

EarthEnable - Rwanda

Organisation implementing the project

EarthEnable Incorporated is an NGO (Non-Governmental Organisation) based in the USA, which owns EarthEnable Rwanda. EarthEnable Rwanda uses a social enterprise approach, donating its profits back to the umbrella organisation to fund new start-ups elsewhere.

EarthEnable was founded by a group of students from Stanford University, who travelled to Rwanda to work with The Mass Design Group. This led to the concept and design of the earthen floor product, including the development of a new varnish.

EarthEnable Rwanda (known in country as Tube Heza) was established in 2014. Another operation started in Uganda in August 2017. EarthEnable is the only organisation providing earthen floors in both countries.

EarthEnable Rwanda and Uganda are registered as for-profit enterprises in their respective countries as there is no social enterprise legal status.

Project Description

EarthEnable eliminates dirt floors in homes by installing affordable earthen flooring. This benefits health by reducing parasitic infections, childhood diarrhoea, respiratory diseases and other illnesses caused by contact with dirt floors. Earthen floors are 90 per cent less carbon intensive and between 20-30 per cent of the cost of the next best alternative, which is cement/concrete.

EarthEnable currently operates in Bugesera, Rwamagana, Ngoma, Kayonza and Kamonyi districts in Rwanda, and Jinja district in Uganda. Over 2,300 households in Rwanda and around 100 in Uganda (approximately 11,000 people) have had a new EarthEnable floor.

Employees - drivers, mason supervisors, and departmental staff supporting sales and floor builds - are 90 per cent Rwandan and include around 70 full-time staff across the Rwanda and Uganda offices.

The project is ongoing.

Aims and Objectives

The main purpose of the project is to improve the health of families in rural Rwanda and Uganda by replacing dirt floors with earthen floors.

Dirt floors are known to cause substantial health problems linked to hygiene, as they harbour parasites and bacteria. The health hazard of soil-transmitted helminths (STH) is well-documented. Dirt floors serve as vectors for these parasites, which enter floors in faeces on the shoes or feet of people, in spilled water, or directly from children and livestock in the home.

STH infections in children are associated with diarrhoea, poor cognitive development, immunodeficiency, malnutrition, stunting, anaemia and wasting. Studies in Argentina, Mexico, Panama, Ethiopia, El Salvador, Ghana, Peru, Eritrea, Egypt, Ecuador and Haiti have shown a higher incidence of STH infections and/or illnesses associated with them are caused by or correlated with living on a dirt floor.

Young children are particularly at risk because water makes up more of their bodyweight than adults, making them more vulnerable to diarrhoea and resulting in a greater risk of dehydration and death (diarrhoea is the second leading killer of children under the age of five). Almost half of Rwanda's population are children under 18 years of age, and 15 per cent are under five. Although everyone in the home benefits from having a clean floor, children are the main beneficiaries.

The ambition of EarthEnable is to eliminate dirt floors worldwide. They are currently focused on scaling the operation in Rwanda and Uganda and developing their approach to transfer.

Context

1.4 billion people worldwide live on dirt floors, including 75 per cent of Rwandans and 67 per cent of Ugandans. Up to 70 per cent of households and 84 per cent of children in Rwanda live in rural villages, where most houses have dirt floors.

As a landlocked country, imports of concrete into Rwanda are difficult. This means concrete floors are too expensive for the vast majority of the rural population, so most homes have dirt floors.

EarthEnable provides a viable alternative. Earthen floors have existed for centuries but have never been scaled throughout Africa.

Key Features

The floors have been tested extensively in Rwanda and Uganda. When the company was founded, they piloted several different construction techniques, working with local masons to find the most effective materials, tools, and techniques at the lowest cost.

Earthen floor construction starts with excavation or backfilling of the existing dirt floor to level it out. Then laterite, a rocky soil also known as murram, is added. The laterite is levelled out and compacted to create a strong surface. Next a layer of screed (fine sand and water) is spread on the floor over the laterite to form a surface that is smooth and consistent. Finally, the floor is sealed with varnish.

In the US, linseed oil is traditionally used for varnish. However, this is expensive, not locally available in Rwanda, and slightly noxious. EarthEnable invented an alternative varnish which is cheaper to produce, green and healthy, as it contains no volatile organic compounds (VOCs).

When the varnish is dry, it forms a durable, waterproof, and shiny surface which can be used after seven days and hardens over time. This allows people to wash the floor to remove dirt or faeces. Installation of an entire floor takes about two weeks (three days of labour plus drying time). During this time families either organise 'phased' installation (living in part of the home while the other part is worked on) or stay with friends or relatives.

