

## CIRCULAR ECONOMY BUSINESS CASE STUDIES IN SOUTHEAST ASIA



## My Dream Home

- Phnom Penh, Cambodia
- Affordable housing
- [www.facebook.com/mydreamhomesr](https://www.facebook.com/mydreamhomesr)
- Analysis period: 2015-2024

## Interlocking Bricks for Affordable Housing

## Business Spotlight

Kongngy Hav founded MY DREAM HOME (MDH) to make affordable housing available in Cambodia, introducing an interlocking brick system made from compressed soil and cement.

These eco-friendly interlocking bricks significantly reduce the use of sand, cement, and energy compared to traditional red bricks, and they thus leave a lower carbon footprint.

This approach has had a positive effect on natural resource use, as it promotes material efficiency and waste reduction. The brick-making process has lower CO<sub>2</sub> emissions than red bricks. Between start of operations in 2015 and MDH has saved an estimated 10,600 tonnes of CO<sub>2</sub> emissions. The use of the interlocking bricks also substantially reduces labour requirements, construction time, and costs by 15%–20%, with a positive social impact on low-income communities.

Future plans involve diversifying into high-end construction materials and exploring new sustainable materials, such as tiles from recycled glass. This expansion aims to maintain MDH's commitment to affordable housing while exploring new market segments.

## Keywords

Interlocking compressed bricks, Affordable housing, Environmental sustainability

## Innovation

Product/service design, Manufacturing, Resource efficiency



# Analysis of My Dream Home

## Context and baseline

A 2017 study in Cambodia established the need for over 800,000 low-cost urban homes by 2030, to be priced below USD 30,000 in order to meet the needs resulting from increased urbanisation and demographic changes. However, even affordable housing projects often exceed the financial reach of average workers, who can afford homes costing only about USD 15,000.

Kongngy Hav, returning from Australia and facing housing challenges, founded MY DREAM HOME (MDH) with the vision of making housing accessible for all. Without any formal training in construction or engineering, Kongngy was inspired by a YouTube video showing how to build with straw bales. After some research, he discovered that the compressed brick system (known as compressed earth brick) would be suitable for providing low-cost housing. He adapted this idea to Cambodian needs, creating affordable, eco-friendly and easy-to-construct interlocking bricks from soil. This innovation offers a cheaper and more sustainable alternative to traditional house-building with red bricks.

## Innovation

The innovation covers bricks as a product and its use in home building. This required innovation both in the brick materials and the design of bricks. The raw material for MDH bricks is soil which is mixed with cement and compressed into bricks, which compares to red bricks being made from clay that requires firing at high temperature to produce bricks. The MDH process avoids clay extraction, which depletes the fertile agricultural land from which it is extracted, and an energy-intensive firing process. Instead, MDH bricks use soil and a small amount of cement. The brick design was then also changed to interlocking design, in which bricks interlock in manner similar to the well-known LEGO system, significantly reducing the need for mortar (sand plus cement) to build My Dream Houses.

The concept of compressed brick is not an innovation, and has already been used in building environmentally sustainable houses all over the world. My Dream Home, however, adapted the concept and original design from Germany by using soil, which is abundant in Cambodia, to make the bricks. The soil is mixed with approximately 10% cement and water, and this goes through a pressing machine. The resulting brick uses five times less sand and cement than red bricks for the bonding system, and is three times stronger than most clay bricks (reaching a compressive strength of 11 MPa, as measured by the Institute of Technology of

Cambodia). Additionally, using interlocking bricks in construction requires fewer stabilisers and less labour, which shortens project completion time.

It took My Dream Home over 2 years to test and customise the pressing machine, so as to attain the optimal strength and properties of the MDH bricks. The company also provides free training and technical support, enabling homeowners to build their own homes under the supervision of the company's experts, and this fosters self-reliance, skills development and cost savings.



## Circular Economy impact

MDH's use of non-arable topsoil for brick production aligns with the circular economy's circularity principle, by reusing a resource – soil – that is typically discarded and used for construction filling. Unlike traditional red clay bricks, which require firing – and in Cambodia, burning wood is most often used for this process – MDH bricks undergo compression manufacturing, which leaves a minimal carbon footprint.

These bricks also contribute to energy and resource efficiency. The excellent thermal properties of MDH bricks keep the interior of the house cooler, as reported by homeowners. They eliminate the need for plaster, reduce the requirement for supporting materials like wood or iron, and significantly reduce cement use – 20% for the combined production and construction processes.

