table 8.11 reports the results of the projections of GDP, the value added of the HTS, total labor as well as by skill category. It may be noted that total size of the GDP will increase to Tk. 23 trillion by FY2020 and to Tk. 32 trillion by FY2025 from the benchmark estimate of Tk. 17 trillion in FY2016. In other words, under the variable growth prospect, the size of the Bangladesh economy in terms of GDP is expected to increase 1.33 times between FY2016 and FY2020, 1.87 times by FY2025. In order to achieve the projected growth of GDP, the amount of HTS value added will have to be at Tk. 96 billion by FY2020, and Tk. 115 billion by FY2025. These estimates imply that the levels of HTS value added in FY2020 will be 1.16 times higher than the FY2016 level, that is in FY2025 it will be 1.39 times higher than the FY2016 level.

Table 8.11: Projected Total GDP, HTS value added and labour demand

Fiscal Year	GDP growth rates (%)	GDP (10^{12} Tk.)	HTS value added (10^{12} Tk.)	Total labour (10^3persons)	Skilled labour (10^3persons)	Semi-skilled labour (10^3persons)	Unskilled labour (10^3persons)
FY2016	6.6	17,296	83	294	37	67	190
FY2017	6.8	18,472	86	303	38	69	196
FY2018	7.2	19,802	89	313	40	71	202
FY2019	7.6	21,307	92	324	41	74	209
FY2020	8.0	23,011	96	336	43	76	217
FY2021	8.0	24,852	100	348	44	79	224
FY2022	7.5	26,716	104	360	46	82	232
FY2023	7.0	28,586	108	371	47	84	239
FY2024	6.5	30,444	111	382	48	87	247
FY2025	6.0	32,271	115	392	50	89	253

Sources: Authors' estimates based on Seventh Five Year Plan Growth Framework and other plan documents.

These levels of value added could be achieved if employees' skills gaps can be minimised, if not eliminated, safety and security of tourists are ensured, and conventional HTS amenities are improved. To achieve the desired levels of HTS value added, the number of workers will have to be increased to 336 thousands persons by 2020 and to 392 thousands respectively by 2025. Assuming distribution of skills to remain constant, the projected employment implies that 43 thousand skilled and 73 thousand semi-skilled workers will be required by 2020, which will increase to 50 thousands and 89 thousands by 2025.

Table 8.12: Projected skills gaps and training needs of HTS labour

	Skills gaps (10^3 Persons)			Training Needs (10^3 Persons)			
Fiscal year	**Skilled labour**	**Semi-skilled labour**	**Unskilled labour**	**Skilled labour**	**Semi-skilled labour**	**Unskilled labour**	**Total**
FY2016	37	62	126	21	35	71	126
FY2017	38	64	130	22	36	73	130
FY2018	40	66	135	22	37	75	134
FY2019	41	68	139	23	38	78	139
FY2020	43	70	144	24	39	81	144
FY2021	44	73	150	25	41	84	149
FY2022	46	75	155	26	42	87	155
FY2023	47	78	159	26	44	89	159
FY2024	49	80	164	27	45	92	164
FY2025	50	82	168	28	46	94	168

Source: Authors' estimates based on Seventh Five Year Plan Growth Framework and Other plan documents.

It would be a formidable task for the projected number of workers across skills to sustain the levels of HTS value, given their levels of skills gaps. It was found from the survey findings that skilled workers have 100 per cent, and semi-skilled workers have 94.95 per cent skills gaps. Even the unskilled workers have 67.94 per cent skills gaps. Assuming that the current levels of skills gaps will persist in future, the number of

workers with skills gaps across skills categories is projected for 2016-2025, as reported in Table 8.12. Thus, skills gaps would vary between 37 thousands and 50 thousands for skilled category, 62 thousands and 82 thousands for semi-skilled categories, and 126 thousands and 168 thousands for unskilled category.

As a result, workers with such wide gaps in skills will hardly be able to perform the tasks efficiently and accurately. In addition to their existing qualifications, the workers need to be trained to perform the tasks efficiently. However, not all of the workers, especially unskilled and to some extent semi-skilled workers, who have skills gaps would require to undergo in-house (on-the-job), institutional training. Thus, the primary target should be the skilled workers. As the average occupancy of the 11 firms surveyed was found at 56 per cent, not all of the skilled workers would require acquiring training immediately. Consequently, it was assumed that 56 per cent of the skilled and semi-skilled categories would require to be imparted with further training. These trainees would, after completion of their training, be in-house (on-the-job) trainers to impart training to the unskilled workers with skills gaps. Accordingly, the training needs during 2016-2025 would vary between 21 thousands and 28 thousands for skilled category, 35 thousands and 46 thousands for semi-skilled categories, and 71 thousands and 94 thousands for unskilled category.

Even though Table 8.11 and Table 8.12 show the labour demand, skill gaps and training needs from 2016 to 2025, targeted intervention for provision of training programme requires the information at disaggregate level; mostly across different designations and departments. Table 8.1A in Annex depicts the projected labour demand across different designations of each department and skill category. As mentioned earlier, the skill gaps came to be 100 per cent in skilled group, 95 per cent in semi-skilled category and 68 per cent in unskilled labour as per the survey findings. Table 8.2A shows the skill gaps across demand across different category designations of each department and skill category. Accordingly, total number of labour with training needs across different designations has been shown in Table 8.3A.

Table 8.13 reveals the existing labour shortage in 2016 across occupations and skill level based on the labour demand in 2016. The labour market of HTS in 2016 experiences shortage of 136.4 thousands labour across different occupations and skill. The maximum shortage exists in food and beverage (production) department where employers expect to employ 54.13 thousands of quality employees.

Table 8.13: Labor market, skills gaps and training needs across occupations and skill levels in 2016 (10^3 persons)

			Labour demand	Labour supply	Labour shortage	Skill gaps	Training needs
Front Office	Skilled	Manage	3.11	1.67	1.44	3.11	1.74
		Assistant Manager	3.11	1.67	1.44	3.11	1.74
	Semi-skilled	Team Leader	3.11	1.67	1.44	3.11	1.74
		Executive	3.11	1.67	1.44	2.55	1.43
		Bell Captain	4.67	2.50	2.17	3.39	1.90
	Unskilled	Bell Man	12.44	6.67	5.77	4.53	2.53
	Total		29.55	15.84	13.71	19.80	11.08
Food & Beverage (Service)	Skilled	Manager	3.11	1.67	1.44	3.11	1.74
		Banquet Manager	3.11	1.67	1.44	3.11	1.74
		Restaurant Manager	3.11	1.67	1.44	3.11	1.74
	Semi-skilled	Supervisor	3.11	1.67	1.44	3.11	1.74
		Bar Manager	3.11	1.67	1.44	3.11	1.74
		Captain	4.67	2.50	2.17	4.67	2.61
		Senior Waiter	15.56	8.34	7.22	15.56	8.71
	Unskilled	Bar Tender	10.89	5.84	5.05	8.91	4.99
		Waiter	24.89	13.34	11.55	18.10	10.14
		Junior Waiter	12.44	6.67	5.77	5.66	3.17
	Total		84.00	45.02	38.98	68.45	38.32

		Executive Chef	Labour demand	Labour supply	Labour shortage	Skill gaps	Training needs
Food & Beverage (Production)	Skilled	Sous Chef	3.11	1.67	1.44	3.11	1.74
		Chef the Partie	3.11	1.67	1.44	3.11	1.74
		Demi Chef the Partie	9.33	5.00	4.33	9.33	5.23
	Semi-skilled	Commee 1	18.67	10.01	8.66	18.67	10.45
	Unskilled	Commee 2	23.33	12.51	10.82	19.09	10.69
		Commee 3	10.89	5.84	5.05	8.91	4.99
		Boucher	10.89	5.84	5.05	8.91	4.99
		Dish Washer	17.11	9.17	7.94	9.33	5.23
			20.22	10.84	9.38	3.68	2.06
	Total	Executive	116.66	62.53	54.13	84.14	47.12
House keeping	Skilled	Housekeeper Assistant Executive	3.11	1.67	1.44	3.11	1.74
		Housekeeper Supervisor	3.11	1.67	1.44	3.11	1.74
	Semi-skilled	Room Attendant	10.89	5.84	5.05	10.89	6.10
	Unskilled	House Man	23.33	12.51	10.82	20.15	11.28
			23.33	12.51	10.82	19.09	10.69
	Total		63.77	34.18	29.59	56.35	31.55
All departments			293.98	157.58	136.40	228.74	128.07

Table 8.14: Overseas employment of Bangladeshi employees in HTS (numbers)

	Occupation	2010	2011	2012	2013	2014	2015
Food & Beverage	Chef/cook	3,064	4,730	6,331	4,610	4,617	3,190
	1st Commee	6	1,489	1,405	5	13	313
	Kitchen Helper	-	9	2	30	83	36
	Butcher	38	37	22	23	45	79
	Baker	26	58	58	67	69	83
	Bar Tender	42	137	128	135	11	6
	Juice Maker	-	-	32	8	20	1
	Coffee Maker	2	36	-	2	6	4
	Sandwich Maker	-	-	2	7	7	1
	Fish Cutter/Cutter	127	144	59	273	229	169
	Washer	267	320	145	14	7	2
	Waiter	7,546	81,316	73,817	11,287	6,075	27,350
	Food & Beverage (Total)	11,118	88,276	82,001	16,461	11,182	31,234
Front Desk		2	-	-	10	18	11
Housekeeping		73	73	152	117	288	533
Total HTS		11,193	88,349	82,153	16,588	11,488	31,778
All Sector		383,147	560,259	598,190	400,192	413,987	550,263
% of F&B overseas employment in HTS overseas employment		99.33	99.92	99.81	99.23	97.34	98.29
% of overseas HTS employment in total overseas employment		2.92	15.77	13.73	4.15	2.77	5.78

Source: BMET.

Apart from the domestic employment, Bangladesh has bright prospects in overseas employment in HTS. HTS overseas employment comprises of more than 2.5 per cent of total overseas employment in 2010 and between 2013 and 2015 (Table-8.14). The share was around 15.8 per cent in 2011 and 13.7 per cent in 2012. However, this drastic rise does not resemble the general trend, as this surge was mostly driven by sudden exports of “commees” in these two years. The trend again returned to its natural track; the share

came down to below 6 in the next three consecutive years. However, food and beverage (F&B) dominates the overseas employment within HTS; more than 97 per cent of overseas employment in HTS falls in food and beverage.

8.5 Conclusions and Recommendations

The comprehensive overview on existing structure of HTS and its contribution to economy reveals some significant findings. The growth of employment per year in the last decade was three times more to the growth in the previous decade. The growth of establishments and average employment per establishment were the key drivers of this increased employment in this sector. Therefore, this sector exhibits the possibility of substantial contribution to overall economy through its wide open window of job opportunities. However, this optimistic forecast of increased job opportunities becomes tenuous when comparison is drawn with some of the neighbouring countries.

The primary survey culminated with the most interesting findings. Most of the respondents expressed concerns about the level of skills gaps in HTS in Bangladesh and stated about their own procedures of mitigating skills gaps in their own institutions. In most of the cases, it seems that the existing skills gaps become a serious issue when the gaps are created from inadequate supply of labour. The current mechanism of on-the-job training practiced by the hotels and resorts helps tackle the skills gaps to some extent. Hence, the question comes if skills gaps are a serious issue in facilitating the growth of this sector. Apart from their apprehension about the skills gaps, the key informants provided suggestions regarding development of tourism, which may act as facilitating factors in bridging the skills gaps.

Hotels and resorts face certain difficulties while training the newly recruited workforce due to inadequate acquisition of skill by fresh graduates. The following measures can be taken in this regard:

- Increased duration (at least six months) of practical training at different intervals should be the uttermost priority of the training institutes for both diploma and bachelor degrees. The attachment programmes should continue for at least six months and the students should get introduced to the hotels/resorts at the first quarter of their tenure. The students should be provided with the opportunity to visit the hotels/resorts that will help them align the theoretical knowledge with practical applications. In this regard, these institutes can be provided with the facility of “Application Hotel Programme” through which each of the institutes can be tagged with specific hotel for practical experience.
- The training institutes can arrange some audio-visual training on specific tasks, which will help the students have more practical orientation. In this regard, to develop the IT skill of the students, the institutes should emphasize to provide adequate training on modern techniques and software (e.g. software OPERA).
- The training institutes should introduce more courses for developing the communication skill and language proficiencies (specially English).
- Mismatch between the expected salary and offered salary is one of the major reasons for higher inclination of bachelor graduates towards overseas employment. The employers have to think more regarding this mismatch. The supply-side actors raised the issue of employers’ reluctance to recruit HTS graduate students as skilled labor. In most cases, the reputed hotels/resorts are run by foreign management, which seems to have inertia in recruiting bachelor graduates. The bachelor graduates can become an efficient workforce in the long-run through training and grooming activities (for example, managerial training carried out by banks for their fresh recruits). The employers should focus on the higher returns in the long run instead of immediate benefits in the short run.
- The reluctance of bachelor graduates to build up their career in HTS can be minimised through improved salary structure. Social perception regarding working at hotels/resorts needs to be changed through awareness building.
- In case of any government intervention to upgrade the skill level of existing supply of labour of HTS, food and beverage (production) should be regarded as the first and foremost priority area. Both the demand and supply side actors reported about the need of improving culinary skills among the existing labour pool. On the other hand, considering the substantial contribution of food and beverage (production) department to HTS overseas employment, the government intervention can enhance international demand of available labour in HTS.

Apart from the development of hospitality management, the respondents also raised concerns about expansion of tourism activities as 98 per cent of total spending on travel and tourism comes from domestic sources. The recent surge in establishment of hotels and resorts has been mostly encouraged by local demand of multinational companies and corporate sectors. The sector might have a sudden boost with increased growth and profits in the short run despite the existing stagnant condition of international tourism. The government needs to revisit the policies to improve the safety and security in the places of tourist attractions as well as to increase investment in infrastructural development in order to attract the foreigners to spend their vacation with scenic beauty of Bangladesh.

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Annexure-A

Table 8.1 A: Projected labor demand across occupations and skills levels (10^3 persons)

Occupations and skills Level	Skill Category	Occupational Category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Front Office	Skilled	Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Assistant Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
	Semi-Skilled	Team Leader	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Executive	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Bell Captain	4.67	4.81	4.97	5.14	5.33	5.52	5.71	5.89	6.06	6.22
	Unskilled	Bell Man	12.44	12.83	13.25	13.71	14.22	14.73	15.24	15.70	16.17	16.59
Food & Beverage (Service)	Skilled	Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Banquet Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Restaurant Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
	Semi-Skilled	Supervisor	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Bar Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Captain	4.67	4.81	4.97	5.14	5.33	5.52	5.71	5.89	6.06	6.22
		Senior Waiter	15.56	16.03	16.56	17.14	17.78	18.41	19.05	19.63	20.21	20.74
	Unskilled	Bar Tender	10.89	11.22	11.59	12.00	12.44	12.89	13.33	13.74	14.15	14.52
		Waiter	24.89	25.65	26.50	27.43	28.44	29.46	30.48	31.41	32.34	33.19
		Junior Waiter	12.44	12.83	13.25	13.71	14.22	14.73	15.24	15.70	16.17	16.59
Food & Beverage (Production)	Skilled	Executive Chef	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Sous Chef	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Chef the Partie	9.33	9.62	9.94	10.29	10.67	11.05	11.43	11.78	12.13	12.44
	Semi-Skilled	Demi Chef the Partie	18.67	19.24	19.87	20.57	21.33	22.10	22.86	23.56	24.25	24.89
	Unskilled	Commee 1	23.33	24.05	24.84	25.71	26.67	27.62	28.57	29.44	30.32	31.11
		Commee 2	10.89	11.22	11.59	12.00	12.44	12.89	13.33	13.74	14.15	14.52
		Commee 3	10.89	11.22	11.59	12.00	12.44	12.89	13.33	13.74	14.15	14.52
		Boucher	17.11	17.63	18.22	18.86	19.56	20.25	20.95	21.59	22.23	22.81
		Dish Washer (worker)	20.22	20.84	21.53	22.29	23.11	23.94	-	-	26.28	26.96
House Keeping	Skilled	Executive House Keeper	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Assistant Executive Housekeeper	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
	Semi-Skilled	Supervisor	10.89	11.22	11.59	12.00	12.44	12.89	13.33	13.74	14.15	14.52
	Unskilled	Room Attendant	23.33	24.05	24.84	25.71	26.67	27.62	28.57	29.44	30.32	31.11
		House Man	23.33	24.05	24.84	25.71	26.67	27.62	28.57	29.44	30.32	31.11

Table 8.2 A: Projected skill gaps across occupations and skills levels (10^3 persons)

Occupations and skills Level	Skill category	Occupational category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Front Office	Skilled	Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Assistant Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
	Semi-Skilled	Team Leader	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Executive	2.55	2.62	2.71	2.81	2.91	3.01	3.12	3.21	3.31	3.39
		Bell Captain	3.39	3.50	3.61	3.74	3.88	4.02	4.16	4.28	4.41	4.53
	Unskilled	Bell Man	4.53	4.66	4.82	4.99	5.17	5.36	5.54	5.71	5.88	6.03
Food & Beverage (Service)	Skilled	Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Banquet Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Restaurant Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
	Semi-Skilled	Supervisor	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Bar Manager	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Captain	4.67	4.81	4.97	5.14	5.33	5.52	5.71	5.89	6.06	6.22
		Senior Waiter	15.56	16.03	16.56	17.14	17.78	18.41	19.05	19.63	20.21	20.74
	Unskilled	Bar Tender	8.91	9.18	9.48	9.82	10.18	10.55	10.91	11.24	11.58	11.88
		Waiter	18.10	18.66	19.27	19.95	20.69	21.43	22.16	22.84	23.52	24.13
		Junior Waiter	5.66	5.83	6.02	6.23	6.46	6.70	6.93	7.14	7.35	7.54
Food & Beverage (Production)	Skilled	Executive Chef	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Sous Chef	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Chef the Partie	9.33	9.62	9.94	10.29	10.67	11.05	11.43	11.78	12.13	12.44
	Semi-Skilled	Demi Chef the Partie	18.67	19.24	19.87	20.57	21.33	22.10	22.86	23.56	24.25	24.89
	Unskilled	Commee 1	19.09	19.68	20.32	21.04	21.82	22.60	23.38	24.09	24.81	25.45
		Commee 2	8.91	9.18	9.48	9.82	10.18	10.55	10.91	11.24	11.58	11.88
		Commee 3	8.91	9.18	9.48	9.82	10.18	10.55	10.91	11.24	11.58	11.88
		Boucher	9.33	9.62	9.94	10.29	10.67	11.05	11.43	11.78	12.13	12.44
		Dish Washer (worker)	3.68	3.79	3.91	4.05	4.20	4.35	-	-	4.78	4.90
Housekeeping	Skilled	Executive House Keeper	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
		Assistant Executive Housekeeper	3.11	3.21	3.31	3.43	3.56	3.68	3.81	3.93	4.04	4.15
	Semi-Skilled	Supervisor	10.89	11.22	11.59	12.00	12.44	12.89	13.33	13.74	14.15	14.52
	Unskilled	Room Attendant	20.15	20.77	21.45	22.21	23.03	23.85	24.68	25.43	26.18	26.87
		House Man	19.09	19.68	20.32	21.04	21.82	22.60	23.38	24.09	24.81	25.45

Table 8.3 A: Projected training needs across occupations and skills levels (10^3 persons)

Occupations and skills level	Skill category	Occupational category	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Front Office	Skilled	Manager	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Assistant Manager	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
	Semi-Skilled	Team Leader	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Executive	1.43	1.47	1.52	1.57	1.63	1.69	1.75	1.80	1.85	1.90
		Bell Captain	1.90	1.96	2.02	2.09	2.17	2.25	2.33	2.40	2.47	2.53
	Unskilled	Bell Man	2.53	2.61	2.70	2.79	2.90	3.00	3.10	3.20	3.29	3.38
Food & Beverage (Service)	Skilled	Manager	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Banquet Manager	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Restaurant Manager	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
	Semi-Skilled	Supervisor	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Bar Manager	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Captain	2.61	2.69	2.78	2.88	2.99	3.09	3.20	3.30	3.40	3.48
		Senior Waiter	8.71	8.98	9.27	9.60	9.96	10.31	10.67	10.99	11.32	11.61
	Unskilled	Bar Tender	4.99	5.14	5.31	5.50	5.70	5.91	6.11	6.30	6.48	6.65
		Waiter	10.14	10.45	10.79	11.17	11.58	12.00	12.41	12.79	13.17	13.52
		Junior Waiter	3.17	3.26	3.37	3.49	3.62	3.75	3.88	4.00	4.12	4.22
Food & Beverage (Production)	Skilled	Executive Chef	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Sous Chef	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Chef the Partie	5.23	5.39	5.56	5.76	5.97	6.19	6.40	6.60	6.79	6.97
	Semi-Skilled	Demi Chef the Partie	10.45	10.77	11.13	11.52	11.95	12.37	12.80	13.19	13.58	13.94
	Unskilled	Commee 1	10.69	11.02	11.38	11.78	12.22	12.65	13.09	13.49	13.89	14.25
		Commee 2	4.99	5.14	5.31	5.50	5.70	5.91	6.11	6.30	6.48	6.65
		Commee 3	4.99	5.14	5.31	5.50	5.70	5.91	6.11	6.30	6.48	6.65
		Boucher	5.23	5.39	5.56	5.76	5.97	6.19	6.40	6.60	6.79	6.97
		Dish Washer (worker)	2.06	2.12	2.19	2.27	2.35	2.44	-	-	2.68	2.75
Housekeeping	Skilled	Executive House Keeper	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
		Assistant Executive Housekeeper	1.74	1.80	1.85	1.92	1.99	2.06	2.13	2.20	2.26	2.32
	Semi-Skilled	Supervisor	6.10	6.28	6.49	6.72	6.97	7.22	7.47	7.69	7.92	8.13
	Unskilled	Room Attendant	11.28	11.63	12.01	12.44	12.90	13.36	13.82	14.24	14.66	15.05
		House Man	10.69	11.02	11.38	11.78	12.22	12.65	13.09	13.49	13.89	14.25

CHAPTER- 9

Labour Market and Skills Gap Analyses: Health Care
(Nursing and Health Technician)

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Executive Summary

The World Health Organization (WHO) categorizes Bangladesh as one of the 58 countries facing a critical shortage of healthcare workers, challenged by a deficiency in terms of their overall skills. While, following WHO recommendations, for every doctor, there should be at least 3 nurses, and 5 medical technicians, in Bangladesh, however, the respective ratios are one doctor; 0.40 nurse; and 0.24 medical technicians. The present study analyses the current status of the healthcare sector of Bangladesh in terms of Nurses and Medical Technicians, and addresses the gap between the skills they possess and the skills required of them in order to promote greater efficiency and equity in service delivery.

The World Health Organization (WHO) - projecting towards achieving Millennium Development Goals (MDGs) on health related targets, suggested the unexplained number of 23 health workers per 10,000 of population, or 2.3 per 1,000, as the threshold density for the health system to perform optimally. WHO principle-based projection shows the number of doctors, nurses and medical technicians required per 1,000 population as being 0.256, 0.768 and 1.28 respectively. Less than 20% of HCPs are accessible to 65% of population in rural Bangladesh.

Non-communicable illness demands more intensive personal care of patients as compared to communicable diseases. Medical technicians are sought for pathological tests, radiography, drawing of blood, and technical assistance for operation and maintenance of medical equipments. The present study identifies and discusses different categories of nursing and medical skills shortage, skill mix imbalance etc., to delineate gaps and that could promote inefficiency in service delivery.

