TRANSFERRING APPROPRIATE TECHNOLOGY TO THE DEVELOPING WORLD: USING PARTNERS IN HEALTH’S ZANMI LASANTE AS AN EXAMPLE

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TABLE OF CONTENTS

Abstract........................................................................................................................................... 3
Haiti’s Need......................................................................................................................................... 4
Haiti’s History...................................................................................................................................... 5
Background on Cange......................................................................................................................... 8
Zanmi Lasante..................................................................................................................................... 9
Community-based model...................................................................................................................... 12
  Partnership and accompaniment....................................................................................................... 13
  Appropriate technology transfer....................................................................................................... 15
  Prevention Projects........................................................................................................................... 19
Conclusion.......................................................................................................................................... 22
Bibliography......................................................................................................................................... 23
ABSTRACT

There are an alarming number of non-governmental organizations (NGOs) that have successfully brought short-term aid to developing areas in need but then failed to sustain the long-term advancement of the assisted community. Although these NGOs may build infrastructure, they fail to effectively maintain the systems they establish because they overlook the need to understand the community. This problem has grown in part because the local beneficiaries in these developing nations do not have the power to speak against or to vote out ineffective project managers. Ironically, the power rests with the donors, who fail to integrate and involve the community. As a result, current aid systems tend to focus on pleasing the donors rather than understanding and rectifying the problems of the people.

I examine the successful community health clinic called Zanmi Lasante directed by Partners In Health’s founder Paul Farmer in Cange, Haiti. This project is the oldest, largest, and most ambitious health facility in Haiti, and it operates under a community-based model that trains and hires thousands of accompagnateurs (community health workers). The clinic is instrumental in preventing illness, monitoring medical and socioeconomic needs, and delivering quality health care to people living with chronic diseases such as HIV and tuberculosis. Farmer’s clinic has been successfully replicated around the world in places such as Peru, Russia, and Africa. This paper explains the fundamental principles of Farmer’s successful model and applies them in the context of transferring appropriate technology to improve the developing world. A technology transfer model based on Farmer’s principles incorporates a countries’ cultural heritage
and historical background in order to foster a system that encourages NGOs to be accountable for their own actions, and allows for the establishment of local enterprises that will re-create, use, and improve the transferred technologies on their own. The goal is to establish a sustainable enterprise in developing countries where the system is operated and understood by the local community.

**HAITI’S NEED**

It is well known in development circles that huge amounts of aid have often brought few improvements to the lives of the world's poorest (Farmer and Garret). The Republic of Haiti is one known example that has been plagued by political violence for most of its history. Known to be the poorest country in the western hemisphere, Haiti has struggled to provide basic needs for the majority of its citizens. Basic survival is a struggle for Haitians with 78% of the population living on less than $2 a day and 54% living on less than $1 a day (CIA World Factbook).

Throughout the centuries Haiti has been crippled by ongoing internal wars for central power and its citizens have struggled to maintain control over their own state’s affairs. Not only were Haitians violated by their own people but external forces worked against them in their time of need. One contributing factor was the international aid embargo orchestrated by the United States government against the Haitian government, which froze an estimated $500 million in promised and greatly needed assistance (Farmer).

In fact, when aid was received, much of the technology and aid never reached those residing in the poor rural areas, where it was needed the most. An all-encompassing
aid, containing both cultural and historical elements that address the specific needs of the community, is crucial to a successful road to recovery and prosperity.

**Haiti’s History**

When entering a region it is imperative to consider the history, political situation, human rights issues, and laws and regulations of the area. The background of a country can dictate its future potential and earning power. Haiti has struggled to survive through the centuries because the nation never was able to rebuild after their revolutionary war with France.

Haiti’s dependence on foreign aid stems from its declaration of independence from France on January 1, 1804. The revolutionary war claimed over 100,000 Haitian lives and destroyed the infrastructure and land, such that clean water, adequate sanitation, health care and stable food supplies were virtually eliminated (U.S. Department of State). Shortly after, France retaliated with help from the United States with a 19th century embargo that further crippled economic development by effectively prohibiting the newly independent nation from participating in the international market. To counter this isolation, the Haitian government struck a deal with the French government to pay France 150 million francs (the modern equivalent of US $21 billion) to compensate for property lost during the Haitian Revolution, in exchange for a formal recognition of Haitian independence (Varma et al). The Haitian government soon became bankrupt and was forced to seek loans from France, beginning their foreign debt. By the end of the 19th century, nearly 80% of Haiti’s budget went to debt repayment (Varma et al), further crippling its ability to carry out basic infrastructure development.
Haiti put up virtually no resistance when it was invaded by the United States in the early 20\textsuperscript{th} century where a minority of light-skinned mulatto men secured political and economic control. They remained dominant in Haitian politics until François “Papa Doc” Duvalier was elected in 1957 and later his son; Jean-Claude “Baby Doc” Duvalier succeeded him in 1971. During their regime, the Duvalier’s accrued US $900 million in multinational and bilateral loans, almost half of Haiti’s current debt. The Duvaliers used most of this money for their own personal spending (Varma et al.)

