Female Professionals in Electronics

Objective

The project promotes future female professionals and technicians in sales, installation and servicing of electronic appliances by supplying them with a sound technical background and capacity through practical oriented vocational training. Through the training, the young women will gain the knowledge, technical capabilities, communication skills and the necessary self-confidence to compete in the growing market and thus generate income for themselves and their families.

Background

Although the majority of electronic appliances in the market were actually manufactured by women in Asian factories, installation, repair and servicing remains a male dominated trade here in Ghana as well as in Europe. It seems, that it is not missing capability that prevents women from being active in servicing and installation of electronics, but specific attitude, which, of course, can be changed by means of education.

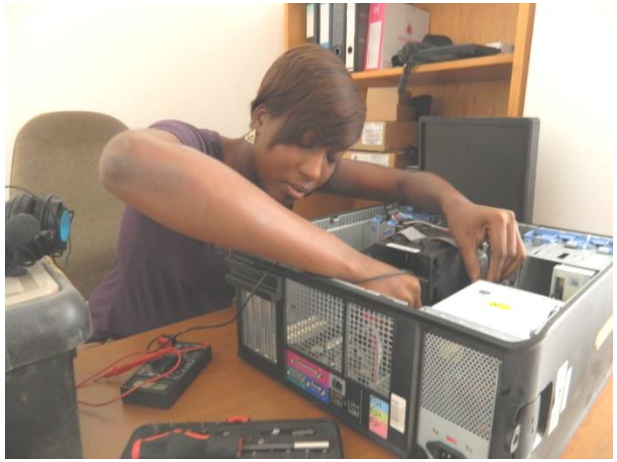
Project Set-up

Girls Vocational Training Institutes in the country typically offer education and training in female dominated trades only, such as catering, tailoring or hair and cosmetics. The project will enable girls schools to install and operate electronic labs in order to offer specific training geared towards the needs of female students/trainees and thus enable them to reach the same level of proficiency as their male competitors. Instructors will receive specific training in order to motivate and promote their female students.

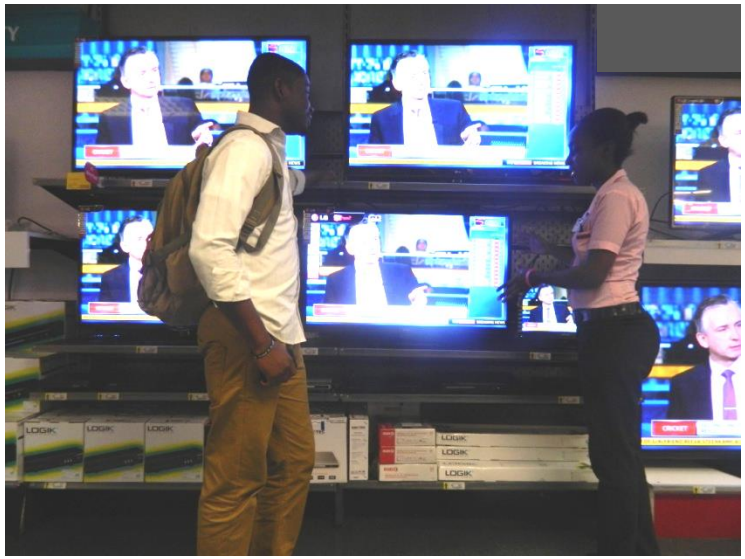
Expected Impact:

Through this project we expect 70 female graduates in electronics per year. This will boost the female/male ratio among graduates from 4% in 2012 to 25% in 2016, when the first batch of 70 female students will leave the three institutes.
(*2012: 240male / 10 female graduates → 2016: 240 male / 80 female graduates*)

Employment Opportunities



There are thousands of smaller and middle sized businesses in the elctronic sector in Ghana. Due to growing urban middle class the demand for electronic appliances is on a constant rise.
Besides servicing and repair of electronical appliances in the workshop women would have good chances in finding reasonable employment as ‚informed salespersons', professionals who are capable of giving profound advice to consumers because of their sound technical background and knowledge.



Another field of employment will gain more importance in the future – after sales services!
Many of today's electronic appliances are not constructed any more to be opened and repaired with some screw drivers, a volt meter and a soldering iron.

After sales service today generally starts with a hot-line where customers expect to find knowledgeable persons on the other end. Besides the technological background - knowing, what's inside the company's products and how they function (or sometimes not...) – this profession asks for communication skills and customer orientation plus good command of computers.
The project will put extra emphasize on these fields. The curriculum will be modified accordingly with additional training moduls dealing with the aforementioned social skills; and instructors will receive specific pedagogical training .

