



## Makerspace training centre project

Innovation and Learning Practice

Bridging Innovation and Learning in TVET (BILT) Project

**Submitted by Gearbox Pan African Network & Machine Africa  
Network of Industries, Kenya**

A makerspace is more than its name suggests. At the facility managed by Gearbox and operated by Machine Africa Network of Industries in Kenya, a large manufacturing makerspace is indeed used to make things, but that only scratches the surface of its function: shared prototyping facilities; training in manufacturing, fabrication and design; mentorship; investment opportunities and community development are all part of the Kenyan project that seeks to create 5 million jobs in Kenya by 2023 under the Mastercard Foundation Young Africa Works Project.

Start date: October 2019

Type of implementing institution: NGO and private sector

Target group: Young professionals between 18-35 years of age

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## **Gearbox Pan African Network & Machine Africa Network of Industries, Kenya**

**Gearbox is a research, product development and prototyping non-profit organization aiming to improve the lives of hardware entrepreneurs in Africa. Machine Africa Networks of Industries (MachineANI) is a constituent of Gearbox. It is a shared production space – known as a makerspace – that houses manufacturing equipment for use by entrepreneurs, trainees and other aspiring craftworkers. The makerspace allows for sharing resources for a wide range of manufacturing processes and creates a culture of openness and collaboration.**

## **Description of activities**

In 2019, a public-private partnership called 'Young Africa Works' was launched by the Mastercard Foundation in collaboration with the Kenya Commercial Bank Foundation and members of the public sector. The goal of the initiative in Kenya is to create 5 million jobs by 2023 in sectors identified as a national priority, which includes manufacturing.

Gearbox is a recipient of funding through the 'Young Africa Works' initiative. Its facilities are designed to build capacity for employment creation and economic empowerment among young professionals. With a subscription model similar to a gym membership, anyone can make use of Gearbox's facilities. These include modern **manufacturing machinery and equipment** that would otherwise be inaccessible to high school graduates, entrepreneurs and start-ups, and graduates from TVET or university programmes.

In addition, Gearbox provides **courses** for learning manufacturing equipment and software. These courses target both initial and continuous training (reskilling and upskilling).

Later-stage start-ups can also make use of Gearbox's incubation facilities. Gearbox manages the training centre and offers tech support in the incubation hub, helping entrepreneurs as they launch small businesses. MachineANI manages production at the makerspace facility, procures materials and maintains the machinery.

## **Relevance**

### **What part of the manufacturing training and production is addressed by Gearbox?**

Gearbox considers itself the first impact-oriented makerspace for hardware entrepreneurs in Kenya. The organization aims to address the gap in physical capital (such as facilities and equipment) and in technical talent required for prototyping, design and manufacturing in Kenya. The makerspaces provide individual access to quality equipment for affordable and efficient means of mass production. This is relevant for graduates from TVET institutions, who need hands-on training to become ready for the working world, and for established professionals looking to improve and experiment on innovations and products. These services are not necessarily adequately provided or feasible in formal TVET or workplace settings in Kenya.

### **In what way does the facility ensure its services are industry relevant?**

Gearbox conducts continual and consistent research in Industry 4.0 technologies, emphasizing product development through Human Centred Design, which places the user in the center of the design and innovation process. The Gearbox Academy has a hands-on and product-oriented approach to training, which provides a unique understanding of what companies and institutions need when it comes to value-added engineering support for their products or services. Gearbox works with both academia and industrial partners to identify and fill curricular gaps, ensuring that current job market requirements are met.

## **Added value**

### **How is the makerspace useful for entrepreneurs and start-ups?**

Gearbox provides a network of like-minded individuals and businesses with the know-how and resources to take their innovation to the market. It is a one-stop shop for members and businesses renting the space to network and share ideas. MachineANI provides a space for a supportive ecosystem for hardware entrepreneurs. The centre's manufacturing facility provides small and medium sized enterprises and entrepreneurs with access to tools that would typically be beyond their reach. The facility also features an incubation space that creates a culture of openness and collaboration.

