

198. PROFILE ON TVET

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I. SUMMARY

This profile envisages the establishment of a TVET training centre with a capacity of enrolling 400 students per annum.

The present demand for the proposed service is estimated at 5337 students per annum. The demand is expected to reach at 7550 students by the year 2017.

The total investment requirement is estimated at Birr 21.36 million, out of which Birr 5.47 million is required for school equipment. The plant will create employment opportunities for 60 persons.

The project is financially viable with an internal rate of return (IRR) of 19.04 % and a net present value (NPV) of Birr 10.31 million discounted at 8.5%.

II. SERVICE DESCRIPTION AND APPLICATION

Based on the common understanding in the existence of a strong linear relationship between education and development many countries have given high priorities to it in solving problems that seriously hamper their economic development. The lack of middle level manpower, for instance, was found to be bottleneck for development, and as one of the measures to alleviate this problem, technical and vocational training programs have been created in a large number of countries from 1970 on wards. In Ethiopia Technical and Vocational Education and Training (TVET), both in specialized TVET schools and comprehensive schools, was regarded as second-class, by the society generally and the youth specifically, due to the low rewards to those who had completed this training. It is the Education and Training Policy (ETP) of 1994 that reversed this trend and promulgated the provision of diversified TVET programme parallel to general education.

In line with this the Ministry of Education has taken the initiative in conducting training needs assessment and identifying various areas of training that aimed at development of middle level technical personnel addressing socio-economic problems. Next to this, curriculum that best suits modular training was designed in each area to be implemented in Middle Level TVET Programme under the jurisdiction of each regional government.

TVETs are types of education that have a specific relation to working life. It focuses on learning specific skills that are required in particular workplaces and is associated with access to a variety of knowledge-based disciplines. It includes such skills as engineering, accounting, IT and business administration, marketing...etc. The envisaged TVET project focuses on providing middle level TVET programme on highly demanded subjects i.e. industrial technology (Automotive, Electricity, Electronics, General mechanic and machine technology) and further expand its programme on demand base.

III. MARKET STUDY AND SERVICE CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The number of TVET institutions in the city has grown from 17 to 68 during the period 2001/2002 - 2004/2005 registering an average annual growth rate of 73.7%. (See Table 3.1). Though it registered a tremendous growth, it is far from satisfying the demand for the services in the city both in terms of number, quality and variety. Most of the institutions are under equipped and under staffed.

In terms of ownership 76.5% of the institutions are private sector owned, 14.7% government owned and the remaining 8.8% owned by NGOs and other actors such as missionaries.

Table 3.1
NUMBER OF TVET INSTITUTIONS IN ADDIS ABABA (2001/2002 - 2004/2005)
AND OWNERSHIP STATUS

Year	Number of Institutions		% Government	% Private	% NGO and Others
	Number	% Change			
2001/2002	17	-	NA	NA	NA
2002/2003	16	-5.9	NA	NA	NA
2003/2004	43	168.8	NA	NA	NA
2004/2005	68	58.1	14.7	76.5	8.8
Average change	-	73.7	-	-	-

Source: Education Statistics Annual Abstract 2004/05, Addis Ababa Bureau of Education

During 2003/04 there were 47,057 students enrolled in TVET programmes in Addis Ababa. Out of the total number of students enrolled in TVET 37,230 (79%) were enrolled in government schools while the remaining 21% (9,827) were enrolled in non-government schools.

In estimating the present demand for TVET programmes the trend in ten grade enrollment was analyzed. Accordingly, during the period 1997/98- 2003/04 the total number of tenth grade students in Addis Ababa, even though fluctuating from year to year, shows a general increasing trend. In 1997/98, 1998/99 and 1999/00 number of grade ten students have increased by about 20.8%, 20% and 4.5% compared to 1996/97, 1997/98 and 1998/99 respectively. However, in 2000/01 number of grade ten students has declined by 11.1%. In the year 2001/02 and 2002/03 compared to the year 2000/01 and 2001/02 enrollment has registered an increase of about 1.3 % and 12.6% respectively. In 2003/04 however number of grade ten students has declined by about 1.1% compared to the pervious year. (See Table 3.2). However, during the time under

consideration the total number of students enrolled in grade ten have registered an annual average growth rate of 6.71 %.

Table 3.2
NUMBER OF GRADE TEN STUDENTS IN ADDIS ABABA

Year	Boys	Girls	Total
1996/97	12,389	11,967	24,356
1997/98	14,398	15,032	29,430
1998/99	17,605	17,704	35,309
1999/00	18,000	18,905	36,905
2000/01	16,217	16,588	32,805
2001/02	16,545	16,680	33,225
2002/03	18,207	19,202	37,409
2003/04	18,136	18,844	36,980

Source: Education Statistics Annual Abstract 2004/05, Addis Ababa Bureau of Education

Accordingly, assuming that the trend witnessed during the period under discussion will continue in the future the number of ten grade students in Addis Ababa as of 2008 computed by applying an annual growth rate of 6.71 % is 47,950 of which 23,516 are boys and the remaining 24,434 are girls.

On the other hand during 2003/04 a total of 36,959 students from Addis Ababa have taken the Ethiopian General Secondary Education Certificate Examination (EGSECE), grade 10. During the same year admission in TVET required GPA of above 1.6 for boys and above 1.4 for girls while for joining preparatory the score required were above 2.6 for boys and above 2.4 for girls.

Accordingly, of the total 36,959 students 30.91% of the boys and 44.58% of the girls or a total of 13,971 students have scored less than or equal to 1.6 which means they are not eligible for both preparatory and TVET.

The total number of students, which has scored the points required to join TVET, are 16,193 (50% of the boys and 38% of the girls). On the other hand a total 6,793 students (19% of the boys and 18% of the girls) has scored the points required to join preparatory classes (see Table 3.4).