Project Concept, Management & Finance

This project concept could actually be described as a ‚**Public-Public-Private-Development-Partnership**‘ as it involves two International Development Agencies and one private company.

The SAMSUNG GROUP is a South Koreas largest industrial conglomerate. Samsung comprises around 80 companies. It is highly diversified, with activities in areas including construction, consumer electronics, financial services, shipbuilding, and medical services The group produces almost everything from ships, aircraft engines, cameras to every electronic equipment in the market.
SAMSUNG electronics outnumbered Nokia in 2012 as the world's largest mobile phone producer by units sold. SAMSUNG products are manufactured in factories on all continents.
SAMSUNG Electronics spent an estimated $14 billion (U.S.) on advertising and marketing in 2013 which is the world's largest advertising budget in comparison to sales. The company follows a strategic CSR approach and is a main sponsor of sports events.
SAMSUNG has a sound economic interest in the project since the company wants to expand into African markets. The Ghana branch will serve as a hub for all of West-Africa. SAMSUNG has a great need for trained personal with both technical and marketing/sales background.

KOICA is the implementing agency for South Korea's growing engagement in international development cooperation. Traditionally Korean aid was focused on Asian countries but, with growing economic interest in African markets, the Korean government has decided to intensify cooperation in Africa. South Korean Aid in Africa, and in Ghana in particular, is focused on Agriculture, Climate Change, Infrastructure Development, Health and Vocational Education and Training. KOICA Ghana has already invested in the latter field in a Public-Private-Partnership Project with Hyundai in Koforidua (training of car mechanics) and has equipped labs of a public vocational institute in Accra.

GIZ engages as the second public partner in this Development Partnership with the Private Sector (DPP). We are the implementing agency of German Development Cooperation with the Government of Ghana. As such we are supporting the non-formal sector under **our Program for Sustainable Economic Development PSED** by promoting specifically designed Vocational Training as part of the traditional apprenticeship system to be found in Ghana. One of the selected sectors is electronics and one of our prime goals is to increase the number of female trainees in technical trades..
The project therefore perfectly complements our endeavors to promote the vocational training system in Ghana.
As GIZ we committ ourselves to this initiative with our global experience in project management and technical cooperation.

Project Implementation

The project aims at enabling three selected vocational training centers in the Greater Accra Area to offer vocational training in electronics in addition to their standing training courses:

The Don Bosco Youth Network DBYN is an NGO supported by the catholic church that specializes in supporting marginalized youth worldwide. Generally DBYN enjoys an excellent reputation in the field of Vocational Training and Education in developing countries. Among other projects, DBYN Ghana operates two vocational training centers in Ghana, one in Sunyani and one in Ashaiman near Tema. The center in Tema offers vocational training in the fields of auto mechanics, electrical installation, secretarial services and electronics. The school owns excellently managed premises and maintains long standing relationships with former students. The school caters for some 360 students with around 100 graduating each year from three year courses. The current electronics class is only attended by 1 girl among 29 boys (2013: no girls, 2012: 2 girls).
Under this project DBYN will run an All-Female Electronics Class in parallel to the usual mixed class.

Accra Girls Vocational Institute AGVI was founded over 40 years ago in 1973 by Madam Jemima Asiedua Boafo, who is still the institute's owner as of today. AGVI follows NVTI curriculum guidelines in the fields of catering, garment and hair&cosmetics. The instructor / teacher rate is approx. 140/15. 95% of the students are female, some boys attend catering courses. The management is still in family hands; most of the instructors have been at the institute for a long time due to a positive working atmosphere and well weighed incentives for extraordinary engagement. The school is economically independent and finances itself through school fees and corporate sponsorship. Contacts to the private sector are excellent and tracer studies are regularly conducted.

The Pentecost Vocational Training Center PVTI in Gbawe in the outskirts of Accra was officially opened in 1998 by the Women's Wing of the Church of Pentecost to cater specifically for the educational needs of girls and reduce unemployment among young women. PVTI follows NVTI curriculum guidelines in the fields of hospitality/catering, garment/fashion design, hair&cosmetics and home care-taking. The instructor / teacher rate is approx. 160/12. 99% of the students are female; currently one boy attends catering courses. The school is managed since its beginning by Ms. Grace S. Manu, the Headmistress. PVTI is economically independent and finances itself through school fees and corporate sponsorship. Attachments/internships in private companies surrounding the school are mandatory for all students (min. 3 months).

