


POLICY PAPER ON

DEVELOPMENT OF TECHNICAL AND VOCATIONAL EDUCATION SYSTEM IN BANGLADESH

LESSONS FROM THE GERMAN EXPERIENCE


FRIEDRICH EBERT STIFTUNG Bangladesh

SME FOUNDATION

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1. Introduction

Small and medium enterprises are considered as engines of growth for its diversified contributions: directly contributes to economic growth through output and employment creation, promote backward and forward linkages, and develop economic resilience of the people. As such, development of SMEs is recognized as a strategy in the development plans in a country like Bangladesh. Germany has been very successful in promoting the SMEs, and is recognized as one of the leaders in developing SMEs because of its innovation, competitiveness, research and development. One of the critical factors in their success has been skilled workforce created through technical and vocational education and training (TVET). Institutional arrangement and approach to TVET have contributed to creating the required skilled force. The 2016 statistics reported 546,947 registered training places; of which 517,789 or 94.7% were company-based training places and the remaining 5.3% were extra-company training places with a cumulative enrollment of about 2.5 million trainees (BIBB, 2018). This policy paper has been prepared to highlight the lessons that Bangladesh can derive from the German experiences.

This policy paper is structured into three broad sections. The first section highlights the TVET system in Bangladesh and identifies the challenges for the Bangladesh face in developing the TVET. The second section provides a description of the German TVET system. Lessons from the German TVET system are identified in section Three.

2. Technical and Vocational Education and Training in Bangladesh

The journey towards technical and vocational education dates back to the independence of Bangladesh. As a regulatory body, the Directorate of Technical Education was established for development of technical and vocational education in 1960. Over the years, the Directorate of Technical Education initiated rapid development and expansion works of degree, diploma and trade level technical education in the country. Later on, a statutory body namely "The East Pakistan Technical Education Board" was established through Act. No.-1 of 1967 by the then East Pakistan Assembly which became functional in 1969, which is now Bangladesh Technical Education Board (BTEB). Thus, the Bangladesh Technical Education Board is responsible to organize, supervise, regulate, control and develop technical and vocational education throughout the country.

2.1 Current Structure and Features of TVET in Bangladesh

Presently in Bangladesh, public and private institutions provide four levels of technical and vocational education namely secondary level (SSC), higher secondary level (HSC), diploma level and short-term training course in various trades. Around 87 percent of the institutes are in private sector. The courses are offered by vocational training institutes, polytechnics, commercial institutes, technical training centers and specialized institutes. The Directorate of Technical Education (DTE) and the Bangladesh Technical Education Board (BTEB) oversee the three layers (SSC

vocational, HSC vocational and diploma) of formal vocational and technical education provided by both public and private institutions and part of the training courses. Various areas of study with fields of specialization in the vocational institutes are presented in Table 1.

Table 1: Composition of Technical and Vocational Education in Bangladesh

Duration of study	Type/Area of study	Number of Technology/ trades/ Specialization	Number of institutions
4 years	Diploma-in-Engineering	59	1259
3 years	Diploma-in-Engineering	1	3
2 years	Diploma-in-Engineering	2	5
2 years	HSC and equivalent	21	1981
2 years	SSC and Dakhil	62	3534
2 years	Trade courses/Certificate Programs	4	1
1-year	Diploma	12	30
1-year	Certificate	57	385
6 months	Certificates / Diploma	2	31
3/6 months	Certificate in NTVQF Basic Level	97	3223
	Total	317	10452

Source: Calculations based on BTEB Annual Report 2018-2019

As found in Table 1, technical and vocational education in Bangladesh is provided for the period ranging from 4 years diploma to 3 months' basic level training on national technical and vocational qualification framework (NTVQF). Taking all types of institutions that deliver vocational education and training, the total number of institutions in the country stand at 10,452 and they provide education and training in 317 specialized areas under 33 categories[1] (Bangladesh Technical Education Board Annual Report, 2018-2019). Currently, the highest number of institutors are found in the category of SSC and Dakhil followed by institutions that offer basic training on NTVQF. Two-years diploma is the least available study in the TVET programs. One-year diploma programs focus on the areas including technical education, vocational education and medical ultrasound. Again, there is a 6 months long certificate course in medical ultrasound. Two/one-year certificate programs specialize in marine trade, skills certificate, certificate in vocational education, certificate in health technology, certificate in poultry farming, certificate in animal health and

[1]The breakdown of 33 categories of TVET in four levels are 2 categories at Secondary school certificate level, 3 categories in higher secondary certificate level; 10 categories diploma and 18 categories certificate/short training.

production, national technical vocational qualification framework level II and level III and advance certificate course.

Among the 33 categories of TVET programs, no student has enrolled under 10 categories in the academic session 2018-2019. Besides data reveal that more than 80 percent of the total registered students were enrolled under three areas including 3/6 months' training on basic level of NTVQF, SSC vocational and HSC vocational in business management. It reveals that the certification process in the technical and vocational education in Bangladesh still keeps parity with the general education system. In truest sense, real technical and vocational education receive little priority to the students.

Over the past two decades there has been increase in both in the number of institutes and student enrollment. Data of the Bangladesh Education Statistics (2019) reveals some important findings and achievements during the period 2000-19. First of all, the number of institutions has remarkably increased during the period under analysis. Secondly, private sector institutions dominate the technical and vocational education in Bangladesh. Altogether, 87.3% institutions are owned by the private sector and the rest 12.7% belong to the government sector. Thirdly, the number of students in the TVET programs have been rising and the number has crossed more than a million in the year 2019. Fourthly, total female students remain low and growth in the number of female students is not encouraging yet. In the year 2019, female students shared slightly higher than 25% which means out of every four students in technical and vocational education, only one is a female.

Despite the progress, enrollment in the three tiers of technical and vocational education programs is still substantially lower than the enrollment in the three tiers of general education and so happens to be in the case of the number of institutions available in the country (Bangladesh Education Statistics 2019). However, the Government of Bangladesh has formulated appropriate policies to promote technical and vocational education and training and ensure quality of the education during the past decade.