Desktop research, questionnaire based interviews, and Key Informant Interviews (KIIs) comprise the information base of the study - both quantitative and qualitative. Information on demographic transitions, mortality, migration, etc. were collated from secondary sources such as the Bangladesh Bureau of Statistics, World Bank, and various other documented sources like The Health and Morbidity Status Surveys of Bangladesh.

Medical technical personnel such as medical assistants, family welfare visitors, or community health workers play important role in places where there are no qualified trained physicians. Based on changing demand for various types of health services as relating to morbidity trends, demographic transitions, and prospects of international migration, an increasing demand for particular skill categories are fast emerging which, if not collaborated by domestic supplies, will create shortages of respective skills.

The total number of registered nurses in the country as of 2014 is estimated 38,452, as compared to the number of doctors present in the country of 61,921. This gives a ratio of doctors to nurses as 1:0.62 as compared to the WHO recommendation of 1:2.

The major skills identified as facing shortage include nurses with specialized training and experience in cardiology, gynecology, pediatrics, women health, medicine, surgery, medical technical graduates, blood drawing technicians, skills in pathology, ultra sonogram, radiology imaging, physiotherapists, anesthetist, blood transfusion technicians, dialysis technicians, X-ray, laboratory technicians, ECG technicians, etc. The diversity of needs for different skill types and emergence of their shortage have been found to be related to the changing morbidity patterns in the country, increasing demand for quality health services, and inability of the existing institutional facilities to cater to the growing demand for different skills in needs.

Key policy options emerged from KII, to overcome shortage of nurses and medical technicians. These include: Public-private responsibilities towards human resource development planning focused on education and training improvements, with increased supply of medical technicians. Also, government commitment to train, monitor and supervise the health sector.

Lack of requisite training and experience for particular task was an important aspect of skill shortage, so experienced workers take up very inexperienced juniors along, in order to provide the required services resulting in worsening service quality. Turnover appears insignificant, especially in the Capital city. Possible reasons for skill shortage identified by few sample organizations focus mainly on two issues: (a) poor benefits package offered for nurses and medical technicians, and (b) differential benefits offered by public and

private sectors, problem of social recognition and stigma attached to various health related technical jobs. Occupations such as nursing, personal care, cleaning jobs are stigmatized, but migration abroad (Europe, North America and Australia) is preferred due to higher monetary benefits, albeit cognizant of expected socio-cultural problems and racial bias.

Looking into the future with respect to the demand for and supply of nurses and medical technicians', say, in the next 5 to 10 years, the study made different projections based on alternative set of assumptions. Based on such exercises, it identified possible skill gaps for nurses and medical technicians.

With respect to doctors, there exists a surplus in the country at the moment, and it is expected to increase significantly moving into the future. The projection, however, is contingent upon the underlying assumptions, any change of which would lead to a corresponding change in projected values. For doctors, for instance, any higher number of doctors per '000 population than what has been assumed - 1: 2,522, would automatically increase demand for doctors, therefore, redeem any possible surplus thereof.

For nurses, on the other hand, the current gap between the demand for and supply of nurses is quite high. Presently, there is a shortage of over 90,000 nurses in the country, even if it is based on very modest assumptions. With an increasing supply of nurses and slower population growth, the situation is expected to improve in the future. The skill gap shall narrow down to 19,000 by 2026 as compared to 96,000 in 2016. The concern over international migration of nurses – at least in terms of depletion of domestic supplies, is not well founded as the demand for nurses overseas as based on migration flows has been quite negligible in recent years.

The situation with respect to medical technicians, however, is expected to be quite severe at least in terms of their complementary needs. While paucity of information restricts any objective analysis of respective skill gaps, given changing morbidity patterns and increasing importance of non-communicable diseases, demand for certain categories of medical technical skills shall increase significantly in the absence of respective domestic supplies.

In order to circumvent skill gaps, it may be worth implementing the following measures, but primarily supported by a decentralisation of health services. These are, introduction of task-shifting and a coordination of training activities, improvement in the stature of nurses, midwives and technicians, increasing production-capacity for nurses, training new cadres of community skilled birth attendants and midwives and improving access to and knowledge of basic primary healthcare so that it can be handled by para professionals like Medical Assistants, Family Welfare Visitors (FWVs), Community Health Workers (CHWs), with the establishment of a functional referral system to a higher level of facilities.

Foremost, to overcome shortage, is the filling up of current vacancies with a comprehensive HRH policy to accelerate the recruitment of nurses and CHWs. Then, regulate dual practice of healthcare workers in the public sector, engage other government entities to expedite the hiring process and improve the public sector image. Moreover, explore contracting mechanisms with non-state service providers, establish high-level coordination platforms in the MoHFW: where workload standards could be redefined in order to increase the role of nurses, midwives, and para-professionals.

The cooperative dialogue expert suggestions have pointed to nine key areas for improving nurses' education. The example of Brazil's Hospital Sírio Libanês is to provide training simulations for newly-hired nursing staff and medical technicians and work in multidisciplinary teams. Strategies for Retention of Healthcare workers seeks to bring back inactive healthcare workers; The MoHFW can collaborate with training institutes to ensure placement for all trainees; a clear idea of their career progression laid out for them. Retention can be improved by in-service training; the incentives can be packaged into the salary structure as benefits, performance bonuses or hardship allowances for the public sector. Given liberalization of the education system more and more medical institutions are in the pipeline – both public and private, capable of producing doctors required by the country. However, there is a dearth of nurses and medical technicians. Accumulated over the years and netted for various attritions - change of profession, death, withdrawal from the job market or international migration, the country's total stock of nurses and medical technicians is quite limited particularly with respect to medical technicians.

9.1 Introduction

Bangladesh is a country of over 160 million people. To accommodate the medical needs of this massive population, the country requires a large healthcare workforce that consists of competent practitioners–from doctors to nurses, medical technicians, down to the personal care givers. The World Health Organization (WHO) categorises Bangladesh as one of the 58 countries facing a critical shortage of healthcare workers. Not only is the number of healthcare workers low, there is also a lacunae in terms of their overall skills. This study analyses the current status of the healthcare sector of Bangladesh in terms of nurses and medical technicians, and addresses the gap between the skills they possess, and the skills that are required of them. Existing national healthcare activities and policies pay little importance to this aspect. There is also a lack of data available at the national level. This study reviews secondary and primary information in order to address the skill gaps in existing nurses and medical technicians in Bangladesh.

Despite the progress made by Bangladesh in the healthcare sector over the past decades,[1] fulfillment of its constitutional commitment to "the supply of basic medical requirements to all levels of the people in the society" and global obligation to achieving the Development Goals (MDGs and SDGs) in health related issues is severely constrained by shortages of professional and technical skills in the health sector. Assessed in terms of "skills gap," "imbalance" between demand for and supply of required skills, "inappropriate skill mix," or "inequitable distribution" across rural and urban areas, Bangladesh is considered to experience a severe shortage of health care providers (HCPs).

Based on WHO estimates, for every doctor, there should be at least 3 nurses, and 5 medical technicians. In Bangladesh, however, the respective ratios are one doctor; 0.40 nurse and 0.24 medical technicians. Irrespective of the universality of the recommended skill ratios, given appropriate variability across countries and societies based on socio-economic and cultural factors, "Bangladesh is one of the 58 countries facing an acute "HRH crisis," and the country's nurse-to-doctor ratio is amongst the lowest in the world.

Such an inappropriate mix of HCPs is more acute across the rural areas of the country as compared to the urban areas. While about 65 per cent of the country's population live in rural areas, less than 20 per cent of HCPs are accessible to them. Bangladesh experiences an overwhelming bias towards urban areas in terms of location of HCPs. To overcome this, The Standard Operating Protocol and the National Healthcare Standard have been developed. Moreover, under the Health Financing Scheme, similar to "Kalihati Upazila Health Services," other new centres will serve as models to provide free services (50 identified diseases) under the "Swastha Surakkha Karmasuchi" of the Government of Bangladesh. Thus, extensive healthcare networks are being contemplated stretching down to the village level, albeit most of the institutional facilities, human and technical alike, remain located in major city centres with highest concentration being in the capital city.

Existing skill gaps have far reaching consequences for the delivery of HCPs. A large proportion of population is served by a small number of Health Care providers. A high population per HCP significantly underscores the level of service rendered to care receivers. Overstretched workload leads to poor quality of service; absence of necessary support services results in inappropriate use of scarce resources, and deter technical and professional development through accumulation of new knowledge and technologies.

Population aged 65+ currently comprise 5 per cent of total population, and it is expected to increase further in the future. Almost a third of the population is below the age of 15. More important, the country's morbidity pattern has been changing. Communicable diseases like diarrhea, malaria, tuberculosis and child mortality, due to hunger and malnutrition, have been overshadowed by non-communicable diseases like arthritis, diabetes, blood pressure, heart disease, cancer, etc., necessitating various types of skills needed in health services.

For instance, diseases such as blood pressure, heart attack, diabetes require more intensive patient care including personal care of patients as compared to communicable diseases like malaria or tuberculosis. There is also the need for medical technicians for pathological tests, radiography, drawing of blood and technical

[1] Whether seen in terms of harnessing population growth, control of communicable diseases, reduction in maternal and infant mortality, improvement in average life expectancy at birth, etc.

assistance for operation and maintenance of varied medical equipments. Together, these two requirements solicit service for intensive patient care, and technical skills for diagnosis of various ailment, and running and maintenance of required machinery and equipment.

The existence of skill shortages is the joint play of demand for and the supply of specific skills emerging respectively from altering level and composition of various healthcare service needs as associated with the country's population and morbidity patterns, and institutional facilities available in the country resulting in diverse health skills' requirements. The lacunae created by varying level and type of demand for different types of health related skills associated with corresponding supplies shall underscore any emerging skill gap in the country.

There is, however, a caveat to this simple demand and supply equation. First, all those skills produced within the country may not be employed by the health sector; doctors may opt for non-medical professions while nurses may remain voluntarily un-utilised. Medical technicians might prefer urban centres which offer ease of transit and higher remuneration from several employers. Second, international migration, either permanent or temporary, may cause a drain on the overall supply of respective skills. This may be true for doctors, nurses, medical technicians, etc. Together these would cause a fall in the overall supply of respective skills.

9.1.1 Purpose and Scope

The purpose of the present exercise is to identify the healthcare skills which are in short supply, and needs to be addressed towards achieving healthcare goals set by the country and meeting SDGs. The particular focus here is on nursing and medical technicians. It identifies and discusses different categories of nursing and medical skills which are in short supply – absolutely or relatively, either current or in the prospective future, with implications for the growth and development of the health sector.

9.2 Concepts, Data Source and Methodology

9.2.1 Concepts and Definitions

Discussions on skill shortage in the health sector, as also in other sectors, is shrouded by conceptual and definitional issues, which significantly underscore any objective analysis of the state of skill situation in the sector. Interchanging concepts such as "skills gap," "imbalance between demand and supply," "inappropriate skill mix," "inequitable distribution across geographical areas," etc. seldom provide a clear picture of the situation on the ground as they hardly refer to the same set of issues. It is, therefore, imperative to clear ambiguities existing within different notions of skills gap.

On purely economic terms, skill shortage refers to the gap that may exist as between the demand for and the supply of a particular skill at a given wage rate which is near about the full employment level. Referred also as "external or skill shortage of vacancies," this is caused by "a lack of suitable, skilled, qualified or experienced applicants." "Labour shortages occur where the demand for workers in a particular occupation exceeds the supply of workers who are qualified, available, and willing to do that job."

Such shortages, however, can be either (a) aggregate labour shortage, or (b) shortage due to some kind of mismatch in the labour market. The aggregate labour shortage occurs where there is (near) full employment, and there is a general difficulty in finding suitable candidate to fill vacancies. However, mismatch in the labour market may arise due to qualitative mismatch – qualifications of workers and the profile of vacancies not quite matching - implying a market situation where there is "a lack of people with qualification, skills or experience necessary to carry out the jobs in question."

Mismatch in labour market can be "regional mismatch" – "where unemployed persons seeking work and firms offering suitable jobs are located in different regions, and the jobs and/or workers are immobile," preference mismatch–"type of jobs the unemployed people are willing to take on and the existing vacancies in the respective region", mismatch due to information deficit – "no aggregate shortage of labour or skills, but supply does not meet demand because of lack of information." Under dynamic shortage model (Arrow and Capron, 1959), "demand for a skill grows faster than supply to be rapid and persistent rise in demand, low elasticity of supply and a slow market "reaction speed."

Besides aggregate skill shortage –mismatch between demand and supply, there is also what is called "internal skill gaps." It relates to situations where an employer's "existing workforce are perceived to be below the desired level of proficiency." Skill mix imbalance is another dimension of possible skill shortage. It neither refers to an aggregate shortage of skill nor an internal skill gap, as discussed above, rather lack of best possible output and overall productivity and efficiency. It creates inefficiency in service delivery. To put it otherwise, overall level and quality of services could have been increased should the imbalance been overcome.

9.2.2 Data Source and Methodology

Information generated through desktop research, questionnaire based interviews, and Key Informant Interviews (KIIs) comprise the information base of the current study which included both quantitative and qualitative data. Information on demographic transitions, mortality, migration, etc. were collated from secondary sources such as the Bangladesh Bureau of Statistics, World Bank, and various other documented sources.

Reports and documents prepared by different national and international organisations, WHO and World Bank in particular, were also important sources of information on the nature and level of demand for various health services. The Health and Morbidity Status Surveys of Bangladesh, provided the information on the nature and trend of the disease pattern in Bangladesh providing information on the major diseases experienced by the population; how prevalence of different diseases changed over time; which diseases are emerging as major causes of sickness and death.

Data on various health related facilities, both human and logistics, are due to the Ministry of Health and Family Welfare (MoHFW). These included supplies and stock of medical professional and technical people, institutional facilities available in the country to train different skill categories, facilities available to provide different healthcare services – hospitals, clinics, diagnostic facilities, and nature, level and distribution of various health facilities across the country.

The quantitative information on both the demand and supply side of health related issues have been supplemented by information generated by the questionnaire survey on different health related institutions. Limited in number though, the survey helped identify various categories of nursing and technical personnel experiencing shortages.

Finally, the Key Informant Interviews (KIIs) generated qualitative information on major aspects of skill shortages in the health sector. It particularly focused on four basic issues:

- Identification of skills deemed short in supply and major underlying reasons;
- Negative implications of any existing skill gaps, and policy options toward redeeming skill gaps and related adverse consequences;
- Relative roles of public and private sectors in overcoming existing skill gaps, and possible implications for the growth and development of the healthcare sector and
- Forward looking policy imperatives for identified problems, to improve these services.

The conceptual framework utilized by the current study to identify any existing skill gaps focuses on four critical issues. These include (i) existing and/or emerging level and nature of needs for various healthcare services, (ii) existing institutional facilities - focusing on human services, rendering those services, (iii) imbalance between the need for and availability of required skills, and (iv) respective implications for growth and development of the healthcare sector.

The following key research questions seek to delineate different skill categories currently deficient or could face shortage within the next 5 to 10 years. What are the underlying reasons for any such shortage? What are the adverse implications of skill shortage for the delivery of healthcare services either overall or specific to a particular service area? What institutional development could harness any adverse consequences of skill shortage? The present study attempts to answer the questions that are posed.

9.3 Healthcare Market

9.3.1 Demand for Healthcare Services

Skill shortage, however defined, has its roots at the level and nature of demand for healthcare services which in turn depends on population dynamics - size, growth, composition and distribution across geographical areas, as also on a country's morbidity pattern. Population size represents overall demand for healthcare services, the market size and market spread, morbidity pattern delineates the nature of demand for healthcare services, and trend over time represents the changing size and focus of the market. Understanding the forces underlying demand for healthcare services is critical to appraising possible imbalances in the market and underlying causes.

Bangladesh is the 8th most populous country in the world with a current population estimated at around 160 million. Growing at an annual rate of 1.2 per cent, it is expected to reach the level of 190 million by 2020, and 210 million by 2025. The vast majority of the country's population live in rural areas, and, despite a rapid growth in urban population, only 35 per cent of population live in urban areas. Both the size and proportion of elderly population in the country are fast increasing; population aged 65+ comprised 5 per cent of population, and numbered 8 million. The proportion of population below age 15, declining in relative terms over time though, comprise one third of the population.

Bangladesh's experience with the morbidity pattern is positive while at the same time alarming. During the past decades, significant progress in areas of controlling communicable diseases such as diarrhea, malaria, tuberculosis, small pox, diphtheria, measles, polio, etc. There is an increasing trend, however, toward non-communicable diseases like arthritis, diabetes, high blood pressure, heart disease, cancer, etc. with far reaching implications for nature and level of healthcare needs.

Between 2000 and 2012, based on Bangladesh Health and Morbidity Status Surveys, the prevalence of overall morbidity per 1,000 population hardly changed for good–188 to 186. During the same period, however, the prevalence of non-communicable diseases increased significantly. For instance, prevalence of arthritis increased from 4.7 per 1,000 to 14.0; diabetes from 2.7 to 7.8; heart disease 1.6 to 3.3; and cancer 0.4 to 0.6. Notably, while persons with lowest asset quintiles experienced relatively higher proportion of most of the diseases, the opposite has been the case with respect to the non-communicable diseases. Persons of highest income quintiles experienced the highest incidence of diseases like diabetes, arthritis, and blood pressure.

The common types of illness experienced by population, however, include fever – (55%), pain (10%), diarrhea (6%) and dysentery (4%). Notably, the above pattern of disease burden can be handled, at least at the primary level, by paraprofessionals like medical assistants, family welfare visitors (FWVs), community health workers (CHWs), with the establishment of a functional referral system to a higher level of facilities.

Table 9.1 Prevalence of morbidity per '000 population between 2000 and 2012

Year	Arthritis	Diabetes	Heart Disease	Cancer
2000	4.7	2.7	1.6	0.4
2012	14.0	7.8	3.3	0.6

Source: BBS, Health and Morbidity Status Survey, 2000, 2012.

Three distinct levels comprise the healthcare services available in Bangladesh, which include (a) primary health care, (b) secondary health care, and (c) tertiary health care. Primary care includes basic or general health care provided traditionally by doctors trained in family practice, pediatrics, internal medicine, and occasionally gynecology. Under secondary health care doctors rendering service act as consultant physician at the request of the primary healthcare doctors. The tertiary level provides specialist services on referral from primary or secondary medical care personnel.

The overall demand for healthcare services, given its three different service levels, and emerging trend in disease prevalence, has serious implications for the nature and level of professional and technical skill need of healthcare services. The issue can be discussed at two different levels: at the aggregate level averaging for all different healthcare service needs, and that based as on specialised healthcare needs associated with particular type of diseases.

The World Health Organization (WHO), projecting towards achieving Millennium Development Goals (MDGs) on health related targets, suggested that a magic number of 23 health workers per 10,000 of population, or 2.3 per 1,000, as the threshold density for the health system to perform optimally. It, moreover, recommended ratios of doctors, nurses and medical technicians as being one doctor: 3 nurses: 5 medical technicians (1:3:5).

Combining together these two WHO principles, one could project the number of doctors, nurses and medical technicians required per 1,000 population as being 0.256, 0.768 and 1.28 respectively. Applying these ratios over a country's total population shall provide the number of respective skills required for the country as a whole at different sizes of population, as shown in Table 9.1.

Information presented in Table 9.2 is too aggregated, failing to provide details on various sub-categories of the skills thus involved. For instance, there are all different categories of nursing professionals with varying levels of education(graduate, diploma or certificate holders), years of work experience, and areas of specialisation (midwives, OT, cardiology, pediatric, community, psychiatric, gerontology, trauma & orthopedic, nephrology, neurology, etc). Then there are also junior nurses working as AIDE to nurse.

Table 9.2 Projected demand for medical professional and technical people

Category	Requirement per 1,000 population	Population size (in millions)			
		160	170	180	190
Doctors	0.256	40,960	43,520	46,080	48,640
Nurses	0.768	122,880	130,560	138,240	145,920
Medical Technicians	1.28	204,800	217,600	230,400	243,200

Note: The ratios are based on an estimated value of 2.3 workers per 1,000 population distributed across major skill groups following the ratios of 1:3:5 using the equation of 1(1+3+5).

More serious, however, is the question of medical technicians who are most diverse in type, job description, level of skill and training, and relative importance at different job areas. Some of their jobs are vital in service delivery. Take, for example, the case of technicians drawing patient's blood whose skill and experience are vital to the results obtained from the blood samples collected, or the expertise of OT technicians, especially those serving for cardiac (medicine), cardiac (surgery), neuro-surgeons, etc.

Valued otherwise, medical technical personnel such as medical assistants, family welfare visitors, or community health workers play important role in places where there are no qualified trained physicians. Currently, Community Clinic is the flagship project of the government projecting one clinic for every 6,000 population. Each clinic shall provide Essential Service Package (ESP) services with 30 items of necessary medicines and staffed by one health assistant (DGHS), one family welfare assistant (DGFP), and one community health-care provider (CHCP).

Based on changing demand for various types of health services relating to morbidity trends, demographic transitions and prospects of international migration, an increasing demand for particular skill categories fast emerging, which, if not collaborated by domestic supplies, will create shortages of respective skills. The nature of skill categories facing shortage is presented in Table 9.3.

Table 9.3: Nursing and medical technicians experiencing high demand in the job market

Skill categories	Field of specialization	Level of education
Nursing	Cardiac	Degree; Diploma; Certificate; 1 year training; 6 months training.
	Intensive care	
	Pediatric	
	Community	
	Psychiatric	
	Gerontology	
	Trauma &	
	Nephrology	
	Neurology	
	Ophthalmic	
	Chest disease	
AIDE tonurse	Personal Care	In-house/on-the-job training
	Serving medicine	
	Bed making	
	Body massaging	
Radiology and imaging	Cancer	4 Year Diploma/1 Year Certificate
Cathlab technologist		
Blood drawing technician		
Anesthetists		
Medical assisstants		4 Year Diploma/1 Year Certificate
Dialysis technician		
Dental		4 Year Diploma/1 Year Certificate
Physiotherapy		4 Year Diploma/1 Year Certificate
Integrated medical		
Laboratory		4 Year Diploma/1 Year Certificate
Junior midwifery		
Patient care		4 Year Diploma/ 1 Year Certificate
Pharma		4 Year Diploma/ 1 Year Certificate
Integrated medical		4 Year Diploma/ 1 Year Certificate
Medical assistants		3 Year Diploma after 10 years of schooling
Family welfare visitor		18 months
Family welfare assistants		
Community health care		
Community medical officer		
Community paramedic		2 year course
Community-based skilled birth		
Paramedical		1year certificate in health technology &

Source: Based on desk research, Key Informant Interviews, and Institutional Surveys.

9.3.2 Supply of Healthcare Services

Three major market segments underline the supply of healthcare services in Bangladesh. First, there are education and training institutions producing different health care providers – doctors, nurses and technicians. Second, institutions such as hospitals, clinics and diagnostic centers provide various services for the delivery which healthcare providers are required. Finally, there are institutions such as the government or the ministry of health and family welfare (MoHFW) overseeing activities of all different institutions related to healthcare services while at the same time formulating programmes and policies to best utilize the available resources to the greater good of the country. Lack of harmony among or between different segments of healthcare services underline possible discrepancy between demand for and supply of various services, therefore, short fall in supply of required skill categories.