Table 3.4

NUMBER OF CANDIDATES FOR EGSECE IN ADDIS ABABA AND GPA

GPA	Boys	%	Girls	%	Number	%
<= 1.6	5,664	30.91	8,307	44.58	13,971	37.8
1.8	1,985	10.83	2,275	12.21	4,260	11.53
2	4,024	21.96	3,703	19.87	7,727	20.91
2.2	1,410	7.70	1,067	5.73	2,477	6.7
2.4	1,731	9.45	1,206	6.47	2,937	7.95
2.6	613	3.35	380	2.04	993	2.69
2.8	525	2.87	347	1.86	872	2.36
3	754	4.12	508	2.73	1,262	3.41
3.2	297	1.62	182	0.98	479	1.3
3.4	502	2.74	325	1.74	827	2.24
3.6	249	1.36	111	0.60	360	0.97
3.8	183	1.00	79	0.42	262	0.71
4	386	2.11	146	0.78	532	1.44
Total	18,323	100	18,636	100	36,959	100

Source: Education Statistics Annual Abstract 2004/05, Addis Ababa Bureau of Education

Accordingly, by assuming that the above trend will hold true in the future, out of the total number of projected ten grade students in 2008 estimated number of students who will

score the GPA required to be eligible for joining TVET programs are estimated to be 21,043 (11,758 boys and 9,285 girls).

As indicated earlier during 2003/2004 there were a total of 47,057 students enrolled in TVTE programmes in the level of 10 + 1, 10 +2 and 10 + 3. Accordingly, assuming that the number of students at each level are equally the total number of 10 + 1 students is estimated to be 15,686. Therefore, it can be concluded that the 10 + 1 intake capacity of existing TVET programme providers is about 16,000. Accordingly, considering the estimated present demand (21,043) and the existing intake capacity, the supply and demand gap for TVTE programmes is estimated at 5,357.

2. Projected Demand

In projecting the demand for TVET programmes it is assumed that demand for TVET programmes increases at annual average growth rate 2.9% which is equivalent to the growth rate of population. Accordingly, by taking the present estimated demand as a base and applying an average growth rate of 2.9% the projected demand is shown in Table 3.5.

Table 3.5
DEMAND PROJECTION FOR TVET PROGRAMME

Year	Projected Demand
2009	5,513
2010	5,673
2011	5,837
2012	6,006
2013	6,181
2014	6,360
2015	6,544
2016	6,734
2017	6,929
2018	7,130
2019	7,337
2020	7,550

3. Service Fee Structure

The following are some of the institutions providing education and the fee they are charging.

- Addis Ababa University charges Birr 1,500 per semester for degree program.
- St. Marry University College charges Birr 40 per credit hour for a degree program and Birr 125 per course for diploma.
- Admass College charges Birr 40 per credit hour for degree program and Birr 105 per module for diploma
- Alpha University Collage charges Birr 45 per credit hour for degree program and Birr 1 per course time for diploma program.

B. SERVICE CAPACITY AND OPERATIONAL PROGRAMME

1. Service Capacity

The market study indicates that TVET will be required for 5,513 persons in 2009 and for 7550 persons in the year 2020. The intake capacity of the envisaged TVET programme is shown as follows

- a) Automotive – 2 classes(40 participants)
- b) Electricity - 2 classes (40 Participants)
- c) Electronics – 2 classes (40 Participants)
- d) General mechanics- 2 classes (40 participants)
- e) Machine technology- 2 classes (40 participants)

Thus, a total of 200 participants per annum will attend the training program to be conducted by the proposed TVET establishment. The number of class is reduced to one for the 10+2 and 10+3 programmes. The total number of participants after three years of operation will be 400.

2. Operational Programme

The Training Center will start operation at 75% of its capacity during the first year. Then it will raise its operation to 85% and 100% (full capacity) in the second and third year and then after, respectively. Operational build-up program is shown in table 3.4 below.

Table 3.4
BUILD-UP PROGRAMME OF THE TRAINING OPERATION

Year	1 st	2 nd	3 rd and above
Capacity Utilization (%)	75	85	100
<u>Operation</u>			
a) Automotive	30	51	80
b) Electricity	30	51	80
c) Electronics	30	51	80
d) General mechanics	30	51	80
e) Machine technology	30	51	80
Total	150	230	400

IV. CONSUMABLES AND UTILITIES

A. CONSUMABLES

In order to conduct the aforementioned training programmes consumables are required. Table 4.1 below shows all consumables and supplies required to properly conduct the training programmes. The total annual cost of consumables for the five departments is estimated at Birr 500,000.

Table 4.1**LIST OF CONSUMABLES REQUIREMENT OF THE TVET**

Sr. No.	Description of Items (Materials)	Cost (Birr)
1	Rag	5,000
2	Cleaning solvent	10,000
3	Soldering wax	8,000
4	Soldering lead	15,000
5	Gasoline fuel	20,000
6	Diesel fuel	20,000
7	Gasket	6,000
8	Sealant	4,000
9	Electrode	10,000
10	Grease	4,000
11	Storage battery	2,000
12	Sand paper	2,500
13	Copper wire	25,000
14	Cable and its accessories	23,000
15	Plugs	18,000
16	Electric varnish	15,000
17	Insulating tape	10,000
18	Circuit breaker	26,000
19	Socket outlet	18,000
20	Conduit	14,000
21	Bend	8,000
22	Boxes	17,000
23	Nipple	6,000
24	Wire clip	5,000
25	Motor control switch	35,000

Cont'd Table 4.1

Sr. No.	Description of Items (Materials)	
26	Resistors	5,500
27	Diodes	15,000
28	Inductors	23,000
29	IC	13,000
30	Capacitor	9,000
31	Dry cell	3,000
32	Transistors	4,500
33	Stationery items	26,000
34	Mild steel (assorted)	20,000
35	Saw blades	5,000
36	Drill bit	2,500
37	Coolant	2,000
38	Cutting fluid	2,500
39	Grinding wheel	3,500
40	Antirust	3,000
41	Thinner	2,000
42	Oxygen	4500
43	Acetylene	6,500
45	Masking tape	5,500
46	PPE	3,000
47	Wire brush	1,500
48	Steel (assorted)	10,000
49	Pipe (assorted)	6,000
	Total	500,000

B. UTILITES

The utilities required by the envisaged TVET will be electricity and water. Annual requirement will be 150,000 kWh of electrical energy and 10,000 m³ of water. The annual requirements of these utilities are indicated in Table 4.2.