From 2015 to the end of 2023, MDH produced 18 million interlocking bricks. Comparing CO<sub>2</sub> emissions from red clay bricks with MDH bricks using international industry data, it was estimated that MDH bricks generated up to 75% less CO<sub>2</sub> in production (depending on fuel use and kiln type used for brickmaking). Cement use during construction was reduced by one-third, resulting in a 33% reduction of CO<sub>2</sub> emissions from avoided cement use in the construction stage.

Furthering their commitment to circularity, MDH is now exploring the development of other affordable construction materials from waste, such as tiles from broken (beer) bottles and other glass waste. The company is working to secure the appropriate financing they require for these new projects.

## Business and market impact

My Dream Home had two business lines - selling eco-friendly bricks and building affordable houses targeting low-income people. Given the steep increases in land prices, the latter had to be suspended in 2019. MDH broke even on its brick production in 2016, and since, balances its social mission with financial sustainability, with the priority of keeping bricks affordable rather than maximizing profit. The 18 million bricks produced during 2015–2023 were enough to build some 1900 homes.

Operational costs are reduced through less-expensive materials (soil replaces sand and cement) and efficient distribution, without using wholesalers. MDH's reputation in Cambodia helps boost sales despite the competition. A key cost saving is in skilled labour, as the interlocking design is simple to put together, halving construction time and resulting in houses that are 15%–20% cheaper than other low-cost options. The price of the company's first houses was about USD 10,000 (in 2015), and despite the increase to almost USD 20,000 in 2019 in view of inflation and cost price increases for materials and land, the houses remain 15–20% less expensive (and they can be 40% less if built by the owners themselves), compared to a traditional red brick house.

My Dream Home is a family business and has scaled its operations prudently, without calling upon external investors. Looking ahead, MDH plans to diversify into high-end construction materials like decorative breeze blocks for higher market segments, and also to offer customisable options.



## Stakeholders

My Dream Home (MDH) has received significant support from stakeholders like Impact Hub, United Nations Development Programme (UNDP), OXFAM, UN Habitat, and Volunteers Building Cambodia, enhancing its local and international recognition. It was indeed an initial loan of USD 10,000 USD in 2015 from a children's development organization from The Netherlands that helped the founder to invest in the brick machine that kick-started this business.

Aside from its commercial activities, MDH wishes to continue to actively support underserved communities. In collaboration with Volunteer Building Cambodia (VBC), MDH has been providing its bricks at half price since October 2022 for 35 homes, in support of sustainable housing in Siem Reap.

My Dream Home has had a profound impact on poor communities, supplying bricks for 1900 homes for low-income families since its market entry, and fostering livelihoods in participating communities.

## Implementation

Launching MY DREAM HOME (MDH) presented significant challenges. Selling affordable housing to low-income groups was difficult due to high land prices and financing costs in Cambodia, where interest rates are high and repayment periods short. To reduce house prices, MDH eliminated intermediaries, which necessitated more efforts to showcase the homes, as well as to absorb costs up front. Buyer financing difficulties also added delays and the risk of defaulting on payments.

Despite being copied by competitors, MDH has built a strong reputation through exceptional service and social-impact recognition. Regulatory support from the government for green and inclusive businesses like MDH in housing projects could further enhance the growth of MDH. Although the environmental focus is valued, attracting investors aligned with MDH's vision has been challenging, particularly in the construction sector. These hurdles underscore the need for broader support and recognition of the social and environmental benefits offered by such sustainable business.



## Takeaways

MY DREAM HOME's vision was initially to provide affordable housing to low-income people, and the company has been able to successfully achieve this vision by improving their interlocking soil bricks over time, because soil is an inexpensive local material abundant in Cambodia. Their journey underscores the importance of adapting existing technologies to local contexts for sustainability of circular businesses.

MDH wishes to maintain its vision by keeping its core products affordable for the low-income family, and they are not looking to make high profits in this business segment. Instead, MDH aims to sustain its revenue by diversifying into other segments with higher profits. Aside from plastic, other materials like glass and seashells can be recycled for construction, illustrating the vast potential for innovation.

This business example can encourage other firms, innovators, and governments to explore unique avenues in circularity and sustainability, emphasising the need for appropriate and customised government incentives to support such initiatives. It also highlights the strategic choice to avoid direct competition in saturated markets, like plastic recycling in Cambodia, and instead to find unique niches for the circular economy.



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## Disclaimer

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