9.3.3 Education and Training of Healthcare Providers

The institutional facilities available in the country to produce different categories of healthcare providers have increased over the past decades both in terms of the number of institutions and the level of student intakes. Cumulated over time, this provides the stock of professional and technical skills available in the country. There are now 147 medical colleges in the country of which 55 are in the public sector and 92 in the private sector. They provide 5 years training in medical subjects offering MBBS degree followed by 12 months internship programme. The basic educational qualification to enrol as a medical student is 12 years of schooling with background in science and biology. Total annual intake capacity of these colleges is 11,569 as of 2013, 5,485 for public medical colleges, and 6,084 for private medical colleges. Given liberalisation of the education system, more and more medical institutions are in the pipeline, both public and private, capable of churning out more and more doctors if required by the country.

Unlike medical colleges, however, institutional facilities to teach nursing professionals and medical technicians have been quite limited. Currently, there are 91 nursing colleges and institutes providing diploma in nursing; 36 institutes provide B.Sc. in nursing. Then there are 12 institutes which provide training in midwifery. Basic educational requirement is 12 years of schooling. Both public and private sector training institutes play important roles in nurse training. Total intake capacity of these various training institutes for nurses is 7,385 and 320 for midwifery. While private institutes account for most of the training of midwifery, public sector plays a greater role in the training of nurses.

The institutional facility for training medical technicians has been very limited both in terms of number of institutes available and their intake capacity. Here the minimum educational requirement is 10 years of schooling. There are in total 104 training institutes to train different categories of medical technicians, of which 97 are in the private sector. Their annual student intake capacity is around 14,075, of which 11,391 are in the private sector and 2,684 in the public sector. These institutes provide BSC degree in medical technology, 3 year diploma and 1 year certificate courses in medical technical areas such as laboratory, radiology and imaging, radiotherapy, physiotherapy, dental and sanitary inspectors. There are particular training institutes under the public sector, as also under the private sector, which provide specialised training for FWVs, community-based skilled birth attendants (CSBAs) and community paramedics.

Allopathy remaining the mainstream medical education in the country, National Health Policy of the Country enacted in 2000 emphasized on alternative health education based on systems such as ayurvedic, unani and homeopathy. There are 64 academic institutions in the country providing teaching and training in alternative medicine in the country, offering graduate programmes with 5 years of study and 12 months of internship (BUMS and BAMS) or diploma with 4 years and six months of internship (Diploma in UMS and AMS). Homeopathy remains the most popular alternative medicine training in the country offered by 41 different institutions, all of which are in the private sector. Only 3 out of 64 public sector institutions provide teaching and training in alternative medicines.

9.3.4 Current Stock of Nursing and Medical Technicians

Accumulated over the years and netted for various attritions, change of profession, death, withdrawal from the job market or international migration, the country's total stock of nurses and medical technicians is quite limited, particularly with respect to medical technicians.

The total number of registered nurses in the country, as of 2014 is estimated 38,452, as compared to the number of doctors present in the country of 61,921. This gives a ratio of doctors to nurses as 1:0.62 as compared to the WHO recommendation of 1:2.There are at present about 3,249 medical technologists in the country. Included under this group are laboratory technicians, radiology and imaging, radiotherapy, physiotherapy, dental assistants, and sanitary inspectors. On top of these, there are 7,330 medical assistants designated as sub-assistant community medical officers (SACMO). They have three years diploma as medical assistant after 10 years of schooling trained by both public and private sector training institutes. Combined together, these two groups of medical technicians totaled 10,579, almost one fourth of the number of nurses currently available, and one sixth of the total number of doctors.

The other categories of medical technical people called health assistants, health inspectors and assistant health inspectors. Together their current stock is 22,580; the biggest number 17,532 accounted for by health assistants. Their jobs basically include assisting doctors and nurses in various capacities.

Two other groups of medical technicians serve in the health sector in various capacities. First, there are about 11,000 registered pharmacists in the country. They are basically owners of medicine or drug stores with some formal or informal training in prescribing medicines to their clients for very common type of diseases, at times called informal healthcare providers.

Table 9.4: Quantitative figures on human resource for health (2011, 2013, 2014)

Sl.	Different occupation &skill groups	2011	2013	2014
1	Total registered graduate doctors	53,063	65,767	75,514
2	Estimates total doctors available in country	43,537	53,929	61,921
3	% of doctors working under MoHFW-	35.0	35.0	41.0
	% doctors working under other ministries (Home, police, railway, civil aviation, LGRD, social welfare & labor)	3.0	3.0	3.0
4	% of doctors working under private sectors	58.0	62.0	56.0
5	Medical officers (MCHFP) under DGFP	540	586	--
6	Registered diploma nurses	26,899	33,183	38,452
7	Estimated nurses currently available	15,023	18,644	--
8	Dental surgeons	4,165	6,034	6,360
9	Thana family planning officer (TFPO)	546	364	366
10	Assistant family planning officer (ATFPO)	1,440	280	330
11	Registered medical technologists			
	a. Sanitary inspector	1,041	1,337	436
	b. Dentists	1,886	2,296	501
	c. Laboratory technicians	2,220	6,614	1,498
	d. Pharmacists	7,622	9,263	11,000
	e. Radiographers	1,456	1,746	629
	f. Physical therapists	581	823	144
	g. Radiotherapist	--	189	41
12	Medical assistants	7,365	7,365	--
13	Health Inspectors	1,401	1,399	1,245
14	Community health care provider	--	13,240	13,141
15	Sub Asst. community medical officer	--	6,704	7,330
16	Asst. upazila family welfare officer	--	211	130

Notes: (--) means data not available.
Sources: MOHFW, Health Bulletin, 2011, 2012 and 2013.

The other similar category of medical technicians includes health workers called FWVs deal mostly with family planning activities. They are trained in-service for a duration of 18 months by public training institutes like the National Institute of Population Research and Training (NIPORT) and Directorate General of Family Planning (DGFP). Total number of FWVs is estimated at 4,898, and their supervisors, called family welfare inspectors, add another 3,752 members. At the lower rank of family planning workers family welfare assistants who comprise 21,083 members. Together, 29,733 strong family planning workers and their supervisors comprise the biggest contingent of healthcare sector technical workers focusing on family planning activities though. Finally, medical technicians or related workers include community healthcare providers with a total stock of 13,141 as of 2014.

9.3.5 Institutional Facilities Providing Healthcare Services

Institutions such as hospitals, clinics, and diagnostic centres provide various healthcare services while at the same time create demand for service providers such as doctors, nurses, medical technicians, etc. They, therefore, act both as major actors on the supply side of healthcare services and as generating demand for various health providers. It is stipulated that the more the number of such institutions, the more shall be the supply of healthcare services.

Based on recent estimates, more than 60 per cent of total healthcare services in the country are provided by private sector hospitals, nursing homes, clinics and diagnostic centres. Most of such institutions, however, are not duly affiliated with the ministry of health; therefore, not much is known about their size, composition, location and relative growth over time.

Public sector hospitals are available from the very low administrative levels of the country called union, going up to upazila health complexes, district hospitals, general hospitals, and various specialised hospitals at major cities and the country's capital. Besides areas of specialisation, and geographical locations, some of these hospitals are medical college hospitals, and vary according to their patient holding capacity defined in terms of number of beds.

Classified broadly as hospitals located at upazila and below administrative levels, and those above, their numbers respectively are 467 and 126 respectively. Most, if not all, Upazilas have a hospital, as every district. For total 64 districts, there are 53 district hospitals. Particular hospitals specialize in certain areas of medicine like infectious disease, tuberculosis, cardiovascular disease, leprosy, etc. Some of the medical colleges and specialised hospitals provide post-graduate degrees. The overall capacity of these institutions to provide post-graduate degree, however, is very limited. Total number of seats for post graduate courses offered by these institutions is 2,237, covering 22 government institutions, 10 private institutions and 1 (one) medical university.

The private sector at present provides more than 60 per cent of the health care services in the country. As such, the number of private sector hospitals, clinics and diagnostics centres has been ever increasing. Estimates show that there are 5,220 registered private diagnostic centres; their actual number including unregistered could be many times higher. The number of registered private hospitals and clinics is estimated at 2,983, with a total hospital bed of 45,485 (BBS 2015).

9.4 Situation of Nurses and Medical Technicians

9.4.1 Nursing in Bangladesh

Nursing is not perceived as an honourable or a prestigious profession in Bangladesh, especially in comparison to doctors. Culture, religion and other socioeconomic factors strongly contribute to this perception.

Female participation in the healthcare workforce has been on the rise (especially in terms of female doctors). This change could have certain implications. Studies show it is more difficult to post women in rural and remote areas due to lack of infrastructure and other socio-cultural barriers. Many female doctors, nurses, medical technicians and para-professionals decide to stay at home after marriage, thereby becoming professionally inactive for indefinite periods of time.

9.4.2 Training and Education System

Basic nursing courses comprise of a 3-year diploma course after 12 years of schooling. Until the late 1970s, midwifery was offered as a separate training programme lasting 1-1.5 years. Later on, the midwifery programme was combined with the nursing training programs with one-year of midwifery training in the final year of the Diploma in Nursing. However, in 2011, a separate programme for midwifery was reintroduced after consideration of several deficiencies and problems faced with the combined programme.(WHO 2015)

After passing the diploma, nurses can undergo a two-year post-basic B.Sc nursing course as in-service or on-the-job training. In 2004, a Bachelor of Science in Nursing was introduced as a four-year graduate course. However, the number of B.Sc. nurses is low. Out of 174 sanctioned posts of Class-I nurses, only one had been filled as of June 2013 (MoHFW, 2013). This situation has been addressed since then with the introduction of both public and private organisational initiatives. Specialised nursing courses like cardiac nursing, rehabilitation and pediatric nursing and junior nursing (midwifery) are offered by private sector institutions. There is a demand for specialised nursing courses in the public sector so that the teaching staff is more knowledgeable and the services of the specialized staff, more effective.

9.4.3 Migration of Skilled Nurses

There has been a change in the demand side for nurses and other care providers in western countries. The main argument is that given the demographic pattern and aging populations, there is a huge demand for nursing and care provider services in most European and North American countries (Aminuzzaman 2007).Many developed nations are facing a demographic dilemma: they need to care for the increasing number of elderly people, whereas, at the same time, their nursing workforce and caretakers have also been ageing. The situation is further aggravated in some countries where the number of people enrolling in nursing programs is experiencing a slow down. This results in a shortage of nurses. The number of care providers is also not increasing as per demand.

To meet their requirements, developed countries have been pulling qualified nurses away from developing nations. The off shoring of qualified nurses increases the proportion of unqualified nurses left behind. Between 2001 and 2002, for the first time, there were more overseas nurses registered in the United Kingdom compared to local nurses. These international nurses came largely from Australia, India, the Philippines and South Africa, but Bangladesh's share has been rising over the years.

During the period of 1991-2004, a total of 20,825 female workers migrated from Bangladesh through the formal channels. Just about 5.74 per cent of the migrant female workers were nurses, of which 87 per cent went to Middle Eastern countries and the rest to the Far East (mostly Malaysia). (Aminuzzaman 2007)

Table – 9.5 International migration of health related skills over time

Occupational category	2010	2011	2012	2013	2014	2015	Total
Doctors	68	29	22	12	54	23	208
Nurses	173	6	69	3	7	1	259
Medical technicians	320	1,072	656	14	17	54	2,133
Total	**561**	**1,107**	**747**	**29**	**78**	**78**	**2,600**

Source: Compiled from data furnished by the BMET, Dhaka.

In recent years, however, the number of trained nurses migrating abroad has been very minimal. Between 2010 and 2015, a total of 259 nurses sought employment abroad, most of which took place in 2010. Quite similar is the case with respect to other medical professionals such as doctors and medical technicians. A sizeable number of medical technicians migrated abroad in 2011 and 2012 (Table 9.5).

The results of an opinion survey found in Aminuzzaman (2007) showed that 82 per cent of respondent nurses found it very difficult to pursue a nursing career in Bangladesh, particularly due to limited opportunities for career growth. Almost all of the respondents expressed dissatisfaction regarding their existing salary.

They felt that their salaries were very low compared to the services they had to perform, including long hours of work and heavy workloads. They noted that the overall "social image" of nursing was very low. This proved to be emotionally taxing for them, especially while pondering the implications of this for the next generation. All of the respondents in Aminuzzaman's study stated that their social image would be significantly improved if they got a nursing career overseas, especially in Europe, North America or Australia.

When asked about the potential problems of migrating, most of the respondents identified socio-cultural problems and racial bias. Despite the challenges, respondents noted that facing such discrimination abroad would be better compared to living in a country where their profession was not treated with dignity and was socially frowned upon (Rahman and Hossain 2011).

9.4.4 Medical Technicians

Medical technicians span across different disciplines in the health sector. Various health technicians such as laboratory technicians, pharmacists, radiographers, blood bank technicians, physiotherapists, medical technologists and occupational therapists are employed in the healthcare system. Technicians are one of the most significant auxiliaries to the health system.

9.4.5 Education and Training System

The Director General of Health Services (DGHS) is one of the agencies under the MoHFW. It arranges three-year diploma courses for pathologists and radiologists. After obtaining the diploma degree, they are legally recognised as medical technicians. They are directly recruited by the DGHS and deployed across rural and urban areas.

There are both Diploma and Bachelor level courses. As of 2011, there were 22 institutes that offered courses across different disciplines at the BSc. level. Further, institutes without official registration (mostly run by NGOs) provide informal training courses in such fields as ophthalmology, including optometry, refraction and training for ophthalmic assistants and nursing assistants (WHO 2015).

The State Medical Faculty (SMF) under the MoHFW has overall responsibility for the registration of training institutes, ensuring the relevance of the curricula for different professional groups, and for supervising student examinations. All training institutes are registered under the SMF. The Bangladesh Technical Education Board (BTEB) was formed under the Ministry of Education, but acts as an autonomous body that also approves institutes for healthcare technology. As on 2010, 69 private institutes were registered there, of which at least 31 were non-operational. As in nursing, the Center for Medical Education (CME) claimed responsibility for the development of curricula for health technicians, but their actual role was restricted, and limited to the two government institutes under the SMF. The Bangladesh Association of Medical Institutes (BAMI) represents private medical training institutes under the BTEB. It was formed out of the friction between the BTEB/Ministry of Education and the SMF/MoHFW. However, in practice, it had minimal influence in decision-making.

The current training system is producing insufficient and incompetent technicians and technologists. The shortage of technicians (estimated to be 483,000) has led many diagnostic centres and laboratories to employ 'healthcare technicians' who do not have any formal training background (Barkat and Ahmed 2014).

9.5 Findings Based on Field Studies

Discussed so far are evidence of skill shortage based on different secondary sources. This has been supplemented, however, with field level data collected through: Key Informant Interviews(KIIs), Institutional Surveys and Focus Group Discussions (FGDs). The goal was to generate and utilise first-hand information on different aspects of skill shortage including its very existence. What follows discusses major findings on skill shortage based on these different research methods.

9.5.1 Key Informant Interviews (KIIs)

A total of 12 different individuals drawn from across different arenas of the health sector have been interviewed intensively. They include directors, chairpersons, managers of hospitals and clinics, and those who have long been associated with the health sector in various capacities. Summary findings based on the interviews are presented in Table 9.6

Whilest existence of shortage of nurses and medical technicians has been perceived unanimously by all Key Informants, many of them sounded serious alarms about its level and possible consequences even during the immediate future – within 5 to 10 years time. There is, however, a lack of clear understanding about the meaning of skill shortage. Views on this varied in terms of, say, shortage in terms of "lack of job commitment," "difficult to get qualified good nurses," "shortage in terms of lack of proper training and experience," or "great dearth of nurses and medical technicians," etc. Irrespective of a lack of commonality in understanding of the issues, all those interviewed acknowledged the presence of shortage of nurses and medical technicians at present, as also their possible deterioration within the next 5 to 10 years.

The major skills identified as facing shortage include nurses with specialised training and experience in cardiology, gynecology, pediatrics, women health, medicine, surgery; medical technical graduates, blood drawing technicians, skilled in pathology, ultra sonogram, radiology imaging, physiotherapists, anesthetists, blood transfusion technicians, dialysis technicians, X-ray, laboratory technicians, ECG technicians, etc. The diversity of needs for different skill types and emergence of their shortage have been found to be related to the changing morbidity patterns in the country, increasing demand for quality health services, and inability of the existing institutional facilities to cater to the growing demand for different skills in needs. The disease pattern is changing; there are increasing cases of high blood pressure, diabetes, heart attack, and cancer. as compared to communicable diseases like malaria, tuberculosis, diarrhea, small pox, etc.

However, the demand for quality healthcare services is fast increasing. Led by the private sector, which contributes to about 70 per cent of the healthcare services in the country, health care institutions, hospitals, clinics, diagnostic centers, etc. are fast growing as spreading across the remote areas of the country. These changes, however, are not duly matched by corresponding supply of quality healthcare personnel; supply of nurses and medical technicians lag far behind respective demands, particularly when it comes to the question of quality and experience.

Concerns over the issue emerged mainly from possible adverse implications of shortage of nurses and medical technicians for the health sector service delivery including overall sector development. The observation is common about "deteriorating service quality," "no proper treatment possible with skill shortage," "using less qualified people to do the job of professional or technical people," "lack of job commitment," "helpless and overworked staff" which may ultimately cause "rise in morbidity or mortality."

Asked about possible options to overcome existing and/or emerging shortage of nurses and medical technicians, Key Informants focused on few key policy options.

These include: (a) public-private sharing of responsibilities to provide health services; (b) greater emphasis on human resource development planning; (c) improvement in education and training curricula; (d) greater institutional facilities for increased supply of medical technicians; and (e) government commitment to train, monitor and supervise the health sector.

9.5.2 Institutional Survey

A total of 10 health institutions have been surveyed based on a questionnaire. These include top rated hospitals, such as Square, Bangladesh Medical College, Green Life, Tangail General;diagnostic centres like Ibn Sina, Comfort, etc. and specialised healthcare centres like the Kidney Hospital, Gono Shasto Nagar Hospital, etc. The selection of respective institutions followed both reputations of individual organisations in the health sector and their willingness to participate in the study, not always easily forthcoming though.

The institutional survey focused, among others, on (i) overall size of the organisation in terms of total staff of select skill categories, (ii) composition of skill categories deployed by respective organisations, (iii) tenure of employment of employees, (iv) benefit structures of employees, (v) annual turnover rate, (vi) reasons and consequences of skill shortage, and (vii) way forward to overcome skill shortage.

Based on staff strength of select skill categories with potential to face shortage, current or in the next 5 to 10 years, listed as in Table 9.7. The largest health institution surveyed includes Square Hospital with a total staff strength of 1,189, distantly followed by Green Life Hospital (418), and Samorita (352). Except for Square and Green Life hospitals, the staff strengths in the rest of the sample organisations are quite comparable – varying between 352 (for Samorita Hospital), and 208 (for Comfort Diagnostic).

There would seem to exist a clear gender bias in favour of particular skill categories facing shortage. Skills such as nurses, personal care workers, dieticians, social workers or counseling, etc. they comprise mostly of females, and this is true across most of the hospitals. For instance, almost 100 per cent of the nurses are females; and there seems to be a cultural taboo towards males working as a nurse. For physiotherapists, there are both male and females, and their relative importance varies across hospitals. Hospital policies, presence of staff of different socio-religious backgrounds, benefit structures, etc. all could play a role in this respect. Some hospitals have an open policy to accommodate more female workers than males while the opposite could be true for other hospitals.

Lack of requisite training and experience to perform a particular task was identified as an important aspect of skill shortage and this is very much reflected in service length of personnel in skill categories deemed facing shortage. For many of these skill categories, people with long years of job experience are supported by those with very little job experience as low as zero years of experience. And the situation is true across almost all sample institutions. For instance, physiotherapists with 15 years of jobs experience are supported by young colleagues with only 1 year of experience; personal care workers could have no job experience at all. What it means is experienced workers take up very inexperienced juniors together to provide the required services, resulting in a deteriorating service quality. Existence of skill shortage under free market conditions leads to frequent job changes towards higher benefit levels causing a high turnover rate for affected skill categories. Too many employers chasing too few experienced skill personnel lead to higher offering higher benefits. Together, shortage of skill shall be associated with high turnover rate and lower differentials between maximum and minimum level of salary or benefits enjoyed by respective skills. The survey data, however, do not provide any definitive conclusions to these aspects of skill shortage.

Survey data on turnover rate by skill category across individual institutions are very limited; there seems to be a lack of a clear understanding of the issue and the record keeping is poor. Sample institutions, which could provide some information on employee turnover rate, however, do not express turnover to be of significant. Ibn Sina, for instance, reported employee turnover rate of 9 per cent for nurses, 5 per cent for healthcare assistants, and almost zero (1%), for rest of the skill categories reported. Green Life, on the other hand, reported a higher rate of turnover for different skills facing shortage. It reported 10 per cent turnover rates for nurses and personal care workers; 5% for radiographers and physiotherapists and none for the others. The Square hospital reported an aggregate turnover rate of 13 per cent across all skill categories identified.

Notably, the issue of turnover rate is not equally critical across all skill categories partly because located in the Capital major hospitals can easily attract skills, which have high turnover rates by offering better benefit package or by substituting low skill technicians for the higher skilled ones. Less skilled technicians work under the supervision of a senior employee, and in the case of needs fresh recruits can be pulled in to fill any service needs. However, shortage of skill categories such as experienced nurses or laboratory technicians could be critical for service delivery and authorities are quite concerned about such shortage. These skills are very much required for quality service delivery but not easily replaceable by less experienced juniors, fresh graduates. (Table 9.C6)

Does skill shortage in any way reflect upon the wage differentials among workers within the same skill category but at different levels of education or job experience? Could it be that as shortages increase for a particular skill, the gap between the maximum and minimum level of salary or benefits earned shall be narrowing down? In a tight labour market situation, fresh graduates shall be offered higher level of benefits compared to their predecessors both as an incentive to attract fresh graduates and to defuse greater acceleration in the benefit package of senior staff within the same skill category.

Taken as a percentage difference between the maximum and the minimum level of salary received by an individual in a particular skill category, such differences narrow down as the level of scarcity increases. In the case of nurses, for instance, the gap between the maximum and minimum salary ranges between 1.3 times (as in the case of Ibn Sina) and 1.2 (for Samorita). Similarly, for radiographer, the figures are 1.5 and 0.3 for Ibn Sina and Green Life respectively(Table 9 C5). With regard to possible reasons and consequences of skill shortage, the sample health institutions were not very much forthcoming, although many of the higher officials in respective organisations provided insights into the issue as Key Informants discussed earlier. Possible reasons for skill shortage identified by few sample organisations focus mainly on two issues: (a) poor benefits package offered for nurses and medical technicians, and (b) differential benefits offered by public and private sectors.

With increasing privatisation of the health sector, currently accounting for about 70 per cent of total sector services, private health institutions take the lead in fixing benefits for the health sector personnel which is in most cases trying to offer as lower a benefit as possible. Such a low benefit structure would have very discouraging effect on the choice of these various occupations. As shown in Table 9 C5, minimum salary structure for skill categories such as personal care workers, physiotherapy technicians are as low as Taka 7,000 per month. Going down to the skill ladder, the benefit structures for low level health technicians is much lower. With certificate or diploma degree in health technology, such a low benefit structure would be most discouraging for choosing such a profession.