2.2 Technical and Vocational Education Plans and Policies

During the past decade there had been some significant policy changes in Bangladesh. The policies focus on promoting technical education and developing technical know-how.

National Education Policy 2010

In order to keep pace with the requirement of skilled manpower in the growing economic sectors in rural and urban economies in Bangladesh, theGoB has formulated the National Education Policy 2010. It has outlined the following targets to strengthen the TVET programs:

- In every upazilla, one technical education institute will be established for the expansion of technical education. Besides, the number of polytechnic institutes, textile institutes, and leather institutes will be increased.
- Government budget will be allocated on priority basis in the sector of vocational and technical education.

- In vocational and technical education, there must be the scope of learning graphic design, multimedia, animation, CAD/CSM etc.

The National Skills Development Policy (NSDP) 2011

The National Skills Development Policy (NSDP) 2011 was framed with a view to change curriculum-based technical education to competency-based education system under the BTEB. Towards that end, 15 industry skills councils were created by the national skills development councils (NSDC). The industry skills councils provide expert services in curriculum design and to tap courses that are highly required to meet the skill requirement in the present and future job market. All of these 15 industry skills councils have standards and curriculum development committees. In the management of Technical training centers for Polytechnic throughout the country local industry skills council representatives are connected to the management body. Technical and vocational training in line with the NTVQF will provide a better platform for the expatriates to get skill-based jobs in the overseas job market.

The National Skills Development Policy 2011 has further attempted to set an action plan for achieving the targets of the National Education Policy 2010. The key TVET policies under the NSDP are as under:

- Introduction of technical and vocational courses in secondary, higher secondary and madrasa levels
- Promotion of gender equality in technical and vocational education and training
- Introduction of double shift in the existing technical school and colleges and polytechnic institutes;
- Undertaken a project to establish 100 Technical School (TS) at Upazila level

Skills Development Strategies under the 7th Five Year Plan

Another strategic document that sets out a development road map of the country is the Five-Year Plan and currently the 7th Five-Year Plan is under implementation. The 7th Five-Year Plan (FY 2016-FY 2020) has placed a greater emphasis on the expansion of technical and vocational education in order to meet the changing demands of the labor force in the economy.

The key strategies relating to TVET programs are the following:

- Diversify technical and vocational education programs to meet the technical manpower needs in the areas of emerging technologies (such as: Fish Production, Leather, Textile, Mechatronics, Mining & Mine Survey, Instrumentation & Process Control, Construction, Environmental, Garments Design & Pattern Making, Electro-Medical, etc.) including the I.T. sector.
- Encourage more women's participation in TVET to ensure empowerment equality and gender equity.
- Develop and modernize the existing TVET Institutions with available rural technologies to meet the challenge of the fast-changing economy in the rural

setting for poverty alleviation and to arrest rural-urban migration.

- Encourage private sector involvement and initiative in the delivery of technical and vocational education programs.

2.3 National Technical and Vocational Qualification Framework (NTVQF)

A new milestone in the fields of technical and vocational education in Bangladesh has been set by developing NTVQF following the guidelines of National Skills Development Policy (NSDP) 2011. Initially, five levels of National Skill Standards (NSS) were designed in the 1980s: Basic, NSS III, NSS II, NSS I, and Master Craftsman. As outlined in the NSS, trainees who completed NSS I and have 3 years of industrial experience may become master crafts persons. However, this is not in practice any more (ADB, 2015). Later on, NSDP 2011 has revived the necessity of NSS and eventually NSDC and BTEB developed the NTVQF that includes 344 competency standards for 155 occupations under 12 sectors. Levels of NTVQF and associated qualifications standards are presented in Table-2. There are 8 levels under the NTVQF where the most basic level prepares the trainees for basic vocational training. Until now, BTEB has endorsed 340 institutes to impart training on NTVQF standards.

Table 2: Various Facets of NTVQF

Levels of NTVQF	Certificates	Qualification standards/ job classification
Level 1 (Pre-vocational)	Diploma Engineers	Middle manager/sub-assistant engineer
Level 2 (Pre-vocational)	NSC-V	Highly-skilled worker / supervisor
Level 3 (Vocational level 1)	NSC-IV	Skilled worker
Level 4	NSC-III	Semi-skilled worker
Level 5	NSC-II	Basic skilled worker
Level 6	NSC-I	Basic worker
Level 7	National pre-vocational certificate II	Pre-vocational trainee
Level 8	National pre-vocational certificate I	Pre-vocational trainee

Source: BTEB (2019)

At the most basic level of NTVQF, there are 97 fields of technology or trades and trainees receive 3-6 months training. A notable feature of training under NTVQF is the high female enrollment in the NTVQF basic level. This indicates that NTVQF could attract female participants in a quick time compared to the other TVET programs.

2.4 Industry-Driven TVET / Linkages between TVET and Industry

Apart from the supply of technical manpower by the TVET institutions governed by the BTEB and DTE, there are some institutes run under NGOs, private sector, public-private partnerships (PPPs) and development partners that supply vocationally trained employees to some key industries. Rahman et al. (2012) has identified eight growth promoting, labor-intensive, and skill-intensive sectors in the country that include (i) pharmaceuticals, (ii) textiles, (iii) food manufacturing, (iv) furniture, (v) ceramics, (vi) leather and leather goods, (vii) transport equipment, and (viii) information technology. Some of these industries get supply of technical manpower at managerial positions (upper tier) and skilled workers/ supervisors (lower tier) from specific TVET institutions.

Among the various industries, the RMG and textile sector has the widest supply side of engineering graduates in various professions. The graduates usually fill the entry level managerial positions. Besides, there are industry led training programs in the RMG sector that trains existing employees to make them skilled workers and also at managerial level employees to make them professionally sound and ready for career growth.