In the US, earthen floors last for 20 - 30 years if maintained with a fresh coat of oil every three to five years. Because of more frequent washing in Rwanda, EarthEnable estimate their floors will last for 10 - 15 years with re-varnishing every few years. Customers can do this easily themselves by purchasing a bottle of varnish. EarthEnable also provide free re-varnishing during an initial six-month warranty period, or for a small fee later on.

Sales representatives go door-to-door educating customers about the benefits and affordability of the floors. When customers sign up they are connected with the operations team and assigned a mason. Customer service representatives check that the clients are happy with their experience and installation.

EarthEnable also builds relationships with local village leaders to share and spread awareness about their product.

The initial pilot phase in Uganda was carried out in partnership with Habitat for Humanity, who provided a loan fund for households unable to pay for a floor.

Funding

Initial seed funding for the project came from Stanford University and a grant from Echoing Green.

As the project scales, profits from in-country operations can be recycled back to the central NGO which can then fund expansion into new countries. At the moment the cost of materials is covered by profits but some fixed costs are still covered by grants.

EarthEnable has received grant funding from a number of different foundations and NGOs to help scale their work. These organisations include:

- Creativity Foundation;
- USAID Div;
- Segal Family Foundation;
- Child Relief International;
- Jester Foundation;
- Silicon Valley Community Foundation;
- Joseph R Mutat;
- Habitat for Humanity;
- Doen Foundation; and
- Mulago Foundation.

The annual budget for 2017 was USD\$350,000. This was covered through a combination of grants and income from the sale of earthen floors.

EarthEnable currently funds training for masons through grant income. Eventually it is expected this will be covered by sales revenue, or by masons paying for the training. Due to low turnover of masons, the cost of training is fairly low (around 9 per cent of total revenue).

The floors cost 2,490 RWF (approximately USD\$3) per square metre. Therefore, the average earthen floor costs around USD\$90. With the cost of cement rising in Rwanda, a concrete floor can cost up to five times this amount.

Innovation

EarthEnable is the only earthen floor company in Rwanda and Uganda. The model provides a simple, affordable and sustainable solution to some of the poorest households with lasting health benefits. The social enterprise approach also creates livelihoods, and the outcome is environmentally friendly.

Compressed earth is a traditional technique, but EarthEnable have innovated by inventing their own cheaper and healthier varnish.

While other initiatives around the world are working to reduce diarrhoea, malnutrition and poor cognitive development through improved access to water and toilets, there are few others focused on floors. Those that are doing this to impact health have limited scope and are not sufficiently scalable. However, EarthEnable's approach is financially sustainable and transferable.

Environmental Impact

EarthEnable uses locally sourced laterite and clay, and all natural materials. It is 90 per cent less carbon intensive than cement. The shops where masons get supplies for the floors are typically located within a few miles of customers' homes, reducing the impact of transporting materials.

Laterite is available throughout Rwanda; it is usually found in the backyard of the customer, meaning they do not have to pay for it and the company does not have to transport it. Sand is sourced from quarries that are found throughout the areas they operate in. As the second most densely populated country in Africa, distribution in Rwanda is made simpler, and the organisation has established an efficient network to get materials to customers. The varnish is free from noxious fumes and is made from flaxseed oil at the EarthEnable office in rural Rwanda.

Financial Sustainability

The project is not yet able to operate independently of grants. They intend to continue to attract grant funding in order to achieve greater scale and sustainability. Grants are primarily required to cover set-up costs and initial overheads until businesses in new locations are established.

EarthEnable provides jobs and training to local communities, embedding economic opportunity and skills for the future. As this is a market-based solution providing the floors via finance options, once a local enterprise has been set-up it is financially sustainable.

In Rwanda, an earthen floor is around 20 - 30 per cent of the cost of cement that is the same quality (in terms of durability, waterproofness, and abrasion resistance). There is cheaper cement available but it is usually mixed with large amounts of other materials. This means it cracks and flakes away quickly, so dirt and parasites re-emerge.

EarthEnable floors are accessible to more than half of the population - households making around 60,000 RWF (USD\$70) or more per month (just over USD\$2 a day). While, occasionally, families on lower incomes decide to prioritise purchasing an earthen floor, most customers come from this income group.

Different payment options are provided to cater for different incomes. Some customers pay for the floors in two instalments (USD\$45 per instalment for a 30 square metre floor). There are schemes allowing customers to pay over time, and many customers like 'phased contracts', which allow them to install the new flooring room by room, paying the entire amount in instalments of 25 per cent over two months. This also means they can continue living in one part of the house while another room is worked on.