No less important would also be the problem of social recognition and stigma attached to various health related technical jobs. Occupations such as nursing, personal care, cleaning jobs are viewed very low in social life of individuals. A higher monetary benefits is having positive change on social views and stigma though, it would be very slow to improve over time. Important is also the question of prospects of professional development and promotion. Skill category such as medical assistants, which takes 4 years to complete after 10 to 12 years of schooling, is said to have no future; "join as MA and retire as MA." People could have taken the profession more positively should there have been the prospects for further skill development and training, and promotion in rank.

Differential benefit packages offered by the public and private sectors have been identified as a major drag in encouraging more and more people coming into nursing and medical technician profession. For instance, status of nurses in the public sector has improved over time. Nurses start their government job as a Second Class government officer, and salary benefits at the starting are quite high compared to those beginning a similar career in the private sector. Except for the very few top rated hospitals, such as Square or United, starting salary for nurses could be as low as 7,000–10,000 as compared to 15,000 to 20,000 in public hospitals, which why many of those nurses working in private hospitals consider themselves being unemployed.

With regard to the consequences of skill shortage, perceptions of the sample health institutions are quite similar. As already reflected in KIIs, possible consequences include (a) poor quality of healthcare service, (b) overwork for existing health workforce, and (c) substitution of low skilled workers to higher skilled ones. Looking forward to what can be done to overcome existing skill shortage and/or that which can emerge in the next 5 to 10 years, sample institutions have similar view points as already reflected in KIIs. Summary of their observations is listed in Table 9 C 6. Particularly important issues emerging from the institutional survey include:

(a) Role of the public sector in taking a lead in terms of upgrading curriculum, building of institutional facilities for training health related technicians, and ensuring proper cooperation and coordination between public and private sectors in increasing supply and improving and maintaining quality.

(b) Improving the status of health related workers in public service, and ensuring a minimum job condition for those in the private sector.

(c) Shortening different training programmes into smaller modules such as certificate programme, diploma programme and degree programme enabling quick supply of skills and enabling scope for skill upgrading for respective workers should they feel appropriate.

9.6 Skill Gap of Nurses and Medical Technicians

The preceding sections discussed demand, supply and current stock of doctors, nurses and medical technicians in the context of Bangladesh. Discussed also were major underlying factors such as population dynamics – size, growth, distribution and composition, morbidity patterns, growth of institutional facilities, etc. It further discussed perceptions about possible shortages of medical professional and technical skills as well as possible consequences based on desk research, institutional surveys, and key informant interviews. Missed from the preceding discussions, however, are ascertaining the nature and level of skill shortage, and their possible trends moving into the future. Which nursing and medical technician skills could face shortages in the near future, and what could be the possible level of such shortage in numerical terms. Some lights have been shed on the issue of nature of skills which could face shortage as, based on desk research, surveys, and discussions. However, quantification of their possible level of various skills facing shortage needs to be completed.

This, however, is important not only because it identifies the skills which would face shortage and associated consequences - already discussed, but also the extent of shortages to be faced at different points in time, and ultimately towards designing appropriate policy options to minimise any associated costs and maximise latent opportunities.

Unfortunately, whilest the past can be discussed with a 2020 vision, the same for the future, especially going into 5 to 10 years, is not that simple, least can be done most objectively. Despite various limitations, what follows discusses the level and timing of shortage of nursing and medical technical skills in the next 5 to 10 years. The focus is on identifying skill gaps of nursing and medical technical skills though, given their complementary nature, also discussed here is the future demand and supply of doctors in the country. Skill gap here is seen simply as the difference between the demand for and supply of the respective skill category at a given point in time.

9.6.1 Skill Gap of Doctors

Table 9.6 focuses on the demand for and supply of doctors in Bangladesh at three different time periods; current year(2016), in five years from now (2021), and 10 years from now (2016). For each period, it further estimates the gap between respective demand and supply to be called the skill gap. Both demand and supply are based on alternate estimates arising from alternative set of assumptions about factors that underlie. While deciding the underlying assumptions, the goal has been to keep the estimated values of demand and supplies as modest as possible, therefore, yielding a similar modest value for any existing skill gap.

Factors which have been critical while estimating the current and future demand for and supply of doctors in the country include: (a) population size of 160 million as of 2016, (b) population growth rate of 1.011 per cent per year - following the World Bank,(c) population-doctor ratio of 2,522:1 – as based on 'total doctors available/working in the country as of 2014 and (d) the number of doctors in the country increasing at a modest annual rate of 10 per cent from 2014, and onwards – slower than the rate experienced between 2011 and 2014 which was around 14 per cent.

Table 9.6: Demand, Supply and Skill Gap of Doctors in 2016, 2021 and 2026

Demand/ Supply/ Skill Gap	2016	2021	2026
Demand	63,395	67,265	71,370
Supply	74,924	120,667	194,335
Skill Gap (demand less	(-11,529)	(-53,402)	(-122,965)

Note: Demand is based on the continuation of the current population/doctor ratio of 2,522:1 as of 2014; supply is based on an annual growth rate of 10% over the number of doctors in the country in 2014 inclusive all possible attritions.

As Table 9.6, shows there rather exists a surplus of doctors in the country at the moment, and it is expected to increase significantly moving into the future. The results should, however, be taken with some caution. First, the assumed population/doctor ratio is very high – 2,522 to 1, which is about 0.4 doctors per 1,000 people, a very low figure by any standard. Two extreme examples are India and OECD countries. In India, there are about 0.7 doctors per 1,000 people; in OECD countries, the corresponding figure is 3.2 doctors per 1,000 people. So any lower population/doctor ratio will automatically increase the demand for doctors.

9.6.2 Skill Gaps of Nursing Professions

Table 9.7 shows possible gaps in the demand for and supply, both current and future of nurses in the country. Unlike doctors the demand for nurses, however, can be looked at from different angles with varying implications for respective size. It can be approached from (a) population/nurse ratio basis, and (b) doctor/nurse ratio. On both account, there are what are called World Health Organization (WHO) standard, OECD country standard, or Government of Bangladesh (GoB) standard based on current state of affairs as relating to number of nurses available in the country – employed or unemployed, as compared to the country's total population. Application of all these different assumptions yields varying estimates of the demand for nurses in the country and at different points in time.

One extreme estimate is that as based on the OECD population nurse ratio – yielding an estimated demand for nurse at 1.4 million in 2016, 1.5 million in 2021 and 1.6 million in 2026. The other extreme is the Government of Bangladesh (GoB) estimate, based on 2014 data, which was one nurse per 4,061 people. The estimated demand for nurses varies between 39,370(2016), and 44,323 (2026). Both these estimates would seem unrealistic looking into the future. A third option is to estimate the demand for nurses following the demand for doctors, and assuming a doctor nurse ratio of 1:2 instead of 1:3 as recommended by the WHO, which is what has been utilised in Table 9.7.

The estimates of the supply of nurses have been rather straight forward. It is based on the current availability of nurses in the country extrapolated into the future with an annual growth rate of 15 per cent - the rate experienced during 2011 through 2014.

Table 9.7 : Demand, supply and skill gap of nurses in 2016, 2021 and 2026

Demand/ Supply/ Skill Gap	2016	2021	2026
Demand	126,791	134,529	142,740
Supply	30,574	61,496	123,690
Skill gap (demand less supply)	96,217	73,033	19,050

Note : Demand is based on GoB doctor/nurse ratio of 1:2 and population/doctor ratio of 2,552:1; supply equals registered nurses available in the country, 23,119, as of 2014, increasing annually at the rate of 15 per cent.

Based on Table 9.7, the current gap between demand for and supply of nurses in the country is quite high a gap of over 90,000. The gap, however, declines over time due to a slowing down in demand as population growth slows, and as the corresponding increase in supply is quite high.

The above refers to the demand for and supply of nurses as a whole – all their different specialisations taken together. However, as mentioned earlier, there is an increasing concern not only about the overall supply of nurses in the country, possibly more important, but also about the availability of specialised nurses towards the country's changing morbidity patterns. These include specialisation in such areas such as cardiac, neurology, ophthalmic, intensive care, nephrology, etc.

While it is easier to identify the needs for specialised nursing professionals, ascertaining their relative importance and expected pattern of needs over time is rather complicated. What should be the relative importance of the 10 different specialised nursing professional groups identified earlier? And could there be changes over time in respective importance? More important, could total nursing professionals be divided between those who would practice general nursing profession and others serving as specialised nurses? The latter could comprise a certain percentage of total nurses available in the country with specialised training in a particular area of nursing.

Failing to find an objective answer for any of the above questions, two simple assumptions have been made. First, only 20 per cent of all nurses available in the country may need to have specialised training, and the remaining 80 per cent general training. Secondly, all 10 specialized categories of nurses are assumed to have equal relative importance and which remain constant over time. Moreover, since there is no reliable information on the availability or supply of different specialized categories of nurses no, skill gap estimate could be made for respective skill category. Under the circumstance, demand for each specialised category of nurses is assumed itself to be an indicator of the respective skill gap.

Table 9.8 :Demand for specialized categories of nurses in 2016, 2021 and 2026

Sl.	Specialised nursing categories	2016	2021	2026
1	Cardiac	2,536	2,691	2,855
2	Intensive care	2,536	2,691	2,855
3	Pediatric	2,536	2,691	2,855
4	Community	2,536	2,691	2,855
5	Psychiatric	2,536	2,691	2,855
6	Gerontology	2,536	2,691	2,855
7	Trauma & Orthopedic	2,536	2,691	2,855
8	Nephrology	2,536	2,691	2,855
9	Neurology	2,536	2,691	2,855
10	Ophthalmic	2,536	2,691	2,855
Specialised nurses		**25,358**	**26,906**	**28,548**
Generalised nurses		101,433	107,623	114,192
Total demand for nurses		**126,791**	**134,529**	**142,740**

Note: Demand for nurses is based on GOB doctor/nurse ratio of 1:2 and population/doctor ratio of 2,552:1. Relative weight for the specialized nursing categories as a whole is 20 per cent of total demand of for nurses; individual specialised nursing categories are assumed to be equally important in relative terms.

Table 9.8 estimates the total demand for specialised nurses at different points in time based on total demand for nurses in the country and assuming 20 per cent of them specifically trained as specialized nurses. The current demand for specialized nurses is around 25,000.This is expected to rise to 27,000 in 2021 and 29,000 in 2026. Based on their equal relative importance, the number of specialised nurses for each of the 10 specialised categories identified will vary between 2,500 (2016), and 2,900 in (2026). However, any change in respective relative importance of specialised nursing categories and/or their relative share as compared to generalised nurses shall affect the level and trend of different specialised nurses that will be required over time.

9.6.3 Skill gaps of medical technicians

The overall demand for medical technicians can be looked at from the point of the demand for doctors multiplied by a constant ratio. While WHO recommends a doctor/ medical technician ratio of 1:5, in the Bangladesh context, a more appropriate ratio could be 1:2. Applying this modest option, Table 9.9 estimates the overall demand for medical technicians at different points in time. The current demand for medical technicians – as of 2016, has been estimated at 127,000, rising to 143,000 in 2026. Notably, the projected number of medical technicians would seem to be rather too modest. This is partly because the number of doctors, on which the demand for medical technicians have been based, underlines a low population growth in the country going into the future as also a very low population doctor ratio. The latter is particularly important as a higher doctor population ratio shall automatically increase the demand for doctors, therefore, corresponding demand for medical technicians. Moreover, given lack of data on the supply side on all individual skill categories, the table provides only the demand side of the picture, therefore, no skill gap analysis. It simply estimates the demand – overall and specific to 20 different medical technician groups identified as important.

Table 9.9 : Demand for medical technicians in 2016, 2021 and 2026

		2016	2021	2026
Overall demand		126,791	134,529	142,740
Demand for individual skill categories				
Sl.	Individual skill categories			
1	Radiology & Imaging	6,265	6,726	7,137
2	Cathlab technologist	6,265	6,726	7,137
3	Blood drawing technician	6,265	6,726	7,137
4	Anesthetists	6,265	6,726	7,137
5	Medical assistants	6,265	6,726	7,137
6	Dialysis technician	6,265	6,726	7,137
7	Dental assistant	6,265	6,726	7,137
8	Physiotherapy	6,265	6,726	7,137
9	Integrated medical	6,265	6,726	7,137
10	Laboratory assistant	6,265	6,726	7,137
11	Junior midwifery	6,265	6,726	7,137
12	Patient care	6,265	6,726	7,137
13	Pharmaceutical assistants	6,265	6,726	7,137
14	Family welfare visitor	6,265	6,726	7,137
15	Family welfare assistants	6,265	6,726	7,137
16	Community health care provider	6,265	6,726	7,137
17	Community medical officer	6,265	6,726	7,137
18	Community paramedic	6,265	6,726	7,137
19	Community-based skilled birth attendants (CSBAs)	6,265	6,726	7,137
20	AIDE to nurse	6,265	6,726	7,137

Note: Demand for medical technicians is based on: (a) population/doctor ratio of 2,552:1; and (b) doctor medical technician ratio of 1:2; for individual skill categories respective demand is based on equal relative importance - 0.05%, in the overall demand for medical technicians.

Table 9.10 estimates demand and supply of select skill categories for which relevant information is available. The select skill categories include laboratories technicians, pharmacists, radiographers, physical therapists, radiotherapist, medical assistants, and sub assistant community medical officers. On the demand side, these 7 skill categories are assumed to have equal percentage share of the overall demand for medical technicians 5 per cent for each category, totaling 35 per cent of total. Their supply, both current and future, is based on a 5 per cent annual growth over the existing supplies based on 2013 data.

Table 9.10 : Demand, supply and skill gap of select medical technicians

Demand/ supply/ skill gap	2016	2021	2026
Total demand for medical technicians*	126,791	134,529	142,740
Select demand**	44,377	47,085	49,959
Select supply	37,859	48,319	61,668
Skill gap (demand less supply)	6,518	-1,233	-11,709

Note : Total demand for medical technicians follows from the Table 9.6. ** select medical technical skill categories include: laboratories' technicians, pharmacists, radiographers, physical therapists, radiotherapist, medical assistants, sub-asst. community medical officer.

The select skill categories, based on their assumed relative shares and growth over time, seem to have some skill gap right now. Moving forward, however, situation is expected to improve, and by 2026 there shall be more supplies of select skill categories than corresponding demands. One possible explanation for seemingly less urgent situation with respect to medical technicians could be that select list covers only 7 out of 20 medical technical skills identified as important, but for which, however, we have very little information.

Take for instance the cases of radiology and imaging, cathlab technologists, anesthetists, etc., the current supplies of respective skills based on informed knowledge are quite limited, and there is growing need for such skills due to changing morbidity patterns in the country. If the skill gap for all these different skill categories could have been thoroughly analysed – both their demand and supply sides, the situation with respect to respective skills would have emerged more clearly.

9.7 Way Forward

9.7.1 Future strategies to address skill gaps

In order to address the inappropriate skill-mix, the following recommendations could be made:

- ***Introduction of task-shifting:*** This can be achieved through an overhaul in the education and training process. Healthcare workers would be multi-skilled, and not just limited to particular tasks. For example, medical technicians who have basic nursing skills, or nurses who can effectively operate medical equipment and diagnostic machinery. This would require proper training and careful assessment so as to avoid potential dangers.
- ***Improvement in the stature of nurses, midwives and technicians:*** Public education campaigns can be arranged in order to improve the stigma that exists against the nursing profession. This should promote nursing, and increase the demand for training. Trained nurses could also be retained, as many nurses tend to quit the profession after marriage due to the same social stigma.
- ***Increasing production capacity for nurses:*** The MoHFW should provide arrangements for increasing the number of seats in nursing colleges and training institutes. Nursing is a significantly cheaper course, as compared to doctors, so this can be achieved without much financial burden. Bangladesh Health Watch (2008) reports that nurse-training should be increased because of high recruitment rates, willingness to work in rural areas, and lower costs per nurse.
- ***Training new cadres of community skilled birth attendants and midwives:*** The MoHFW should create provisions to train healthcare workers as community skilled birth attendants, especially for rural areas. Community health workers from BRAC have already set an example, as described by May et.al.(2011). Training may also be provided to improve the competency of the vast army of unqualified providers (especially village doctors) in rational and harmless healthcare provision (Ahmed Hossain and Chowdhury 2009). If there arises any concern that upgrading their diagnostic and curative skills may lead to abuse and malpractice, it may be contained by managerial and regulatory interventions by the public sector (Kamal and Nichter 1998).
- ***Coordinating training activities:*** Bangladesh government can work with the Bangladesh Technical Education Board in order to promote task-shifting (discussed above) and improve the skill-mix distribution. This way, the trainees can gain the appropriate skills to perform specified tasks. The curricula should be updated frequently to meet global standards and to suit practical purposes.
- ***Improving access to and knowledge of basic primary healthcare:*** According to the Bangladesh Bureau of Statistics (2008), the most common illnesses (fever, pain, diarrhea and dysentery), at least in the primary care level, can be handled by the para professionals (nurses, medical technicians, family welfare visitors, including CHWs), with the establishment of a functional referral system to a higher level of facilities (Kruk et al. 2009, Shadhin and Chowdhury 2008).
- ***Decentralisation of health services:*** Increased delegation of management and financial responsibility to the upazila level will help improve the quality of services to a large extent. Establishment of an Upazila Health System of preventive and curative health services, including specific disease control programmes, accountable to the Upazila Health Management Committee, would help in fostering high-quality service at the local level.

9.7.2. Way Forward to Address Shortages in the Healthcare Workforce

The following strategies can be used as an attempt to reduce shortages in the healthcare workforce.

- ***Filling up current vacancies as soon as possible:*** This can address the shortage problem, but an on-the-job training opportunity needs to be implemented, especially for unskilled workers. MoHFW needs to coordinate the overall hiring process through engagement with other ministries and authorities.
- ***Accelerate the recruitment of nurses and CHWs and introduce a comprehensive HRH policy:*** The hiring procedure should be such as to meet the WHO standardized predefined ratios (doctors: nurses: technicians). A sector-wide approach could be used for closing the gaps.
- ***Improve professional attractiveness of the public sector:*** By implementing a salary restructure, offering incentives and redefining benefits and performance appraisal methods, healthcare workers could be attracted from the private sector. It is important to identify the particular benefits which will make workers lean towards the public sector.
- ***Explore contracting mechanisms with non-state service providers:*** This can be done in an attempt to supplement the public network of healthcare professionals.
- ***Regulation of dual practice for healthcare workers in the public sector:*** ICDDR, B (2010) reports that 80 per cent of public sector healthcare employees are involved in dual-practice. This is mainly because nursing and technician jobs are mostly shift-based. Proper supervision should be enforced to ensure they are fulfilling their duties and responsibilities, especially in the public sector.
- ***Engage other government entities to expedite the hiring process:*** Currently, nine government authorities are involved in recruiting employees for the public sector (El-Saharty 2015). By holding cabinet-level dialogues to address the healthcare shortages, the MoHFW can expedite the hiring process to third-parties, while enforcing strict guidelines and routines.
- ***Establish high-level coordination platforms in the MoHFW:*** MoHFW should implement the planned National Health Workforce Committee and National Professional Standards Committee as laid out in the Health Workforce Strategy for 2012–32 (El-Shahrty 2015). They should be held collectively responsible for leading coordinated efforts for the training, recruitment, deployment, and regulation of all healthcare professionals.Workload standards could be redefined in order to increase the role of nurses, midwives and para-professionals.

9.7.3. Strategic Interventions for Improving Nursing Education Institutes

A cooperative dialogue on Advanced Nursing Education in Bangladesh (2013) brought together (Lund, Huda and Berland 2013), delegates to identify barriers to the advancement of nursing education in Bangladesh. Their expert suggestions include:

- Provision of support for training of nursing instructors (e.g. specialty courses and short courses) with full-time and part-time attendance options.
- Implementation of a “Centre for Nursing Development” with a wide base of national and international advisers to facilitate cohesion in identifying and communicating nursing concerns, building educational capacity and leadership training.
- Defining proper well-defined job descriptions and prepare monitoring and evaluation protocols to improve accountability and standards for students and staff.
- Development of an effective Management Information System (MIS) to improve the quality of monitoring in appointments and service delivery.
- Creating policies, networks and positions to guide and support collaboration between education and clinical practice.
- Offering incentives and recognition for initiative and excellence.
- Allocating resources to strengthen the capacity of nursing institutes and colleges (classrooms, labs, libraries, multi-media and internet facilities).
- Investing in new internet technology for nursing instructors in order to share expertise.
- Creation of a structured framework to communicate nurses’ professional concerns (career progression, concerns, remuneration and benefits).

Nursing Institutes and hospitals can take the example of Brazil's Hospital SírioLibanês, which is committed to skills development of its workforce and the community at large (DEG and others 2016). They offer services for development and continual improvement of the hospital's workforce. Like Bangladesh, Brazil is also a developing country. Therefore, some of their practices can be implemented in Bangladeshi institutes without much resistance. They include:

- Provide training simulations for newly-hired nursing staff and medical technicians. This can cover the most frequently occurring errors in treatment and care.
- Work in multidisciplinary teams to deliver high quality care to patients. This will also promote the development of a varied skill-set.
- Design a skills-upgrading programme at the operations-level. The existing low-skilled and unqualified workers can foster and develop their skills and eventually qualify for formal positions. This also improves career prospects of the workers. It also allows hospital employees to develop skills internally.
- Carry out annual performance assessment. This is done to assess each employee's development stages and to detect any potential gaps in skills, training requirements and new opportunities for professional development. These will also ensure high quality patient care.

9.7.4. Strategies for Retention of Healthcare Workers

- ***Augmentation of the pool of healthcare professionals:*** By providing financial and non-financial incentives, the MoHFW can attempt to bring inactive healthcare workers back to active participation. Many Bangladeshis trained as healthcare professionals opt out of the health workforce due to better opportunities or problems with working outside the home for women.
- ***Internalised placement system for trainees:*** There can be provision for jobs, even before the trainees graduate. This would minimise the amount of time spent looking for jobs after graduating. The MoHFW can collaborate with training institutes to ensure placement for all trainees.
- ***Developing a clear programme for career development and progress:*** Retention can be greatly improved if the workers have a clear idea of their career progression laid out for them. Retention can be improved by in-service training and by implementing differential payment structures.
- ***Establishing an incentive system for the public sector:*** Incentives can be offered to the workers in order to address the shortage of healthcare professionals in rural and remote communities. This method has shown success in Thailand (Tangcharoensathien et al. 2013). The incentives can be packaged into the salary structure as benefits, performance bonuses or hardship allowances.