Table 4.2
UTILITIES REQUIREMENT AND COST

Description	Qty.	Cost ('000 Birr)
Electricity, kWh	150,000	33.65
Water, m ³	10,000	32.50
Total		66.15

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Operational Process

The process of providing training consists of the following activities.

- a) registration
- b) develop curriculum(adopt the ministry of education standard)
- c) Plan training program
- d) Execution of the plan
- e) Evaluation of the training program

2. Source of Technology

The training program requires facilities to aid the teaching learning process. Some of the workshop materials can be obtained locally the remaining will be obtained external suppliers. Address of one of the external supplier of such workshop machineries is given below:

B. ENGINEERING

1. Machinery and Equipment

The workshop machinery and tools required by the envisaged TVET project are listed in Tables 5.1, 5.2, 5.3, 5.4 & 5.5.

Table 5.1

**LIST OF MACHINE, EQUIPMENT AND HAND TOOLS REQUIRED FOR
AUTOMOTIVE WORKSHOP**

Sr. No.	Description	Unit	Qty.	Cost(Birr)
1	Wrenches	Pcs	2	90
2	Torque wrench	Pcs	6	300
3	Tire pressure gauge	Pcs	2	150
4	Crow bar	Pcs	6	150
5	Files	Pcs	6	150
6	Air compressor	Pcs	1	5,000
7	Tires and wheel assembly	Pcs	6	10,000
8	Wheel balance machine	Pcs	2	20,000
9	Welding machine	Pcs	1	10,000
10	Hammers	Pcs	4	200
11	Pullers	Pcs	4	240
12	Inspecting light	Pcs	4	600
13	Hydraulic jack	Pcs	6	1,200
14	Safety stand	Pcs	12	600
15	Tire choack	Pcs	12	200
16	Cross wrench	Pcs	3	180
17	Tool kit	Set	3	1,500
18	Baleeder wrenches	Set	5	350
19	Pressure bleeder (with adapters	Pcs	5	125
20	Bleeding tubes	Pcs	10	1,50
21	Glass Jar	Pcs	5	50
22	Hydraulic brake system model	Pcs	2	10,000

Cont'd Table 5.1

Sr. No.	Description	Unit	Qty.	Cost (Birr)
23	Brake fluid	Set	30	6,000
24	Retracting spring pliers	Pcs	5	750
25	Hold-down spring pliers	Pcs	5	500
26	Brake drum micrometer	Pcs	5	450
27	Tape rule	Pcs	3	75
28	Steel rule	Pcs	10	300
29	Brake drum caliper	Pcs.	5	250
30	Slide hammer	Pcs.	2	100
31	Brake adjustment gauge	Pcs.	4	360
32	Drum brake lining riveting machine	Pcs.	1	500
33	Riveted – lining gauge	Pcs.	2	60
34	Bonded – lining gauge	Pcs.	2	70
35	Disc brake pad gauge	Pcs.	2	90
36	Caliper piston remover	Pcs.	5	300
37	Dial indicator	Pcs.	5	500
38	Rotor thickness gauge	Pcs.	3	450
39	Wheel cylinder clamp	Pcs.	10	500
40	Horseshoe – lock pliers	Pcs.	10	3,000
41	Guide pin bushing installing tool	Pcs.	5	250
42	Dust boot installation tool	Pcs.	5	350
43	Booster – push – rod gauge	Pcs.	2	500
44	Booster – housing holding fixture	Pcs.	3	300
45	Car hoist	Pcs.	2	15,000
46	Belt tension gauge	Pcs.	3	5,000
47	Power steering gear	Pcs.	6	12,000
48	Oil pressure gauge	Pcs.	3	270
49	Power steering pump	Pcs.	3	1,500
50	Arbor tool	Pcs.	6	1,800
	Total			112,460

Table 5.2
LIST OF MACHINES, EQUIPMENT AND HAND TOOLS REQUIRED FOR
ELECTRICITY WORKSHOP

Sr. No.	Description	Unit	Qty	Cost(Birr)
1	Screw driver(assorted)	Set	20	300
2	pliers (assorted)	pcs	20	500
3	Adjustable pipe wrench	pcs	5	500
4	Self grip wrench	Pcs.	5	750
5	End cutting nipper	Pcs.	5	575
6	Open end tin snips	Pcs.	5	150
7	Paper Scissors	Pcs.	5	75
8	Cable knife	Pcs.	5	150
9	Screw extractor	Set	5	200
10	Adjustable spanner	Pcs.	5	450
11	Socket wrench	Set	5	1,500
12	Allen key	Set	5	1,500
13	Rubber mallet	Pcs.	5	250
14	Hand Vice	Pcs.	5	2,500
15	C-Clamp	Set	3	75
16	Electric Soldering iron	Set	5	1,500
17	Goggle	Pcs.	15	300
18	Glove, rubber	pair	5	125
19	File brush	pcs	5	75
20	Painting brush	Set	5	75
21	File (assorted)	Set	20	400
22	Chisel	Set	5	150
23	Vernier caliper	Pcs.	5	250
24	Micrometer	Pcs.	2	600