Sustainability

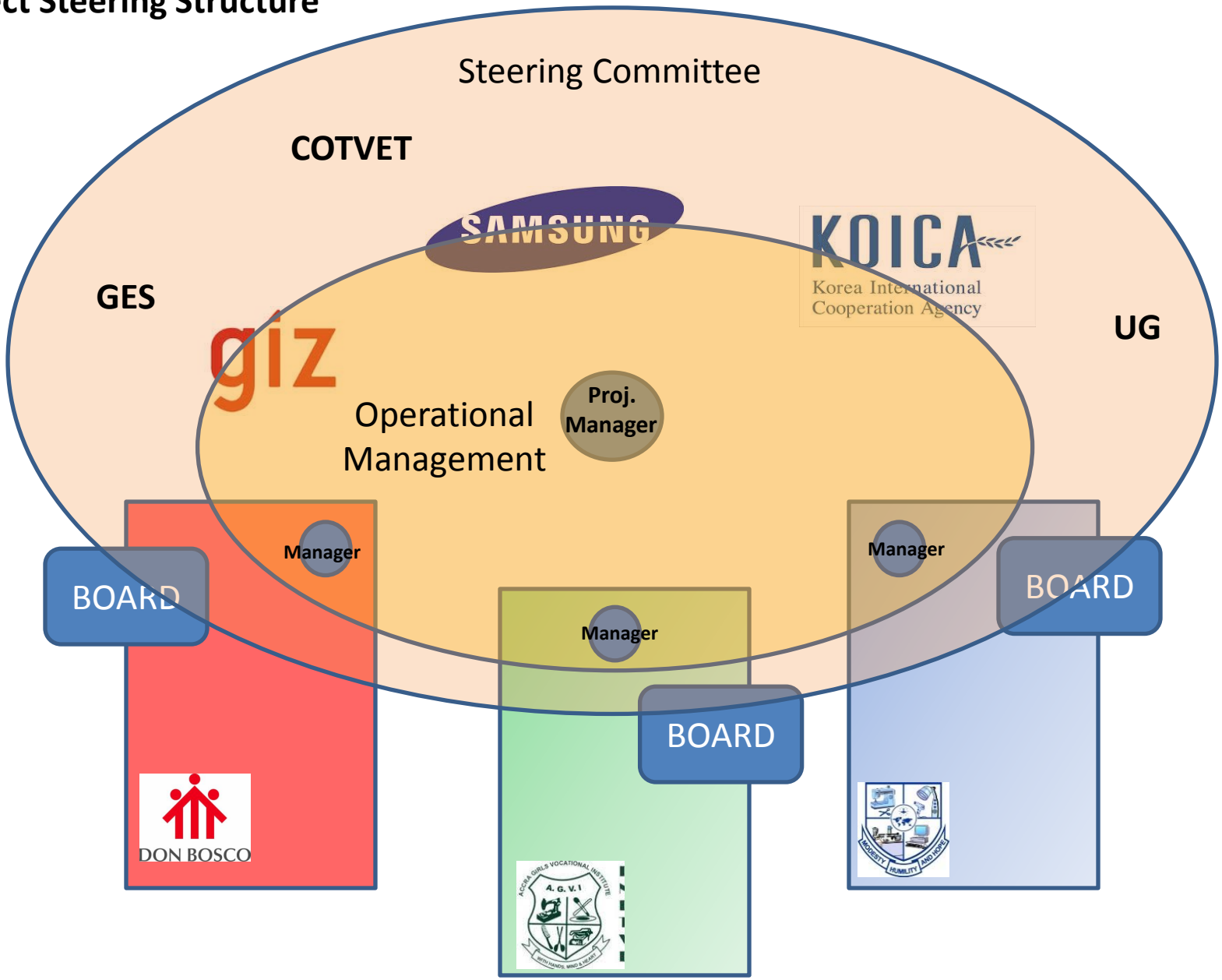
In order to gain sustainability the project will involve public as well as civil society actors and stakeholders.
The project is only meant to jump-start more female presence in a technical field such as electronics. Once female electronics-professionals have lost their ‚exoticness' it is expected that the male / female ratio in all training institutes will rise on the female side.