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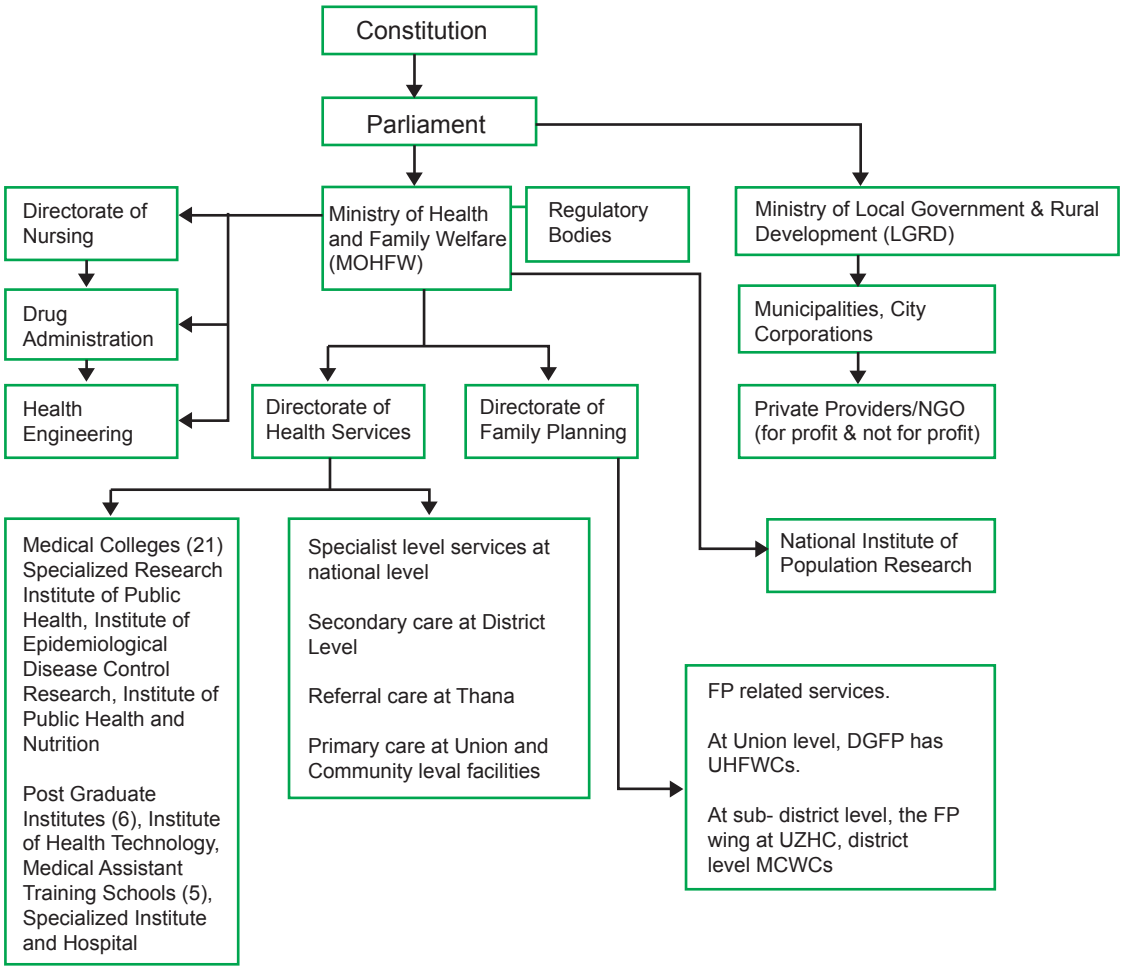
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Appendices:

Appendix A: Context of Bangladesh' Healthcare System

Organisation of the Current Healthcare System of Bangladesh



Source: Asia Pacific Observatory on Health Systems and Policies

The legal guidelines for medical education and practice are dictated by the Medical and Dental Council (BMDC) Act. It provides regulations for the establishment of a consistent minimal standard of basic and higher education, as well as qualifications in medicine and dentistry. In addition to that, there are regulatory and statutory bodies, which aim to:

i) Develop skilled manpower (doctors, medical practitioners, nurses, pharmacists etc.)
ii) Ensure the standard of healthcare services by regulating the activities of professionals
iii) Protect people's rights
iv) Ensure access to health services

These regulatory bodies include the Bangladesh Medical and Dental Council (BMDC), Bangladesh Nursing Council (BNC), and the State Medical Faculty (SMF). These have developed into managerial bodies for proper governance of the healthcare sector in Bangladesh.

The BMDC was established in 1980 to regulate the registration process and to award medical practitioners and dentists (through licenses, certifications etc.) in order to establish a uniform standard of basic and higher qualifications in medicine and other medical matters.

The BNC was established in 1983 to act as a national education board in order to ensure quality education for nurses. It serves as the regulatory body and focal point from which all activities related to nursing are managed. The BNC works closely with the Directorate of Nursing Services in regulating nursing and midwifery services.The State Medical Faculty (SMF) of Bangladesh was established in 1914 for the purpose of approving medical courses, conducting examinations and awarding diplomas and certificates (since 1962) to candidates who successfully pass medical examinations. It includes courses for paramedical technicians, medical assistants and technologists.

These bodies face several legal challenges. They also have limited resources and funding. The BMDC has the authority to exert punishment for medical malpractice, but it has failed to enforce this power. Due to this, negligence, malpractice by medical practitioners has become quite common in Bangladesh. The BMDC cannot act without gaining prior approval from the Ministry of Health and Family Welfare (MoHFW). Hence, they cannot initiate independent investigations against doctors working in state-owned medical institutions. BMDC can only show-cause notices to the authorities of the respective institutions. In many cases, these medical institutions form committees to investigate complaints from BMDC, but the complaints are hardly dealt with.

In recent years, the Bangladesh Technical Education Board (BTEB) and the MoHFW have started exerting their dominance over the SMF. Any institute can acquire licenses to provide diplomas and certificates by gaining permission from the health ministry and subsequently gain approval from the SMF. This two-tier system of approval is rather time-consuming for potential medical educational institutions. The regulatory power is highly concentrated at the health ministry despite the existence of various institutions which are assigned for regulating the behaviour of healthcare providers and standardization of services. The managerial role of the public sector is dictated by a weak legal framework and the insufficient institutional capacity of regulatory authorities.

Since the early 2000s, the policies for human resources and health (HRH) have been experiencing a shift in focus – from expanding the workforce and improving efficiency (of doctors, nurses, medical technicians, through training and education) to providing training for Community Health Workers (CHWs) to provide basic health and medical care to the community.

Overview and Governing Bodies of the BNC:

The Bangladesh Nursing Council (BNC) and the Directorate of Nursing Services (DNS) jointly serve as the regulatory body and focal point from which all activities relating to nursing are managed. The activities encompass all involved in nursing and midwifery education and practices. In Bangladesh, the BNC legally decides the curriculum for nursing and midwifery education and appoints nurses and midwives. The DNS too shares similar responsibilities in terms of decision-making authority to other Directorates under the MoHFW.At the national level, the DNS serves as a policy-making committee relating to healthcare services and education within the public sector.

Nursing services are regulated by the Bangladesh Nursing Council Ordinance 1983.The BNC had revised the curriculum in 2006, and it's current implementation is based on a new curriculum for the Diploma in Nursing Course.In the new curriculum, the BNC aims to strengthen the capabilities of nursing and midwifery professionals according to the needs of individual patients by cultivating critical thinking skills and addressing the need of nursing and midwifery across different communities.

Although the curriculum has been revised, there is still a lack of healthcare professionals. The shortage in the number of nurses required cannot be addressed solely by a Diploma in Nursing. Private nursing courses and midwifery education are considered as being equivalent to certificate nursing courses.

In the transitory stage of nursing and midwifery education, it is an issue of how the shortage of healthcare professionals can cope with the strengthening of the education for improving the standard of nursing and midwifery (Hashimoto and matsumoto 2012).

Nursing Institutions and Data

The BANBEIS Education Statistics report (2014) shows that the subsector of Professional Education institutions has grown from 199 in 2003 to 476 in 2014. Medical, dental, nursing and homeopathic colleges occupy a large portion of this number. The report shows that 10 per cent of all students were in nursing

institutes, which also happened to have 78 per cent female teachers. Forty-seven per cent of these institutions were in Dhaka, 14 per cent each in Chittagong and Rajshahi, 9 per cent in Khulna, 7 per cent in Rangpur, and 4 per cent each in Barisal and Sylhet. Despite the perceived unattractiveness of the sector, the number of nurses being trained in such institutes is on the rise.

The following data have been retrieved from the MoHFW HRD data sheet (2011): there were a total of 84 nursing institutes (public and private). The average duration of diploma courses was 4 years. Annual enrollment of nurses in those institutes stood at 3670 and the annual turnout was 2700. Annual enrolment in the post basic Bachelors of Science (BSc.) in nursing and public health was 950, while the total number of degree holders in BSc. in nursing was 1,075. Teacher-student ratio stood at 1:27. The ratio for the Dhaka Medical College Hospital (DMCH) Nursing Institute was 1:89. Compared to the international standard ratio of 1:8, Bangladesh's numbers are way off.

Ninety percent of students in the basic nursing institutes are female. In 2011, the total number of registered nurses was 25,498. There were 26,899 registered diploma nurses of which 15,023 nurses were actually available. The others migrated, remained inactive, or took alternate career paths. The table below shows the current distribution of nurses, as retrieved from the Bangladesh Nursing Council website.

Sl.	Name of Register Book in Bangladesh	Duration	Registered	
1.	Diploma in Nursing	3 years	20 ,172	-
2.	Diploma in Midwifery	1 year	18 ,282	41 ,480
3.	Diploma in Orthopedic Nursing	1 year	1,685	
4.	Diploma in Nursing Science and	4 years	7,428	
5.	Diploma in Nursing Science and Midwifery	3 years	14 ,085	
6.	Diploma in Midwifery	3 years	-	597
7.	BSc. in Nursing/BSc. in P.H. Nursing	2 years	2,856	4 ,446
	BSc. in Nursing (Feb 2016: 407)	4 years	**1,470**	
8.	Psychiatric Nurse	1 year	-	82
9.	Ophthalmic Nursing	1 year	-	31
10.	Pediatric Nursing	1 year	-	60
11.	Diploma in Cardiac Nursing/Intensive Care	1 year	-	206
12.	Chest Disease Nursing	1 year	-	43
13.	Rehabilitation Nursing	1 year	-	34
14.	Assistant Nurse	6 months	-	2,425
15.	M.C.H. Visitors	27 months	-	504
16.	Family Welfare Visitor (FWV)	18 months	-	6,364
17.	Junior Midwifery	18 months	-	2,100
18.	Junior Nursing	6 months	-	181
19.	C.S.B. Attendant	6 months	-	8,382
20.	Community Paramedic	2 years	-	319

Post Basic 6 month Midwifery Training Complete (59+115+349+187+392+187+118+77) = 1484
Table: Data Sheet of Total Registered Nurses, Bangladesh Nursing Council (April 2016)

Appendix B: Data on Population and Health Related Issues in Bangladesh.

Table 9.B1: Population and Demographic Information of Bangladesh - Changes Over Time

Indicator Name	1990	2000	2010	2013
Population, total	108,509,679	133,776,064	153,405,612	159,077,513
Rural population	86,528,873	101,541,384	105,504,710	105,761,094
Urban population	21,980,806	32,234,680	47,900,902	53,316,419
Population, ages 0-14 (% of total)	42.0	37.0	32.0	30.0
Population, ages 15-64 (% of total)	55.0	60.0	64.0	65.0
Population ages 65 and above (% of total)	3.0	4.0	5.0	5.0
Age dependency ratio (% of working-age population)	82.0	68.0	57.0	54.0
Age dependency ratio, old (% of working-age population)	6.0	7.0	7.0	8.0
Age dependency ratio, young (% of working-age population)	76.0	61.0	50.0	46.0
Population growth (annual %)	2.0	2.0	1.0	1.0
Population, female (% of total)	49.0	49.0	49.0	50.0
Completeness of birth registration, rural (%)			29.0	
Completeness of birth registration, urban (%)			35.0	
Completeness of birth registration (%)			31.0	
Rural population growth (annual %)	2.0	1.0	0.0	0.0
Rural population (% of total population)	80.0	76.0	69.0	66.0
Urban population growth (annual %)	5.0	4.0	4.0	4.0
Urban population (% of total)	20.0	24.0	31.0	34.0

Source: World Bank, Country Data.

Table- 9.B2: Health indicators of Bangladesh, 2000 - 2015

Indicator	2000	2010	2011	2012	2013	2014	2015
Mortality rate, adult, female (per 1,000 female adults)	165	121	117	113	110	107	
Mortality rate, adult, male (per 1,000 male adults)	176	159	158	157	154	152	
Birth rate, crude (per 1,000 people)	28	21	21	21	20	20	
Death rate, crude (per 1,000 people)	7	6	6	6	5	5	
Contraceptive prevalence, modern methods (% of women ages 15-49)	44		52		59		
Contraceptive prevalence, any methods (% of women ages 15-49)	54		61		62	62	
Mortality rate, infant, female (per 1,000 live births)	60	36					28
Mortality rate, infant (per 1,000 live births)	64	39	37	35	34	32	31
Mortality rate, infant, male (per 1,000 live births)	68	42					33

Life expectancy at birth, female (years)	66	71	72	72	72	73	
Life expectancy at birth, total (years)	65	70	70	71	71	72	
Life expectancy at birth, male (years)	65	69	69	70	70	70	
Fertility rate, total (births per woman)	3	2	2	2	2	2	
Survival to age 65, female (% of cohort)	68	76	76	77	77	78	
Survival to age 65, male (% of cohort)	66	70	71	71	72	72	
Wanted fertility rate (births per woman)	2		2				

Source: World Bank, Bangladesh country data.

Table 9.B3: Level and pattern of mortality in Bangladesh

Indicator	2000	2010	2011	2012	2013	2014	2015
Immunization, DPT (% of children ages 12-23 months)	82.00	94.00	95.00	95.00	95.00	95.00	
Immunization, measles (% of children ages 12-23 months)	74.00	88.00	89.00	89.00	89.00	89.00	
Hospital beds (per 1,000 people)			0.60				
Community health workers (per 1,000 people)			0.33				
Nurses and midwives (per 1,000 people)		0.27	0.22				
Physicians (per 1,000 people)		0.30	0.36				
Specialist surgical workforce (per 100,000 population)						3.02	
Cause of death, by communicable diseases and maternal, prenatal and nutrition conditions (% of total)	47.70			31.80			
Number of infant deaths	231,531	123,231	116,322	110,578	105,556	101,722	97,478
Number of under-five deaths	316,983	157,890	147,391	138,673	131,509	125,294	119,326
Number of neonatal deaths	154,428	91,438	86,839	82,874	79,859	77,111	74,378
Cause of death, by injury (% of total)	9.00			9.20			
Cause of death, by non-communicable diseases (% of total)	43.30			59.00			
Women's share of population ages 15+ living with HIV (%)	20.10	29.58	30.61	31.56	32.52	33.36	
Prevalence of HIV, total (% of population ages 15-49)	0.10	0.10	0.10	0.10	0.10	0.10	
Mortality rate, under-5 (per 1,000)	88.0	49.6	46.7	44.0	41.6	39.5	37.6
Mortality rate, under-5, female (per 1,000 live births)	84.9	46.4					34.7
Mortality rate, under-5, male (per 1,000 live births)	91.0	52.5					40.4
Mortality rate, neonatal (per 1,000 live births)	42.6	28.9	27.6	26.3	25.2	24.2	23.3

Source: World Bank Data

Table 9.B4: Morbidity pattern in Bangladesh

Prevalence of morbidity per 1,00 elderly population (64+) years	
Arthritis	77
High blood pressure	52
Diabetes	36
Treatment received by types of treatment facility (in %)	
Government	22
Private	68.9
NGOs	1.79
Abroad	0.2
Others	7.3
Maternal Health/ Types of child delivery (in %)	
Normal	83.6
Caesarean	16.4
Types of birth attendants (in %)	
Doctor/ Nurse	31.5
Others	68.5
Place of delivery (in %)	
Health care facility	31.4
Home	68.6
Injury/accident - Prevalence of injured persons per '000 population	
Total	7.0
Male	9.3
Female	4.6
Prevalence of severe burn per '000 population	
Male	0.2
Female	0.3

Source: Health and Morbidity Status Survey, 2012.

Table 9.B5: Facilities for professional and technical skill development in Bangladesh

Sl.	Skill Categories	Number of institutions providing such training			Number of seats for admission		
		Total	Public	Private	Total	Public	Private
A	Doctors/ Physicians						
	Post graduate	33	23	10	2,260	2,091	169
	Medical college	87	23	64	7,712	2,862	4,850
	Dental college	27	9	18	1,597	532	1,065
	Sub-total for physicians	147	55	92	11,569	5,485	6,084
B	Nursing						
	Nursing (Diploma)	91	44	47	4,540	2,630	1,910
	Nursing (B.Sc.)	36	13	23	2,845	1,285	775
	Midwifery	12		12	320	0	320

C	Medical technologists						
	Medical assistants	111	8	103	6,821	716	6,821
	Institute of Health Technology (Diploma)	90	8	82	12,650	2,419	10,231
	Institute of Health Technology (B.Sc.)	18	3	15	1,425	265	1,160
	Sub-total for medical technologists	104	11	97	14,075	2,684	11,391
	Community-based skilled birth attendants (CSBAs)	47	45	2	NA	NA	NA

Source:Adapted from Health Bulletin 2013 and Bangladesh Health Sector Reports.

Table 9.B6: Number of seats for postgraduate courses offered by different institutions

Name of Institutions	MS	MD	M.Phil	Diploma	MPH	MTM	MMED	Total
Medical University (BSSMU)	140	150	70	106		10		476
22 Government Institutions	312	360	242	478	185		15	1,592
10 Private institutions	21	38	15	95				169
Grand Total	473	548	327	679	185	10	15	2,237

Source: Adapted from Bangladesh Health Sector Reports

Table 9.B7: Distribution of hospitals across the country by type (number in respective year)

Type of facility	2007	2010	2013
Upazila health complex	413	424	436
Union hospital	17	27	31
Total	430	451	467

District hospital	49	53	53
General hospital	13	9	11
Infectious disease hospital	5	5	5
Medical/Dental/alternative medical college hospitals	16	17	22
Specialised hospitals affiliated with post-graduate institutes	7	7	7
Specialised hospital (others)	1	2	2
Chest disease/ TB hospital	11	12	13
Leprosy hospital	3	3	3
Speciali sed centers	3	6	6
BSMMU (Medical University)			1
Sub-total	108	117	126

Source: Bangladesh Health Sector Reports.

Table 9.B8: Stock of manpower in the health sector in Bangladesh (as of 2014)

Sl.	Manpower	Number
1	Registered doctors	75,514
2	Doctors present in the country	61,921
3	Doctors under the MOHFP	25,207
4	Doctors under other ministries	1,858
5	Doctors working in the private sector	34,856
6	Registered dental surgeons	6,360
7	Registered nurses	38,452
8	Medical technologists	
	Laboratory	1,498
	Radiology and imaging	629
	Radiotherapy	41
	Physiotherapy	144
	Dental	501
	Sanitary inspectors	436
9	Registered pharmacists	11,000
10	Sub assistant Community medical officer (SACMO)	7,330
11	Health assistant	17,532
12	Health inspector	1,245
13	Assistant health inspector	3,803
14	Upazila family welfare officer	366
15	Assistant upazila family welfare officer	330
16	Family welfare visitor	4,898
17	Family welfare inspector	3,752
18	Family welfare assistant	21,083
19	Community healthcare provider	13,141

Source: HR Data Sheet, 2014.

APPENDIX C: TABLES

Table - 9.C1: Projected workforce per 10,000 populations based on WHO recommended skill-mix ratio and MoHFW targeted skill-mix ratio using 2007 data

Healthcare provider	MoHFW 2007 estimate	Workforce ratio 2007	MoHFW projected skill mix ratios	WHO recommended skill mix ratio	MoHFW workforce projection	Workforce projection using WHO ratios
Doctors	38,537	1	1	1	91,000	91,000
Nurses	15,415	0.4	1	3	91,000	273,000
Technicians	9,249	0.24	1	5	91,000	455,000

Source: World Bank, 2010.

Table – 9.C2 : Course name, number of institutes and seat capacity in Bangladesh, Bangladesh Nursing Council, September 2015

Sl.	Courses	Duration	Public		Private		Total	
			NI/NC	Seat	NI/NC	Seat	NI/NC	Seat
1.	Diploma in Nursing Science and Midwifery	3 years	43	2,580	91	4,420	111	7,000
2.	Diploma in Midwifery	3 years	38	975	13	410	51	1,385
3.	Diploma in Cardiac Nursing	1 year	0	0	3	60	3	60
4.	Diploma in Pediatric Nursing	1 year	1	20	0	0	1	20
5.	BSc. in Nursing (Basic)	4 years	14	1,035	30	1,480	45	2,515
6.	BSc. in Nursing/Public Health Nursing (Post Basic)	2 years	4	400	28	1,125	34	1,525
7.	Family Welfare Visitors	18 months	12	1,000	0	0	12	1,000
8.	Junior Midwifery	18 months	0	0	12	320	12	320
9.	Community Paramedic	2 years	4	100	23	1,270	27	1,370
10	Community-based Skilled Birth Attendants	6 months	48	960	4	80	52	1,040
		Grand Total:	164	7,070	204	9,165	348	16,235

Table 9.C3 : Summary findings of Key Informant Interviews (KIIs)

Sl.	Existence of shortage	Skills and occupations facing shortage	Possible reasons for existing skill shortage	Consequences of skill shortage	Options to overcome skill shortage.
1	There is great dearth of nurses and medical technicians	Shortages exist for skills relating to pathology, ultra-sonogram, radiology imaging, paramedics.	Rising demand for health services and diagnostic tests; lack of supply of requisite skills and technicians.	Deteriorating service quality; right attitude for patient care lacking; absence of moral obligation to serve people; increasing pressure on required salary and benefits.	Government commitment to train, monitor and supervise the sector; public private sharing responsibilities by 30, 70 ratios to overcome existing skill gaps.
2	Difficult to get qualified good nurse	Nurses with specialized training and experience	Nursing training is less exposed to handing patients.	Difficult to get good quality nurses; number of patients per nurse is high; deterioration in patient care.	Shortening of nursing training at the junior level with scope for gradual under-gradation and certification.
3	Great shortage of medical personnel; crisis deepening in the next 5 years or so	Blood drawing technicians; medical technical graduates.	Combination both demand and supply side issues; mushrooming of diagnostic centres at the district level	No proper treatment possible with skill shortage; underutilised machinery and equipment; absence of quality medical education.	Updating curriculum; establishment of medical colleges in less served areas of the country; good networking of public and private institutions for better scope of practical training
4	Shortage is there but not that critical	Diploma graduate nurses		Using less qualified people to do the job of professional or technical people; deterioration in service quality; high turnover of different skill categories.	
5	Shortage in terms of lack of job commitment	Medical technicians		Deteriorating service quality	Public private sharing responsibilities to provide health services.
6	Acute shortage of nurses	Nurses; physiotherapists; anesthesist; blood transfusion technicians; ultrasonography; dialysis technicians;	Increasing demand for various types of healthcare services and lack of proper planning to increase supply of necessary skills accordingly.	Trained but not qualified; reluctant to give service or solace; unable to provide basic services administering medicine	Nursing curriculum needs to be re-hauled; motivated to increase their skills through various incentive mechanisms
7		Pathology; radiography	Lack of adequate facility to train necessary skills	Gap in service management;	Concentrate more on human resource development planning
8	Acute shortage of nurses deteriorating further in next 5 years	Specialisation in cardiology, gynecology, pediatrics, women health, medicine, surgery	Nursing is no longer seen as a service to humanity but purely a lucrative job with prospects	Helpless and overworked; not proper service made available; rise in morbidity and mortality.	
9	Shortage in terms of lack of proper training and experience		Long duration of training is de-motivating ; differential opportunities between public and private sectors	Job done by under-skilled workforce;	Shortening duration of training programs could help increasing supply of respective skills

Sl.	Existence of shortage	Skills and occupations facing shortage	Possible reasons for existing skill shortage	Consequences of skill shortage	Options to overcome skill shortage.
10	There is shortage of skilled nurses and medical technicians	Technologist; anestheists; anesthesiology surgeons;	No scope for higher degree; lack of relevant teachers; lack of motivation due to limited scope for promotion; join and retire from the same post.	Deteriorating healthcare system; students with science background are less enthusiastic about medical technician occupation.	Availability of M.Sc. program to produce future teachers in the field; good curriculum; must teach and train medical technologist.
11	No shortage of nurses; lack of trained medical technicians	Pathologist technologists, radiologists.	Demand is very high; supply of qualified technicians low; mostly trained on the job; poor quality of teaching; very little scope for practical demonstration; social stigma against pursuing such a career to culture and religion.	Hard to replace technicians if they decide to leave current employment	Improvement in education and training curricula; greater institutional facilities for increased supply of medical technicians
12	There are shortages of nurses and medical technicians	X-ray, laboratory technicians, ECG technicians	Lack of social recognition and respect, poor salary, limited scope for promotion and , no scope for further education and training, all discourage proper supply of medical technicians	Deteriorating healthcare services; average number of patients served is very high by any standard, poor service quality	Improve private-public cooperation in areas of curriculum development, increasing scope for practical training.