Cont'd Table 5.2

Sr. No.	Description	Unit	Qty.	Cost(Birr)
25	Portable electric drill	Pcs.	2	10,000
26	Voltage supply unit	Pcs.	5	10,000
27	Bench Vice	Pcs.	5	2,500
28	Bench lever shear	Pcs.	1	15,000
29	Digital multi meter	Pcs.	10	5,000
30	Portable frequency meter	Pcs.	5	2,500
31	Panel Voltmeter	Pcs.	9	5,400
32	Panel Ampermeter	Pcs.	9	5,400
33	Battery-Acid meter (Hydrometer)	Pcs.	5	3,000
34	Battery Charger	Pcs.	1	3,000
35	Portable earth resistance meter	Pcs.	3	6,000
36	Portable insulation tester	Pcs.	3	2,700
37	Digital clampon tester	Pcs.	5	3,500
38	Instant water heater	Pcs.	3	1,500
39	Storage water heater	Pcs.	2	4,000
40	Normal cooking oven	Pcs.	3	15,000
41	Cool top cooking oven	Pcs.	1	3,000
42	Automatic cooking oven	Pcs.	1	6,000
43	Normal electric iron	Pcs.	5	1,500
44	Steam/ spray electric iron	Pcs.	5	2,500
45	Electric 'Enjera Mittad'	Pcs.	5	2,500
46	Plum bob	Pcs.	5	1,500
47	Dis-soldering gun	Pcs.	5	2,500
	Total			126,950

Table 5.3

**LIST OF MACHINES, EQUIPMENT AND HAND TOOLS REQUIRED FOR
ELECTRONICS WORKSHOP**

Sr. No.	Description	Unit	Qty	COST(Birr)
1	Flat head screw driver (different sizes)	Pcs.	30	450
2	Philips head screw drive (different sizes)	Pcs.	30	900
3	Square head screw drive different sizes)	Pcs.	30	1,200
4	Electrician knife	Pcs.	30	600
5	Pliers (different types)	Pcs.	30	450
6	Wire striper	Pcs.	30	600
7	Insulation Remover	Pcs.	30	450
8	Nipper	Pcs.	6	180
9	Indenter	Pcs.	6	150
10	Neon tester	Pcs.	30	4,500
11	Adjustable wrench	Pcs.	6	600
12	Wrench Set	Pcs.	6	540
13	Spanner Set	Pcs.	6	420
14	Vice	Pcs.	6	3,000
15	Soldering iron (25w, 40w, 60w)	Pcs.	30	3,000
16	Soldering gun	Pcs.	30	30,,000
17	Solder sucker	Pcs.	30	15,000
18	Brush	Pcs.	30	450
19	Analog multi meter	Pcs.	15	4500
20	Digital multi meter	Pcs.	15	7,500
21	Analog wattmeter	Pcs.	6	4,200
22	Digital wattmeter	Pcs.	6	6,000
23	Oscilloscope dual trace	Pcs.	6	30,000
24	Function generator	Pcs.	6	12,000
25	RF signal generator (AM and FM)	Pcs.	6	18,000

Cont'd Table 5.3

Sr. No.	Description	Unit	Qty	Cost(Birr)
26	Frequency counter	Pcs.	6	48,000
27	Transistor tester	Pcs.	2	9920
28	Audio amplifier (for public address system)	Pcs.	6	38,000
29	Microphones	Pcs.	6	12,000
30	Loud speakers (5w, 10w, 20w)	Pcs.	2	40,000
31	AC power supply (0-48V)	Pcs.	10	55,000
32	DC power supply (0-30V)	Pcs.	10	25,000
33	Rheostat	Pcs.	10	31,500
34	Radio Receiver (training model)	Pcs.	6	15,000
35	Radio Receiver (commercial)	Pcs.	6	18,000
36	Audio tape recorder (training model)	Pcs.	10	15,000
37	Audio tape recorder (commercial)	Pcs.	10	20,000
38	Logic analyzer	Pcs.	2	60,000
39	Signature analyzer	Pcs.	2	75,000
40	Logic probe	Pcs.	6	3,600
41	Current tracer	Pcs.	2	30,000
42	Logic tracer	Pcs.	2	35,000
43	LED seven segment display	Pcs.	6	60,000
44	LCD seven segment display	Pcs.	6	72,000
45	Logic trainer modules	Pcs.	4	45,000
46	Digital computer	Pcs.	6	60,000
47	Ammeter	Pcs.	6	4,800
48	Voltmeter	Pcs.	6	6,000
49	Multi-meter	Pcs.	6	6,000
	Total			929,510

Table 5.4

**LIST OF MACHINES, EQUIPMENT AND HAND TOOLS REQUIRED FOR
GENERAL MECHANICS WORKSHOP**

Sr. No.	Description	Unit	Qty	Total Cost(Birr)
1	Bench drill, 400mm	Pcs.	2	6,000
2	Bench grinder, distance b/n grinding wheels 320mm	Pcs.	2	7,000
3	Vice (Bench) Jaw width 150mm, Jaw opening 200mm	Pcs.	25	12,500
4	Vice Jaw Cap	Pcs.	50	5,000
5	Shearing machine	Pcs.	1	400,000
6	Bench (wooden top), 50x2500x2500 mm	Pcs.	7	2,100
7	Power Hacksaw, Length of blade 450 mm	Pcs.	1	17,300
8	Hand Hacksaw, solid and flat frame-50	Pcs.	30	1,500
9	Flat file Bastard cut, 350mm, length, width 35mm, thickness 6.5mm	Pcs.	13	390
10	Flat file second cut, 300mm length	Pcs.	13	585
11	Half round file, Second cut length 300mm	Pcs.	13	650
12	Round file Bastard, 300mm length, Ø 12mm	Pcs.	13	1,500
13	Round file-Second cut, 250mm length, Ø 10mm	Pcs.	13	2,000
14	Triangular file-second cut, 250mm, length triangular side 17.5mm	Pcs.	13	2,300
15	Square file-second cut, 250mm width 10mm, thickness 10mm	Pcs.	13	2,400
16	Outside micrometer, 0-25mm	Pcs.	13	3,500
17	Outside micrometer, 25-50mm	Pcs.	13	4,000