### **What benefits exist for the community and marginalized groups?**

Gearbox adopts specific measures for gender inclusion and for including people who are considered vulnerable in their communities, such as refugees. Women and

younger people are especially vulnerable: they are often unable to secure loans from financial institutions to start their ventures due to a lack of collateral. Women face added challenges in manufacturing, a sector historically dominated by men. Gearbox lowers barriers to entry into manufacturing by providing access to markets, materials, machines, networking opportunities and entrepreneurial training. In addition, Gearbox benefits independent artisans. Without access to proper tools and machinery, the products they manufacture are often inconsistent, which can cost long-term contracts and job security.

### What opportunities exist beyond the in-house training and networking?

MachineANI has an in-house business development department tasked with securing business contracts in manufacturing for trained beneficiaries. The centre offers a shared space where users can access and utilize the equipment at a fee to fulfil their own contracts, removing the need for entrepreneurs to take the large leap from incubation to owning their own equipment and facilities before they are ready. The makerspace is equipped to commercially mass produce at least one item at scale, enabling long-term sustainability of the centre while providing jobs for the local community. Small-scale businesses run by trainees often employ locals and increase regional economic activity.

## Transferability

### How much of Gearbox's success is dependent on its facilities?

While the makerspace facilities and manufacturing equipment are an essential part of Gearbox's offering, these physical resources are not required for all aspects of the initiative. In addition to the technical components of training, Gearbox also focuses on Human Centred Design, which aims to meet the end-user needs. By teaching this method to local youth, entrepreneurs and citizens, any TVET stakeholder can introduce the concept of surfacing local challenges and utilizing technological awareness training to create solutions. The same applies for teaching the innovation development cycle to grow a solution from an idea to scalable implementation.

### What are ways TVET institutions can make use of local makerspaces?

Certain contexts may mean TVET institutions are simply not equipped or mandated to provide hands-on technical training that compares to Gearbox. However, a similar public or private makerspace or incubation facility can still be a valuable resource. As an example, the Gearbox Academy enables TVET and other tertiary institutions to outsource hands-on training from the MachineANI centre. This extends to curriculum development and review, as well as training for TVET trainers and instructors.

**Gearbox's Makerspace training centre is one of the BILT project's Innovation and Learning Practices that address systemic challenges within the five work streams of the project. Specifically, the Marketspace training centre initiative addresses entrepreneurship in TVET:**



### Entrepreneurship in TVET

*Unlocking the potential of innovative entrepreneurial activities and fostering entrepreneurial culture*

**Additional Innovation and Learning Practices cover the following areas:**



**New Qualifications and Competencies**



**Digitalization in TVET**



**Greening TVET**



**Migration and TVET**

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## About the BILT Project

UNESCO-UNEVOC's Bridging Innovation and Learning in TVET (BILT) project is a reference point for innovation and learning in TVET. It utilizes the international UNEVOC Network to create opportunities for collaboration and a platform for bridging innovation and learning between Europe, Africa and the Asia-Pacific region. BILT complements developments at the national level in supporting innovative, market-oriented and attractive modes of learning and cooperation in TVET.

The BILT project explores the process of identifying, integrating and implementing new qualifications and competencies in TVET. This is known as the 'three I's process'. In addition to the broad focus on new qualifications and competencies, BILT addresses four complementary themes: Digitalization and TVET, Greening TVET, Entrepreneurship in TVET, and Migration and TVET.

For more information, please visit  
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## New Qualifications and Competencies in TVET

- Identifying new qualifications and competencies in a timely manner;
- Integrating them into appealing and flexible curricula and training regulations; and
- Implementing them in innovative training approaches

## Entrepreneurship in TVET

Unlocking the potential of innovative entrepreneurial activities and fostering entrepreneurial culture

## Greening TVET

Responding to new development paradigms for sustainability and reduced environmental impact

## Digitalization in TVET

Providing response to new skills demands, as technology has permeated the world of work and is changing the profile of jobs

## Migration and TVET

Accelerating the integration of migrants into their host communities, and allowing them to become productive members of the workforce

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