Table 9.C4: Professional and technical staff employed by different hospitals and diagnostic centers by skill category and gender

	Major skill categories	Green life		Samorita		Square		Comfort		Tangail General		Ibn Sina	
		Total	% of female	Total	% of female	Total	% of female	Total	% of female	Total	% of female	Total	% of female
	Doctors	58	72	50	30	410	31	25	28	41	29	100	10
	Nurses	170	94	120	93	695	87	50	100	138	85	6	83
	AIDEs to nurse			20	100							20	100
	Pharmacist	17	24	1	100	10	20			4	25	10	0
	Midwives	4	100	3	100								
	Health service manager			1	0					1	0	10	70
	Radiographer	6	17	7	14	3	67	7	0	1	0	25	40
	Radiotherapist			2	0	4	75						
	Pathologist	4	50	5	0	31	10	4	50	1	0	15	13
	Ophthalmic assistants	2	100	3	33							4	0
	Ophthalmic nursing assistants			2	100								
	Cathlab					1	0						
	Physiotherapist	4	75	5	60	9	44	1	0	1	0	10	50
	Dieticians/ nutritionist	2	100	4	100	5	100	1	100			1	100

	Major skill categories	Green life		Samorita		Square		Comfort		Tangail General		Ibn Sina	
		Total	% of female	Total	% of female	Total	% of female	Total	% of female	Total	% of female	Total	% of female
	Physiotherapy technicians			4	0							6	50
	Medical assistants			10	0			20					
	Healthcare assistants									16	50	50	0
	Personal care workers	150	67	110	0			100	70	24	21	36	25
	Social work & counseling	1	100	3	33								
	Medical technologist (Dental)									1	0		
	Medical tech. (Biochemist)									1	0		
	Medical tech. (Hematology)									1	0		
	Biochemist											10	10
	Sample collector											9	100
Total staff of select categories		418		352		1,189		208		230		328	

Source: Based on data generated by the Institution Survey.

Table 9 C 5 : Monthly salary differences of major skill categories across hospitals

Major Skill Categories	Greenlife		Samorita		Square		Comfort		Ibn Sina	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
Doctors	50,000	22,000	100,000	25,000		28,000	30,000	18,000		
Nurses	15,000	10,000	20,000	9,000		16,000	15,000	10,000	35,000	15,000
AIDEs to Nurse			8,000						30,000	7,000
Pharmacist	15,000	10,000				20,000			25,000	10,500
Midwives	15,000	10,000								
Health service manager									45,000	20,000
Radiographer	15,000	12,000			60,000		30,000	15,000	38,000	15,000
Radiotherapist					80,000					
Pathologist	70,000	40,000				80,000	28,000	23,000	70,000	20,000
Ophthalmic assistants	11,000	9,000							15,000	8,000
Ophthalmic nursing assistants										
Cathlab technologist						17,000				
Physiotherapist	15,000	10,000							25,000	15,000
Dieticians/nutritionist	30,000	25,000					20,000			
Pharmaceutical technicians						6,500			25,000	8,000
Physiotherapy technicians									16,000	7,000
Medical assistants							15,000	12,000		
Healthcare assistants									16,000	7,000

Major Skill Categories	Greenlife		Samorita		Square		Comfort		Ibn Sina	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
Personalcare workers	10,000	8,000					10,000	6,000	40,000	7,200
Social work & counseling		12,000								
Biochemist									70,000	20,000
Sample collector									25,000	15,000

Source: Based on data generated by the institution Survey

Table 9. C 6 : Reasons and consequences of skill shortage

Skill shortage - reasons and consequences	Nurses	Paramedics
Possible reasons for skill shortage:		
Compensation package is poor	x	x
High differences in benefits offered by government and private sectors	x	x
Consequences of skill shortage		
Poor quality healthcare service provided	x	x
Overwork for existing/available skills	x	x
Substitution of low skill for high skills	x	x

Source: Based on data generated by the Institution Survey.

Table 9.C7 : Way forward to overcome skill shortage

Sl.	Major issues towards overcoming existing skill shortages	Green Life	Samorita	Square	Comfort	Ibn Sina	Tangail General
1	Type of skill categories which could experience shortage in the next 5 or 10 years.	Pathology, radiology, technologists and technicians	Consultants	Nurses		Pathologists , radiologists and other technologists.	All different skills
2	Possibilities of meeting existing skill shortages based on in-house or on-the-job training.	Possible, but be of little value if not associated with certificates	Not possible	Not possible. Shortage will exist even if on-the-job training is provided	Provide on-the-job training		
3	Skills /occupations that should receive high priorities	All skills, especially paramedics				All are important, especially technicians as they need to be trained	
4	Institutional arrangements to overcome skill shortage.	Informal training alone cannot fill in the gaps; formal training is required.	Courses for nurses and medical assistants should be shortened	Participation and influence of the government are prerequisites		Needs changes in training curriculum	

Sl.	Major issues towards overcoming existing skill shortages	Green Life	Samorita	Square	Comfort	Ibn Sina	Tangail General
5	Relative roles of public and private sectors in meeting current or future skill needs		Private sector can identify and facilitate the needs	Both government and private sector should play equal role		Public-private partnership	
6	Need to improve the status of nursing and technical personnel in the workplace	More nursing training institutes are needed with proper services	Create learning institutes in the workplace, like Samorita has	Government has to focus and prioritise health sector more	Should change jobs only after gaining some practical knowledge		Introduce 3 8-hour shifts to cover 24-hour service

Source: Based on data generated by the Institution Survey

CHAPTER- 10

Labour Market and Skills Gap Analysis: Agro-Food Sector in Bangladesh

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Executive Summary

Food processing for commercial purposes and market sales had always been a major economic non-farm activity in Bangladesh. With increasing urbanization and globalization, the demand for processing of various types of agricultural food commodities into other kinds of food for domestic consumption and exports has arisen and become much more perceptible than before. With this trend there had also been the rise of automated processing facilities while previously most of these were small scale and the processing was manual. The Government has been aware of the problem of labour availability in this sector. The present study has been commissioned to investigate and report on the skill gaps analysis in agro-food sub-sector.

There are critical steps in the processing of food which must be strictly adhered to for ensuring wholesomeness. The necessity of high skills in such stages of processing is absolutely paramount. As found by the Consultant during its field study, the firms are quite deficient in getting such skilled persons for which cannibalizing is also quite rife. There is also the general need for other skilled and semi-skilled persons because of high automation particularly in new establishments as well as the intricacies of processing of food to cater to the specific culturally determined culinary tastes. This study attempts to fulfill the need for initial identification of areas where further skill development is necessary and that formal systems of training be it within the firms or outside may be institutionalized. The study results are based on both literature review and field visits and collection of data from several firms.

The firms that have been chosen for the purpose of this study were selected in terms of their size, capital, market share and diversity of product lines. Initial plans to include firms that were historically promising, but failed to utilize their potential and firms that are major stakeholders in both the domestic and the international market were excluded due to time constraint and to maintain objectivity in terms of finding out the scenario of the other players in the market, whose need in filling up the existing skill gap of the labour force need to be institutionally catered in near future.

Thus the final product line, after considerable revision based on exploratory surveys and expert interviews, chosen to be observed for their current market demand and future growth potential, was as follows:

1. Dairy Products, i.e., milk (powder and liquid) and milk products (especially yogurt and Ghee)
2. Fruit Juice
3. Chicken (processed)
4. Automated bakery items (snack, biscuit, dry cake etc.)
5. Spices (powdered and otherwise processed)
6. Chanachur
7. Rice Bran Oil

It was assumed that for the purpose of the present study, the existing and potential skill gap of labour in this sector would represent that of the agro-food sector.

The agro-food manufacturing subsector is relatively labour intensive. But as pointed out earlier, the labour has to be skilled due to demand for hygiene and food safety and the rigorous standards in particularly export destinations. The study has found that at least 42 types of agricultural food products are exported. Within each broad category, of course there are many others. For example, under the item juice, there may be mango, pineapple, guava, orange and other juices. In any case, the figures for 2013-14 export values indicate the types of the main products that are leading in the global market for this sector. By now, possibly more products are being processed and exported. The information from earlier years indicate that while there are shortage of skilled workers and training facilities are inadequate, the prospects for growth of the sub-sector is very promising.

The overall assessment based on consultations and field visits indicate that the agro-food subsector is a dynamic one expanding both at the domestic and the export market. The latter so far has been more difficult to enter because of quite stringent rules regarding food hygiene and safety. However, there are many other problems relating to the expansion of the sub-sector, most of which have in one or other implications for higher skills in the enterprises. These also need to be given attention to if the issue of skills formation and retention are to be resolved properly. The most needed skills are at the level of quality control and proper testing facilities for ensuring quality. However, in many cases, the quality control has to begin with the point

of original supply of the agricultural product and the Consultants are of the belief that unless good quality food safety at the farmers level can be ensured, it would be hard to do so at the enterprises' processing level. How this can be done has to be thought of clearly.

At the shop floor in the factory, good physical environment and cleanliness has to be maintained. It must be said that in quite a few cases, particularly older firms, there seemed to be some limitations in this regard. The actual processing in some cases were manual, in some semi-automatic and in others fully automatic. It seemed to us though based on a very small sample, that the interface between automated processes and the manual processes were not fully seamless with scopes for, even if inadvertent, unhealthy practices. In case of the fully automated ones, we heard comments that with automated processes you do not need much skill; you have to just switch the machine on or off, a completely erroneous view given that the HACCPs in automated ones may malfunction at any time spoiling the whole batch of products if not immediately not properly attended to. And here one also needs highly skilled technicians to identify and sort out the problem.

The third major problem we found is that there is a dearth of training facilities. Some firms have in-house facilities for only rudimentary training while the training facilities that the Government or non-government organizations have are highly inadequate, more text-bookish. What we observed is that each food (say chanachur and jam making are two quite different processes each needing specific operational skills and in case of automated processes, the machines may even vary depending on vintage and source. Unless the training centres provide training with the specific equipments, the operators are hard put to muster the skill. At the beginning of automation, the vendors had provided some training in operating the machines but when the original worker leaves for some reason or another, finding a replacement is difficult which leads to cannibalizing by firms.

Regarding training, two issues are important; what will be the size of overall employment and skill structure in future and consequent need for training; secondly, what type of training may be necessary and in which form. Under certain plausible assumptions, by 2020, there is a need for nearly 1.3 million skilled and semi-skilled persons which may by 2025 increase to more than 3 million. Given that food processing industries have special needs related to ensuring strict hygiene and food safety in the shop floors, most of them need to be trained well. The sheer number indicates that the food industries may need specialized and possibly separate training facilities.

It seemed to the Consultants that the conventional training in formal Training Facilities where too many types of training are provided may not be much useful for training in agro-food processing. Either there should be a separate training facility solely for this sub-sector where each of the major food items should have separate training facilities or that the present training centres should have completely dedicated Food processing division within them for specialized training for various relevant skills.

The discussion and analysis in the foregoing sections have already indicated the types of training that are necessary. To recapitulate, we would emphasize the following types of training:

- Cleanliness and physical environment of the shop floor;
- Quality control including strict maintenance of HACCP points, lab testing facilities, interface between automated and manual processes for each specific food product, packaging;
- Formal training in higher level skills as scientists, food technologists and food engineering.

There are of course the needs for other types of skills more of general nature but is not unique to the food industry. These are not mentioned. Readers may find those in the section on main findings above.

Based on the findings of the study, and the summary of main issues as well as those which are also important for the development of the sector, the following occupations need to be developed through formal (including formal educational) trainings:

a. HACCP-hazard analysis and critical control point
b. GAP-good agricultural practice
c. GHP-good hygiene practice
d. TQM-total quality management
e. Supply chain management and logistics
f. GMP-Good Manufacturing practices.

g. Basic sanitation and hygiene
h. Food hygiene & food spoilage
j. Food QC
k. Food technicians and technologists including lab technicians
l. Food packaging Technician
m. House keeping and occupational safety and hygiene
n. Productivity improvement technique

A Guideline Sample Syllabus has been developed based on the requirements of various skills which may be used to impart training on the issues above and for related occupations. When the trainings are arranged, much of these need to be contextualized specific food by food although some broad categorization may also be made. For this to be done with comparative ease and for these to be practical, the trainers or training institutes need to consult the specific food group associations as to the effectiveness of the sample syllabus and their specific requirements.

Labor Market and Skills Gap Analysis: Agro-Food Sector

10.1 Overview

10.1.1 Background

Food processing for commercial purposes and market sales had always been a major economic non-farm activity in Bangladesh. Dhenki-processing of paddy into rice for final consumption originated as long as rice had been a staple in the country. Making rice into other kinds of processed food, various types of dairy products, wheat processed ultimately into loaves, biscuits and many other types of food arose over time. With increasing urbanisation and globalisation, the demand for processing of various types of agricultural food commodities into other kinds of food for domestic consumption and exports has arisen and become much more perceptible than before. With this trend there had also been the rise of automated processing facilities while previously most of these were small scale and the processing was manual. The labour employed in such units acquired their skill, by and large, through experience and apprenticeship.[1] With the advent of larger and increasingly automated establishments catering to regional and national demand and also for the international market, and also because of the necessity of preservation of wholesomeness of food, the necessity for better skilled, formally trained labour has arisen.

The Government has been aware of the problem of labour availability for manufacturing industries in general and has already made various types of interventions in terms of policy, institutionalisation and investment for training facilities (discussed in more detail in later). Several industrial sub-sectors have already been examined to assess the situations therein for policy interventions and investment. Studies are now underway for several others which include the agro-food processing sub-sector of manufacturing industries. The present study has been commissioned to investigate and report on the skills gap analysis in agro-food sub-sector.

10.2. Objective and ToR of the Study

10.2.1 Broad and Specific Objectives

The broad objective of the study is provided by the Government in the following terms:

A proper assessment of the demand and supply situation of skills in the labour market in order to plan for skill development for the medium to longer term requirements of the economy.

The specific objectives for sectoral studies are as follows:

- To review and assess at the micro levels current status and emerging needs of the sectors identified in the national economic development plan to be supported by SEIP.
- To project future skills needs—in terms of quantity and quality—in order for the country to move up the value chain as Bangladesh is increasingly pulled into global and regional value chains by examining the current labour force.

10.2.2 Rationale

As discussed later, the agro-food sub-sector was already second in contribution to the country's GDP a decade back. By now, the increase in population, rising income, increasing urbanisation and the prospects of exports have all combined to make the sub-sector expand its scope, diversify its products, increase value added as well as become a significant source of employment. However, food manufacturing has one aspect which makes it stand out compared to others which is the need for ensuring safety of food. There are critical steps in the processing of food which must be strictly adhered to for ensuring wholesomeness. In fact, for this reason, the design of the food factory may also have to be quite special. For an in-depth analysis of such designs, see Baku, Christopher G.J. (ed.) (2013), Handbook of Food Factory Designs, Springer.

The necessity of high skills in such stages of processing is absolutely paramount. As found by the Consultant during its field study, the firms are quite deficient in getting such skilled persons for which cannibalizing is also quite rife. Apart from that there is also the general need for other skilled and semi-skilled persons because of high automation, particularly new establishments, as well as the intricacies of processing of food

[1] So called learning from Ustads.

to cater to the specific culturally determined culinary tastes. It is therefore imperative that the needs for training of skilled persons in processing of various types of food be given immediate attention so that the subsector is not starved of the necessary skills for its further growth. This study will, we hope, fulfill the need for initial identification of areas where further skill development is necessary and that formal systems of training be it within the firms or outside, may be institutionalised.

10.2.3 ToR and Scope of the Study

Under the sectoral/sub-sectoral studies, the idea is to get answers to the following questions:

- What are the expected skills that the employers in these fields require?
- What are the available institutions, which provide skills in the particular field of agro-food processing? What specific types of skills training do they provide?
- What were the capabilities of the workforce before their participation in the training provided by current institutions in these fields?
- What types and levels of training programs will be needed to meet the skills demands in each of these sectors?
- What are the requirement of skilled workforce in agro-food processing taking into account any migration out of the country of skilled manpower in the sector.

The scope of the study, activities to fulfill the ToR/scope and method of investigation will be discussed in a subsequent section before which some of the specific characteristics of the agro-food sector needs to be discussed for an understanding of the rationale behind them.

10.3. Methodology: Scope of Study, Method of Investigation and Activities

10.3.1 Certain Issues on the Scope of the Study

Rice milling and other grain milling as well as sugar manufacturing all involve primary processing of agricultural products. For the present exercise, we have kept those outside the scope of the study. Not that these manufacturing activities do not have skill shortages. They may, but because of resource and time constraints it has been decided to keep those outside the purview of the present exercise[2]. Similar is the case with fish and shrimp processing. Thus the study restricts itself to only those processing activities which by and large, involve secondary level processing (such as using wheat flour for bakery products rather than making of wheat flour itself unless it is integrated with the secondary process or making of fruit pulps and fruit juices in the same establishment).

The second issue was which products to be looked into. As indicated above, while the same enterprise or even the same establishment may have several product lines, all are not equally important from the view point of the firm or of the over-all aggregate future possibilities. Further, it appeared to the Consultants that unless there are issues of major HACCP or automation, the shortage of skill may not be properly understood for their critical nature. Hence, we had also to weigh in these factors in the choice of product lines to be examined. Based on these considerations, the initial choice of product lines was made based on these considerations. The final product lines for a firm were decided based on the most important 3 products that it had which some time were somewhat different from the initial list. There was another choice made.

Practically, all agro-food products are of plant origin. As poultry sub-sector has advanced quite well in the country along with the dairy activities, we decided to include them as well even though there are not that many firms specialising in meat or chicken. Thus processed chicken and food items prepared with chicken meat were included as a special case. So were milk and dairy products.

Sampling for the field study posed another problem. Time was too short for any elaborate field work. As decided by the SEIP, only 10 firms may be investigated. The immediate idea was to look into the apparently major ones such as PRAN, Square and BRAC food enterprises and some others. When the Consultants discussed the issue of choice of firms with stakeholders such as BAPA members in a meeting it was pointed out as well as by the food technologist in the team that there are several upcoming, more dynamic and

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[2] Some of these activities such as rice milling have been analysed in detail elsewhere (Asaduzzaman, Ahmed and Mahjab 2013). The analysis indicates major inefficiencies in production process in fully automated rice milling indicating that there are necessities of skill upgrades for better capacity utilization.

automated establishments although some are concentrated more or less in the domestic market, we had to include them in the list. The final sample is thus not going to be at all a random one and thus may not be statistically defensible. However, we believe that the firms chosen are probably the most dynamic ones and are forward looking and thus probably indicate the nature of skill demand in the future. The list of the firms so chosen is shown in the next sub-section.

On the whole, therefore the analysis and assessment in the study is largely case study based and all the advantages and disadvantages of a case study based analysis therefore apply in the present situation. The main advantage is that one can really go in-depth into a problem and the main disadvantage is that there is no way to generalise the analytical results or their assessments.

10.3.2 Sample selection

Firms

The firms that have been chosen for the purpose of this study were selected in terms of their size, capital, market share and diversity of product lines. The firms so far have been visited and studied are as follows:

1. Abdul Monem Group of Industries
2. Abdul Monem Rice Bran Oil
3. Prome Food Industries
4. AST Beverage (Globe Group)
5. Hashem Group (Sajeeb Food Industries)
6. BRAC Dairy
7. BRAC Chicken
8. Rani Food and Beverages

Initially, we had plans to at least one more firm which, seemed quite promising in the past but may not be so any more, in order to understand factors that might inhibit the growth of a firm. For instance, we intended to visit Ahmed Food Industries because despite being in the industry for a long time, they have not yet grown or modernised keeping pace with the changing market structure. However, due to time constraint, we failed to do so.

In addition to that, being a major stakeholder in the market, PRAN Group of Industries was a natural choice for the present study. However, it was excluded finally as both secondary data and exploratory studies of the other firms made it clear that inclusion of PRAN would make our analysis highly skewed towards the existing skill gaps of the highly automated market leaders as opposed to the needs and overall scenario of the upcoming and relatively smaller (market followers, as the nature of the industry showed natures of oligopolistic competition in the export market and monopolistic competition in the domestic market) firms in the industry. This enables us to maintain objectivity in terms of finding out the scenario of the other players in the market, whose need in filling up the existing skill gap of the labour force need to be institutionally catered in the near future.

Product lines

From literature review and personal experience, the following products lines were initially chosen for the survey:

1. Dairy Products, i.e., milk (powder and liquid) and milk products
2. Fruit Juice
3. Pickles
4. Automated bakery items (snack, biscuit, dry cake, etc.)
5. Spices (powdered and otherwise processed)
6. Chanachur

However, after conducting some expert interviews, it was discovered that pickles neither have a major market share in the domestic or the international market not does it have any potential for expansion in the forthcoming 5 to 10 years. Therefore, it was excluded from the product list that needed to be observed for the present study. Instead, rice bran oil was added to our potentially upcoming and expanding list of products, both in the domestic and the international market. Thus the final product line, after considerable revision based on exploratory surveys and expert interviews, was as follows:

1. Dairy Products, i.e., milk (powder and liquid) and milk products (especially yogurt and Ghee)
2. Fruit Juice
3. Chicken (processed)
4. Automated bakery items (snack, biscuit, dry cake etc.)
5. Spices (powdered and otherwise processed)
6. Chanachur
7. Rice Bran Oil

These are the products that have both considerable domestic market share and export potential. Thus, it was assumed that for the purpose of the present study, the existing and potential skill gap of labour in this sector would represent that of the agro-food sector.

10.3.3 Method of investigation and the instruments

The method of investigation involves several steps. Literature review, visit to offices of the firms chosen, visit to the factories for examining firsthand the nature of problems and shortage of skill ideas directly from the shop floor managers, talking to supervisors and workers on the shop floor and finally filling up a questionnaire prepared for eliciting certain specific information on the past and present and future of the firm, their product line development, problems of skill shortage, training received and desired and their nature, in-situ training and training desired from formal institutions all these issues were investigated. Note particularly that the firm managers were also asked about the HACCP in their processes and if skill shortage is a problem in handling those critical points.

