Lessons Learned in Sustainable Information and Technology Transfer Considering Culture and Resources

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Abstract

In terms of information and technology transfer, sustainability is defined as the ability for a society (or culture) to maintain and incorporate the information and technology in a long term manner without continued outside influence. When a major disaster occurs, like the recent Haiti earthquake, the good intentioned outside relief effort is often immediate with no lasting effects. For example, to have a new building built out of precast panels engineered and manufactured in the U.S., and erected with volunteers from outside of Haiti, will immediately provide for the local community. But will have the people learned in terms of building the next building? It is highly probable the old construction methods and problems will continue. To have a lasting effect, the long systemic causes need to be identified and addressed from within the society or culture – empowerment of the local population has to be developed

Haiti is an undeveloped nation with the majority of the population below the poverty level. Similar to Haiti, is the population of rural Tanzania. This paper will present the current efforts of sustainable information and technology transfer for the Samé Polytechnic School in rural East Africa. And it is hoped the parallels in the two cultures can be used to provide insight for long term solutions to the built environment of Haiti

Introduction

The recent earthquake in Haiti is an enormous tragedy with fantastic devastation. The magnitude 7.0 earthquake occurred on January 10th, 2010 and affected a population base of 5-million people. There were over 200,000 deaths and an additional 300,000 injuries (USGS/EERI 2010). The relief, assistance, and reconstruction efforts on a global scale have been significant; the United States Agency for International Development (USAID) alone has listed over 50 Implementing Partners (USAID 2010). This list does not include the ability of each partner to organize into sub-partners and divisions. The USAID list does not include non-USAID partners and independent NGO's (e.g. World Bank, UNOPS, Nazarene Church, Lutheran Church, EERI). The author estimates, that there are well over another 100 groups on the ground in Haiti giving relief in all forms: humanitarian, agricultural, infrastructure, leadership administration, and buildings housing.

Haiti is the poorest nation in the Western Hemisphere and has a weak centralized leadership and command structure. As such, traditional relief efforts that demand centralized leadership and command structure will have great difficulty in implementation. A U.S. Senate report on the status of the Haiti relief effort confirm the lack of leadership, donor disagreement, and overarching disorganization has led to little progress being made in the rebuilding of Haiti (MNT 2010) (CFR US Senate 2010).

While the U.S. Senate report states little process being made, it does not measure success. What defines success is dependent on the goal of the project. For instance, measured success in providing temporary housing differs greatly from the success measure in educating and changing construction techniques of the local community (information and technology transfer). One is short term and the other is long term. One depends on providing a product while the other requires influencing a culture; a way of life.

This paper presents some lessons learned in information and technology transfer of the built environment of rural East Africa. Rural East Africa is similar to Haiti in that they both have a poor population base with no centralized leadership or command structure (multiple tribal societies). Specifically, the Polytechnic School of Samé, Tanzania will be presented. It is hoped the lessons learned in Samé, Tanzania may help contribute to the success of long term information and technology transfer, for the built environment, in Haiti. To have the local population being able to incorporate the information and technology transfer without continued outside influence. In other words, *"to help people on their terms – not ours – think globally and solve locally"*.

The paper will be presented in five sections.

- Project Overview
- The Challenge Defined
- The Culture
- The Materials
- Summary

Project Overview: Samé Polytechnic School

The site for the Polytechnic School is located one mile to the north of Same, Tanzania and located on a main route - highway B1. The town has population of approx. 20,000 and is a train stop for the main Tanga *line* of the national *railway* network. The town can be characterized as gathering and distribution center for the people of the rural area. The main commerce is providing for the tourist and churches.

Recently the United Republic of Tanzania has taken measures to provide high quality education for its people. The measures are part of the *Vision 2025* strategic plan (MOE 2005). The plan mandates that all students graduate from secondary school. However, secondary school curriculum does not provide vocation training or means of acquiring job skills. In order to provide an opportunity for the graduates of secondary education to obtain job skills, the Catholic Diocese in Samé, Tanazania is proposing to build a 1000 student polytechnic school for the rural population of Tanzania.

The poor economic rural location combined with the undeveloped status of Tanzania (UN-OHRLLS 2008) has left most of the population to build their homes and structures with little to no oversight or regulation conformance. The following pictures (Figures 1 – 4) were taken in rural East

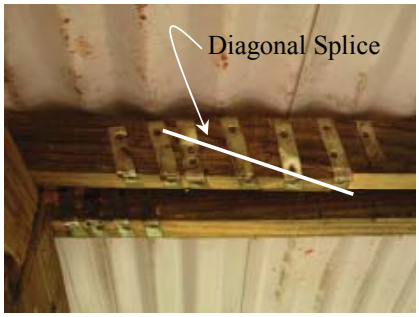

Figure 1: Typical Beam Splice
Source: David Lambert

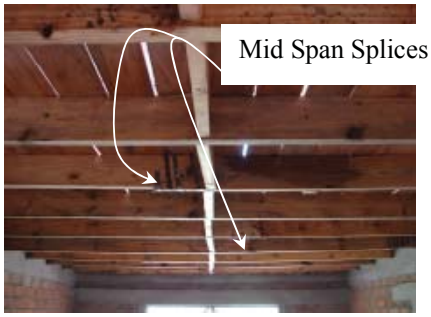

Figure 2: Typical Beam Splice
Source: David Lambert

Figure 3: Poor Mortar Joints
Source: David Lambert

Figure 4: No Lateral System
Source: David Lambert

Africa in 2007 and give an indication of the quality of construction. The pictures are of multiple newly constructed structures.