Roughly 10 per cent of clients get free installation, generally in relation to product development and testing. They also carry out some activities to reach those on the very lowest incomes. These include installing earthen floors for free for a family, selected by village leaders at community events called 'Umuganda'.

Another way of reaching poorer families is through working with cooperatives to install floors for their members. By approaching cooperatives at the point of sale of their crops, EarthEnable encourage people to use that money to pay for a floor. They are also exploring the idea of acting as a cooperative in their own right and collecting crops for payment instead of money.

Social Impact

A World Bank Study shows how eliminating dirt floors results in a dramatic reduction in childhood diarrhoea (49 per cent), parasitic infections (79 per cent), and lower incidence of asthma and malnutrition. As most customers don't have shoes, earthen floors provide protection from 'jiggers' (parasites that burrow painfully into children's feet). Improved health leads to increased income as fewer work and school days are missed due to illness, and money is saved on medicine.

There are additional benefits for women and girls, who often spend the most time cleaning homes. On dirt floors, women and girls sprinkle the floor with water several times a day to keep the dust down. Clothes and household items need cleaning more often because they become dirty more quickly. Having a clean floor cuts down on the time needed to do this.

During harvest season, most families store crops in the home. On an earthen floor crops are protected from the bugs found in dirt, preventing them from being ruined. Most families cook their meals on the floor, so by removing dirt it improves hygiene during food preparation.

As with most successful health interventions, the presence of a clean floor helps to improve socio-economic status. Illnesses caused by a dirt floor cost families health expenses, prevent children from attending school, and inhibit cognitive development.

Apprentices train for one to three months, working alongside a trained mason. They learn about mixing proportions for the compact earth floor, how to recognise compaction, trowelling, and how to tackle common issues like leaky roofs or uneven foundations.

There are currently about 90 active masons and 90 active sales representatives who work as contractors. Overall, approximately 500 masons have been trained since EarthEnable started, some of whom have gone on to use these skills in other employment.

EarthEnable invests significantly in the professional development of staff, through frequent coaching sessions and they reshuffle duties and responsibilities for staff to grow into more senior roles. High youth unemployment means it is common for Rwandans to graduate from college without jobs. EarthEnable actively hires and trains young people who want to be part of Rwanda's development.

EarthEnable Rwanda has secured strong support from the Minister of Local Government as well as the Rwanda Housing Authority. They are currently in talks with district governments in each of the five areas they operate in. All are interested in partnering to build earth floors for the most vulnerable populations and EarthEnable are hoping to be the primary contractor for any floors built by the district governments. In the short-term this is likely to begin with new floor construction for resettled people (vulnerable populations who are either homeless or do not have stable shelter), with the hope that it will eventually expand to include government-funded subsidies for those on the very lowest incomes who cannot afford a floor.

Dirt floors are strongly associated with poverty. For this reason, EarthEnable customers are automatically people of low income. They frequently receive requests to sell floors 'up-market', to people who already have or can easily afford cement, but who would prefer an earthen floor because they are more durable and more eco-friendly. However, they have chosen to build floors only for those who cannot afford other options, and to occasionally build demonstration floors for NGO clients.

Barriers

The business model has been adjusted a number of times to continually improve overall efficiency and customer satisfaction. They try to reduce the price of the product to make it increasingly accessible for the majority of Rwandans and Ugandans, whilst also covering the cost of serving rural communities.

Rural logistics and distribution (last-mile delivery) is much more difficult in terms of achieving scale efficiencies. To simplify the supply chain and keep costs low they have recently shifted towards bulk delivery and installation - serving groups of customers (three to five households) at the same time in a village.

At the beginning of 2017, the gross profit margin was -136 per cent; but by the end of that year they achieved positive gross profit margins of 40 per cent. They are not yet net profitable, but they believe the approach demonstrates that there is a sustainable way of eliminating dirt floors.

Lessons learned

To reach a lower-income segment of the population, a half-priced 'Do-It-Yourself' option, known as Kwigira (meaning 'self-reliance'), was introduced. Kwigira customers were trained to install their own floors instead of hiring masons, but only those who already had significant masonry experience would sign up for this. Or customers would choose this option, and then hire a mason to attend the training and install the floor for them. EarthEnable phased out this option and instead created a new product, Ishema (meaning 'pride'). They conducted training to certify masons in building their floors and then set up an 'Angie's List' model (a directory for people to read and publish reviews of local masons), bringing this concept to rural Rwanda. This meant that trained masons could be recommended for customers to contact directly. Whilst making the product significantly cheaper, this also ensures product quality. This change has improved gross margins substantially by cutting out inefficiencies. They continue to sell the full-service product, now called Damarara (meaning 'treat yourself'), which involves delivery of materials and a team of full-time masons to install the floor.