10.3.4 Activities

Activities for the present exercise includes the following:

a. Collection of materials on training and interventions made so far
b. Literature review
c. Meetings with BAPA members
d. Visit of corporate offices of firms chosen
e. Visit of factories for product lines chosen of a particular firm and in-depth discussion both at corporate office and factories
f. Writing of field impressions based on office and factory visits
g. Filling up questionnaires
h. Analysis of data and assessment including those based on field impressions
j. Writing of report and recommendations

10.3.5 The Situational Context

Agro-food Processing and its Characteristics

According to the industrial survey data from the Bangladesh Bureau of Statistics, the agro-food sector contributed 4.7 percent of GDP and 1.1 percent of total employment in 2005/6. This makes agro-food the second largest manufacturing sector in terms of value addition after leather, clothing and textiles (combined). In addition to its direct employment and GDP contribution, the sector is also important for a substantial number of employment and value added creation in the agriculture and fishing sectors, which supply its raw materials.

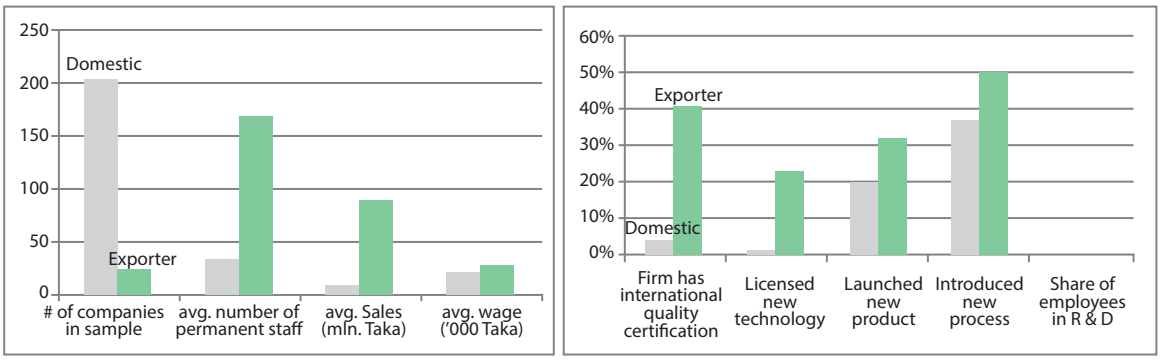
The agro-food industry in Bangladesh has grown at a rather fast rate over the last decade or so at about 12.3 percent exponential rate per year (based on a semi-logarithmic trend) which means that the industrial output may double every 6 years or so. Given that the general manufacturing industries had been growing at rates varying from 7 to 11 percent or so, agro-food industry has done quite well. The growth in employment likewise, hopefully done similarly as the industry in general is labour intensive although definitive statement cannot be made as main source of information on labour employment, the Labour Force Surveys, have been conducted over this period only in certain years.

According to World Bank (2008), there were 6,139 companies operating in the agro food processing sector in 2006. Over 90 percent of these firms were found to be small (less than 50 employees), and the majority

of them were rice milling (3,885) and bakery (1,145) companies. Other significant categories are grain milling (226), vegetable oil (133) and confectionaries (100). Roughly two thirds of the agro-food companies are found to be located in rural areas. It is worthwhile to note that with the exception of frozen shrimps, only a very small fraction of food products produced in Bangladesh are exported while most are sold in the domestic market.[3] The World Bank study further makes the following points:

- Only roughly one tenth of companies in the sample are exporters, and the data show that these companies are typically much larger both in terms of employees and in terms of sales.
- They are also found to pay higher wages. This is related to the fact that exporters tend to perform much better than domestic firms on a number of indicators related to innovation and productivity.
- For instance, they are much more likely to have an international quality certification, or to license and use new technologies. Exporters are also more likely to launch new products or introduce new processes, and they have a higher share of employees in R&D activities.

Figure : 10.1 : Firm characteristics in Agro-food sector



Source: World Bank Enterprise Survey bangladesh 2007

Although other agro-food exports remain relatively small compared to shrimp exports, a number of products in this category have shown strong growth over the past years and thus contributed to the diversification of the sector. These include fruit and vegetable preserves, grain mill and bakery products, vegetable and animal oils and fats, and drinks (mainly fruit juices).

Agro-food exports are currently very concentrated on a number of regional markets, mainly targeting the ethnic food niches in countries with strong Bangladeshi diaspora, such as the United Arab Emirates, India, Saudi Arabia, and other Gulf countries.

Value chains for agro-food industries are typically rather complex, with a number of middlemen involved between the usually small scale producers and the processing firm. The complexity of the value chain poses challenges for many agro-food companies to ensure that they get the type and quality of raw materials they need at the right time. Stakeholder responses from firms revealed that managing inbound logistics, including relationships with suppliers, cold chain, and transport management, is seen as a major challenge by the industry.

Investigations regarding business environment indicate the important role of duty- and quota-free access to the US and EU and 10 per cent cash incentives provided by the government as major issues in ensuring competitiveness by the entrepreneurs in the sub-sector. However, there are concerns regarding sanitary and phytosanitary measures in major destination countries as well as more stringent rules of certain buyers.

Similarly, inbound logistics and cold chain management continue to present a problem to the food processing industry, in particular when dealing with easily perishable goods. Reliable and affordable (cold) storage and transport infrastructure as well as unreliable electricity supply adds to the problem.

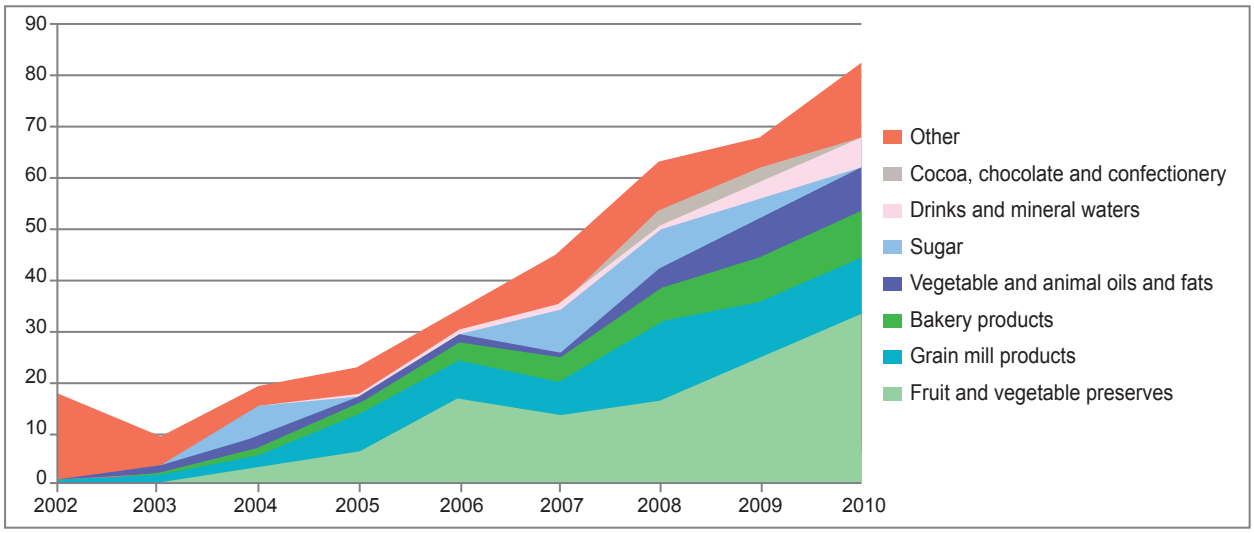
[3] It should be noted that tea and coffee, which are also exported in substantial amounts, are not considered processed food items for the purpose of this study and are thus not covered in this section.

According to the World Bank study (2008), the Bangladeshi agro-food sector had important positions in a number of markets which may develop further both because of expansion of the domestic and the export markets, particularly where there is a large presence of the Bangladesh diaspora. Rapid growth in exports to these markets has provided a number of food processing firms with exposure and experience in exporting over the past years.

However, the business model of exporting to ethnic markets based on diaspora networks is bound to reach its limits, given that it is focused on a rather small fraction of the world market. New opportunities in this area would depend on developing access to new markets, consumer groups, and retail networks. And that would necessitate development of skills in processing, improved hygiene and food safety measure all depending critically on highly skilled labour force, an issue on which we shall discuss shortly.

Frozen shrimps accounted for the bulk of Bangladesh's agro-food exports, exceeding US$ 550 million in 2010. In later years export patterns have been rather volatile, with substantial growth in 2007 and 2010, but declines in 2008 and 2009 (see Figure 10.2). Among non-shrimp exports, although small, several products have indicated robust growth. These include fruit and vegetable preserves (jam, jelly, chutneys, and frozen vegetables), grain mill and bakery products, vegetable and animal oils and fats, and drinks (mainly fruit juices).

Figure 10.2 Bangladesh Agro Processing Exports other than Fish and Fish Products (including Shrimp)



Source: COMTRADE (2002-07), Bangladesh Export Promotion Bureau (2008-10)

It should be noted that this represents a rather substantial decline in the EUR value reported by Eurostat, given the devaluation of the USD against the Euro over this time period.

By now, the situation has changed somewhat apparently for the better. Information based on the most recent Survey of Manufacturing Industries, conducted by BBS, shows the extent of the growth of the agro-food sub-sector. Given that the data is already about 5 years out of date by now there must have been further growth. The country by now probably has nearly 45-50 thousand establishments of various sizes processing food. Another nearly 10 thousand establishments specialise in processing drinks (Table 10.1).

Table 10.1 Number of establishments of the agro-food sector in Bangladesh

BSIC code and Description	No. of establishments	Gross Output (Billion Tk.)
10 Manufacture of food products	42,792	5,394.9
11 Manufacture of beverages	8,441	608.8

Source:BBS, Survey of Manufacturing Industries-2012.

Table-10.2 summarizes some selected characteristics (i.e., total labour employment, composition of the labour force according to gender and value added) of the agro-food industries of Bangladesh, based on more recent secondary data.

Table 10.2 Selected Characteristics of Agro-food Industries

Description	Total labour employment	Total male empl. (%)	Total female empl. (%)	Net fixed asset (in mn. Tk.)	Gross value added (in mn. Tk.)	Gross VA as a % of total GDP* (%)	Gross VA as a % of manufacturing GDP** (%.)
Vegetable and animal oils and fats	14,703	95	5	10.22	42.84	2.83	1.68
Dairy products	6,292	94	6	1.83	1.19	0.07	0.47
Grain mill products except rice milling	13,878	94	6	4.70	15.40	1.01	6.05
Starches and starch products	133	100	0	0.4	0.40	246.44	0.01
Rice/rice milling	79,683	69	31	32.79	51.74	3.42	20.33
Bakery products	51,942	84	16	9.37	14.43	9.50	5.67
Sugar	14,064	98	2	7.2	3.73	0.25	1.47
Cocoa, chocolate andsugar confectionary	986	97	3	0.90	0.25	0.02	0.01
Processing of tea and coffee	51,712	60	40	22.91	11.62	0.77	4.57
Prepared animal feeds	5,368	89	11	5.00	8.37	0.55	3.29
Soft drinks	13,236	93	7	33.04	9.20	0.60	3.62
Other bottle waters	6,572	85	15	13.32	4.22	0.28	1.66

Source:1. BBS, Survey of Manufacturing Industries-2012 ; 2. Bangladesh Economic Review 2015
*At current price of 2014-15. According to Bangladesh Economic Review 2015, GDP at Current Market Price is BDT 1513600 Cr
**At current price of 2014-15. According to Bangladesh Economic Review 2015, Manufacturing GDP (i.e. Total contribution of Manufacturing Industries' in GDP) at current market price is BDT 2,544,83.1 Cr

The Real Diversity of Agro-food Processing

Given the above discussion, it becomes important to at least understand the diversity in broad terms. For this, we need to understand that both domestic and export demands are important. While we do not know the internal demand, some idea of external demand possibilities may be had from the information from the Bangladesh Agro-processors Association (BAPA).

BAPA in its Annual Report of 2016 has reported 44 products for 2013-14 that are exported by its members, which probably account for all the major producers. Quite obviously, there may be products which are processed only for domestic consumption. In any case of the 44 product types that are exported, only one is a non-food item and one is a tobacco-based product. The rest 42 are all processed from agricultural food products. Within each broad category, of course, there are many others. For example, under the item juice, there may be mango, pineapple, guava, orange and other juices. In any case, the figures for 2013-14 export values indicate the types of the main products that are leading in the global market for this sector. These are shown in (Table 10.3).

Table-10.3 Broad Categories of Products and their Values Exported by the Agro-Food Industry of Bangladesh in Fiscal Year 2013-2014

Sl. No.	Broad Category	Value (mil. USD)
1.	Spices	35.57
2.	Juice	27.79
3.	Drinks	18.33
4.	Biscuits	14.02
5.	Puffed Rice	10.62
6.	Chanachur	9.00
7.	Mustard Oil	5.67
8.	Snacks	5.56
9.	Meat	3.99

Note :Products are listed in descending order in terms of their value of export

Note that the list does not include some of the major agro-processed food such as rice (now by and large processed in highly automated and semi-automated mills), shrimp and fish which are also major export items[4]. Thus the above figures can be taken at best as indicative, not definitive of the relative importance of agro-food products manufactured in the country. Yet it is instructive to note that the 9 broad items above account for 84 per cent of the total export value of US$ 155.51 million. This identifies, in a very preliminary manner, the initial list of products to be looked into for skill gap analysis.

Note the congruence between the earlier mentioned export items list and the list based on BAPA information on export values. There is also some similarity with aggregate picture drawn by the World Bank for enterprises in 2005/06. Bakery products, confectionaries, and vegetable oils are included in both lists.

10.4 Labour Skill and Training Issues

The agro-food manufacturing sub-sector is relatively labour intensive. But as pointed out earlier, the labour has to be skilled due to demand for hygiene and food safety and the rigorous standards in particularly export destinations. There is a supply side issue in terms of human resource development, i.e., skill development of labour in the sector.

The sector had already been identified by the “Technical and Vocational Education and Training (TVET) Reform Project” as one of eight growth-oriented industrial subsectors in a study performed by the Bangladesh Institute of Development Studies (BIDS)[5]. Rushidan et al. (2008)presented an application of the Skills for Trade and Economic Diversification (STED) methodology to two sectors–agro-food and pharmaceuticals – of Bangladesh’s economy. STED has been developed in recognition of the fact that having the right skills among workers is crucial for firms or industries to succeed in trade, and vice versa understanding trade is important to provide workers with the right skills.

Two existing projects are closely linked to STED work in Bangladesh. The project “Technical and Vocational Education and Training (TVET) Reform” provides support at the macro and sectoral level to increase the relevance of TVET and implement mechanisms for skills anticipation, namely through industry skills councils in four pilot sectors. The project “Assessing and Addressing the Effects of Trade on Employment” (ETE) has established a high level policy dialogue on coherence between trade and labour market policies and promotes a better understanding of the linkages between the two.

The methodology is now taking an important place in the ILO’s toolbox to promote decent work. It is expected to inform technical assistance in the area of skills and trade, and to make a strong contribution to their effectiveness in the future.

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4 To the best of our knowledge, BAPA members include basically the enterprises which are involved in, by and large secondary processing of food. Rice millers, shrimp/producers/exporters and tea producers/ exporters have their own association which may report their own production/export data.

5 The remaining seven sectors are: pharmaceuticals (chosen for this report), textiles, furniture and fixtures, pottery and china ware, leather and leather products, transport equipment (principally shipbuilding) and information technology (Rushidan, et. al. 2009: “Mapping and Analysis of Growth-Oriented Industrial Sub-Sectors and their Skill Requirements in Bangladesh”, Research Report prepared specifically for the National Conference on Industry Skill Survey, held on 13 November 2008, at the BRAC Centre in Dhaka. The study was jointly sponsored by European Union, GoB and ILO).

To evaluate the two sectors' export potential and upcoming sectoral skill requirements, STED proceeds according to six steps:

- The methodology starts by analysing a sector's position and its outlook, paying particular attention to trade and competitiveness issues.
- Based on this analysis, it proposes a vision of the sector's future under which it performs well on trade.
- It then identifies the business capabilities that the sector will need to improve if it is to succeed in achieving the vision.
- Next, it identifies the types of skill that will be needed to underpin those business capabilities, and also areas where it is necessary to improve skills in order to tackle existing deficiencies.
- Based on this, and on information about the adequacy of the skills supply, it identifies the main features of the gap between demand and supply of skills that will emerge in the absence of a response by industry, government or education and training systems.
- Finally, it makes proposals as to the sorts of response that are required at policy, institutional and enterprise level.

The available literature, the characteristics of the firms, the business environment, the problems of skill and other issues indicate that there are still major gaps and concerns regarding the development of the sub- sector. The findings from the case study-based survey that the present report is based upon identified many of these problems again. This report focuses on these issues, particularly on the skills requirements, which are varied, substantial and essential to success.

10.5 Major Findings of the Present Study: Gaps in Business Capabilities

The gaps in the present agro-food sector of Bangladesh have been identified through a combination of: sectoral analysis, including review of existing data and literature, tripartite workshops with representatives from employers, workers and government, and structured interviews with firms.

10.5.1 Business Capabilities Required to Meet Objectives

If the Bangladeshi agro-food sector is to meet the objectives outlined above, it will have to bridge a number of gaps between the business capabilities it has now and the business capabilities required to meet the objectives.

The analysis undertaken and stakeholder consultations point to seven main capability gap areas:

1. Export marketing, product management, channel management
2. Supplier capability
3. Product development
4. Operational effectiveness and food safety
5. Regulatory compliance
6. Logistics / supply chain / cold chain
7. Regulation

10.5.2 Export Marketing, Product Management and Channel Management

The sector has significant strengths in marketing, linked to its strong position in a number of markets. Success in these areas will depend on developing strong capabilities in marketing of food in areas including export marketing, product management and channel management, applicable to the new product markets to be targeted.

The industry interviews showed the EU, the USA, the Middle East and the Gulf Region as the markets traditionally perceived as most attractive, because of high prices received and prospects of substantial sales. However, other markets, including Russian Federation, Japan, China, Australia, Malaysia and Singapore, are expected to show increased demand for Bangladeshi food exports over the immediate future.

10.5.3 Firm's View about Export Growth

More than half of the firms consulted saw international marketing as very important to their future success. Sixty-five percent also saw international distribution channel management as very important, 60 percent

saw selling to major international retailers as very important and 60 percent saw brand development as very important.

10.5.4 Supplier Capability

One of the major challenges of developing new export markets will be to develop the capabilities of the suppliers of agricultural produce on which new products are based. Success will be built to a significant extent on developing a base of suppliers that delivers what the agro-food company needs. This may affect any or all aspects of agricultural production. About three-fourths of firms visited felt that sourcing high quality agricultural or aquaculture inputs is critical in maintaining their brand name and success.

10.5.5 Product Development

Bangladesh's agro-food sector should be moving into developing products that are new (at least to itself, if not globally), and modifying existing products so that they better meet the requirements of export markets. Successful product development in food requires a combination of technical and business capabilities– technically perfect food products that can be produced efficiently will not sell if they fail to meet consumer demand, and products that consumers love will fail if they cannot be manufactured and distributed cost-effectively, to high quality and with an adequate shelf life.

While much of the requirement for skills will be within businesses, there may also be a role for an agro-food research centre to assist businesses with product development. India's Central Food Technological Research Institute (CFTRI), established in 1950, was highlighted as an exemplar in consultations with industry.

Almost all the enterprises had launching of new products and/or introducing new product lines either in the pipeline or in their future outlook.

10.5.6 Operational Effectiveness and Food Safety

It is necessary for the sector to improve operational effectiveness and their implementation of food safety practices. These are closely connected, as both operational effectiveness and food safety are outcomes of the design of production processes and procedures, the technologies used and the reliability with which procedures are followed.
Strong capabilities in this area are founded on good design of production processes, effective and appropriate use of technology and proper implementation of food safety methodologies including HACCP (Hazard and Critical Control Point Analysis).

Design of production processes is not static – improvements in productivity and quality come from continuously or periodically re-examining production processes to find better ways to work. Professional experts including food scientists, engineers and food safety professionals typically contribute to this, but in many food businesses globally production workers and their supervisors also contribute, often through structured team-based improvement initiatives.

For products with short production runs, processes may need to be fine-tuned for each run, and technicians and production workers may have a significant role in this from day to day.Well-designed processes and procedures are not enough by themselves. If they are not followed, this can cause outcomes such as deficiencies in quality, problems with food safety, waste of materials and loss of production efficiency. All of the firms surveyed saw safe handling of food as critically important to their future success. Seventy percent also saw quality management as critically important.

10.5.7 Regulatory Compliance

Almost four-fifths of agro-food firms surveyed for the study saw regulatory approvals as critically important to future success and viewed regulatory compliance as critically important. Most of them either had ISO certification or in the process of either getting new certification and/or renewing the old ones.

10.5.8 Logistics /Supply Chain /Cold Chain

About three-fourths of firms interviewed saw "sourcing high quality agricultural or aquaculture inputs" as

critically important to their success, and stakeholder discussions highlighted that operating an efficient logistics and cold chain was seen as a key prerequisite for this.

10.5.9 Regulation

Ensuring that Bangladesh's agro-food sector consistently complies with standards for food safety requires more demanding and intrusive regulation of the sector. Eighty percent of firms surveyed saw regulatory compliance as critically important to their future success.

10. 6. Implications for Types of Skills Needed

Each of the gaps in business capabilities identified has skills aspects. These are discussed for each business capability gap.

10.6.1 Export Marketing, Product Management and Channel Management

The need is for marketing and sales skills at a variety of levels, from call centre staff to process orders and deal with routine issues to senior executives capable of setting international marketing strategies, running effective international sales and marketing operations, and establishing and managing relationships with retailers, industrial customers (e.g. for food ingredients), agents and distributors in international markets.

There will be a significant requirement for marketing professionals with skills in export marketing, product management and channel management. All of these will require some specialist expertise in food business, science and technologies, with product managers needing significant knowledge of food science, consumer tastes, supply chains, food safety and other specialist areas, as well as marketing. Marketing skills required span industrial and consumer marketing.

10.6.2 Supplier Capability

There is a broad need to improve the supply chain, particularly in getting good quality raw materials which in some cases is semi-processed agricultural commodities, in quite some others such as pulp and juice making, spice grinding, jam and jelly making etc. the raw materials are harvested agricultural products. Grading and sorting of which is a major issue. This better be done at the post-harvest stage at the farmers level to save costs and processing time at the factory. Farmers therefore need also to be trained in handling the harvested products before being supplied to the factory gates. At the most basic, improved skills in harvesting, handling and packing of basic agricultural products are needed, along with advice on issues that may include use of agricultural inputs, timing of planting and harvesting, and choice of plant varieties, among others. The skills should be easily within the reach of farmers, subject to suitable skills development and advisory arrangements being put in place. It may be pointed out here that Good Agricultural Practice standards, (which includes, among others, care with use of agro-chemicals and disease prevention). Maintaining very high standards with the basic raw materials and requisite training and awareness thus becomes extremely important.

10.6.3 Product Development

The main skills required in food product development are at professional level in food business (including marketing), food science and food technology/engineering. Typically, they have a relevant degree plus significant food industry experience. Packaging is an important aspect of product development. This implies demand for specialist skills in technical and marketing aspects of packaging design.People with these skills may be employed within the agro-food business itself, at a separate institute similar to India's CFTRI (mentioned earlier), in professional services firms, at a university, or by suppliers of equipment or of packaging supplies.

