Researching to deliver appropriate International Development

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Centre for Sustainable Development, Department of Engineering
Presentation contents

1. Introduction
2. Development & Engineering for International Development
3. From theory to practice, examples from India
4. Lessons learned
5. My current research : urban development in Kenya
6. Final thoughts
Introduction

• PhD research student investigating the sustainability of approaches to slum upgrading through stakeholder perception
• NGO - Shelter Associates, Pune, India
• Sustainability & Engineering consultancy
• UN-HABITAT, UN-DESA Internships
• MPhil Engineering for Sustainable Development
• MEng Architecture and Environmental Design
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United Nations Millennium Development Goals

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Global partnership for development
Past civil engineering achievements

Bazalgette’s sewers in 19th century London
21st Century India

19th Century London
Infrastructure $\rightarrow$ development

- Positive impact of globalisation
- Sharing skills, knowledge, resources
- Relieving poverty

Engineers today can share their expertise globally to achieve MDGs in developing countries

Engineering can address basic lack of infrastructure and basic services which exacerbate poverty
What is ‘Development’?

- Assumed to be positive
- Imposes western view

For sustainability:
- Appropriate
- Not a demonstration project
- Affordable
- Reproducible
- Maintainable
- Culturally sensitive
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Theory to Practice

- The foreign engineer has a valuable opportunity
- Difficult to design for a climate, culture and situation that is foreign to us
  - More harm than good?

Some examples....
Examples of theory in practice

- Award winning school building in Ladakh, Northern India
- Funding raised by UK based charity
- Aim to be ‘a model for appropriate modernisation’
- Designed by UK based engineering consultants, pro bono
Building strategy

- Aimed to be an entirely sustainable project with a self-regulating system of water, energy and waste management.

- Innovative and modern building technologies and design strategies were developed by UK based engineers.

- The contemporary technologies incorporated were conceived to operate a technical building in the harsh climate.

- The design and technology sought to offer a solution.

- Professional expertise and skills from the UK were shared for free on the school project.
The reality... Irregular Power Supply

- Despite design to be self-sufficient building
- Despite having won award for ‘Green Building’
- No reliable power supply
- Solar system has technical fault
- Generator using costly diesel
Trombe Walls

- French design
- Ladakhi’s leave all doors and windows open
- Users do not have time to manage
- Furniture block vents
HOW TO USE THE SOLAR WALL

SUMMER DAY
- Upper window open for ventilation
- Outer window open
- Inner window open
- Damper closed (all summer)

WINTER DAY
- Damper open (all day when sun is shining; close 12 hours after sun is gone)
- Windows closed
- Damper open (as above)

SUMMER NIGHT
- Outer window open all summer
- Middle windows open or closed, depending on weather!
- Damper closed (all summer)

WINTER NIGHT
- Damper closed (as soon as sun goes down)
- Window + shutter closed at night
- All windows and shutters are closed
- Damper closed (as soon as sun goes down)
- Wall is warm and heats up the room!
Trombe walls

- Users do not understand how to operate
- Technical language
- Operation & Maintenance instructions limited

...... Good in theory, but not in practice
Solar Ventilated Pit Latrines

- Based on traditional design – more acceptable
- Integrated solar driven flue to exhaust fumes – clever simple design
- Composting toilets – provides fertiliser
- Repeatable design

http://tilz.tearfund.org
Solar Ventilated Pit Latrines

But...

- Children scared to use toilet
- Fear of falling down hole
- Normal practice is to use corner not centre of cubicle
- Mothers normally clear up from sawdust
- → Extra cleaning needed, too much water mixing with waste, compost is too wet and not decomposing effectively
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Why did this happen? .... Lessons learned

- Local resources unable to operate and maintain the building design
- Lack of awareness → Ongoing training, O&M
- Cultural awareness → Collaboration with local designers
- Inappropriate design → Pilot and test
- Ignorance → Preparatory research
- Lack of resources → Responsibility to provide O&Ms, volunteer time
A sustainable development?

- Individuals’ good intentions
- Personal experience
- Good for the engineering consultancy
- Modernised education

Considerations.....

Financially reliant on foreign funding

Unique, therefore not a repeatable ‘model’

Undermining state education

Political and community impact

‘Hungry parrot in a golden cage’
Valuable Opportunity

• There is a fantastic opportunity for engineers to contribute
• But must be appropriate
• Work with the local community/local partner
• Ensure handover/community ownership
• Share knowledge and skills
• Build local capacity
• Cultural sensitivity is vital
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My Research

- An investigation of the sustainability of slum upgrading approaches through stakeholder perception
- To understand alternative delivery models for sustainable development in urban informal settlements
- To find appropriate delivery models
- How partnerships can best be forged to share resources and expertise
- The real needs, aims and priorities of a development project
Case study selection

- Completed examples (of different ages, approaches and contexts) of what are deemed to be current best practice slum upgrading projects (water and sanitation infrastructure and services – integrated with livelihoods generation) and which demonstrate alternative approaches.