Cont'd Table 5.4

Sr. No.	Description	Unit	Qty	Total cost(Birr)
18	Outside micrometer, 50-75	Pcs.	13	6,500
19	Inside micrometer, 50-200mm	Pcs.	13	7,800
20	Depth gauge, micrometer, 0-150mm	Pcs.	13	13,000
21	Vernier caliper 1/20 th and 1/50 th , 0-300mm from each type	Pcs.	13	29,990
22	Vernier depth gauge, 0-250mm	Pcs.	5	12,000
23	Vernier height gauge, 0-300mm	Pcs.	5	13,000
24	Tape rule, 0-2000mm	Pcs.	10	250
25	Surface plate (granite), 300x450mm	Pcs.	5	3,000
26	Angle plate 150x1500 mm	Pcs.	5	4,500
27	V-Block (With V-Clamp)	Pcs.	10	8,000
28	Try-square (Steel square) width 10mm, blade length 300mm	Pcs.	13	1,950
29	Combination set, 300mm	Pcs.	30	6,000
30	Bevel Protractor	Pcs.	30	3,000
31	Scriber	Pcs.	15	1,500
32	Firm Joint divider	Pcs.	13	1,300
33	Spring Joint divider	Pcs.	5	1,000
34	Outside firm joint caliper	Pcs.	13	6,500
35	Outside spring joint caliper	Pcs.	5	3,000
36	Inside firm joint caliper	Pcs.	13	8,450
37	Inside spring joint caliper	Pcs.	5	3,200
38	Hermaphrodite caliper	Pcs.	5	3,500
39	Center Punch	Pcs.	13	10,240
40	Prick Punch	Pcs.	13	11,300
41	Flat cold chisel, 20mm (width) length 125 mm	Pcs.	13	1,300

Cont'd Table 5.4

Sr. No.	Description	Unit	Qty	Total cost(Birr)
42	Cape chisel, length 150mm, width 3mm	Pcs.	8	1,200
43	Diamond point chisel, length 150mm, width 7mm	Pcs.	8	900
44	Round nose chisel	Pcs.	10	630
45	Cross peen hammer, 300gm	Pcs.	8	400
46	Riveting hammer, 400gm, in set of 3 types long, short, round heads	Pcs.	8	2,500
47	Tap and die set	Pcs.	13	1,950
48	Vise Grip pliers	Pcs.	8	800
49	Rivet set	Pcs.	13	260
50	Different size pop rivet gun	Pcs.	8	500
51	Pitch gauge (Metric)	Pcs.	5	300
52	File card	Pcs.	25	500
53	Brush (wire) over all length 250mm, 3 rows and 15 tufts, 25mm long steel bristle	Pcs.	30	1,500
54	Screw driver (Flat)	Pcs.	25	500
55	Open end wrench (Set)	Pcs.	5	500
56	Anvil (30 kgs)	Pcs.	2	1,000
57	Solid hacksaw frame for 300 mm blade length	Pcs.	25	6,250
58	Pipe wrenches, 3 inch opening	Pcs.	8	11,600
59	Pipe tongs (chain tongs), 5 inch long chain	Pcs.	10	600
60	Pipe/tube cutters, 3 inch opening	Pcs.	10	12,520
61	Combination machinist's & pipe vise, 4 inch opening	Pcs.	2	3,000
62	Standard pipe vise, 4 inch opening	Pcs.	10	4,800

Cont'd Table 5.4

Sr. No.	Description	Unit	Qty	Total cost(Birr)
63	Chain pipe vise, 5 inch long chain	Pcs.	10	6,000
64	Pipe dies (in a set)	Pcs.	10	1,500
65	Pipe die stock	Pcs.	10	1,750
66	Pipe taps (in a set)	Pcs.	15	375
67	Pipe burring reamer (tapered type)	Pcs.	15	6,000
68	Flaring tools (25 mm long)	Pcs.	10	5,000
69	Oxygen cylinder with accessories (75 liters capacity)	Pcs.	3	2,100
70	Acetylene cylinder with accessories (75 liters capacity)	Pcs.	3	3,000
71	Arc welding machine with accessories (25 – 300 Amperes)	Pcs.	3	12,000
72	Pipe bending machines (power driven from ¼ -2 inch diameters)	Pcs.	2	120,000
73	Safety goggles (clear)	Pcs.	25	3,750
74	Safety goggles (dark)	Pcs.	25	4,500
75	Face shield (for arc welding)	Pcs.	15	3,000
76	Ball peen hammer (200 – 300 grams head)	Pcs.	13	2,600
77	Oil can (250 ml capacity)	Pcs.	10	1,500
78	Over Head Projector (OHP)	Pcs.	1	20,000
79	Counter bore (8, 10, 12, 14, 16 mm diameter)	Pcs.	15	1,500
80	Dividers (15, 20 mm long)	Pcs.	13	1,300
81	Steel rule (30 mm long and 0.5 mm accuracy)	Pcs.	25	2,500
82	Drill vise (100 mm jaw and 150 mm opening)	Pcs.	6	30,000