Industry-oriented technical education in the upper tier employment (managerial positions) under the public sector management is given by the Bangladesh University of Textiles, the only public university among all textile universities in Bangladesh that provide undergraduate, post graduate and executive development engineering education in the fields of textiles. This university supplies advanced level Textile Engineering graduates in six different specialization areas who hold entry level to mid-level managerial positions in the RMG and Textile industries.

Under the private sector management, BGMEA University of Fashion and Technology (BUFT) is another tertiary institution that supplies graduates in the fields of textile engineering. From this university, the industry can hire graduates in apparel, knitting & knitwear, fashion design, apparel merchandising, textile engineering and other allied areas such as leather and accessories design, fashion modeling, fashion photography, fashion marketing.

Another higher education center and the only institution under the public-private partnership that strengthens RMG, textile and other allied industries in Bangladesh by providing technically skilled human resources is National Institute of Textile Engineering & Research (NITER). It is jointly run and managed under the Ministry of Textiles & Jute and Bangladesh Textile Mills Association (BTMA). Apart from specialized graduate programs in Textile Engineering, NITER offers engineering in two other important fields: B.Sc. in Industrial & Production Engineering (IPE) and Fashion Design & Apparel Engineering (FDAE) to meet the present demand of our textile and RMG sector.

Bangladesh Knitwear Manufacturers and Exporters Association-BKMEA operates a Factory based Mid- Level Management Training center that provides training on some major areas of employment in the textile industry. The major fields of training run by the

BKMEA training center include industrial relation and supply chain management, occupational health & safety, electrical safety, chemical safety, environmental safety, building safety, security compliance, buyers code of conducts, international standards, audit techniques. Besides, it also offers training for workers on various employment relations and safety and health related areas. Industry professionals can also get customized training from BKMEA. The practical nature of all these training programs play an important role to upgrade the skills of human resources in the garments and knitwear sector.

Apart from the technical institutions at the tertiary level, there are also technical training centers that supply skilled workers in different industries. One of them with relatively wide geographic coverage is the training centers under the Bureau of Manpower, Employment and Training (BMET). Currently, BMET has 70 training centers in the country that offer a number of short modular training in the fields of marine, automobile, civil works, electrical, information technology, electronics and readymade garments.

Under joint-venture management, Bangladesh-German Technical Training Centre (BGTTC) supplies vocationally skilled manpower in various short-term courses and trades. This training center runs SSC vocational courses and trade courses in housekeeping, auto CAD, drafting mechanical, garments, graphics design, computer, welding, refrigeration and air conditioning, machine tool operation, general mechanics, electronics, plumbing, electrical, civil construction and automotive.

Bangladesh-Korea Technical Training Centre (BKTTC) is another joint-venture technical school that operates under BMET. This TTC provides training in 6 trades for the SSC Vocational Courses and short-term term training in 34 different trades. One of the most popular trade courses in BKTTC is housekeeping training for one month. Large number of female workers who seek employment in the Middle-East countries usually participate in the housekeeping training at BKTTC.

2.5 Challenges of TVET in Bangladesh

Despite labor endowment and multiple efforts to make them skilled, the economy suffers a lot due to the unavailability of trained labor which underscores low performance of the TVET sector. Some key challenges of TVET sector are as follows:

(a) Absence of Apprenticeship: Absence of apprenticeship is a profound concern for the TVET sector in Bangladesh. Theoretical coverage in TVET institutions and examination systems is well-developed (ADB, 2015). However, the less developed part is the less exposure to practical applications during the period of study and less congruence with the local and global market requirements. This leads to a lack of employers' confidence in the TVET system and eventually leading to skill shortages and unemployment amongst TVET graduates. A recent study points out that certifications from formal institutions are not among the major criteria defining the skill level of workers. Duration of overall work experience and on the job-training are among the criteria having more weight (GOB, 2015).

Lack of skilled manpower and high mobility of skilled manpower is a major constraint in Bangladesh. Although there are a substantial number of technical educational institutions in Bangladesh, those institutions suffer from direct industrial linkages.

(b) Demand for TVET is low: In spite of series of government initiatives, *making technical and vocational education attractive to the mass people still remains a major challenge.* Demand for enrollment to technical and vocational education is quite low compared to the demand for admission in the general schools and colleges.

(c) Deficiency in Quality: Another major challenge of TVET is the low level of quality of the certified graduates. The unsatisfactory performance of the technical and vocational education and training is mainly caused by deficiencies in quality. Most employers find the training received by workers to be inadequate, and in some cases, irrelevant to their needs (GOB, 2015).

(d) Limited Number of Specialized Institutions: There are sufficient areas of technology specialization/trades available in the country. Specialized institutions are few in numbers and therefore are not conveniently located for the mass students. Limited number of specialized institutions either for 1-2 years diploma or trade courses are available in the areas of health technology, medical ultrasound, marine trade, poultry farming animal health and production and in the 14 areas of NTVQF.

(e) Low Female Enrollment: Female enrolment in technical and vocational education is still low. Achieving the target of female enrolment in technical and vocational education is still a challenge. In the 7th Five-Year Plan, the target of female enrolment was 40% of the total. However, at the end of the 2018-19, enrollment was around 30%.

(f) Lack of Infrastructure: Lack of infrastructure in the technical and vocational institutions is a major challenge in Bangladesh. Institutions lack modern laboratories and technology. In 2019 it was found that 37.30% institutes have Science Laboratory (BANBEIS, 2019). In the absence of modern amenities, most of the vocational training is conducted in classroom style (GOB, 2010). A comprehensive strategy is needed for ensuring full-scale vocational training with adequate practical exposure.

(g) High Teacher-Student Ratio: Teacher-student ratio in the public polytechnic institutes is very high. The standard of teacher-student ratio is set be 1: 12 (National Education Policy, 2010). However, the actual scenario is far higher than the standard. Table 6 evidences that the teacher-students ratio in the polytechnic institutes is 1:49 which is four-times higher than the standard outlined in the Education Policy and rate is much higher in the glass and ceramic institute.

