Isaac Buzadzhi

Professor Sheppard

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Natural Building; An Assessment of Viability

Across the country, homes are getting bigger, flimsier, and harder to afford, and yet the dirt below our feet is still one of the oldest building materials on Earth. Clay, sand, straw, and other natural materials can make walls that last for generations and stay cool during the summer. Still, natural building has barely made a dent in the housing crisis. The problem is bigger than people not knowing about it. Natural building is still treated like a custom experiment while the rest of construction acts like a system. Builders know how much lumber to order. Inspectors know what to check. Banks know how to value the finished house. A natural home usually starts over every time. It needs a new design, a new builder, and another argument with the permit office. A custom home can prove that earth works. It cannot prove that a contractor can build one hundred of them and make money. Natural building will not solve the housing crisis until it becomes a tested, repeatable, and code-ready system that contractors can build for profit.

The current building system did not become standardized for no reason. Thousands of people have to work together to produce one house. The architect draws it. The supplier ships the materials. The crew builds it. The inspector checks it. The bank finances it. Everyone has to agree on what the house is and how it should work. Wood studs come in known sizes. Nails and screws have ratings. Wall assemblies have already been tested. That sameness removes some of the guessing. It also creates a culture where anything outside the system looks unsafe or primitive. Sarfo Mensah and Samuel Laryea interviewed builders in Ghana and found that many people viewed local building materials as weaker or less durable than imported materials. Foreign materials were assumed to be better, even when that assumption was not based on real performance (Mensah and Laryea). Once concrete, steel, and wood control the market, they start looking like the only serious options. Natural building does not need the system to keep making exceptions. It needs standards of its own.

Compressed earth blocks give natural building a real path toward that. A compressed earth block, or CEB, is made by mixing soil with water and sometimes a stabilizer. The mixture is then pressed inside a machine. The blocks come out at a set size and can be cured, stored, tested, and stacked like other masonry. That is much easier to scale than shaping every wall by hand. Philbert Nshimiyimana and his coauthors tested blocks made with calcium carbide residue and rice husk ash. The unstabilized blocks had a dry compressive strength of about 159 psi. Adding enough calcium carbide residue raised that strength to about 623 psi. A mixture that also used rice husk ash reached 1015 psi. The stabilized blocks also had better thermal performance than the unstabilized blocks (Nshimiyimana et al. 1). Those numbers matter. They show that earth is not one random material. The soil mixture can be changed, pressed, and tested until it meets a target. That starts turning dirt into a product.

Cost matters just as much as strength. Contractors and developers may like sustainable materials, but they still have to make money. Mansoure Dormohamadi, Reza Rahimnia, and Victor Bunster compared twenty-two different wall systems. The study included adobe, rammed earth, compressed earth block, fired brick, and concrete masonry. The researchers looked at cost and environmental impact. They found that unstabilized earthen walls had much lower environmental impacts than the conventional wall systems. They also explained that CEB units can be industrialized, which means they can be produced with machines instead of being made differently on every project (Dormohamadi et al. 362). Their research also found that transportation can become a major part of the wall's environmental impact. If heavy earth blocks have to travel hundreds of miles, part of the advantage disappears. That means the production yard, soil source, machine, workers, and delivery distance all have to work together. Cheap dirt alone does not create cheap housing. The full system does.

This is where most natural building projects fall apart. There are some unicorns in the industry. They are beautiful earth homes designed by highly esteemed architects, and some of them sell for millions of dollars. They prove that natural materials can look good and last. They do not prove that natural building can solve affordable housing. These houses usually need special clients, special builders, custom engineering, and more said patience with the permit office. The builder may spend months learning how to complete one project and then never build the same house again. There is no rhythm. There is no repetition. Contractors cannot build a large business if every job starts at zero. They need to know how many blocks a crane can place in one hour. They need to know how long the blocks cure. They need standard door openings, roof connections, foundations, and moisture protection. A custom earth home proves possibility. A repeatable earth home proves a market.