Foreign aid thus became the primary source of national income for Haiti, but it was quickly siphoned away during the years of the Duvalier dictatorships. The practice continued following the collapse of the dictatorship as the Haitian military government blatantly violated political, social and human rights at every level (Farmer and Garrett). However it was not until the late 1980’s, when Haiti established a democratically elected government that its citizens began to truly feel the pain and suffering of poverty without any foreign aid.

Jean-Claude Duvalier was overthrown by a popular uprising in 1986. Finally in 1990, Haiti attempted to take a step in the right direction by democratically electing the immensely popular activist-priest Jean-Bertrant Aristide as the nation’s first elected president. Although the United States might not have been able to prevent his victory, they used effective methods to undermine the ascetic priest and liberation theologian. The first Bush administration both funded the opposition and cut off aid to them. The U.S. policy of withholding aid expanded through their influence to include aid from the European Union and the Inter-American Development Bank (IDB). The U.S. defends its policy of giving aid only to non-governmental organizations (NGOs) in Haiti, but that
practice was heavily criticized. As the IDB’s Resident Representative in Haiti Gerard Johnson told the delegation, “If you don’t have a government, you don’t have a country. You can’t lend only to NGOs” (Shah).

Declassified records now make it clear that the CIA and other US groups helped to create and fund a paramilitary group called FRAPH, which rose to prominence after a military coup that ousted Aristide in September 1991 (Who Removed Aristide?). The 1991 coup d’état is seen as the most massive human rights violation in recent Haitian history (Farmer). The subsequent military regimes plundered Haiti’s treasury and inflicted widespread violence and injustice on its people. Not only were the Haitian National Police (HNP) largely incompetent in preventing and investigating crime, they are responsible for frequent arrests, torture, beatings, and the excessive and indiscriminate use of force against the Haitians (Human Rights Watch World Report 2006, 198).

This background is crucial for understanding the current crisis in Haiti and why the levels of poverty are worse than ever. Haiti’s minimum wage is 200 Haitian Gds (5 USD) for non-textile manufacturing jobs and 125 Haitian Gds (3 USD) for workers employed in textile factories, based on piece-rate incentive pay (Ouvriye). A recent study of workers employed at the SONAPI Industrial Park determined an employee must earn approximately nine times the current minimum wage to earn a wage that would allow a one-adult wage earner and his family with two minor dependents to meet basic needs (Solidarity Center). This prohibits a worker’s ability to earn sufficient wages and provide for his family, which perpetuates poverty and in turn breeds socioeconomic and political instability, and ultimately hinders the reconstruction process.
BACKGROUND ON CANGE

When Paul Farmer came to Cange, Haiti in 1983 he was faced with the social and economic issues plaguing the country’s poorest citizens. He met well-intentioned health practitioners starved for resources. The best-equipped facilities were inaccessible to the poor, and facilities for training local doctors, nurses and public health workers were completely inadequate (American Academy of Achievement). Known as Dokte Paul to the Haitians, Farmer soon became a household name among the villagers and was seen as a “god” because he brought hope when there was none.

The village itself was a community of drifters and refugees, living in tiny huts with dirt floors and bark roofs. The villagers had no access to clean drinking water, education or medical care of any kind. Infectious diseases such as malaria, tuberculosis and typhoid were rampant. They were effectively cut off from the rest of the world without aid and proper health care. Many turned to their beliefs to explain their material circumstances.

This widespread devastation was mainly the result of the Péligre dam project, which was built in 1956. The dam was advertised as "a development project," however no one seems to have given much thought to the peasant farmers who lived in the valley upstream. As their lands were flooded, farmers were forced to move further up into the mountains where there was only infertile land. Since they could no longer produce food from their farms, many peasant girls and boys from Cange, children of what Farmer called “the water refugees,” were forced to leave home and look for work in the capital where they cooked and cleaned (Kidder). Unfortunately more than a few of them are now
Zanmi Lasante

Paul Farmer’s work in Cange resulted in the creation of a public health system known as Zanmi Lasante. Perhaps a million peasant farmers relied on Zanmi Lasante for healthcare. Most of them came from the central plateau on overloaded passenger trucks but many also came on foot and by donkey. Farmer remarked “now and then out on the road, a bed moved slowly toward the front gate, a bearer at each corner, a patient on the mattress” (Kidder, 22). This health center was the Haitians only defense against widespread disease and suffering.

