Improved Construction System for Housing and Buildings Using Precast Concrete Elements

Submitted By: MEKI SA DE CV

Organization Profile

Organization Name: MEKI SA DE CV

Organization Type: Private sector

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Practice Details

Country(ies): Mexico

City(ies): Chihuahua, Mazatlan, Parral, Durango

Start Year: 1988 **Ongoing:** Yes **End Year:** N/A

Main Adequate Housing Components:



Housing Thematic Areas:

- Housing Affordability & Financing
- Housing & Climate Mitigation
- Technology & Digital Solutions in Housing

Relevant SDGs:



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Problem & Context

With over six decades of immersion in housing development and formal academic training in housing and urbanism, our organization has directly witnessed the structural shortcomings of public housing policies in Mexico. Despite the creation of national housing institutions (INFONAVIT, FOVISSSTE, FOVIMI) in the 1970s, these mechanisms failed to address the growing housing deficit—today surpassing 12.5 million homes—due to poor economic planning, limited scalability, and speculative financial models. Early projects, such as Unidad Independencia and Tlatelolco, offered glimpses of potential, but institutional efforts fell short in terms of technical, economic, and social dimensions. The securitization of housing portfolios since 2014 further deepened the crisis, leading to widespread home abandonment (1.5 million units). Our proposal addresses this critical, ongoing failure—emphasizing scalable, inclusive, and sustainable solutions for vulnerable populations.

Solution Developed

Our practice is based on a patented construction system (Patent No. 173768), the result of over 60 years of research in housing. Initially validated in 1988 with 16 homes in Chihuahua, the system won Mexico's National Award for Housing Technologies in 1993. It was selected out of 202 proposals and recognized by the President of the Republic. With support from FONHAPO, we implemented a system to rehabilitate 769 homes in Mazatlán, targeting an abandoned housing complex for vulnerable families who had previously been defrauded by informal actors.

The main objective was to provide dignified, affordable housing using a method that reduces costs by up to 50%, requires no specialized labor, and enables self-construction. The innovation integrates thermal insulation, seismic resistance, and fire protection into structural elements produced on-site—floors, walls, and roofs—which reduces emissions by ~3 tons of CO_2 per home annually. The embedded color and finish eliminate the need for paint, offering millions of aesthetic combinations. This solution is not only cost-effective and environmentally sound, but it is also scalable, inclusive, and ready for institutional programs.

Implementation

Our housing solution was implemented across several Mexican states, adapting to diverse funding models and challenges. In 1988, 16 homes were built in Chihuahua with support from the State Pension Fund. In 1994, FONHAPO commissioned us to rehabilitate 769 abandoned homes in Mazatlán after we won the National Social Housing Technologies Award. In Parral, we launched a private development offering 35% more space for the same market price, selling 250 units in one month, though the project was halted due to administrative mismanagement. In Durango, the state government invited us to develop 2,500 homes, but a national economic crisis limited the outcome to two prototypes.

The system's strength lies in its technical and financial innovation. Structural walls are 8–10× stronger than conventional block, and spherical shell roofs resist 25× more load than flat slabs. Thermal comfort is achieved through passive solar design and integrated insulation, resulting in a reduction of CO_2 emissions by 3–4 tons/year per unit. No finishing is required thanks to integral color concrete, allowing infinite aesthetic combinations with zero maintenance. Most importantly, the system reduces construction costs by 40–50% and requires no skilled labor, supporting mass affordability and environmental goals.

Financial backing came from public institutions (FONHAPO, state governments, and pension funds) and private capital (MEKI S.A. de C.V.), validating the model's scalability across sectors.

Enablers & Obstacles

Our leading enabler is a patented, award-winning construction system that integrates five innovations to significantly reduce costs, enhance energy efficiency, and improve seismic resistance. With support from FONHAPO, FOVI, and state governments, we successfully implemented housing solutions in Mazatlán, Chihuahua, and Parral. The system transforms construction logistics by manufacturing structural elements on-site, reducing transport costs and carbon emissions. However, we face structural policy obstacles: Mexico's housing institutions (INFONAVIT, FOVISSSTE) have long excluded the most vulnerable populations and prioritized speculative finance over social need. The absence of diversified national programs—contrasted with over 300 in the U.S.—limits innovation. Until housing is recognized as a multidimensional challenge requiring inclusive strategies and long-term planning, practical solutions will remain constrained.

Results & Impact

Our housing system delivered structural, thermal, and aesthetic benefits—at significantly reduced cost. Technically, homes are built with continuous footings to prevent uneven settlement, walls 12× stronger than traditional masonry, and vaulted concrete roofs up to 25× more resistant than flat slabs. These domed roofs provide superior thermal comfort by minimizing sun exposure and deflecting heat and cold, reducing energy use. White finishes and integrated insulation enhance performance and eliminate maintenance. Walls and decorative elements are molded with color and textures embedded on both sides, offering millions of design combinations.

Construction cost is reduced by 30–50%, and labor costs by up to 75%, making the solution accessible for low-income households. In Mazatlán, 769 families benefited, gaining durable, dignified homes with residential-quality finishes, zero maintenance, and potential for self-construction.

This approach empowers marginalized groups to build in community-led schemes, fostering economic autonomy and social cohesion. Environmentally, each 70 m² unit prevents an

estimated 3–4 tons of CO_2 annually. Long-term, the model supports resilient communities, greener construction, and inclusive urban growth.

Replication & Scale Up

After winning the National Award for Social Housing Technologies, I promoted the system across Mexico. However, the National Housing Developers' Chamber actively discouraged adoption. Local obstacles—political or private—also varied in each location. Despite this, I continue to improve the system, as described in Section 17. Projects in Durango were canceled due to the economic crisis; in Parral, Chihuahua, the initiative remained incomplete due to partner mismanagement.

The housing system is highly replicable and scalable. While it has not yet expanded due to local political, institutional, and market resistance—including from national housing developer chambers—its technical, economic, and social advantages remain strong. After winning the national housing technologies award, we promoted the system across Mexico. It is ideal for public, private, and community-led initiatives, especially for reducing informal settlements and enabling self-construction at low cost.

Policy Uptake

This housing practice is a new or innovative practice that is not yet adequately or fully integrated into formal policy frameworks.

Recommendations vary depending on the level of government involvement in each country. In some cases, support is purely financial, while in others, the government plays a more active role. For social groups, success depends on organizing and training members in financial management. When resources are managed directly by the beneficiaries, the process becomes significantly more efficient and empowers the community in a sustainable way.

Lessons & Takeaways

The key factors range from social and political to economic—always the main driver of housing production. I've worked within political systems and, as noted earlier, I believe current government schemes must be deeply restructured. The growing housing deficit shows their ineffectiveness. At the same time, we should empower social groups to develop their own strategies, such as collective savings, to support directed and self-built housing efforts.