10.6.4 Operational Effectiveness and Food Safety

Improving capabilities in operational effectiveness and food safety requires development of skills at all levels within production operations, notably including:

- Operatives, supervisors and production technicians
- Quality control and quality assurance staff
- Laboratory technicians
- Production managers

- Scientists and engineers
- Trainers

Good Manufacturing Practice guidelines for food companies give guidance as to the skills required for food safety. One very specific and extremely important issue in particular point relates to the HACCPs within the process. Unless labourers who are highly skilled and have keen eyes can do the job properly. The research team has seen such HACCPs where minute changes in the temperature may spoil the whole batch of products. Knowledge of proper use of dyes and food colours is important at operational level to regulate their use.High skills and adequate equipment and scientific facilities at the first three categories in the list above are sin qua non for producing safe and hygienic food products. More specifically, key areas where skills development is required are the following:

- Food safety training and certification for all in operations, at levels appropriate to their role.
- Training to support improvement initiatives, undertaken as part of the initiative. An example of such an initiative is the Kaizen initiative that has been undertaken with support from the TVET Reform Project.
- Training in materials handling and processing technologies for those already working in the sector.
- Technician training in laboratory and machine operations, making use of the food technician qualification established at the initiative of the TVET Reform Project where feasible.
- Bachelor degree courses in food process engineering and industrial engineering.
- Initiatives to develop or update skills in food process engineering and industrial engineering among people already working in the sector, including executive education courses, activities by professional societies, and professional networking activities.
- The agro-food sector has significant numbers of apprentices, but most are employed and trained without formal registration under the 2008 Bangladesh Apprenticeship Training Rules. The sector should move to comply with the Rules, and should receive technical assistance to do so.

10.6.5 Regulatory Compliance

Major skill needs relating to regulatory compliance are:

- Skills in quality assurance and documentation of compliance for quality assurance specialists; and
- The skills in food safety and safe food handlings described earlier, backed up by the skills required to document compliance where appropriate, and by an approach to work that favours strict compliance.

10.6.6 Logistics /Supply Chain /Cold Chain

Skills in logistics and supply chain are required at a range of levels. The key requirement is for high level logistics and supply chain professionals capable of designing and optimising logistics systems, and capable of the wider job of developing supply chains that integrate upstream with farmers and farming groups (and in some cases with intermediaries) and downstream with customers in export markets. The quality of the work done by logistics and supply chain professionals will have a major impact on the competitiveness of exporting industries.

10.6.7 Regulation

It is a characteristic of regulation globally, across all sectors, that it is difficult for regulators to reconcile facilitating the development and operation of the regulated sector with the need for rigour in regulation. It requires high calibre, strong minded leadership to understand what may compromise the regulatory system, and to prioritise the sector's long term interests over short term convenience by refusing to bend to persuasion, pressure or established convention. It also requires high calibre leadership to recognise problems with the regulatory system that add no value, and to rectify these openly.

Upgrading the capabilities of Bangladesh's food safety regulatory systems is likely to require more staff at a range of levels. At senior levels, it will be important that at least a proportion of staff are very well qualified, capable of making sound judgments on food safety and public health, and capable of leading an organisational culture that enforces regulations effectively and ensures that inspection regimes are effective in checking compliance with standards and good practice, and in ensuring that corrective action is taken when problems occur.

At other levels, it is important that staff should be technically competent in areas such as laboratory analysis of food samples, inspection of food processing operations and sampling of food products. It is important that

they should be conscientious and able to withstand pressure to overlook poor practices or to facilitate agro-food businesses in improperly passing inspections.

10.7 Projected Skill Demand versus Current Supply

10.7.1 Recruiting New Workers

It has not been feasible within the scope of this study to undertake a thorough analysis of the supply of relevant skills in Bangladesh. The research relies, instead, on assessments by industry as to the adequacy of the supply, and on expectations by industry as to how the balance between supply and demand will develop into the future. Assessments such as these generally form an important input into analysis of the adequacy of skills supply in any case, as estimates of skills supply and demand made without reference to industry knowledge often turn out not to be comparable in practice.

Based on the interview survey undertaken for this study, food technicians, scientist and laboratory technicians with suitable expertise are relatively difficult skills to find. About one fourth of the firms reported difficulty in finding suitable people for jobs as equipment technicians or as laboratory technicians. Part of the problem with technician skills is not just a general shortage of technicians, but just as much a matter of finding people with the right expertise and experience. There are also some difficulties in finding quality control and quality assurance people with the right skills. Finding people for a top management position was also rated as difficult, by almost all of the firms.

Finding food processing operatives, sales people and mid-level managers was rated as relatively easy. This finding on sales people and managers appears to particularly reflect people oriented towards serving the domestic market, and people oriented towards selling to the diaspora. High level skills in selling and marketing to, and in supplying, mainstream international markets appear to also be in short supply.

While there is no shortage of potential recruits for many roles, there are problems with the quality of people available at entry level. Most respondents to the interview survey reported that the general education and training background of their recruits did not give them the skills required to perform effectively. Many observed that general education and training did not adequately expose their recruits to the sort of performance expectations that a real business would have. Specific areas of skills deficiency highlighted were in technical skills in food handling and processing, food safety and sanitation and food testing procedures.

Looking to the future, skills requirements in the sector will rise at each occupational level. Developing overseas markets, developing new products, and developing logistics systems and supply chains will require more people with high level professional and management skills. The level of skill required among technicians may increase with more complex production equipment and more demanding food testing requirements. The need for strong core skills at operative level is likely to increase over time.

10.7.2 Skills of Existing Workers

Firms consulted in the interview survey were not unhappy with the skills of their existing workforce. Despite this, they unanimously felt that skills could be improved substantially, and that this could have a very positive impact on productivity. There was significant barriers reported in collaborating between the existing monopolistically competitive firms in determining unanimously about the level of skill that the mid and top level food and factory practitioners should have from the supply side, i.e., the technical knowhow and the team-playing attitude that the responsible employers and worker representatives came to a consensus that firms and their workers simply do not take enough interest in skills, and as a consequence place too low a priority on skills development.

10.8 Projected Output, Employment and Skill Structure in Agro-food Industries

The categories of agro-processing in the labour force surveys include not only agro-food processing but also other non-food agro-processing. Considering as far as possible only the agro-food processing industry and given whatever data are available, in this section attempt has been made to project the future levels of employment in agro-food processing and the possible skill structure of the overall employment.

The method that has been applied is admittedly crude. The first step had been to estimate the elasticity of observed agro-food output wrt observed GDP. The projected GDP had been estimated on the basis of

assumed growth rate as indicated in the Seventh Five Year Plan. Given these estimated future GDP figures and the estimated GDP elasticity of agro-food output (or rather the quantum index of food industries reported by the Economic Review of the Ministry of Finance), the future output indices up to 2025 were estimated.[6] The GDP elasticity of output had been estimated to be 2.1 i.e., every 1 per cent rise in GDP, everything else remaining the same, leads to a 2.1 per cent growth in agro-food output which appears to be quite high.[7]

Next an estimate was made of the employment elasticity of agro-food (combined) output based on aggregate labour employment in various sub-categories of food industry in the years 2010 and 2013 (culled from the LFS in those years)[8]. There are two caveats here. First, the two LFS sub-categories do not completely match with each other and not all are in food categories as such. These non-food categories had to be weeded out from the labour estimates. Second, as our main interest is in processed food, the basic processing of grain milling (rice milling, flour milling or pulse milling) have not been considered. Based on these considerations, the output elasticity of employment had been estimated to be 1.26. Based on these Table 10.4 below provides the estimated output and employment for future years up to 2025. By 2025, the estimated labour employment is seen to grow nearly 6 times or more over the level in FY2015. The employment effect is both due to the demand side growth (GDP elasticity of output) and the employment growth (elastic employment effects of output). The latter also indicates that the varied nature of employment (read skill) that might be needed.

The same table also provides estimates of the skill structure. We first found from the survey of the firms that of the total employment on average 8 per cent are in non-technical categories, the rest 92 per cent are technical hands. Of the technical personnel, 38 per cent are in skilled category, 40 per cent are semi-skilled and the rest 22 per cent are unskilled. These present structure has been assumed to remain unchanged in the future although our hunch is that in future the unskilled category may shrink and the semi-skilled category will expand. But for the time being we are assuming that the present skill structure will continue for some time. Even under this restrictive assumption, it is expected that the unskilled and semi-skilled categories would need to be trained given the trend towards automation, particularly in medium sized enterprises. The skilled ones may also need training but possibly of rather sophisticated categories, particularly in highly automated factories with various HACCPs in the production processes. In the last section we try to project the demand for skill by type of operation on the shop floor and related technical departments by type of skill. In any case, the case for training is rather clear from the above statistics. The next question of course is the possibilities of and barriers against such training an issue that is discussed in the following section.

Table 10.4 : Estimated Agro-food processing output, employment and skill structure (FY2016 – FY2025)

Year	GDP ('000 bilion Taka)	Processed food output index	Projected employment and skill categories (lakh)				
			Total	Non-technical	Skilled	Semi-skilled	Unskilled
FY2015	8248.6	312.47	7.67	0.61	2.68	2.82	1.55
FY 2016	8784.76	355.12	9.0	0.72	3.14	3.31	1.82
FY 2017	9364.55	404.34	10.55	0.84	3.69	3.88	2.14
FY 2018	10001.34	462.08	12.45	1.00	4.35	4.58	2.52
FY 2019	10721.44	531.95	14.83	1.19	5.18	5.46	3.00
FY 2020	11536.27	616.85	17.81	1.43	6.22	6.55	3.60
FY 2021	12459.17	720.48	21.58	1.73	7.54	7.94	4.37
FY 2022	13455.90	841.52	26.14	2.10	9.14	9.62	5.29
FY 2023	14465.10	974.06	31.33	2.51	10.95	11.53	6.34
FY 2024	15477.65	1117.24	37.14	3.00	12.98	13.67	7.52
FY 2025	16483.70	1269.75	43.52	3.48	15.22	16.02	8.81

6 Note that there are two types of indices, for food industries and for beverage industries. Discussions with stakeholders indicate that the weights may be 80 per cent for food and 20 per cent for beverages. Using these weights the two indices were merged together into a combined agro-food output indices.

7 In fact, if we look at it from another angle, every 1 per cent rise in agro-food processing output leads to a 0.44 per cent rise in GDP. Admittedly part of this is direct as part of GDP, but also it includes the multiplier effects that agro-food processing has on agricultural and ancillary (trade and transport) activities.

8 Obviously the estimate was of an arc elasticity rather than a point elasticity.

10.9 Understanding Barriers to Fulfilling Future Needs

The business capability and skills improvements required by the Bangladesh agro-food sector are extensive. The responses required are also extensive. In many areas,different options are available, or it may be necessary to use a combination of approaches, i.e., a mix of automated and semi-automated systems. Regarding training as an issue for managing future needs of skill, firms often cited various concerns which are:

- Difficulty in assessing what training is needed
- Cost of training
- Lack of suitable providers of education or training services
- Difficulty in providing suitable training internally
- Workers may not stay long enough to justify training
- Would have to pay workers more to retain them if they were better trained
- Cannot recruit people with the right skills in Bangladesh
- Workers are not sufficiently well educated to acquire the skills that are needed
- Colleges and universities are not educating people with the skills needed

10.9.1 Agro-Food Industry Skills Council

The sector already has an Industry Skills Council, established with the objective of guiding and assisting with the agro-food work of the TVET Reform Project, continued its work through 2012. The industry has itself established a Centre of Excellence for the sector, to provide training and other common support services. Bangladesh's Skills Development Policy, approved by the Government of Bangladesh in 2011, envisages the formation of Industry Skills Councils to "bring together major enterprises and industry bodies in an industry sector to discuss skill development issues affecting their industry sector."

It envisages that the Industry Skills Councils would have a range of functions in identifying and anticipating skills needs, developing policies, planning, improving skills development capabilities, and other aspects of building and maintaining strong skills development systems for each sector.

Further strengthening and extending the role of the existing Industry Skills Council to cover all these functions will provide an ideal mechanism to bring together the various interested organisations and groups and to approve (or reject), prioritise between, refine and coordinate the implementation of the detailed responses suggested by this study.

Technical Assistance

Many of the proposed responses set out here could usefully be supported by technical assistance from international partners including the ILO.

10.9.2 Export Marketing, Product Management and Channel Management

Increasing exports, bringing new products to market, and selling to different types of international customers is creating a need for more people with high level skills in marketing and related disciplines.
It is likely that a mix of the following approaches will be required to meet these skill needs.

- Executive education for managers and for sales and marketing professionals, to develop the additional skills they need to operate effectively in marketing and selling to export markets. In many other countries, this sort of education is provided by business schools, through professional institutions, or sometimes through private training providers. It is common for major businesses to send key staff to executive education courses at leading international business schools.
- Placing marketing professionals from Bangladesh downstream in distribution channels for a period may also be a good way to develop skills and experience.
- Recruiting from other countries, attracting members of the diaspora where they are available and have the right skills, but also recruiting people in export markets. It will be necessary to have some people working in-country. Local sales and marketing staff may bring important insights into the local market, and may be able to leverage existing relationships. They will be closer to the market in culture and language than expatriates from Bangladesh.

- There will be a need for people to work in telephone-based customer service roles serving foreign markets, but based in Bangladesh. Aside from appropriate language skills and a good basic education, these roles will mostly not have specific qualifications requirements, so language skills are the main potential constraint. So long as call centres can operate in English, or in Bangla when dealing with members of the diaspora, there should be no shortage of suitable people who can be trained for these roles. Where other languages are required, there may be a greater need to recruit in-market.
- There is scope for professional networks to make an important contribution to skills development in marketing and sales.

Supplier Capability

In developing suppliers, a key requirement is that interventions will be attractive to the farmer, in terms of being easy to assimilate and not interfering with important work. The following types of mechanism are likely to be effective:

- Arranging short training courses
- Monitoring and regularly visiting from agricultural (and aquaculture) advisors and/or assessors linked to Good Agricultural Practice schemes
- Where the agro-food form deals with farmers through intermediaries, it is possible for the firm could provide train-the-trainer support to the intermediaries. This would help them maximise the value of agricultural output. Alternatively, where there are other advisory services in place, agro-food firms could help train advisors in the skills and knowledge they need to best meet the needs of the firms.

Product Development

The key types of skills interventions required to enable product development include the following.

- Bachelor and masters degree courses in food science, food technology/engineering and food business.
- Executive education courses in food product development for people already working in the sector, ranging from substantial part time courses leading to qualifications such as diplomas or higher degrees, to short courses focusing on specific topics.

Operational Effectiveness and Food Safety

Improving capabilities in operational effectiveness and food safety requires development of skills at all levels within production operations, notably including:

- Operatives, supervisors and production technicians
- Quality control and quality assurance staff
- Laboratory technicians
- Production managers
- Scientists and engineers
- Trainers

Good Manufacturing Practice guidelines for food companies give guidance as to the skills required for food safety. One very specific and extremely important issue in particular point relates to the HACCPs within the process. Unless labourers who are highly skilled and have keen eyes can do the job properly. The research team has seen such HACCPs where minute changes in the temperature may spoil the whole batch of products. Knowledge of proper use of dyes and food colours is important at operational level to regulate their use.

High skills and adequate equipment and scientific facilities at the first three categories in the list above are sin qua non for producing safe and hygienic food products. More specifically, key areas where skills development is required are the following:

- Food safety training and certification for all in operations, at levels appropriate to their role.
- Training to support improvement initiatives, undertaken as part of the initiative. An example of such an initiative is the Kaizen initiative that has been undertaken with support from the TVET Reform Project.
- Training in materials handling and processing technologies for those already working in the sector.

- Technician training in laboratory and machine operations, making use of the food technician qualification established at the initiative of the TVET Reform Project where feasible.
- Bachelor degree courses in food process engineering and industrial engineering.
- Initiatives to develop or update skills in food process engineering and industrial engineering among people already working in the sector, including executive education courses, activities by professional societies, and professional networking activities.
- The agro-food sector has significant numbers of apprentices, but most are employed and trained without formal registration under the 2008 Bangladesh Apprenticeship Training Rules. The sector should move to comply with the Rules, and should receive technical assistance to do so.

Regulatory Compliance

Major types of intervention likely to be required are:

- Substantive training for new and existing quality assurance and documentation managers and specialists;
- Courses in regulatory compliance for managers, supervisors and technicians throughout sector's supply chain and manufacturing operations.

Outside formal training interventions, there is also a need for industry associations, firms and agencies involved in food safety to promote regulatory compliance, with regulatory and management policies in place to support it.

Logistics/Supply Chain/Cold Chain

The response to the need for skills to underpin capabilities in logistics, supply chain and cold chain could include the following:

- A centre of expertise in supply chain and logistics, possibly based at a university, to provide access to high level skills in the area, and to provide education and training.
- Primary degree and master courses in supply chain and logistics.
- Consideration of possible training, apprenticeship or education courses in mid-tier skills, such as freight forwarding, warehouse management, and transport supervision.
  Universities, firms, industry associations and government could all usefully be involved in delivering on these issues.

Regulation

Stronger regulation will require stronger skills, sourced both through upgrading the skills of the existing workforce and through recruiting small numbers of highly qualified people. High levels of skill and knowledge are crucially important to the ability of staff at a regulator to make good decisions in the context of the competing pressures under which they work.
Mechanisms to upgrade skills may include:

- Training for inspectors.
- Placements with regulators in the main regulated markets.
- Upgrading qualifications through studying towards higher qualifications

10.10 Assessments and Recommendations

The overall assessment that may be made is that the agro-food sub-sector is a dynamic one expanding both at the domestic and the export market. The latter so far has been more difficult to enter because of quite stringent rules regarding food hygiene and safety. However, there are many other problems relating to the expansion of the sub-sector, most of which have one or other implications for higher skills in the enterprises. One of these is the type of skill needs and associated training facilities, while the other is the extent, or rather the sheer number of workers that may need to be trained.

To take the second issue first, we have seen earlier that under certain plausible assumptions, by 2020, there is a need for nearly 1.3 million skilled and semi-skilled persons which may increase to more than 3 million by 2025. Given that food processing industries have special needs related to ensuring strict hygiene and food safety in the shop floors, most of them need to be trained well. The sheer number indicates that the food industries may need specialised and possibly separate training facilities (also see later).

The most needed skills are at the level of quality control and proper testing facilities for ensuring quality. However, in many cases, the quality control has to begin with the point of original supply of the agricultural product and the Consultants are of the belief that unless good quality food safety at the farmers level can be ensured, it would be hard to do so at the enterprises' processing level. How this can be done has to be thought of clearly.

At the shop floor in the factory, good physical environment and cleanliness has to be maintained. It must be said that in quite a few cases, particularly older firms, there seemed to be some limitations in this regard. The actual processing in some cases were manual, in some semi-automatic and in others fully automatic. It seemed to us tough, based on a very small sample, that the interface between automated processes and the manual processes were not fully seamless with scopes for, even if inadvertent, contamination. In the case of the fully automated ones, we heard comments that with automated processes you do not need much skill; you have to just switch the machine on or off, a completely erroneous view given that the HACCPs in automated ones may malfunction and any time spoiling the whole batch of products if, not immediately not properly attended to. And here one also needs highly skilled technicians to identify and sort out the problem.

The third major problem we found is that there is a dearth of training facilities. Some firms have in-house facilities for only rudimentary training, while the training facilities that the Government or non-government organisations have are highly inadequate, more text-bookish. What we observed is that each food say, chanachur and jam making are two quite different processes each needing specific operational skills and in the case of automated processes, the machines may even vary depending on vintage and source. Unless the training centres provide training with the specific equipment, the operators are hard put to muster the skill. At the beginning of automation, the vendors had provided some training in operating the machines but when the original worker leaves for some reason or another, finding a replacement is difficult, which leads to cannibalising by firms.

It seemed to the Consultants that the conventional training in formal training facilities where too many types of training are provided may not be much useful for training in agro-food processing. Either there should be a separate training facility solely for this sub-sector where each of the major food items should have separate training facilities or that the present training centres should have completely dedicated food processing division within them for specialised training for various relevant skills.

The discussion and analysis in the foregoing sections have already indicated the types of training that are necessary. To recapitulate, we would emphasise the following types of training:

- Cleanliness and physical environment of the shop floor;
- Quality control including strict maintenance of HACCP points, lab testing facilities, interface between automated and manual processes for each specific food product, packaging, etc.
- Formal training in higher level skills as scientists, food technologists and food engineering.

There are of course the needs for other types of skills more of general nature but is not unique to the food industry. These are not repeated here. Readers may find those in the section on main findings above.

Based on the above findings and the summary of main issues as well as those which are also important for the development of the sector, the following occupations need to be developed through formal (including formal educational) trainings:

a. HACCP-hazard analysis and critical control point
b. GAP-good agricultural practice
c. GHP-good hygiene practice
d. TQM-total quality management
e. Supply chain management and logistics
f. GMP-Good manufacturing practices
g. Basic sanitation and hygiene
h. Food hygiene and food spoilage
j. Food quality control
k. Food technicians and technologists including lab technicians
l. Food packaging technicians

m. Housekeeping and occupational safety and hygiene
n. Productivity improvement technique

Some of the above occupations (such as good agricultural practices) may lead to need for training farmers but we only take account of what the implications are for the enterprises (such as materials testing capability in the food manufacturing company. Given this, the occupations can be re-categorised into, say,5 categories of operations which are:

- Processing line;
- Quality Control operations;
- Personnel safety;
- Maintenance, Cleaning and hygiene; and
- Research and Development.

Each of these can be further subdivided into specific work categories.[9] However, as within a department, most works are substitutable but not so between departments, we have refrained from analysing the detailed categories but concentrated rather on the departments. Also note that the unskilled (basically manual job-holders) are transferable between departments in contrast. Hence, they are not shown separately between departments but rather in aggregate for the particular year under all kinds of operations. The results are shown in Table 10.5.

Table 10.5 :Demand for occupational and operational category bylevel of skill(selected years)

(in lakhs of persons)

Year	Production operation	Skilled	Semi-skilled	Unskilled
FY2015	Processing	1.30	1.81	
	QC	0.35	0.28	
	Personnel safety	0.22	0.16	
	Maintenance	0.34	0.28	
	Cleaning & hygiene	0.32	0.2	
	R&D	0.15	0.09	
	All	**2.68**	**2.82**	**1.55**
FY2020	Processing	3.00	4.21	
	QC	0.81	0.66	
	Personnel safety	0.51	0.38	
	Maintenance	0.79	0.64	
	Cleaning & hygiene	0.73	0.48	
	R&D	0.36	0.18	
	All	**6.22**	**6.55**	**3.60**
FY2025	Processing	7.38	10.29	
	QC	1.97	1.62	
	Personnel safety	1.25	0.93	
	Maintenance	1.94	1.58	
	Cleaning & hygiene	1.79	1.17	
	R&D	0.89	0.43	
	All	**15.22**	**16.02**	**8.81**

Source: Estimated by consultant based on data from the surveyed firms.

[9] Process operations, for example, may have the following sub-categories: Machine CIP, Unit line check up; production line set-up planning; raw and packaging materials receiving for production,; machine start-up; machine and products inspection; technical data documentation; finished product control, unit operation line closing. Quality control operations similarly may have up to 8 branches of work which may be performed by people in that department. However, the people in production line cannot operate the quality control line nor the personnel safety line except perhaps in an emergency. Thus, the occupational training needs have to be decided on the basis of the broad operational categories and thus we have further analysed the skill categories shown in table 5 earlier by these operational and technical lines.

When the trainings are arranged, much of these need to be contextualized specific food by food although some broad categorization may also be made. For this to be done with comparative ease and for these to be practical, the trainers or training institutes need to consult the specific food group associations as to the effectiveness of the sample syllabus (discussed above) and their specific requirements.

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