Farmer’s work was successful because the people of Cange worked in a true partnership with Partner’s in Health. Members of the community worked at the health center, treated simple cases and educated their neighbors. In addition promising youths from the village were selected and sent to medical school in Cuba (Kidder, 180). Farmer’s plan imitated steps that any school of public health would recommend; create a baseline, a first line of defense and a second line of defense (Kidder, 90). His model however, was built on hours of sweat due to traveling to the most remote areas in the Haitian mountains to understand the people he was treating. To first create this baseline he took a census of the people in order to identify problems and find out exactly what their needs were. He used his observations as a way to begin building records. He asked the locals questions that nobody else cared to ask and attempted to understand their cultural and religious background.
It soon became obvious that his work would be partly guided by the study of human culture. For example, a doctor who knew nothing about local sorcery beliefs might end up at war with Voodoo priests, but a doctor-anthropologist who understood those beliefs could find ways to make Voodoo *houngans* (male priests) his allies (Kidder, 83). Furthermore, Farmer understood that Haitians believed in the reality of *maji*, or sorcery, because it was a way for them to explain their suffering in a culture that had evolved in the absence of effective medicine. The knowledge he collected would become a baseline, in which he could measure against future censuses to see how well his new health system was working.

The second part of the system was to create a “first line of defense” out in the communities. This would include items such as vaccination programs, protected water supplies and sanitation. At the heart of the defense would be a *cadre* (group) of people from the villages who were trained to administer medicines, give classes on health, treat minor ailments and recognize the symptoms of tuberculosis (TB), malaria and typhoid (Kidder, 90). This *cadre* represented the true partnership between the Cange community and Partners in Health. Without the support and commitment of the Haitians, Zanmi Lasante’s infrastructure would have fallen victim to a cultural misunderstanding.

Finally, what the first line of defenses failed to prevent would be handled at the second line—or at the physical health clinic. Inside the small hospital, people could get the treatment they needed and be provided with the medicines and tools to improve their health.
Partners in Health was able to successfully import this model to the “inner-city” of Boston, and the more remote areas of Rwanda, Malawi and Siberia. For example in 2005, PIH initiated, with the Rwandan Ministry of Health and the Clinton Foundation, a new rural AIDS initiative in Rwanda based on the Haitian model (Farmer and Garrett, 2007). This model has seen much success with more than 2,000 people with AIDS who are now receiving therapy within two health districts in eastern Rwanda. Over 400,000 people live in these districts and 60 percent of them are resettled refugees or others displaced by war and genocide. Prior to 2005, there was not a single doctor to care for them (Farmer and Garrett, 2007). PIH brought in doctors at first, some of which were American. But the project quickly took hold and within months of their arrival, over 95 percent of employees were from Africa. The Haitian model helped bring the community back to life by using the existing infrastructure and focusing on the basic needs of the people.

Butaro Hospital, Rwanda Source: http://www.pih.org/pages/butaro-hospital
**COMMUNITY-BASED MODEL**

Zanmi Lasante has been so successful because the program promotes the notion of health as a human right. The programs created by PIH are properly designed to reflect patients’ needs rather than the wishes of donors (Farmer and Garrett, 2007). This model can be translated and applied to other areas of need besides health care. A community-based model that incorporates a three-pronged approach will not only work for health clinics but also other micro-business models and NGOs (non governmental organizations) who want to harness their knowledge for social good. The model can be broken down into three parts: partnership and accompaniment, appropriate technology transfer, and prevention projects.
PARTNERSHIP AND ACCOMPANIMENT

PIH listens to people, brings the right tools, develops the local connections, and creates a true partnership with the people living in the community. They do this by approaching their relationship with the community in three different ways. They focus on forming three types of partnerships 1) an interpersonal partnership with members of the community, 2) partnerships that concern social and economic needs, and 3) a solid relationship with the government. All three must be implemented simultaneously to help the community in need.

An interpersonal partnership is one that is created between individual members of the community and those of the organization there to help them. In Cange, there are *accompagnateurs* (community health workers), who are trained by PIH to help patients overcome obstacles by accompanying patients through treatment, monitoring needs for food, housing, and safe water, leading education campaigns and empowering community members to take charge of their own health (Partners in Health, 2009). These community health workers bridge the gap between the community and the health clinic. They are seen as a familiar and welcoming sight to all and are a symbol of trust between the community and PIH.