Table 6: Teacher-student ratio in the technical and vocational institutions

Type of Institute	Teacher-Student Ratio
Polytechnic Institute	1:49
Technical School & College	1:35
Glass & Ceramic Institute	1:63
Graphic Arts Institute	1:27

Source: (BANBEIS, 2019)

(h) Limited Number of Institutions with Long-term TVET program: There are a relatively larger number of specializations in four years technical and vocational diploma engineering. The structure of admission in engineering diploma for four years is aligned with the general education as those institutions attract students only who qualify secondary school (SSC) or higher secondary school (HSC). However, the number of institutions for four-year diploma is limited compared to the number of eligible students. Besides, the opportunity to study in various fields of engineering and technology is absent for a mass who do not qualify for higher secondary education. As a result, a large proportion of the young population remain unskilled for the rest of their life who enter into the local and international labor market. The students who opt for a four-year diploma in engineering but do not get a chance, they hardly become interested to enroll in short term certificate or trade courses. The same happens for those who do not pass HSC. Therefore, the government needs to increase the opportunity of access to technical and vocational diplomas for the HSC pass students and at the same time more students from the secondary school need to be channeled to the world of jobs that match with their acquired qualifications.

3. Vocational Education in Germany

Germany has one of the best proven models of vocational education in the world that has historically led to the country's industrial growth and competitive advantage in the world market. Bergseng (2019) pointed out that the Vocational Education and Training (VET) system in Germany is known and admired worldwide for its ability to provide the labor market with highly skilled VET graduates and for yielding benefits for the economy. High quality vocational education and training is well endorsed by many visible and measurable indicators including development of SMEs, global competitiveness of SMEs and low youth unemployment rate. 2016 statistics reported 546,947 registered training places; of which 517,789 or 94.7% were company-based training places and the remaining 5.3% were extra-company training places with a cumulative enrollment of about 2.5 million trainees (BIBB, 2018).

3.1 Entry Process into the Vocational Education

In Germany, general and vocational education is regulated with some variation in 16 states and therefore, the duration of compulsory education is not the same across the states (Bauer and Gessler, 2016). Nonetheless, entry into the VET essentially remains open to everybody in every state and there are no admission requirements in dual VET. Learners can enter into the dual VET at some point when they are in the lower secondary schools. For regular VET programs, such as dual apprenticeships, both in and outside companies, or school-based VET; there are no formal age limits in place. With dual apprenticeships, employers decide whom they will hire, and some might prefer younger candidates. However, employers set their own age limits in rare cases (Bergseng, 2019).

As the statutory requirement, children enter into compulsory schooling in Germany at the age of 6 and continue up to the age of 9-10 depending on the provision of the Federal state. After completing four years of elementary school students make a decision about the secondary school within the three-tier school system: grammar schools, intermediate schools

and secondary general schools (Schneider et al. 2007).

The grammar school continues from classes 5 to 10 (lower secondary) and then 11-13 (upper secondary) which provides in-depth general education and in turn leads the successful learners to university education. Intermediate schools provide extended general education for class 5 to 10 and upon completion students get an intermediate certificate which certifies qualifications to get entry into full time vocational schools or vocational training in the dual VET system. The third category is secondary general schools (class 5 to 9), also known as modern schools; are customized for secondary school leaving certificates for those who intend to gain practical skills and enter into the world of work. The vast majority of VET students start their apprenticeship directly or soon after completing compulsory schooling. Table 7 summarizes the nature of vocational education in Germany.

VET in Germany has two main windows: (a) dual VET and (b) school-based VET programs at upper secondary level. Again, school-based VET programs include (i) programs at full-time vocational schools; (ii) general upper secondary programs with a vocational component which usually leads to the general higher education entrance qualification; and (iii) specialized programs at post-secondary level which are built upon the intermediate school -leaving certificate or initial VET that leads to entrance qualifications for universities of applied sciences. At tertiary level, vocationally qualified applicants who don't possess a school-based higher education entrance qualification but have several years of practical experience in the relevant occupation can access advanced vocational training (AVT) courses offered by chambers of schools leading to become a master craftsman, technical engineer and achieve a level 6 or vocational bachelor degree. Level 6 certifies vocational bachelor qualifications who are eligible to acquire the middle management position in the company and to exercise a trade independently (Cedefop, 2017).

Table 7: Structure of VET in Germany

Start of schooling	6 years
Duration of lower secondary compulsory education	9-10 years
Duration of elementary schools	4 years
Schooling system following lower secondary education	3 tier school system for class 5 to 10 with a variation from one state to another
Entrance requirement to full-time vocational schools	Minimum requirement is lower secondary general school certificate
Entrance requirement for dual VET	A school leaving certificate is not required instead a signed apprenticeship contract with a company is required.
Entrance requirement to advanced vocational training	Several years of expertise in relevant occupation

Start of schooling	6 years
Entrance requirement general upper secondary programs with a vocational component	Intermediate level certificate
Duration of Full-time vocational schools	1 to 3 years
Duration of dual VET	2-3.5 years
Duration of general upper secondary programs with a vocational component	2-3 years
Learning modality in dual VET	1 to 2 days or about 12 hours per week in schools and reaming days in the company[2]
Number of qualified occupations	328
Upper secondary students enrolled in vocational programs (% of all students in upper secondary education, 2015)	73.2%
Dual VET students (% of all students in VET) in upper secondary education in 2017 (European Commission, 2019)[3]	45.6%
Employability rate of VET graduates in 2018[4]	92.4%
Governance	Shared responsibility between Federal government, state government and social partners like companies and chambers.
Regulatory Body	National level: Federal Institute for Vocational Training (BIBB), Federal Ministry of Industry and Energy, Federal Ministry of Education and Research. Regional level: Chambers of Commerce, Chamber of Crafts,
Financing	Free of cost. Cost of training is financed by companies and the cost of vocational school is financed by the federal government and state government.[5]

[2] In vocational schools one-third of the lessons consist of cross-occupational learning and two-thirds consist of the work-related subjects. The cross-occupational branch includes, for example, contents of such subjects as Social Studies, Economics, German, Foreign Language, Religion and Sports. It is closely connected to the work-related contents, but addresses it in a different manner.