Cont'd Table 5.4

Sr. No.	Description	Unit	Qty	Total cost(Birr)
83	Drill chuck 13mm	Pcs.	6	2,400
84	Spot facing tool (10, 15, 18, 20, 25 mm end diameter)	Pcs.	50	75,000
85	Portable grinder (0.3 KW power)	Pcs.	5	50,000
86	Lead mallet	Pcs.	10	4,800
87	Plastic mallet	Pcs.	10	1,250
88	Rivet block (4, 5, 6, 7, 8 mm diameter)	Pcs.	15	900
89	Spray gun (250 cc capacity)	Pcs.	5	2,400
90	Compressor (3 KW and 250 liters capacity)	Pcs.	1	126,000
91	Set square (30°-60° and 45°)	Pcs.	60	3,000
92	T-square (900 mm long)	Pcs.	30	2,700
93	Drawing board (1000 x 1200 mm)	Pcs.	22	11,000
94	Steel rule (300 mm long, 30 mm wide, 3 mm thick and 0.5 mm accuracy)	Pcs.	30	1,500
96	Bulldog snips (30 mm long)	Pcs.	25	1,250
97	French curve	Pcs.	25	625
98	Vernier caliper (0.05 mm accuracy)	Pcs.	25	2,500
99	Ruller	Pcs.	5	150
100	Seaming hammer (250 gram of head)	Pcs.	25	1,875
101	Setting hammer (250 gram of head)	Pcs.	25	1,250
102	Stake	Set	1	500
103	Turning machine (manual) (1000 mm long)	Pcs	4	100,000
104	Wiring machine (manual) (1000 mm long)	Pcs	4	50,000
105	Steel rule (0.5 mm accuracy, 300 mm length, width 25 mm & 2 mm thick)	Pcs	30	3,000
106	Compass (steel)	Pcs	30	4,500
107	Scissors	Pcs	30	1,500

Cont'd Table 5.4

Sr. No.	Description	Unit	Qty	Total cost(Birr)
108	Pocket knife	Pcs	30	6,000
109	Try-square	Pcs	30	1,500
110	Scriber	Pcs	30	1,500
112	Divider	Pcs	30	1,800
113	Trammel	Pcs	30	2,100
114	C-clamp	Pcs	30	2,400
115	Parallel clamp	Pcs	30	2,800
116	Punch(assorted)	pcs	30	3,000
117	Hand notcher	Pcs	20	14,000
118	Dovetail notcher	Pcs	20	18,000
119	Bench shear	Pcs	10	40,000
120	Square shear	Pcs	10	45,000
121	Ring shear	Pcs	5	30,000
122	Circle shear	Pcs	5	35,000
123	Portable electric nibbler	Pcs	5	150,000
	Total			1,710,790

Table 5.5

**LIST OF MACHINES, EQUIPMENT AND HAND TOOLS REQUIRED FOR
MACHINE WORKSHOP**

Sr. No.	Description	Unit	Qty	Total cost(Birr)
1	Bench drill, 400mm	Pcs.	2	6,000
2	Bench grinder, distance b/n grinding wheels 320mm	Pcs.	2	7,000
3	Vice (Bench) Jaw width 150mm, Jaw opening 200mm	Pcs.	25	12,500
4	Vice Jaw Cap	Pcs.	50	5,000
5	Shearing machine	Pcs.	1	400,000
6	Bench (wooden top), 50x2500x2500 mm	Pcs.	7	2,100
7	Power Hacksaw, Length of blade 450 mm	Pcs.	1	17,300
8	Hand Hacksaw, solid and flat frame-50	Pcs.	30	1,500
9	Flat file Bastard cut, 350mm, length, width 35mm, thickness 6.5mm	Pcs.	13	390
10	Flat file second cut, 300mm length	Pcs.	13	585
11	Half round file, Second cut length 300mm	Pcs.	13	650
12	Round file Bastard, 300mm length, Ø 12mm	Pcs.	13	1,500
13	Round file-Second cut, 250mm length, Ø 10mm	Pcs.	13	2,000
14	Triangular file-second cut, 250mm, length triangular side 17.5mm	Pcs.	13	2,300
15	Square file-second cut, 250mm width 10mm, thickness 10mm	Pcs.	13	2,400
16	Outside micrometer, 0-25mm	Pcs.	13	3,500
17	Outside micrometer, 25-50mm	Pcs.	13	4,000
18	Outside micrometer, 50-75	Pcs.	13	6,500
19	Inside micrometer, 50-200mm	Pcs.	13	7,800

Cont'd Table 5.5

Sr. No.	Description	Unit	Qty	Total cost(Birr)
20	Depth gauge, micrometer, 0-150mm	Pcs.	13	13,000
21	Vernier caliper 1/20 th and 1/50 th , 0-300mm from each type	Pcs.	13	29,990
22	Vernier depth gauge, 0-250mm	Pcs.	5	12,000
23	Vernier height gauge, 0-300mm	Pcs.	5	13,000
24	Tape rule, 0-2000mm	Pcs.	10	250
25	Surface plate (granite), 300x450mm	Pcs.	5	3,000
26	Angle plate 150x1500 mm	Pcs.	5	4,500
27	V-Block (With V-Clamp)	Pcs.	10	8,000
28	Try-square (Steel square) width 10mm, blade length 300mm	Pcs.	13	1,950
29	Combination set, 300mm	Pcs.	30	6,000
30	Bevel Protractor	Pcs.	30	3,000
31	Scriber	Pcs.	15	1,500
32	Firm Joint divider	Pcs.	13	1,300
33	Spring Joint divider	Pcs.	5	1,000
34	Outside firm joint caliper	Pcs.	13	6,500
35	Outside spring joint caliper	Pcs.	5	3,000
36	Inside firm joint caliper	Pcs.	13	8450
37	Inside spring joint caliper	Pcs.	5	3,250
38	Hermaphrodite caliper	Pcs.	5	3,500
39	Center Punch	Pcs.	13	10,240
40	Prick Punch	Pcs.	13	11,300
41	Flat cold chisel, 20mm (width) length 125 mm	Pcs.	13	1,300
42	Cape chisel, length 150mm, width 3mm	Pcs.	8	1,200
43	Diamond point chisel, length 150mm, width 7mm	Pcs.	8	900

