Modular Construction, A Housing Affordability Game-Changer?

Based on the original article by Erica Barnett

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OVERVIEW

This research article by Erica Barnett analyzes different approaches to constructing modular housing and the benefits each process brings in its potential affordability.

Specifically, the work of firms Katerra, Blokable, and OneBuild are examined. All three organizations move the construction that typically occurs on building sites onto the factory floor, with the purpose of constructing multifamily homes in half the time and with half the cost.

The single largest determinant of the selling and rental price of any house is the cost of physical construction – the cheaper it is to build the house, the cheaper it will be to sell and rent it.

A solution that is able to improve the affordability of construction would help control rising rents in an era of housing shortages. If these modular housing firms can accomplish their desired outcome of affordable and effecient construction, their work could become a game-changer in the housing industry.

Prototypes on Blokable's factory floor

ANALYSIS OF AFFORDABILITY

The idea that modular housing built in factories can be used to revolutionize the construction industry is a new one. The affordability gains nested in this idea could apply especially to apartments and condos, where the productivity in the building process has barely increased since 1945 according to McKinsey Global Institute.

To understand the high costs of constructing most multifamily homes, it helps to understand the standard process. At the center is the developer, a businessperson responsible for all the moving parts of the project. They shepherd the deal through all relevant interests, such as securing funds from various organizations (banks, investors, etc.), ensuring all regulations are met, and hiring professionals to design and construct the building.

Expenses rise when the developer selects a general contractor, who hires subcontractors, who often hire their own sub-subcontractors, and so forth. The contractors at the bottom the chain conduct the bulk of the actual work, with each layer of subcontractor taking on some of the risk of the construction project while increasing expenses.

Modular housing is designed to minimize the layers of contractors, putting most or all of the construction process under the control of one organization. It also standardizes as much of the process as it can, making home construction much more like a modern, automated clothing factory and less like a tailor shop where each piece is made by hand to custom specifications.

A modular company like Katerra builds prefabricated components that can be quickly assembled on the building site, while Blokable manufactures entire apartments that just need to be stacked on the site like Legos. But all share

one common value in their mission statement, to eliminate some of the players and processes that make traditional housing expensive, allowing them to build more housing faster and for less.

In a growing city's housing market, home-builders will typically pause future development when the supply of new homes decreases rent to a point where it's no longer profitable to build.

When development costs can be cut, however, it will be easier for developers to remain profitable at a lower rent, pushing that 'no-build' tipping point down and resulting in a greater supply in housing and more affordable rent.

The same reduction in construction costs could also enable non-profit developers to move projects forward with less public subsidy, resulting in the same greater supply of subsidized affordable housing and cheaper rent.

KATERRA AND BLOKABLE EXPLAINED

Katerra: the components-to-site approach

Based in Menlo Park, CA, Katerra was founded on the idea that vertical integration is the best way to cut costs and eliminate unwanted and expensive surprises during design and construction.

Katerra's components-to-site method can best be thought of as 'the Ikea model'. Like buying furniture from Ikea and assembling it at home, sets of pre-built components can be purchased from Katerra and assembled on site.

Among the main components Katerra will manufacture are panels made of cross-laminated timber (CLT). Katerra plans on being able to build CLT panels to order and snap them together on site, like flat-pack Ikea furniture panels that can be fitted together in different configurations. This approach will allow for what the company calls "mass customization", using a predetermined, but customizable kit of parts. Developers can specify features like the size, configuration, and finishes of the units, and Katerra will build semi-custom components to order.

Katerra's cross-laminated timber factory.

As of the publish date of this article (August 2018), Katerra has $1.3 billion in outstanding orders for new construction projects, with a few in development pending completion.

Blokable: the stack-on-site approach

Blokable's stated purpose is to "make a dent in the housing problem", with the focus being on subsidized affordable housing. The company says it can build at prices substantially lower than the $300,000 per unit that is often cited as the average cost of affordable housing construction in Seattle.

If Katerra is like Ikea, then Blokable is like Lego. Fabricated in Vancouver, WA, Blokable manufactures steel-framed stackable apartments, standardized to be 35 feet by 9 feet on the outside with 260 square feet inside. This prefabricated and uniform approach makes it easy for the company to transport them to a site, stack them, and connect them to electrical and water grids.

