Background

The increase in current demand for residential housing, coupled with the changing prices of conventional building materials, presents a growth opportunity for alternative building materials and methods. The CP Block, a new building block made of highly compressed rice straw, is currently being developed as a substitute for conventional wood frame and cinder block construction. Rice straw is an agricultural byproduct that has historically been treated as a waste in California’s Sacramento Valley. With over 1.2 million tons of rice straw generated every year, the CP Block provides benefits to both homebuyers and society. Improved indoor air quality and lower energy costs are examples of private benefits. Decreased energy consumption and reduced amounts of harvested lumber are just two of its public, or environmental, benefits.

THE CP BLOCK
- 24”L x 12”W x 12”H
- Made of compressed rice straw
- Highly insulating
- Above average soundproofing
- Resistant to fire and pests
- No chemical off-gassing
- Reduces agricultural waste

CONSTRUCTING A WALL
- Similar to cinderblock construction
- Blocks are stacked and reinforced with steel rods (rebar)
- 2 x 6 framing lumber is used for the header at the top of the wall and the floor plate to anchor the wall’s base to the concrete foundation
- Drywall is used for the interior wall
- Various materials can be used for exterior walls, including plaster, vinyl siding, plywood, etc.

Problem Statement

The CP Block is an innovative and experimental product. Oryzatech, Inc. plans to introduce the product to the green building and mainstream construction markets as a substitute for conventional wood frame and cinder block construction. In response, our project investigates:
- The amount homebuyers are willing to pay for a CP Block home compared to a wood frame home
- Whether or not homebuyers value the environmental benefits associated with the CP Block
- The “straw effect” – whether homebuyers are deterred by building with straw
- Characteristics of consumers more likely to choose a CP Block home
- How builders rate the potential performance of the CP Block
- Whether or not the industry professionals would be willing to build CP Block homes
- Where the prime geographic markets for the CP Block are located

Approach

CONSUMER DEMAND

We used a contingent valuation survey to estimate the consumer demand for a CP Block home. Survey respondents were asked to choose between a conventional wood frame home and a CP Block home. The survey had multiple variations:

- Estimate the percentage of new homebuyers that would choose the CP Block home over a conventional home across a range of prices
- Rate the factors that consumers would consider important when deciding between the conventional house and the CP Block home
- Rate the potential performance of the CP Block
- Decide whether or not they would be willing to build CP Block homes

INDUSTRY ASSESSMENT

Although consumer demand is important, homebuilders typically do not build the homes they live in; they usually purchase a home already built. We asked industry professionals to:
- Promote private and environmental benefits to consumers
- Minimize use of the term “straw” in marketing
- Demonstrate ease of construction and consumer demand to builders
- Target first-time homebuyers and hotspots in the Southwestern U.S.

Results

CONSUMER DEMAND

1,024 respondents participated in our nationwide consumer survey.

- If the price of the CP Block house increases by $1,000, the percentage of buyers decreases by 1.2%

Results from survey variations:

- When the environmental benefits of the CP Block house are described, the percentage of buyers increases by 7.3%
- When the CP Block is identified as straw, the percentage of buyers decreases by 10%
- $1,000, the proportion of estimated buyers decreases 1.3%

Demographic results:

- Respondents that do not currently own a home are 10% more likely to purchase the CP Block home

INDUSTRY ASSESSMENT

74 respondents participated in our nationwide industry survey; however, the sample was small and non-random. Results of the industry assessment are not to be used as a statistical predictor, but rather as a preliminary evaluation of the CP Block’s performance.

- Ease of construction
- Consumer demand

GEOGRAPHIC MARKET

We utilized county demographic and housing starts data from the US Census and our logit model to project the number of CP Block houses sold per square mile by counties in the Southwest region of the United States. Data on rice agriculture in CA was incorporated to compare the hotspots to rice straw supplies to density of CP projected home for production convenience.

Predicted density of CP Block homes purchased in the Southwestern United States

Recommendations to Oryzatech, Inc.

- Promote private and environmental benefits to consumers
- Minimize use of the term “straw” in marketing
- Demonstrate ease of construction and consumer demand to builders
- Target first-time homebuyers and hotspots in the Southwestern U.S.