[3] In addition to enrollment only in dual VET, some students also complete VET along with general studies and therefore, the total percentage of VET qualifiers usually becomes more than 50% at the upper secondary level.

[4] Source: European Commission (2019)

[5] Public expenditure for education in Germany in 2017 was 4.1 % of the country's gross domestic (European Commission, 2019). 2010 data shows that public expenditure on vocational education was 0.73% of GDP (Cedefop, 2013).

Start of schooling	6 years
Average salary of an apprentice[6]	62.1% of a skilled worker
Status of dual VET Qualification	Skilled workers at level 3/4 of the National Qualification Level
Status of Advanced VET Qualification	Vocational Bachelor who is a Master Craftsman / Technical Engineer of national qualification level 6 out of level 8.

3.2 Dual Vocational Education Training (Dual VET) System in Germany

Dual VET system is the core of vocational education and training in Germany. The term dual VET is coined due to dual nature of learning consisting of classroom learning at a vocational school and practical learning in a company. Germany has maintained a dual VET system for more than a century with strong social partnership. The dual vocational education and training system, with its combination of practical and theoretical education, is the highest attended vocational education. For dual VET, trainees must register with companies instead of vocational schools. In this system, a vocational school is an autonomous place of learning and its job is to provide basic and specialized vocational training previously obtained by general education. Learners under the dual VET include those who have completed their education in special, secondary general, intermediate, comprehensive, vocational and grammar schools (Schneider et al. 2007). However, most students enter into dual VET at upper secondary level.

In 2016, new enrollment in dual VET was 520332 of which 60.8% were male and 39.2% were female (BIBB, 2018) and total pupils at vocational schools were 24,90,4627 at the end 2017. Distribution of vocational students in various types of vocational schools are presented in Table 8.

Table 8: Vocational students in various types of vocational schools in 2017

School type	**% of total trainees**
Part-time vocational school (dual system)	56.7%
Pre-vocational training year	4.8%
Full-time vocational school	16.9%
Specialized upper secondary school	5.5%
Specialized grammar school	7.6%
Trade and technical school	7.3%
Others	1.3%
Total pupils	**2490462**

Source: Federal Ministry of Education and Research (datenportal.bmbf.de/portal/en/B24.html)

[6] Apprentices receive salary ranging from 400 Euros per month in the first year to 1400 Euros per month in the final year (Muehlemann & Wolter, 2014).

[7] Federal Ministry of Education and Research, Germany. Available at: https://www.datenportal.bmbf.de/portal/en/B24.html.

According to 2017 data presented in Table 8, the scale of dual VET is more than 1.31 million trainees out of 24, 90,462 pupils with the average age at 19.4 years old. Report by the Federal Institute for Vocational Education and Training (BIBB) reveals that, about 52% of the population at the age of 16-24 has entered Dual VET in 2018. The apprenticeships under dual-VET are granted by economy-wide industries and the highest proportion of apprenticeships are being provided by the manufacturing industry. In 2016, out of 520,332 new training contracts, 58.5% were in the manufacturing industry, 27.2% were in the craft sector, the rest were in agriculture, public services and freelance sector/liberal professions (Phạm Thị Minh Hiền, 2019).

Duration of training under Dual VET lasts from 2 to 3.5 years depending on the occupational field and the training level in the national qualification framework. Germany's national qualification framework (issued in 2013) provides 8 qualification levels, in which vocational training levels include level 3, level 4 and level 6. Dual VET graduates are placed at level 3 or level 4 depending on the registered training course (level 3 with a two-year training period, level 4 with a training period of 3-3.5 years).

In order to graduate under dual VET, students must pass the test which is standardized nationwide. Theoretical and practical contents in the graduation examinations in all 16 states follow the same standard. Particularly the theoretical exam is held jointly, at the same time nationwide. Thus, although the training content at vocational schools may not be exactly the same due to provisions of different state governments, the graduation examinations must be consistent nationwide, and diplomas granted are following the national qualification framework. Dual VET graduates are eligible to get employment as skilled workers and can also continue study to upper level in vocational bachelor courses or transfer to an academic university. Vocational bachelor degree qualifiers become the 'master craftsman' and this qualification is required to teach in-company vocational training programs under dual VET.

3.3 Key Aspects of Dual VET System

The unified structure of dual VET was adopted in a large conference in 1920 ((Bauer and Gessler, 2016) and is the most popular vocational education in Germany. Dual VET is built on some strong foundation stones and some of them are briefly highlighted below:

(i) Strong Apprenticeship System: The most notable part of dual VET is the apprenticeship under which companies provide in-house training with an exposure to hands-on learning experiences in real work environment under the training of master craftsmen who have passed vocational bachelor degree equivalent to National Qualification Standard 6. The dual system refers to the requirement that apprentices receive about 70% of the training period in the company premises and the remaining 30% takes place at vocational schools. Most of that formal education takes place at a vocational school. Company training takes place in the company premise with a focus on learning practical skills from the master craftsman and experienced workers; while vocational school learning focuses on

theoretical knowledge building (company training classes teach how to do; vocational school class teaches what tasks to do in an occupation and why to do that). Full time VET schools have the highest number of students. These schools prepare for vocational work or training in dual systems. The presence of a full-time vocational school is conducted in the first year of training in a dual system. In Germany, firms invest in apprentice workers and support them for pursuing formal technical education for improvement and up-gradation of skills. In return, firms are benefitted from such upgraded knowledge. Thus, *the presence of a strong apprenticeship program in the dual VET is one of the key driving forces of industrial supremacy of Germany.*

Some unique features of apprenticeship are as follows:

- **Formal contract between company and trainees:** A contract is signed between trainees and company that forms the formal legal relationship between them and is same as employment contract with all provisions of facilities and training conditions[8].