Cont'd Table 5.5

Sr. No.	Description	Unit	Qty	Total cost(Birr)
44	Round nose chisel	Pcs.	10	630
45	Cross peen hammer, 300gm	Pcs.	8	400
46	Riveting hammer, 400gm, in set of 3 types long, short, round heads	Pcs.	8	2,500
47	Tap and die set	Pcs.	13	1,950
48	Vise Grip pliers	Pcs.	8	800
49	Rivet set	Pcs.	13	260
50	Different size pop rivet gun	Pcs.	8	500
51	Pitch gage (Metric)	Pcs.	5	300
52	File card	Pcs.	25	300
53	Brush (wire) over all length 250mm, 3 rows and 15 tufts, 25mm long steel bristle	Pcs.	30	1,500
54	Screw driver (Flat)	Pcs.	25	500
55	Open end wrench (Set)	Pcs.	5	500
56	Anvil (30 kgs)	Pcs.	2	1,000
57	Solid hacksaw frame for 300 mm blade length	Pcs.	25	6,250
58	Pipe wrenches, 3 inch opening	Pcs.	8	11,600
59	Pipe tongs (chain tongs), 5 inch long chain	Pcs.	10	600
61	Pipe/Tube cutters, 1 inch opening	Pcs.	10	12,520
62	Combination machinist's & pipe vise, 4 inch opening	Pcs.	2	3,000
63	Standard pipe vise, 4 inch opening	Pcs.	10	4,800
64	Chain pipe vise, 5 inch long chain	Pcs.	10	6,000
65	Pipe dies (in a set)	Pcs.	10	1,500
66	Pipe diestock	Pcs.	10	1,750
67	Pipe taps (in a set)	Pcs.	15	375

Cont'd Table 5.5

Sr. No.	Description	Unit	Qty	Total cost(Birr)
68	Pipe burring reamer (tapered type)	Pcs.	15	6,000
69	Flaring tools (25 mm long)	Pcs.	10	5,000
70	Oxygen cylinder with accessories (75 liters capacity)	Pcs.	3	2,100
71	Acetylene cylinder with accessories (75 liters capacity)	Pcs.	3	3,000
72	Arc welding machine with accessories (25 – 300 Amperes)	Pcs.	3	12,000
73	Pipe bending machines (power driven from ¼ -2 inch diameters)	Pcs.	2	120,000
74	Face shield (for arc welding)	Pcs.	15	3,000
75	Ball peen hammer (200 – 300 grams head)	Pcs.	13	2,600
76	Safety goggles (dark)	Pcs.	25	4,500
77	Ball peen hammer (200 – 300 grams head)	Pcs.	13	2,600
78	Oil can (250 ml capacity)	Pcs.	10	1,500
79	Over Head Projector (OHP)	Pcs.	1	20,000
80	Counter bore (8, 10, 12, 14, 16 mm diameter)	Pcs.	15	1,500
81	Dividers (15, 20 mm long)	Pcs.	13	1,300
82	Steel rule (30 mm long and 0.5 mm accuracy)	Pcs.	25	2,500
83	Drill vise (100 mm jaw and 150 mm opening)	Pcs.	6	30,000
84	Drill chuck 13mm	Pcs.	6	
85	Spot facing tool (10, 15, 18, 20, 25 mm end diameter)	Pcs.	50	75,000
86	Portable grinder (0.3 KW power)	Pcs.	5	50,000

Cont'd Table 5.5

Sr. No.	Description	Unit	Qty	Total cost(Birr)
90	Lead mallet	Pcs.	10	4,800
91	Plastic mallet	Pcs.	10	1,250
92	Rivet block (4, 5, 6, 7, 8 mm diameter)	Pcs.	15	900
93	Spray gun (250 cc capacity)	Pcs.	5	2,400
94	Compressor (3 KW and 250 liters capacity)	Pcs.	1	126,000
95	Steel rule (30 mm long and 0.5 mm accuracy)	Pcs.	25	2,500
96	Floor type drill press with its all accessories	Pcs.	5	75,000
97	Up right drill press with all its accessories	Pcs.	5	82,000
98	Radial drill press with all its accessories	Pcs.	3	54,000
99	Horizontal boring machine with all its accessories	Pcs.	2	40,000
100	Vertical boring machine with all its accessories	Pcs.	2	50,000
101	Engine Lathe with all its accessory & ments	Pcs.	2	300,000
102	Material Stand, adjustable	Pcs.	2	3,000
103	Turing tool holder	Pcs.	5	3,500
104	Parting off tool holder	Pcs.	5	3,000
105	Tread Cutting tool holder	Pcs.	6	4,800
106	Open ended Spanner Set 8 to 27mm	set	5	750
107	Ring spanner set 8+10 to 27mm	Pcs.	5	800
108	Safety goggles, clear lenses	Pcs.	25	3,750
109	Number Stamp set 5mm	set	5	3,000
	Total			1,794,740

The total cost of the above stated work shop machinery and equipment is estimated at Birr 4.7 million, out of which Birr 3.25 million is required in foreign currency .In addition to the above mentioned machineries and tools required by the TVET project, library facilities including books and office furniture and equipment, class room facilities and teaching aids. The estimated cost of such facilities is estimated at Birr 800,000, which is required in local currency. Therefore, the total cost of machinery and equipment is estimated at Birr 5.5 million.

2. Land, Building and Civil Works

The total area required for plant site is estimated to be 5,000 m². Of this, the built-up area of the institution will be 2000 m². There will be five workshops with satellite store and office for the instructor in the ground occupying an area of 450m² each. Therefore the total area covered by workshops amounts 2250 m². In addition to the workshop, there will be a building for class rooms(1050m²), cafeteria(250m²), offices(200m²), meeting hall(500m²) etc whose total floor area is estimated to be 2000m² that rests on 500m² lands. Building construction cost is estimated to be Birr 2,300 per m², and the total building cost is estimated to be Birr 9,775,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city governments depending on the level of development.

In Addis Ababa the city's Land Administration And Development Authority is directly responsible in dealing with matters concerning land. Accordingly, the initial land lease rate in Addis Ababa set by the Authority based on the location of land is as shown in Table 5.6.

