**Designing Aquaponics Systems for the Developing World**

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“We want to create design guidelines, based on research, that organizations and also individuals can be inspired by to develop systems that are going to be successful, empower, and help people improve their lives and communities.”

**Seven Principles for Successful Designs for the Developing World**

**1. Designs for the developing world have greater impact when contextualized, developed, and implemented by interdisciplinary teams.**

In 2009 a small design startup, Proximity, launched a gravity-fed drip system. It's not much more than a huge PVC-canvas bag raised a few feet off the ground. The design hinges on a novel water filter that cleans out dirt and grit without sapping water pressure. Proximity's system cuts water usage in half, increases yields by a third, and costs just $65. The device enables a single woman to tend a larger plot by herself. Her children can thus go to school instead of farming. Thousands of farmers in Myanmar have purchased them.

Contrast the success of the Proximity system with the disastrous design that pumped water while children played on it. By 2008, Roundabout Outdoor, a company with backing from the US government, had installed more than 1,000 of these $14,000 devices across Africa, often at the expense of existing wells. Unfortunately, the math suggested that kids would have to play 27 hours a day for the PlayPump to provide enough water for those it served. Today most of them lie fallow, rusting monuments to good intentions married with half-baked design.

**2. Collaboration with people from the specific developing world context encourages designer empathy, promotes user ownership, and empowers resource-poor individuals.**

5-Collaborative partners: Community, Boots on the Ground, Education, Construction, Funding

a. Recognize and accept the need for partnership

b. Develop clarity and realism of purpose

c. Ensure commitment and ownership

d. Develop and maintain trust

e. Create clear and robust partnership arrangements

f. Monitor, measure and learn.

**3. Testing the design in the actual setting is an essential part of designing for the developing world, not merely a final step.**

a. Importing technology without adapting it to the specific developing world context is ineffective and unsustainable.

**4. Partnership project site Inspection by interdisciplinary team.**

a. Partners must visit site to make an accurate assessment of potential obstacles or opportunities affecting their area of responsibilities.

**5. Project management techniques that are adapted to the specific developing world context enable a more effective and efficient design process.**

a. Effective project planning and preparation

(1). Adequate capital planning and budgeting

(2). Adequate exchange between organizations setting project investment goals and those responsible for establishing overall development policies

(3). Accurate assessment of the market or needs for project

b. Accurate appraisal and assessment processes

(1). Objectives and expected outputs of projects clearly defined

(2). Understanding economic and technical criteria in project appraisal. Recognizing administrative, social, cultural and environmental impacts

(3). Avoiding the promotion of “pet projects” by individuals and groups

(4). Avoid lag periods in the processing and approval of projects by funding agencies

(5). Overcome the difficulty of estimating true costs of capital

c. Effective project design

(1). Project design appropriate to local conditions, needs and capacities

(2). Accurate estimation of resource needs, avoiding heavy additional unplanned borrowing

(3). Adequate and appropriate specifications, siting, use of proper materials, proper construction of capital facilities

(4). Create detailed designs creating no need for frequent design changes or unplanned additions to or expansions of the project

(5). When possible integrate into larger and related systems or networks

(6). Have a contingency plan to meet emergencies or unanticipated delays

(7). Look for project support, such as tax incentives, land reforms, and subsidies or other benefits

(8). Instill interaction between project planners and ultimate users, clients and beneficiaries during design

**6. Cooperation with governments and local influencers contextualizes and assists in successful project designs.**

a. Seek out beneficial GOV/NGO programs and possible contextual partners

**7. Consistent and continual participation after project implementation.**

a. Provide ongoing training leadership, management, marketing, sales, and technical skills.

b. Require weekly reports water chemistry, production, personnel, sales.

c. Establish an ongoing consultation program emails, phone calls, skype, whatsapp.

Why is Designing for Developing Countries More Challenging?

Making these designs affordable and appropriate for developing nations is often challenging, especially when the system cost must be low. Creating appropriate designs for developing countries is more challenging than for developed countries. The variables relate to functionality, profitability and cost.