Concrete – Innovation approach for developing sustainable solutions for BoP customers

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Ambition & Opportunities

ONE AMBITION

BUILDING BETTER CITIES

The cities of the 21st century will see a rapid increase in their population. Urbanization is the challenge of our century. This situation means meeting new issues: improving the living conditions of city-dwellers, making sure they have access to decent housing as well as to energy and raw materials without depleting resources.

Ambition & Opportunities

INNOVATION SERVES OUR AMBITION OF "BUILDING BETTER CITIES".

We support through innovation the development of cities and contribute with solutions which play their part in providing cities with more housing, making them more compact, more durable, more beautiful and better connected.

GIVING CITIES MORE HOUSING
by providing affordable housing

MAKING CITIES MORE COMPACT
by helping build taller buildings to limit urban sprawl

MAKING CITIES MORE DURABLE
so that buildings resist both the passage of time and natural disasters, and protect the environment

MAKING CITIES BETTER CONNECTED
through roads, bridges and tunnels that improve traffic flows on journeys

MAKING CITIES MORE BEAUTIFUL
by encouraging architectural creativity

Self-built neighborhoods in cities

- Close to **100 Mn** people live in self built informal neighbourhoods in urban India.
- Housing needs of **20 Mn** units in such neighbourhoods.
- Efficient in some ways by making use of recovered materials but inefficient application making homes **less durable and sustainable**
- A decent strong roof is still an aspiration for many
- But access to **good quality** construction materials?

Current Practice and issues

- **Shacks made of corrugated metal or other recovered materials**
- **Even if concrete is used – its done on-site with poor control of the process leading to poor quality and less durable structures with cracks and voids**
- **Huge wastages**
- **A serious challenge to manage inventory and on-site mixing process**
- **Adding to the chaos and congestion**

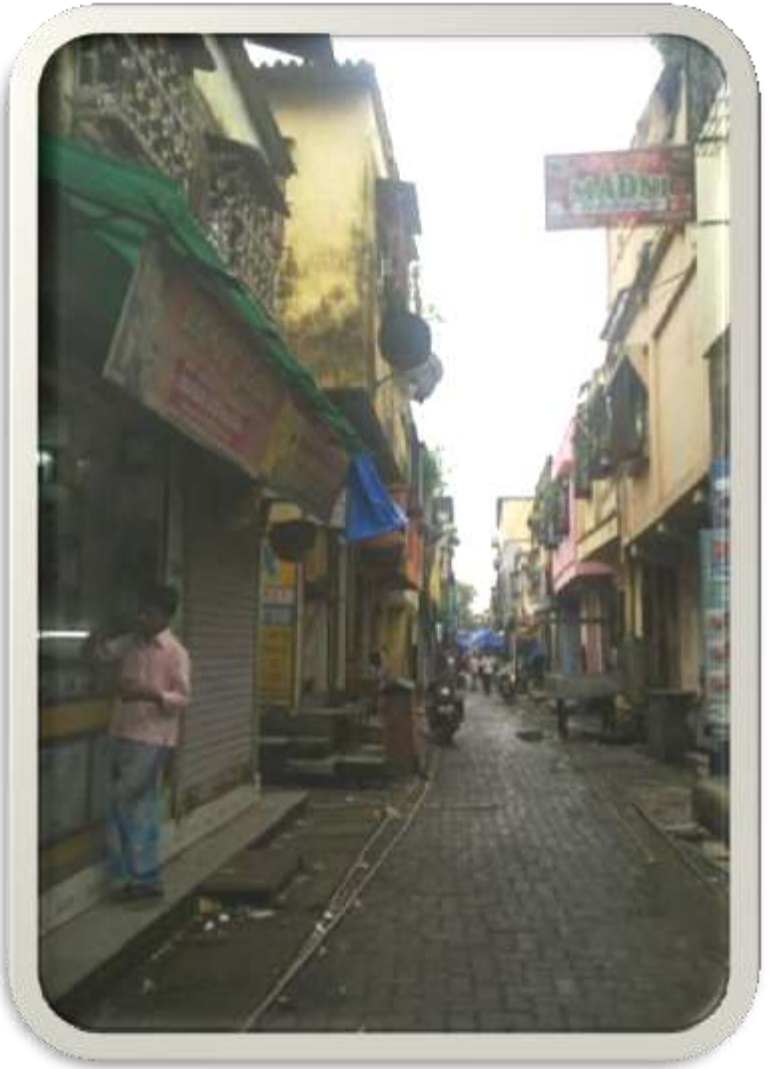
Concrete is an obvious solution.....