Unlike Katerra, which produces customized buildings composed of a standardized kit of parts manufactured off-site, Blokable replicates largely identical units in its factory and pops the completed units into place on-site. The resulting homes are much cheaper than traditional apartments—expected to be, "$125,000 a door instead of $300,000 or $350,000".

As of the publish date of this article (August 2018), a demonstration unit on land donated by the Edmonds Lutheran Church in a suburb near Seattle has been set up for interested visitors. The unit is part of a planned "village" of up to 70 affordable apartments Blokable plans on building over the next two years in collaboration with a nonprofit housing provider. A second project in Auburn, WA, will include a dozen studio and one-bedroom units for people graduating from programs at Valley Cities Behavioral Health and would otherwise be risk of experiencing homelessness.

OneBuild's 'N' Habitat seven-story mixed-use development

ONEBUILD'S CHALLENGES AND SUCCESS

OneBuild serves as a both proof of concept for the modular housing theory and as a testament to its remaining challenges. With half a dozen market-rate and affordable modular apartment buildings across Washington, including a seven-story 49-unit stack of modules erected during two weekend road closures, OneBuild proves modular apartment building can work. However, a recent experience of OneBuild's shows that the innovative homebuilding landscape remains a tricky business.

To lower costs below prior projects, OneBuild began building its modular apartments in China, framed in steel instead of wood. It launched a pilot project in south Seattle built to house 13 homeless families in steel units. The project, however, never got built.

OneBuild founder Dale Sperling pointed towards overreaching inspectors forcing expensive changes, citing, "One code hurdle after another." Seattle officials say Sperling's plans simply violated their rules. Overseas (and even out-of-state) modular construction can lead to permitting problems when units don't conform with local regulatory requirements, such as minimum water heater sizes, fire and safety standards, and environmental requirements.

There are other political considerations to consider as well. Seattle City Council member Sally Bagshaw told Sperling upon one of their initial meetings, "'I love the concept, I love what you're doing, I've seen it done in other cities, but I can't support you if you're building in China. We need to be building them here.'" As the Pacific Northwest faces a housing shortage of epic proportions, concerns about the origin of modular units could be another roadblock to building the tens of thousands of affordable units the region needs.

Despite these setbacks, not all is lost. OneBuild is proceeding with its Chinese steel modules for a planned 56-unit development in Bremerton, Washington, called InHabit Burwell. A spokeswoman with the city of Bremerton's planning department says the project has received its site development permit and should be getting its building permit in the next few weeks.

CAN MODULAR HOUSING DELIVER?

Straight from the horse's mouth, the author concludes:

"The modular promise is big: cutting construction costs in half would be a game-changer for housing affordability in booming cities throughout North America. The acceleration of home-building it would catalyze would pull down rents and prices, benefiting all residents who buy or rent market-rate homes. And it would be a major boost to non-profit affordable housing developers as well, helping them get more out of limited public funds to create more subsidized homes for people who can't afford what the market can provide.

Moving most of the home manufacturing process to remote factory sites outside of expensive cities also has the potential to fix the wicked problem of construction workers not being able to afford to live where they work, which squeezes the availability of labor, which raises construction costs, which in turn makes those cities even less affordable to workers. The full potential for modular home construction is massive, so it's worth keeping an eye on pioneers like Katerra, Blokable, and OneBuild."

WHAT H4H LEARNED

The author paints an optimistic picture of modular housing's potential. The advantage modular housing holds over traditional construction in cutting unnecessary layers out of the equation is a strong point. Henry Ford's assembly line for manufacturing cars was challenging and difficult to figure out, but resulted in the ability to mass-produce automobiles at a lower price. An apt analogy can be made with modular housing.

Understanding the differences between Katerra's and Blokable's Ikea vs Lego approach is also extremely helpful as Homes 4 the Homeless continues to explore the most effective and efficient modular housing solutions.

Lastly, the challenges OneBuild faced with their permitting issues, along with the example of their successes serves as useful instruction for our organization moving forwards.

Homes 4 the Homeless Modular Housing Prototype