- **No cost for the trainees:** As per the contract signed between trainee and the company, companies pay training costs and allowances to them while school classes are free of charge as the government gives finance to vocational schools.

- **High allowances for trainees:** Dual-VET is attractive to the higher secondary pupils as the participants receive high allowance during the training period and they enjoy high rates of employment upon certification. They receive an average training allowance of 876 Euro per month. On average 95% of graduates are employed, of which about 68% continue to work for their training company. As a result of high organizational citizenship behavior, companies can promote intrapreneurship and employees have low inter-firm mobility.

- **Strong Social Partnership:** Social partners like employers and business chambers work hand-in-hand with the Federal and state government for successful operation of dual VET. Role of local Chamber of Commerce in many phases of dual vocational education training includes:

    - Giving license to companies for in-house training

    - Organizing graduation examinations for dual VET students

    - Selecting qualified members to from the examination board comprising of representatives of employers, employees (nominated by the Sector

[8] The conditions contained in a training contract include (i) type, structure and especially the goal of the training, (ii) beginning and duration of the training, (iii) training measures, (iv) duration of the regular daily time of training, (v) duration of the probation period, (vi) payment method and amount of trainee allowance, (vii) duration of the leave, (viii) preconditions for termination.

Association) and vocational school teachers (managed by each State Government)

- Monitoring in-company training, in-company trainers, training center, supporting businesses and learners

(b) Content Development Process: Content development process is well-established with inputs and insights from multiple stakeholders including training companies, Federal government agencies like BIBB, industry experts, occupation experts suggested by employers, and representatives from trade unions. Contents for in-company training are updated within every year. New training contents at the workplace are determined by the companies and they send proposals to the BIBB which is a research agency of the Federal Government. Based on these proposals, BIBB coordinates with experts from each industry and occupational field (proposed by the industry/employers) and trade unions to develop in-company training standards. BIBB also researches and publishes documents guiding the implementation of in-company training standards such as: explaining the learning objectives in the general training plan, instructing teachers, examiners and assessing students, training results, exam structure.

TThe Federal Ministry of Industry and Energy sets the standards of training in the companies that register with the local Chamber of Commerce. There have been training standards for 328 occupations in dual VET systems. The contents include: (i) name of training (ii) duration of training (iii) description of knowledge, skills and competencies to be achieved for that occupation, (iv) instruction of the training plan, structure of the content and training schedule (v) assessments needed to meet training requirements.

The contents of dual VET are based on the framework curriculum, which includes general subjects for specialized occupations, specialized job-related theories and other subjects such as soft skills, foreign languages, physical education, religion and sports.

(c) Teacher Qualification: High quality of VET requires superior standard of teaching and qualified teaching staff. Therefore, VET teachers in Germany are required to possess academic achievements along with professional expertise. Teachers in VET consist of teachers of general subjects, job-related theories and practical subjects. VET teachers are required to have a Master degree equivalent to level 7 in the National Qualification Framework. VET teachers are trained in 2 phases: university education (from 4.5 -5 years, including practice at a vocational school and a company) and the probationary period that lasts from 1 to 2 years to observe the class and supervise teaching.

(d) Financing Vocational Education: Another notable feature of dual VET is that vocational schools are publicly funded and training at a school is free. Finance for school operation is arranged under public-private partnership where the government and various social partners provide the funds. The social partners include the Federal Ministry of Education and Research (BMBF), the Federal Ministry of Economy (BMWi), the Federal Agency for Employment (BA), the Ministry of Employment, Economics, Education or Cultural Affairs, the European Union, local

governments, companies, unions, Chambers, private institutions, and the individuals themselves. Employers invest on average 18,000 Euro per apprentice per year, but about two thirds of the total cost is refinanced by trainees' contribution during the training period. State governments also make significant investment and pay the full cost of vocational school education.

(E) Governance Mechanisms and Monitoring: Governance and monitoring of dual VET is very strong and quality is ensured by a complex but easy to implement checks and balance system so that the sustainability of the professional qualifications is better guarded. Since dual VET is conducted in two places, i.e, companies and schools, the governance mechanism is a little bit different for two learning centers. Monitoring of vocational training including quality assessment is conducted by the school inspection agency of the state government.

Education in vocational schools is controlled by each state's government while in-company training is regulated by the Federal government. Federal ministry of industry and energy issues the standards of in-company training with a consensus with the Federal Ministry of Education and Research. Each state government also develops or updates training curricula at vocational schools based on the in-company training standards.

Companies that provide in-company training are regulated by the Federal Government and they need to be registered with the local Chamber of Commerce for eligibility to provide in-company training. The Federal Government also sets the in-company training standards. The registered companies must have full time and part-time in-house trainers. Full-time in-house trainer is a master craftsman who possesses a professional bachelor degree and part-time trainers are skilled workers of the company. The Chambers of Commerce are responsible for assessing and certifying in-company trainers. Training must be provided in a real-life work learning environment. In-company training programs and plans need to be concordant with the curriculum framework at vocational schools so that the training contents in two places are suitable and complementary.

