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DEVELOPING SUSTAINABLE AFFORDABLE HOUSING FOR SOUTH AFRICA USING INNOVATIVE TECHNOLOGIES

Lead partner: Dr Alireza Moghayedi, University of Cape Town, South Africa

THE PEOPLE

Dr Alireza Moghayedi, University of Cape Town (Present – University of the West of England, UK)

Professor Bankole Awuzie, Central University of Technology

Dr Temitope Omotayo, Leeds Beckett University

Manfred Braune, University of Cape Town

Paimaan Byron, National Home Builders Registration Council

Karen Le jeune, University of Cape Town

Mark Massyn, University of Cape Town

THE CHALLENGE

The housing backlog in South Africa is estimated at 2.3 million and is growing. Traditional approaches to tackling the housing crisis have led to mass urban sprawl, infrastructure problems, and lack of maintenance and repair.

This significantly impacts the lives of people within the community and specifically those in the lowest income groups, living in informal settlements and slums. Building better quality, sustainable and affordable housing is one solution to this challenge.

THE PROJECT

'Developing sustainable, affordable housing for South Africa using innovative technologies' aimed to help address the lack of knowledge on options for sustainable, innovative, and affordable housing (SIAH). The project uncovered a set of critical success factors and suitable technologies for the delivery of sustainable, affordable housing. The project also provided engineering students with access to the latest construction technology, improving education and providing new research ideas.

The project was coordinated by the University of Cape Town with the Central University of Technology, South Africa. The industry partner was the National Home Builders Registration Council (NHBRC) and the UK partner, Leeds Beckett University. Dr Temitope Omotayo, originally from Robert Gordon University (UK) and now Leeds Beckett University, is a knowledgeable researcher in the field of sustainable housing and was a key part of the team producing new evidence to advance built environment sustainability in South Africa. Close relationships were made with industry through the NHBRC in South Africa and through training delivered to housing designers, developers and building inspectors. The NHBRC contributed staff time to the project and provided access to datasets that allowed the project to work with real-time, rather than theoretical, data.

IMPACTS

A major outcome of this project was **tackling a significant national problem** of access to sustainable affordable housing for low-income communities in South Africa.

"The most significant impact is tackling a big national problem. We are very proud of the things we did … We are looking at a new school of thought on affordable housing … If I want to look at the community and the public impact, this is net zero, aligned with the 2050 target, this is significant."

Dr Alireza Moghayedi, lead partner

The project **designed and constructed the first affordable net zero house** in Pretoria. The team continues to work to develop a digital twin of the house, which will facilitate monitoring and enhance efficiency.[1] These outcomes support the 2030 and 2050 net zero targets in South Africa for buildings and housing as well as the sustainable development goals.

1 orbix360.com/jBaR6Ehsr

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The project has increased the **quality and relevance of research** and the body of knowledge on sustainable affordable housing solutions. The project team achieved a significant milestone by developing a model capable of evaluating the sustainability of housing projects.

The project has increased the **quality and relevance of education**. In total, the team supervised 12 postgraduate research projects and over 30 undergraduate research projects. The students have produced high-quality research dissertations and theses, and four students have received awards for their outstanding work.

The project has raised awareness and sensitised stakeholders to the **possibilities of sustainable housing**. The team successfully enhanced the knowledge of over 2,000 African experts and professionals, highlighting the critical role of innovation in improving sustainability in affordable housing. The project partnership with the NHBRC proved to be more impactful than originally envisaged as the NHBRC could provide real data on housing that could be used for the modelling.

"The project is (almost) finished and now (we) have to think about how we can push to net zero. The government is increasing the budge for subsidy housing by 25% … This solution – it is not just adequate, this is a resilient house."

Dr Alireza Moghayedi, lead partner

THE FUTURE

There are several plans underway for the future of the project, including collaborating with the South African government and housing sector to develop a roadmap for implementing and scaling up sustainable, innovative and affordable housing. The project team is engaged in the development of a SIAH (sustainable, innovative, and affordable housing) net zero emission model. The team's objective is to use local bio-materials in building this innovative and sustainable housing prototype.

Due to the research conducted on the TSP project the team is expanding the reach of its research by making the SIAH framework and sustainability assessment tools globally accessible. Creating a public digital platform will enable more stakeholders, including end-users, to evaluate the sustainability of houses and receive practical recommendations tailored to their local environment and conditions. Ultimately, this platform has the potential to enhance the sustainability and affordability of housing projects worldwide.

The project leader, Alireza, has now taken up a post in a university in the UK and has a number of reflections on the future for projects such as these. He believes there is often a tendency to reduce ambitions because of the limited funding periods of programmes. Some projects are hard to complete in a short time frame and need a long-term strategic plan. In this project however, Alireza believes there is the potential to receive additional funding from TSP and also funds such as Horizon Europe (which requires long-term post-funding plans to be included).

SOURCES

This impact case study was prepared using information from interviews with the project team, online resources and reports.

- Final report: 21 February 2023
- Progress report 1: 8 June 2021
- Progress report 2: 15 December 2021
- Progress report 3: 27 July 2022
- Interview with Alireza Moghayedi and correspondence
- Website https://siah-i.com/about/

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