EarthEnable have exchanged knowledge with other social enterprises in Rwanda and across the region, including solar companies, clean cookstove companies and agricultural groups. This has helped them to create an effective rural logistics and distribution business model. The process of last-mile logistics, as well as a door-to-door sales and marketing approach, have been massive learning opportunities and they often share their insights of this with others.

They have also learnt the importance of being close to customers and continuing to keep them at the centre of any decision. The company headquarters is purposely located in the village rather than the capital city of Kigali, so as to enable more day-to-day integration with the target community. By regularly and easily visiting customers, they can respond more effectively to their concerns. This has included the decision to adjust the business model to train all masons as contractors themselves.

Evaluation

Quality control officers test each floor at three stages of construction - after compaction of the laterite, after laying the screed, and after the varnish has dried. Tests include checks for durability, waterproofness, and abrasion-resistance. A Quality Control working group manages this, as well as brainstorming different ways to continue improving product quality.

All masons are evaluated for every floor that they build and receive scores which are available to customers. This acts as an incentive to build each floor well. In the last quarter the average score was 8.1.

Though there is already much evidence to show the benefits of eliminating dirt floors, EarthEnable are currently carrying out a health impact evaluation to compare the health of customers before and after receiving their floors against a control group in other areas.

To find out how the floor has impacted them, customers are surveyed one, three, and six months after their floor is completed. After one month, 70 per cent of customers report that household health has improved since they upgraded their floor. Forty-nine per cent report that they have been spending less money on healthcare.

Recognition

EarthEnable won the Postcode Lottery Green Challenge, which awards sustainable entrepreneurship, in 2017.

In May 2018, co-founder and CEO Gayatri Datar, took part in Startup Grind's Female Leader Month as a speaker at the [Kigali event](#). She has also participated in a number of panels and podcasts to further spread the message about the need to reduce dirt floors across the world.

EarthEnable has appeared in many articles and received press coverage worldwide.

- NPR: <https://www.npr.org/sections/goatsandsoda/2014/09/02/342447826/when-a-home-poses-health-risks-the-floor-may-be-the-culprit>
- NPR: <https://www.npr.org/sections/goatsandsoda/2017/09/05/547407906/whatever-happened-to-the-mission-to-get-rid-of-rwanda-s-dirt-floors>
- Stanford Business: <https://www.gsb.stanford.edu/insights/paving-way-healthy-homes>
- Fast Company: <https://www.fastcompany.com/3034089/stopping-disease-with-a-simple-innovation-new-floors>
- So/creatie: <https://socreatie.nl/gayatri-datar-getting-every-rwandan-a-solid-and-healthy-floor/>
- Africanews: http://www.africanews.com/2018/01/13/low-cost-earthen-floor-technology-helps-to-improve-the-quality-of-lives-in/?utm_content=buffer1e773&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer
- The NewTimes: <http://www.newtimes.co.rw/section/read/221933/>
- Share America: <https://share.america.gov/check-out-these-3-inspiring-startups/>
- Virgin Unite: <https://www.virgin.com/virgin-unite/rwandan-start-earthenable-wins-eu500000-postcode-lottery-green-challenge-2017>
- Change Maker: <http://www.changemakerpodcast.com/episode-4-what-you-know/>
- Tonyloyd: http://tonyloyd.com/011/?utm_source=ReviveOldPost&utm_medium=social&utm_campaign=ReviveOldPost

They have been visited by a variety of donors and interested parties who want to see their on-the-ground work in Rwanda and Uganda, including:

- large entities like USAID and Habitat for Humanity;
 - fellow social enterprise partners like BBOX, One Acre Fund, Inyenyeri, Green Light Planet, and Gardens for Health;
 - individual donors and family foundations like Segal Family Foundation, Child Relief International, and DOEN Foundation;
 - academic supporters, such as professors from Stanford Design School; and
 - various student visits from Oxford, London School of Economics, Harvard, Stanford, and several other universities.
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Transfer

The project began in one district in Rwanda and has scaled up to a further four districts in the last 12 months. They have also transferred the approach to one district in Uganda.

The main barrier to transfer is securing financial support to accelerate growth into new regions. EarthEnable are exploring franchise partnerships to scale the model further. They have the ambition of inspiring an industry around earthen floors. Their business model is designed for others to be able to copy, to encourage a competitive market that builds on their work.

They are currently exploring partnerships with UNHCR (The UN Refugee Agency) to work in refugee camps in Rwanda and developing solutions for other parts of the house (roofs and walls).

EarthEnable believe that by sharing their work with other interested parties they will be able to scale, and draw on the expertise and advice of others to continue to refine and grow the organisation.