The Catholic Diocese recognizes the deficiencies in the construction knowledge and methods, and realizes the deficiencies are due to the lack of knowledge and the limitation of resources. A secondary goal in the construction of the polytechnic school is to transfer information and technology to the rural people and to raise the quality of the built environment. In this secondary goal, the school can show the world what the people of Tanzania can do, despite their economic level. And it is to be a stepping stone for the people themselves to build similar quality buildings.

The solution is to create a permanent change that can be found in a goal of "providing a means for long term change locally with local resources" - a sustainable solution.

The Challenge Defined

The challenge that will be discussed in this paper is how to improve on the quality of building performance for the materials, construction processes, and knowledge base of the local population. In terms of a developed nation, there is simple and straight forward solution, use materials that conform to ASTM; implement a quality control program with inspectors and preapproved procedures; and provide a report summarizing the applicable knowledge for improved building performance. The authority for implementation of the solution is derived from titles, licensure, and codes.

For an underdeveloped nation, the solution is not universally identifiable. There is no baseline for quality measure (standards, codes, and inspection procedures). And the authority for implementation is unique to the local population.

Thus the challenge in creating a long term effect is to first determine baseline of quality and the authority structure. The authority structure also includes becoming familiar with the cultures way of life and discovering how new ideas are accepted and incorporated into the culture. Once this is established, the challenge becomes to put the technology and knowledge in terms of the local resources.

Travel to the site is imperative in meeting this challenge.

The Culture (Authority Structure)

The years of experience in working with rural East African cultures have made it clear to the author that developed nations (western culture) contrast greatly. Western culture can be described as task and goal oriented. Also authority is derived from titles, licensures, and codes. A plan is made, a schedule is created, and goals are set. The objective is completion of the project. The authority is given to a person with title or a document with a stamp. In contrast, the culture of rural East Africa is focused on relationships first and foremost; and authority is derived from the tribal leader. Acceptance and change is garnered from strong relationships. A document with a stamp or person with a title will have little effect on creating change. In order to create lasting change, a relationship with the leader needs to be established, and this occurs from consistent and long term contact. In Kenya, we had a person on site for 3 months. In Tanzania, we are in our third year of annual travel. It is noted that the importance of relationships to the local population, means that we may spend two days saying, "Hello". And we spend three days saying good bye. Therefore, to walk off the plane with a western culture thinking of adhering to a schedule and completing tasks is grossly unrealistic.

By establishing a relationship with the leaders of the local population, our suggestions (information and knowledge transfer) are open to being accepted. And if accepted, then can become part of the culture and long term change can take place.

In addition, the relationship building reveled the following,

- Long term planning is not part of the local culture. Life is simple, find food during the day, and make sure the wild animals stay away at night. When time allows, enjoy the fellowship of relationships. Thus, the time line is day to day living.
- Wealth is measured in terms of goats or cattle. Money is only a means to interact with others beyond the local population. And this interaction occurs infrequent. Thus, obtaining money is not a priority or objective.
- Water is for drinking and for the livestock.
- Straw is for livestock.

Some of the problems in the quality of building can be attributed to the local culture. For example, improper amounts of water (to little) were used with cement. It was the belief that simply adding cement alone made the material strong. And water was for livestock, not building materials. Another example: is the saving of money to purchase building materials. This concept of saving money did not exist. When the construction required the purchase of materials, the community did not save, but look at the resources on hand at the immediate time. The poverty level combined with the lack of planning often resulted in stopping of construction for long periods of time (years), while the resources where obtained. During these stoppages, the building was left to decay and reducing the quality. Also, to add straw to adobe to increase quality was unheard of. It was well established in the culture that straw was for the livestock and if straw was to be added to the adobe brick, it would be after the animals ate.

The Materials (Baseline of Quality)

The main building material in rural East Africa is adobe. The reasons are obvious for its popularity; the resources (mud and sun) are plentiful and free. However, adobe has limitations.

Figure 5: Adobe Brick Water Decay
Source: David Lambert

Adobe will "melt" when subject to water exposure (Figure 5). Through travel to the site and building relationships, construction techniques were learned. It was accepted practice in constructing a new building, that if the building was not completed by the beginning of the rainy season, the building would "melt" away and construction would begin all over when the dry season started. A new building could take three years or so to build. Once erected, the adobe was protected with a coat of plaster (weak cement mixture or animal dung) and a sheet metal roof. After each rainy season, the plaster would have to be repaired; however degradation of the adobe would occur. The typical life of building is about 10 years, but even a building that has deteriorated is still used.

The solution to this use stabilized adobe. The solution in a developed nation is to stabilize the adobe by adding an asphalt emulsion stabilizer. It may be possible to obtain the stabilizers to build the school, what about the next project?
In rural East Africa, this solution is too expensive to continue use (poverty level economics) and it is not sustainable for the local population would have to rely on outside resources.

In terms of the local resources, what is the solution? Cement stabilized adobe has good potential. Though cement is expensive (≈ $20 per bag), it is widely available. The challenge then becomes how to use the cement efficiently and how to transfer the knowledge. Because the time and effort was committed to relationship building, the acceptance and incorporation of knowledge is open.

Summary

When it comes to offering assistance and help to an underdeveloped nation there are short term and long term solutions – both have their benefits. When considering long term solutions that are sustainable for the local population, the baseline of quality and implementation needs to be established, prior to any solution being offered. The establishment of the baseline requires travel to the site and relationship building (emersion in the culture). A baseline would include such items and issues as

- availability of local materials;
- skill set of local population;
- authority structure; and
- cultural characteristics and limitations.

For the Samé Polytechnic project, first hand (travel to the site) exposure to the culture was essential for creating solutions for long term acceptance of information and technology by the local culture.

The Samé Polytechnic project is moving forward in collaboration with The Mbesese Initiative[1]; The Catholic Diocese of Samé, Tanzania[2]; and Cal Poly – SLO.

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