COTVET, the Council for Technical and Vocational Education and Training, is the Ghanaian authority to coordinate and regulate the country's vocational training sector. COTVET's new Executive Director, Mr. Sebastian Seh, is ready to support initiatives encouraging girls and young women to enter male dominated trades . His statements at the launch of COTVET's gender strategy marked a clear vision (http://www.myjoyonline.com/news/2014/February-27th/cotvet-to-support-more-females-in-technical-skill-training.php). The project enjoys COTVET's full support which will ensure integration into the existing vocational training landscape once the project support has ended.
More information on www.cotvet.org

The Progressive Electronics Technician Association of Ghana PETAG represents businesses in the electronic sector. The Association has 1.466 members with the largest concentration in the Greater Accra Area. Most of the member companies belong to the informal sector , which means they are owned and operated by traditional master-craftspersons. Many of theses small companies train apprentices in their workshops., but female employees are extremely rare up to now. PETAG's National President, Mr. E. Morrison, shows exceptional engagement in the development of occupational standards, units specifications and workplace guidelines for the industry. Mr. Morrison is also a strong supporter of the idea of winning more female professionals for the sector.

The University of Ghana, Department of Psychology is going to accompany this project with a field study on the influence on learning conditions, peer learning, performance and social effects in different gender based settings. We want to find out the differences between all-female groups, gender mixed groups (50-50%) and the male dominated variety as it is found presently in the sector (i.e. 1 female among 29 males students)based groups (50/50% male and female, different classes of male and female and male dominated class). The study will closely follow selected individual girls taking part in the project and document behavioral change, social development , growth in confidence etc. Methodical students of the University will conduct systematic and periodic interviews with the students and their parents. The findings of the study will be made available to interested Government institutions and stakeholders when undertaking other projects.

Project Steering Structure



Methodology

- The project will follow given curricula by COTVET. Instructors will be specifically prepared to present technology in a gender sensitive way. The project will put special emphasize on easing understanding and access to technological thinking for the girls which they might not have experienced in their educational life to the necessary extend for a professional career in electronics.
- PETAG for the Informal Sector and SAMSUNG for the Formal Sector have a strong interest in contributing content for the curricula to suit current market demand.
- High amount of practicals and hands-on training (minimum 50%). The institutes are encouraged to offer repair services for electronic devices to the public in order to design training lessons as close as possible to real-life.
- Strong emphasize on social and communication skills, entrepreneurial training and customer orientation. Training sessions will be designed in interactive fashion with integrated role plays, field trips and early involvement in marketing activities. SAMSUNG will play a big role in this field of market oriented training.
- Scientific research methods are to accompany the project in order to document social and behavioral change. Besides the hard facts such as number of graduation certificates and number of employment contracts after graduation we also want to record the ‘soft’ effects of this project on our target group and document for later projects how different learning group settings influence performance and well-being of the female trainees in a technological field.

Curriculum

Year 1

Section 1: Health, Safety and Protection
Unit 1-3: Hazards, Safety Equipment, Electrical Safety and Protection
Unit 4: Basic Electronics, Signs and Symbols
Section 2: Structure of Matter and its Relevance to Electricity and Electronics
Unit 1: Atomic Structure
Unit 2: Insulators, Conductors and Semiconductors
Section 3: Chemical Source of Electromotive Force
Unit 1: The Construction of Cells
Section 4: Direct Current Theory
Unit 1-2: Resistors, Power and Energy

… plus comprehensive training in entrepreneurship, customer-orientation and communication skills

Year 2

Section 1: Electromagnetism
Unit 1-3: Electromagnetic Fields and Electromagnetic Induction, Self and Mutual Induction
Section 2: Instruments and Measurements
Unit 1-3: Moving Coil Instruments, Analogue Multi-meter, Cathode Ray Oscilloscope
Section 3: AC Theory
Unit 1-3: Alternator Principles, RLC Circuits, Alternating Systems
Section 4: Concepts of Electron Emission
Unit 1: Electron Emission
Section 5: Concepts of Semi-Conductors
Unit 1-2: Semi-Conductor Theory, Diodes
Section 6: D.C. Power Supply
Unit 1-2: Rectification, Switch Mode Power Supply
Section 7: Transistors
Unit 1-3: Bipolar Transistors, Unipolar Transistors, Other Semi-Conductor Devices
Section 8: Amplifiers
Unit 1-3: Voltage Amplifiers, Power Amplifiers, Operational Amplifiers

… plus comprehensive training in entrepreneurship, customer-orientation and communication skills

Year 3

Section 1: Digital Electronics
Unit 1-2: Binary System and Logic Gates
Unit 3-4: Combinational Logic Gates and Sequential Logic Gates
Unit 5: Integrated Circuits
Section 2: Multi-vibrator
Unit 1: Multi-vibrator
Section 3: Radio Transmission and Reception
Unit 1-2: Radio Waves, Modulation and Demodulation
Unit 3: Transmitters and Receivers
Section 4: TV Transmission and Reception
Unit 1: Television

… plus comprehensive training in entrepreneurship, customer-orientation and communication skills

Impact, Operational Planning & Budget Overview

Impact:
The number of trained female professionals in the electronics sector is significantly raised.