4. Lessons Learned and Recommendations

For ensuring employment of a huge manpower in Bangladesh, self-employment and employment in SMEs is essential. Besides, the changing landscape of the working environment requires lifelong learning. To this end, TVET has no alternative. In order to strengthen TVET in Bangladesh, the following lessons can be considered from the German experience:

First, Bangladesh needs to take lessons from Germany to raise the popularity of vocational education to the young population by publicly funded vocational schools. Enrollment in technical and vocational education in Bangladesh provides a contrasting picture than the scenario in Germany. In 2017, about 2.5 million pupils were studying under the VET while 1.1 million were studying TVET in Bangladesh in the year 2019. In 2015, 73.2% of upper secondary students in Germany were enrolled in VET whereas it is still less than

10% in Bangladesh. Dual VET in Germany is the most popular mode of learning to the upper secondary pupils. More than 70% of VET entrants participate in apprenticeship-based VET/dual VET (Cedefop, 2017). In contrast, demand for enrollment in technical and vocational education is quite low compared to the demand for admission in the general schools and colleges. In Bangladesh, only 9.8% and 13.8% students enrolled in the SSC vocational and HSC vocational courses compared to SSC and HSC general education in 2019. In spite of series of government initiatives, making technical and vocational education attractive to the mass people still remains a major challenge. To overcome this, vocational education and training can be offered at free of cost as is done in Germany. Private sector institutions are growing in Bangladesh but this might fail to attract people to vocational schools due to the cost of learning.

Second, another key strategic lesson for Bangladesh from the German experience can be the shift from purely technical school-based learning system to dual system/practical oriented learning by incorporating apprenticeship in the curriculum. In this context, in line with German practice, a major part of the learning time needs to be allocated to in-company training instead of the current practice of classroom learning in the technical schools/centers. Industries in Bangladesh should develop a sound apprenticeship system to complement theoretical learning in the TVET institutions with work experience in the plants. A key qualitative difference between industries in Germany and other countries is the extensive industry involvement in training, skills, human capital, and capabilities invested in young people through the German apprentice system. In Bangladesh, vocational schools and training centers rarely provide a complete exposure to the real work environment. In most cases, they provide the trainees some practical sessions inside the training schools with some old and dysfunctional technologies which are mostly dummies in nature. Mid-level managers and workers in the knitwear sector receive factory-based training from the BKMEA training center at a limited scale. Similar kinds of technical training centers are needed for all high-growth industries like plastic, furniture, steel and iron, and some trades including automobile, civil works, plumbing, electrical etc.

Third, following German experience, Bangladesh needs to institutionalize public-private partnership in financing, curriculum design and instituting apprenticeship in TVET. Companies, chambers of commerce and industry experts need to play an integral role in the management of vocational education in Bangladesh. Industry engagement in designing and implementing TVET programs need to be prioritized as industry practitioners can guide new modules and new trades in the TVET education. VET institutions in Germany develop curriculum for formal vocational education with close interactions between government and employers' organizations. In Bangladesh, there are curriculum design committees in the TVET sector and more recently designed NTVQF recognizes the role of industry council members in the design and implementation of vocational education. At this time, focus needs

to be given on proper implementation of existing policies. Industries need to play a positive role to receive trainees and students as apprentices in their firms and also play a support the assessment and evaluation of the learning process in the institutions. At the same time regulatory bodies of TVET like NSDC, DTE and BTEB need to proactively seek services from the industry experts ISC members in various stages of their operations.

Four, VET in Germany makes no compromise to quality at any levels including curriculum design, monitoring in-company training and classroom training, teacher quality, laboratory quality, examination system and certification process. In Bangladesh, quality and appropriateness of technical and vocational education needs to be strengthened for supplying employable manpower in the wake of the fourth industrial revolution. For this purpose, a comprehensive policy and financial package is needed to modernize the existing institutes and to construct new institutes.

Five, qualification process in TVET needs to be strengthened with the involvement of multiple stakeholders as is done in Germany. Examination Board of dual VET system in Germany consists of representatives of employers, employees (nominated by the Sector Association) and vocational school teachers (managed by each State Government). The system is also characterized by a complex network of checks and balances at the level of the federation, of the federal states, of the community and the company. Thereby it is guaranteed that more common educational political and economic goals of the vocational training system are not suppressed by short-term needs on the part of employers. A similar approach in Bangladesh can improve the quality of certification and ensure better alignment between skills learned by the trainees and skills needed by the industries.

Six, industry driven technical education needs to be prioritized as is the case in Germany. In Bangladesh, industry-specific VET mostly exists for RMG and textile sectors under the public sector, private sector and public private partnership. Similar endeavors are needed for producing skilled workers, technicians and mid-level managers in other thrust sectors. Plastic industry association has recently established a vocational training institute. More engagement of industry associations in developing vocational institutes will widen the supply of sector specific skilled human resources. However, widening vocational education without strong monitoring and control by the state authority and without making it free is unlikely to bring sustainable development of technical and vocational education in the country.

Seven, an important movement to raise awareness and acceptability of technical education and training in the country will be setting vocational qualification as a criteria in the job advertisement for clerical, technical positions, and for any non-managerial positions. NTVQF level needs to be tied to hiring policies in the private and public sector. In the public sector it is still very common that people from the general fields of education get appointments in the technical areas of work like lift operator, typewriter/computer operator, cleaner, electrician, plumber, housekeeper, cook and many more. A shift in job circular

design and job description is essential to uphold the importance of technical and vocational education and training to the prospective job candidates. Awareness raising through mass media and also publicity in the primary and secondary level of education can help attract people to technical and vocational education.

Eight, considering the stock of the working population in Bangladesh, the number of TVET institutions is substantially smaller than that of Germany. There were 517,789 company-based training places and 29,158 training schools with more than 2.5 million trainees in 2016. In contrast, there are little more than 10000 TVET institutions in Bangladesh. Therefore, capacity of technical and vocational education in the country needs to be expanded by establishing new institutions and modernizing the existing institutions. Besides, institutions need to be equipped with appropriate technology and laboratories to impart appropriate and quality education. In a drive to reduce regional disparity in the country, the 7th Five Year plan outlined for creation of a separate fund in the Annual Development Program (ADP) to develop technical and vocational institutions in some lagging regions including Rangpur, Rajshahi, Khulna and Barisal and establishment of technical and vocational institutes were prioritized in those regions. For this purpose, more private investment needs to be encouraged. At the same time, the government needs to allocate more funds in the ADP for expansion of and quality improvement of technical and vocational institutions as outlined in the 7th Five-Year Plan.