The construction industry can learn from manufacturing. Factories do not redesign a product every time someone buys one. They build the same core product and slowly improve it. McKinsey reports that modular construction has shortened some construction schedules by twenty to fifty percent. It also estimates that companies can cut construction costs by more than twenty percent when they gain enough experience and scale (Bertram et al.). Those numbers come from modular construction, not compressed earth block, so they are not a guarantee. The basic idea still applies. Repetition makes crews faster. It reduces mistakes. It makes costs easier to predict. A CEB system could have a single megablock size, a tested soil mixture that gets made offsite and is trucked and pressed onsite of the construction area, a simple standardized foundation plan, plug and play electrical, plumbing, and hvac systems, and basic connections that stay the same on every house. The first few homes may be slow. The crew learns. The plans improve. By the tenth house, nobody should be figuring out basic details anymore.

Standardization would also make building codes easier to deal with. The permit office does not want to guess if a wall is safe. An inspector needs something clear to check. Straw bale construction gives an example of what this can look like. Appendix BJ of the 2024 *International Residential Code* gives actual requirements for straw bale walls. It limits where the basic rules apply and requires more engineering outside those limits. It does not tell inspectors to blindly trust straw. It gives them rules (International Code Council). CEB construction needs the same path. A builder should be able to bring in test results, engineering details, moisture protection plans, and a clear inspection checklist. The conversation would stop being, “Do you think dirt walls are safe?” It would become, “Does this wall meet the written standard?” That is a much easier question to answer.

The same problem continues with banks, insurance companies, and appraisers. Most homes are valued using comparable sales, or comps. If similar houses nearby sold for a certain price, the appraiser has evidence for the value. Natural homes usually do not have many comps. There may only be one earth home in the whole county. The bank cannot easily tell what it will sell for later, so the house looks risky. That forces many natural builders or homeowners to pay with cash. Then the homes stay small and rare, which means the comps still do not exist. It is a loop. Repeatable developments could start breaking it. If twenty similar CEB homes were built, sold, insured, and tracked, lenders would finally have real numbers. They could see construction costs, repair costs, energy use, and resale value. Repetition creates data. Data lowers risk.

Natural building still has real weaknesses. Water can destroy an unstabilized earth block. Soil changes between locations. Some stabilizers add cost and carbon. Thick walls take up more space. Machines cost money before they produce one usable block. Nshimiyimana and his coauthors found that the unstabilized blocks broke down when they were placed in water. The stabilized blocks performed much better, but the researchers still called for more testing on water absorption, erosion, and long-term durability (Nshimiyimana et al. 14). This is where some natural building advocates lose people. They act like natural means are automatically safe and cheap. It does not. A bad earth wall can fail just like a bad wood wall can fail. Those problems are not reasons to throw the idea away. They show what needs to be tested.

This is also where investors could actually make a difference. Funding another custom showcase home will create another nice picture. Funding a complete system could create something the market can use. The money should go toward soil testing, block machines, standard wall designs, engineering, weather testing, and a small pilot development. Build ten nearly identical houses. Track every hour of labor. Track every broken block. Track energy use, repairs, moisture, inspections, and resale value. The mistakes will show up quickly. Then the system can be fixed. That is how every serious industry grows. It tests something, records the failure, and builds the next version better.

Housing has become too expensive for millions of people. Harvard's Joint Center for Housing Studies reported that the median price of a new single-family home was around $417,000 in 2025. It also found that almost half of renter households were spending too much of their income on housing (Joint Center). A few custom earth homes will not touch a problem that large. Natural building has to compete inside the real housing industry. It has to pass inspections, survive rain, produce clean estimates, get financed, and leave profit for the contractor. The materials are already here. The research is already moving. What is missing is a complete system. The next step is not another one-of-a-kind house. It is one tested house built again and again. Natural building will matter when the tenth house is faster, cheaper, and easier to finance than the first.

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