Ready mixed concrete has emerged as a major choice for quality construction

Its available for most segments of users in cities

People building homes in the dense neighborhoods also aspire for RMC but…

- how could we deliver concrete in the narrow alleyways where there is no room for concrete trucks to pass?
- even if trucks could access, cost to serve small requirement was high
- discharge time was too long
- ready mixers shy away and say these jobsites are too small & costly to serve



Mission

~ Providing access to high quality concrete and mortar to people who cannot be served affordably through commercial RMX

~ Bringing sophistication to their construction activity

Challenges

TECHNICAL (& DELIVERY)

~ How can we deliver high quality concrete with a long retention of fresh properties while not compromising on hardened and set properties

~ How do we deliver in small units

BUSINESS MODEL

How can we create a sustainable business model?

How do we make it affordable for this segment of consumer

Nice to be doing good (for the BoP) but focus also has to be doing good business

How did it begin…

- With a **bucket concept** in 2012
- Truck mixers deliver bulk ready-mixed concrete to the nearest accessible point in a neighborhood
- Concrete was discharged on floor and filled in **15 ltr buckets**
- Buckets transported in **cycle rickshaws** to the place of pour
- **Slow-setting** concrete

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Lessons……

- **Concept had drawbacks & learnings :**
  - Buckets were **expensive**
  - Handling and **ergonomics not convenient**
  - Users wanted normal setting not Slow Setting
  - Could not fully address truck-mixer accessibility

- **An alternate idea was to deliver in Bags**
  - Transported in mini trucks
  - Bags have closer connect (cement exp.)
  - Masons used to bag handling (cement exp.)
  - Reduced cost

New Model

Production

Network of mini-batching plants
+
Manual bagging

Packaging

30 Kg bags

Delivery

Dedicated /Outsourced fleet of small vans/ trucks

Sales

Sold on per bag basis

Customers

IHB in congested neighbourhoods

Product development & field testing

Segregation and retention were major challenges

No agitation happens as in case of truck mixer deliveries

Ability to retain fresh properties while being transported on flat bed trucks

Various trials on product and effects of delivery on behavior of concrete

Performance Specs

Flow of 350 – 450 mm3
(to get the best performance even if compaction is inefficient on site)

Retention : Customized from 4 to10 hrs.
(to give flexibility for delivery to different sites)

2 hour window for placing & finishing

Segregation : No segregation at all

Grades M20 to M60

Bags to be leak-proof and robust

Pilot project Key learnings - Market

A pilot in Mumbai in 2 localities – Dharavi & Shivajinagar

- **Demand exists** for quality products in small segment and this solution has **potential to be disruptive** challenging deeply ingrained mind-sets in construction
- Customers willing to pay **premium** over the site mix cost for the value they get – Not perceived as a cheap product/solution
- A key learning was also on customers expectation on promised **weight of bag**
- Need for a **sales team** with local flair & different skill-set and a distribution channel to increase penetration
- Contrary to general belief, there is demand for **Value added concrete** in this segment

Key learnings - Operations

- **Manual bagging is slow** - Max. 600 bags/ day(approx. ~8 cu.m per day, 200 cu.m p.m).
- **High Bagging costs**
- Mix cost is still high due to certain admixtures
- Delivery cost is still high **– Long turnaround time**
- *With volume capped, the production costs (land rent, operating team, energy, security) attached with mini plant, make the* ***mini plant model unsustainable***

Improved Model

Production

Leverage current **RMX plant network** + **PLC controlled** bagging units

Packaging

35 Kg bag (3 times of reuse)

Delivery

Dedicated /Outsourced fleet of small vans/ trucks

Sales

Sold on per bag basis **Dedicated sales force and leverage existing channels**

Customers

IHB in congested Neighbourhoods **Small applications in large job sites**

Bagging Unit & Bag

- Developed an in house bagging unit
- Load cells connected to PLC
- Takes approx. 40 min to Bag 1 m3
- Tyre-mounted – Positioned under the batching plant Mixer
- Flexible to be moved between plants

What did this refined model do….

For the customer….

- Now gets the exact quantity
- He can order with short notice and gets delivered wherever in the catchment area within few hours
- Can order as low as 35 bags
- Larger construction sites can use this solution for small applications like columns, beams….

For us it reduced the break-even volume by half

- Wider range of applications
- Leveraging existing facilities reduced cost
- Emerged as a sustainable model that can be scaled up

Value for the customer

- Receives same **quality of concrete** that goes into **world class buildings** and meets the design specifications at an **affordable price**
- **Small applications** can be served with good quality ready mixed material
- Can construct additional floor on a concrete slab and make his home more **spacious, comfortable**
- More durable house that has **no leakages** from roof
- **Faster**, hassle free construction
- Huge reduction in **wastage**
- No need for **storage space** management
- **Technical support** on construction

Next Stages

Value-addition

- Mortars for plasters and brick-laying can be delivered on the basis of this model
- Customers in this segment can have access to a range of value-added concrete
- Improve quality of other materials like bricks

Services

- Engaging with key stakeholders of the eco-system to improve construction systems by
  - providing access to quality tools required for construction at these small sites.
  - developing efficient systems that can help faster construction of small houses. (E.g. wall systems, formwork …….)

Annexure

Bagging Unit

Jobsite

Thank You

A seemingly simple solution yet……