Nine, in the German model, dual VET trainees receive allowances from the companies. Adoption of a similar approach in Bangladesh can significantly attract poor families in the TVET and can reduce the percentage of labor force who remain uneducated in their whole life. Provision of allowance by the firms to the trainees can increase their self-worth and promote social recognition of TVET. The government can support this initiative by providing some incentives to the companies in the form of cash and policy support. In this regard, the government can give preferential treatment in financing, exporting and importing, allocation of industrial plots, tax incentives to the firms that facilitate the apprenticeship to the TVET learners, and will play a role as a social partner to strengthen TVET.

Ten, assessment of skills demand in the national and international markets is needed to design appropriate and market driven TVET programs in the technical and vocational institutions. In Germany, areas of new training evolve form the work centers where entrepreneurs propose the fields of new training and then validated by the Federal agency before inclusion in the national VET system. A similar practice can be introduced in designing and implementing training under the vocational institutes. The DTE in Bangladesh can play the role of BIBB of Germany.

Eleven, in the context of changing nature of job and more technology driven nature of jobs, different types of new and emerging vocational programs need to be planned, including those in the emerging trades such as accounting and financial services, graphics and textile design,

animation, automobile etc. In order to send people in international job markets with appropriate skills, an analysis of international job markets and communication with the foreign ministries in Dhaka can be useful that in turn can boost remittance of the emigrants. Besides, emphasis needs to be given on some occupations that might have growing demand with the industrialization and economic growth in the country. Some occupations that are mostly overlooked in Bangladesh but not in German VET are as under:

i. Specialist in furniture, kitchen and removal services
ii. Cell Technician / Cell phone repairer
iii. Baker
iv. Cook
v. Butcher/workers for slaughtering center
vi. Animal Keeper/Animal caretaker (in the poultry firm)
vii. Office Cleaner
viii. Online salesperson
ix. Home delivery person
x. Housekeeper
xi. Caregiver

Twelve, the Directorate of Technical Education (DTE) and the Bangladesh Technical Education Board (BTE B) oversee the three layers (SSC vocational, HSC vocational and Diploma) of formal vocational and technical education provided by both public and private institutions and part of the training courses. Role of BTEB and DTI must be distinct but supplementary. One should focus on research, industry collaboration, and stakeholder engagement and coordination. The other one can concentrate on examination systems and certification processes.

Thirteen, certification process in technical and vocational education in Bangladesh still keeps parity with the general education system. In the formal TVET programs, certification and years of schooling in SSC and HSC vocational are coined with the general education system but do not relate the achievement in terms of industry qualification or employment skills. In Germany, once a student achieves the first level of vocational education, s/he receives qualification to get employment as a skilled worker. In Bangladesh, SSC vocational courses need to be tagged with industry relevant skills and must provide the entry to the job market as a skilled worker. SSC passed candidates should be selectively allowed a vocational bachelor or diploma degree with only a combination of industry experience. The classification of certificates like SSC/HSC and various streams like SSC vocational and Dakhil vocational should primarily be different from the classification system in general education but should have a pathway for vocational graduates to access tertiary education at some point.

Fourteen, a new facet of TVET in Bangladesh has been framed under the NTVQF. The NTVQF standards have been set in collaboration with industry councils, industry experts and regulatory bodies like DTE, BTEB, NSDC. Now the provision of in-company training/learning under the NTVQF needs to be ensured. At the same time, the employment rules for various occupations in the public and private sectors must be linked with vocational qualifications that will raise the acceptance of TVET to mass people. Students are easily attracted to dual VET due to high social reputation/recognition for

vocational education in Germany. The professional qualification certificates are highly valued by the employers. Therefore, unemployment of young people at international comparison is low in Germany. A similar culture needs to be promoted in Bangladesh through hiring practices in public and private sectors.

5. Conclusion

TVET education in Bangladesh has been prioritized in many national strategic plans such as the 7th Five Year Plan, National Education Policy and National Skills Development Policy. A remarkable step of all these plans has been the development of NTVQF that can reshape the face of TVET in Bangladesh if implemented properly. In contrast to the conventional TVET system, the NTVQF standards has identified the competencies and level in relation to the job classification. At this stage, guidelines for NTVQF implementation should be properly grounded that calls for exploring the features of successful VET models in the world. In this regard, Germany can be considered as an ideal example as vocational education and training (VET) in Germany provides the worlds' best example with many unique features. The system in Germany is century old and the system is well-built in the minds of all stakeholders. Germany has set universal examples for sound technical and vocational education amplified by the country's dominance in industrial growth, export competitiveness and access to global markets. Bangladesh has a high opportunity to grow in the world in many aspects and boosting technical and vocational education can stimulate the growth in an unprecedented way. In Germany, training facilitation by companies contributes to qualification at the enterprise itself, as enterprises providing vocational training always stay up to date with technologies. There are hidden champions in Germany (Mittelstand) that have strong competitive power within and outside the European Union. For instance, SMEs in Germany is ranked second globally and one of the dominant factors that has shaped this remarkable position is the supply of skilled manpower by the technical and vocational institutes. Low labor mobility between industries is a sign of high identification of employees with the company that reduces costs related to the fluctuation and re-training.

Therefore, adopting some features of German model can be useful in designing TVET in Bangladesh. However, all components of the German model cannot be easily replicated in the context of Bangladesh as industries in the country are not as matured as is the case of Germany, the young population in Bangladesh is very high and many SMEs have low financial capacity. Therefore, a stage can be set for gradual adoption of key learnings from the German experience. As the starting point, apprenticeship, compensation for the trainees, training at a free of cost in the institutions, more government budget for institutions, and ensuring involvement of industry experts, chambers of commerce and company representatives in the curriculum design, examination and certification process can be implemented on a priority basis.

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