Table 5.6
INITIAL LAND LEASE RATE IN ADDIS ABABA

Sr. No	Location of the land	Land Grade	Initial Price in m²
1	Central Business zones	1	1167.3
		2	1062.9
		3	916.2
		4	751.5
		5	619.2
2	Places That are Under Transit	1	716.4
		2	647.1
		3	559.8
		4	472.5
		5	384.3
3	Expansion Zones	1	245.7
		2	207.0
		3	150.3
		4	132.3

Source; Addis Ababa City Land Administration Authority

As can be seen from Table 5.2 the initial land lease rate ranges from Birr 1,167.3 to 132.3 per m².

Currently, most of the educational facilities in Addis Ababa are located on the central business zones of the city. Therefore, expansion zones are recommended as the best locations for the project. Accordingly, the average of the land lease rates in the expansion zones which is Birr 183.8 m² is adopted.

The Federal Legislation on the Lease Holding of Urban Land legislation has also set the maximum on lease period and the payment of lease prices (See Table 5.2 and Table 5.7).

Table 5.7
LEASE PERIOD

Type of Service	Lease Period (Years)
Residential area	99
Industry	80
Education, cultural research health, sport, NGO and religious	99
Trade	70
Urban Agriculture	15
Other service	70

Table 5.8
LEASE PAYMENT PERIOD

Sr. No.	Service Type	Period of Payment According to the Grade of Towns
1	Private residential are obtained through tender or negotiation	50 - 60 years
2	Trade	40 - 50 years
3	Industry	40 - 50 years
4	Real estate	40 years
5	Urban Agriculture	8 - 10 years
6	Trade and social service	40 - 50 years
7	Others	40 years

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided. The lease price is payable after the grace period annually.

Regarding, the terms and conditions of land lease the Addis Ababa City Government have adopted Article 6 of the Federal Legislation with very minimal changes. Therefore,

for the purpose of this project profile since the project is engaged in social service , 99 years lease period, 50 years lease payment completion period, 5% down payment and seven years grace period is used.

Accordingly, the land lease cost of the project, at rate of Birr 183.8 per m² for 99 years of holding is estimated at Birr 90.98 million. Assuming 5% of the total cost (Birr 4.55) will be paid in advance as down payment and the remaining Birr 86.43 million will be paid in equal installments with in 50 years, the annual lease payment is estimated at Birr 1,728,639.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The list of manpower, including instructors, office personnel and other workers is given in Table 6.1 below.

Table 6.1**MANPOWER REQUIREMENT AND LABOUR COSTS (BIRR)**

Sr. No.	Position	Req. No.	Salary	Salary
1	Director	1	3,000	36,000
2	Secretary	2	800	9,600
3	Department heads	5	11,000	132,000
4	Purchaser	2	2,400	28,800
5	Personnel	1	1,500	18,000
6	Accountant	1	1,500	18,000
7	Cashier	2	1,200	14,400
8	Store man	5	2,500	30,000
9	Instructors	10	20,000	240,000
10	Technical assistant	5	7,500	90,000
11	Registrar	1	2,000	24,000
12	Librarian	2	1,800	21,600
13	Duplication and photocopying operators	2	1,200	14,400
14	Driver	2	1,000	12,000
15	Cleaners	4	1,400	16,800
16	Clerk	1	450	5,400
17	Program Officer	1	1,500	18,000
18	Messenger	2	700	8,400
19	Guards	6	2,100	25,200
	Sub Total	60	-	762,600
	Fringe benefit(25%) of basic salary			190,650
	Grand Total			953,250

B. TRAINING REQUIREMENT

There are professionals with several years of experience. So, there is no need for training.

VII. FINANCIAL ANALYSIS

The financial analysis of the TVET project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity
	70 % loan
Tax holidays	5 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 21.36 million of which 15% is required in foreign currency.. The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1
INITIAL INVESTMENT COST

Sr. No.	Cost Items	Local Cost	Foreign Cost	Total Cost
1	Land lease value	4,549.05	-	4,549.05
2	Building and Civil Work	9,775.00	-	9,775.00
3	Plant Machinery and Equipment	2,224.45	3,250.00	5,474.45
4	Office Furniture and Equipment	100.00	-	2,224.45
5	Vehicle	450.00	-	450.00
6	Pre-production Expenditure*	908.23	-	908.23
7	Working Capital	106.24	-	106.24
	Total Investment cost	18,112.97	3,250.0	21,362.97

* N.B Pre-production expenditure includes interest during construction (Birr 1.86 million) , training (Birr 40 thousand) and Birr 100 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.

B. OPERATING COST

The annual operating cost at full capacity operation is estimated at Birr 2.49 million (see Table 7.2). The major components of the operation cost are direct labour, material and input and administration cost which account for 22.97%, 20.08% and 15.31% respectively. The remaining 41.64% is the share of, utility, labour overhead, repair and maintenance depreciation and financial cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Material and Inputs	500.00	20.08
Utilities	66.15	2.66
Maintenance and repair	273.7	10.99
Labour direct	572.0	22.97
Labour overheads	238.3	9.57
Administration Costs	381.3	15.31
Land lease cost	-	-
Total Operating Costs	2,031.4	81.58
Depreciation	256.2	10.29
Cost of Finance	202.6	8.13
Total Production Cost	2,490.23	100

C. FINANCIAL EVALUATION**1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 2.15 million to Birr 2.40 million during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 33.89 million.

2. Ratios

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other

relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point of the project including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 28\%$$

4. Payback Period

The pay back period, also called pay – off period is defined as the period required to recover the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 5 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money

in a bank account. Accordingly, the IRR of this project is computed to be 19.04% indicating the viability of the project.

6. Net Present Value

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project into a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 8.5% discount rate is found to be Birr 10.31 million which is acceptable.

D. ECONOMIC BENEFITS

The project can create employment for 60 persons. The project will generate Birr 8.02 million in terms of tax revenue. The project will contribute to the expansion of education which is vital for development of the country.