Kenya

- KENSUP WatSan (‘top down’)
- Rotary club/Practical Action WatSan (‘bottom up’)

Soweto East Case Study

Kenya Slum Upgrading Programme KENSUP WatSan

Key Stakeholders:

• Government ministries / KENSUP
• UN-HABITAT – Donor and advisor
• Maji na ufanisi - NGO
• Settlement Executive Committee - Community
• Managing CBOs
Silanga Case Study

Integrated Community Upgrading - SILANGA

Rotary Club - Donor

Practical Action – NGO

Nairobi Water and Sewerage Company – Utility provider

Athi Water Services Board

World Bank, Water and Sanitation Programme – Monitoring & Evaluation

Community Umbrella Group

CBOs
Data collection

- Stakeholder interviews
  - Implementing partners and end-users
- One-on-one interviews
  - Men, women, youths, children, structure owners, tenants, facility managers
- Group discussions
- Perception gathering
  - Drawings, music, writing,
Interviews

- 40 Kibera resident interviews
- 4 group discussions
- 12 stakeholder interviews
- Other conversations

Other data collection:
- Articles
- Maps
- Documents
- Drawings
- Songs
Well-being

CAUSES
- Electricity
- Well piped system
- Water tanks
- Clean water
- Food
- Church
- Hospitals
- Resource centre
- Schools
- Houses
- Drainage
- Roads
- Toilets
- Communications/telephone
- Information flow

IMPACTS
- Jon opportunities
- Capital/Money
- Good life
- Security
- Walk without fear
- Good quality education
- Jobs
- More informed
- Less disease
- Improved health
- Stay long

(Soweto East Group Discussion)
Well-being

CAUSES
- Affordable Shelter (3)
- Electricity (6)
- Clean water (1)
- Infrastructure/roads/transport (5)
- Health facilities (1)
- Sanitation (2)
- School (training school) (4)
- Clean environment

IMPACTS
- Lower poverty level
- Healthier
- Less disease
- Less crime
- Less poverty
- Booming business / improved access
- Good transportation / communication
- People being treated well (respect)
- Healthy society
- Society
- Self-reliance

Prevents disease outbreak / improve health

Empowered community

Ideas / less crime / able to work

(Silanga Group Discussion)
Key:

- Strong relationship
- Medium relationship
- Weak relationship
- Small importance
- Medium importance
- High importance

Arrow indicates direction of relationship
Distance from centre indicates degree of accessibility
Numbering indicates ranking in order of importance, (1) = most important
Overlapping indicates influential relationship

N.B.

'Well-wishers' were missed from the numbering of most important.

(Silanga Group Discussion)
Water and Sanitation Blocks

CAUSES

- To prevent diseases caused by flying toilets
- To use the space (land) for communal benefit
- Need to improve pit-latrine facilities
- Site needed to be cleaned/ upgraded
- For access to clean water

IMPACTS

- Cleaner environment
- Affordable
- Access to clean water
- Pride
- No need to use house
- Prevention of diseases
- Government acknowledges the group working here
- Community empowerment
- Employment for the staff
- Now more visitors; can serve all; passers by as well as local community residents
- Standard user services for all
- Created business opportunities
- No burden of emptying latrines because connected to sewer
- Affordable charges

(Silanga Group Discussion)
Children’s Perspectives

- Priorities and needs for ‘well-being’
- Use and impact of water
- Toilets
<table>
<thead>
<tr>
<th>School</th>
<th>UNDUGU</th>
</tr>
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<tbody>
<tr>
<td>Name</td>
<td>Enoch OWAH</td>
</tr>
<tr>
<td>Date</td>
<td>26/11/2009</td>
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</tbody>
</table>

We don't have a toilet.

In the bush, you don't use contraceptive.

There is danger in the bush.
NAME: ERICKSON WAINIRE
AGE: 15 yrs. SCHOOL MDC

SECURITY

Security has been poorly maintained in our area more especially at night. I urge the government to employ more police men in the slums. The government should employ people to do works i.e. - To repair roads and make new ones.
- To build dams.
- Clean up exercise.
- Making schools, hospitals and churches.
- Teach them law and order.

The government should also ensure that there is no movement at night because it is the main cause of crime in the slums. The government should also punish those police officers who fail to do their duties i.e.
- By taking bribes.
- By using and injecting drugs i.e. bhang, alcohol.
- By not attending their duties.
- If the police force should make sure that they are doing their duties properly so that crime may not exist in slums. Businesses should be closed earlier by police more.
Florence Nduku Age 15yrs
Gidoam Academy

Life in Kibera and Sanitation

I live in Kibera slums, where I start my life when I was too young. Kibera is a place where it lives thousands of people. There is advantage of living there and disadvantages. But most of them are disadvantages. Many things are affecting our health life and environment. For instance are: (A) dirty environment (B) poor construction of houses (C) lack of latrines (D) dirty water contaminated (E) child abuse etc.

Our environment is dirty and it causes diseases which cost a lot of money to cure. Houses are constructed poorly and they are weak anytime they can fall down. Sanitation is poor in Kibera as people use flying toilets because they lack latrines and these make sheets to have rusts. Dirty water is used in Kibera as the water pipes...
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Research

• Impartial, open minded, critical, independent, the real story, truth
• Does low income mean poor?
• Priorities are different
• Who am I to say how someone should live their life and develop?
• Some people choose to live in the slum
• Culture is different
My message

- A fortunate position to transfer knowledge.
- Do not impose your views on others or presume.
- Make the most of your independent position. Make up your own mind. Learn the truth.
- Absorb and learn as much as possible before implementing. Test and critique.
- Appropriate and sustainable infrastructure and engineering development could greatly help to reduce poverty.
- You have a valuable and exciting opportunity.

The world is your oyster!