Indicators:
1. 70 female graduates from the 3 institutes annually
2. Ratio of female graduates in Electronics in Ghana has increased from 4% in 2012 to 25% in 2016
3. 70% of female graduates find employment 12 months after training

Output 1: The public and potential employers are informed about new training options for female students	**190 TUS$**
1.1 Run public awareness campaign around the training centers to win female students 1.2 Convince potential employers to hire more female professionals (PETAG members)	
Output 2: Functional Electronic Labs are installed in all 3 institutes	**493 TUS$**
2.1 Undertake necessary construction works 2.2 Deliver and install necessary equipment in teaching labs	
Output 3: Training institutes are able to run pilote training due to jump-start financing	**169 TUS$**
3.1 Subvention school fees for female students in degressive way for 3 years 3.2 Subvention teacher‘s salaries in a degressive way for the initial period of 3 years	
Output 4: Curricula reflect market demand and instructors are capacitated	**104 TUS$**
4.1 Get accreditation of the new departments from COTVET 4.2 Amend curricula with training modules on customer orientation and communication skills 4.3 Train instructors regarding specific needs of female students and in new training areas mentioned under 4.2	
Output 5: Management, Steering, Documentation, Monitoring and Evaluation	**322 TUS$**
5.1 Form management and steering structure 5.2 Conduct regualr and systematic internal and external evaluations 5.3 Introduce a study on the influence of different gender based learning settings on training outcome	
Total	**1.279 TUS$**

Equipment Needed

Equipment & Facilities

General Workshop Equipment

Work Bench for Electronics (with vice)	13
Assembly vice Spannfix-Vario	13
Power Supply 2 x DC 0-30V/5A	13
Power Supply AC 0-50V 100VA	13
High Speed Drilling Machine	1
Bench Drilling Machine	1
PCB Board Cutter	1
Electronic Practice Rack for Experiments	8
Small Parts Magazines	20
Shelves, lockable cupboards	5
White Board, Black Board	2
Chairs	26
Extension Cable 10m	2
Power Meter (analog / digital)	2
PC, Monitor, Keyboard	26

Safety Equipment

Fire Extinguisher	2
Safety Goggles	26
Ear Protector	26
Respirator	1
First Aid Box	1
Rubber Mats	26

Small Parts / Consumables

Solder for electronic work
PCB boards
Selection of Components: Transistors / FETs
Selection of Components: Thyristors / Triacs

Tool-sets for students

Solder for electronic work	26
Magnifier Glass, Magnifier Lamp	26
µC-Trainer Application Board	26
Accessories for µC-Trainer Application Board	26
Electro-static discharge wrist strap	26
Precision pocket vernier caliper	13
Files set	13
Analog multi-meter incl. cable set	26
Digital multi-meter incl. cable set	26
Voltage and continuity tester	26
Training Board Fundamentals of Electrical Engineering / Electronics	13
Plug-in Components for above	13
Breadboard	26
Basic Tool Kit: side cutter, long nose Pliers, screwdriver etc.	26
Tool kit electronics	26
Soldering station analog	26

Teaching Aids and Demonstration Units

Set of Antennas and Receiver for Demonstration, Satellite Dish, LNB	1
Digital TV for Configuration	1
Digital Audio Receiver for Configuration	1
Digital Audio/Video Media Player for Configuration	1
Digital TV prepared for Training	2
Photovoltaic Experiment Set	2
Experimental Kit for Magnetic and Electric Fields	1
Unstabilized, stabilized and switch Mode Power Supply	1
Data Sheets of Transformers and Rectifier Bridge Components	1
Documentation and Manuals Microcontroller Technology PIC16F887	1
Documentation and Manuals µC-Project Voltage Measurement and Display	1
2 Channel Digital Storage Oscilloscope Incl. Cable Set	8
Function Generator 5 MHz sinus, Rectangle, saw-tooth, TTL out	8
Oscilloscope	1
Transformer	1
Set of Permanent Magnets	1
Set of Electro Magnets	1
Frequency Generator	1
Sample Circuits and Band Filters	1
Logic Tester	1
User Manuals for all Equipment	xxx

Construction Work is necessary at AGVTI (extension of existing classroom facilities) and most probably also at DBYN. PTVI has sufficient classroom facilities available which would only need minor renovation.