Secondly, a partnership must be formed with community organizations that focus on the social and economic needs of the people. In Cange, Zanmi Lasante and PIH has partnered with Fonkoze, the largest microfinance institution in Haiti, to work together to help find Haitians living in extreme poverty. When a patient enters the health clinic
showing these signs, Fonkoze is alerted to their location, where they can then provide financial and education services (Werlin and Hastings, 2006).

Fonkoze has four steps that together constitute the core program through which they work with the Haitians to help them pull themselves out of poverty and into a financially secure future for themselves and their families. The chemen lavi miyò, or the road to a better life is the first step that reaches out to the poorest of the poor and accompanies them with one-on-one supervision and encouragement to help obtain health care and home repair (Fonkoze, 2012). This is a two-year program and once the client is ready to take the next step, they can obtain a ti kredi, or little credit, which is a small loan of $25 that will finance basic living and working expenses (Fonkoze, 2012). The last two steps involve larger loans and eventually help the Haitians to become part of the formal economy and create jobs for their fellow community members. Organizations that focus on social and economic needs help to provide that stable infrastructure so desperately desired in a fragile community such as Cange.

Finally there must be partnership with the country’s government. In order for these basic human rights to be met not only must the community be helped but also the government must be assisted in delivering on their promises. When a new micro-business model or NGO enters a country the government must be invested in the project in a way that they can understand so they can help implement the program successfully (Damberger, 2011). This allows the government to provide their people somewhere to go to get help and puts resources into the hands of those who can make a difference.
**APPROPRIATE TECHNOLOGY TRANSFER**

The community-based model may be applied to the transfer of appropriate technology into a developing country. The importance of international technology transfer for economic development can hardly be overstated because both the acquisition of technology and its diffusion fosters growth in the community and in the economy (Hoekman, Maskus and Saggi). Simply put, appropriate technology are life-changing grassroots solutions to economic needs (Invent for Humanity). This technology is generally implemented without specialized training; repairable with locally available resources; extendable within local constraints; require no or commonly-used power sources; limited to consumable donations of single-dosages (such as vaccines); and contain little to no salvage value (Invent for Humanity).

Technology can be transferred to the developing world in a variety of ways however; some options may not be suitable for the environment of a community faced with poverty and poor nutrition. Four options must be considered in the process of getting technology to the point of need including; importing capital goods and technological inputs, foreign direct investment (FDI), directly trading knowledge via technology licensing, and refraining from patenting at least the initial work.

Most developing countries heavily rely on imported technologies for basic expertise and as sources of new knowledge (Hoekman, Maskus and Saggi, 11). Although importing capital goods and technological inputs is a direct and automatic benefit, this is simply not sufficient to run a sustainable community. Absorptive capacity and the ability to adapt foreign technology are required (Hoekman, Maskus and Saggi, 11).
In developing countries, technology acquisition should amount to adapting the existing methods that have been imported to a level where the locals understand the methodology. In many cases however, governments do not have the money to update and fix projects brought in by NGOs and other non-profit organizations. When these technologies eventually breakdown they effectively become unusable to the community because no one has the ability to fix or replace the technology.

Foreign direct investment helps to provide developing countries with more efficient foreign technologies and results in benefits such as technological spillovers and greater competition (Hoekman, Maskus and Saggi, 11). Case studies suggest that technology can be substantially dispersed throughout a nation to reach those people who need it the most due to FDI (Blomstrom and Kokko, 1997). This however can be overshadowed by the fact that domestically held firms may actually do worse as the foreign presence in their industry increases (e.g., Aitken and Harrison, 1994). Thus hurting those local businesses whose need to survive is crucial. There are millions of small and growing businesses in developing markets that need capital to grow and with the necessary financing these firms have the potential to create jobs and drive sustainable economic growth in the developing country. Nevertheless, foreign direct investment is required to provide assistance to the developing world. FDI alone however, will be unsuccessful in creating a society that can operate efficiently because after the NGO and the aid they provide has left; the community will lack the knowledge and resources to conduct activities that foster growth.

The other two options deal with a direct trade in knowledge via technology licensing or refraining from patenting the work entirely because they can help to alleviate
the burden that the previous two options present. Licensing is an important source of international technology transfer for developing countries. The shift typically involves the purchase of production or distribution rights and the underlying technological information and know-how (Hoekman, Maskus and Saggi, 12). A successful transfer requires both the capacity to learn and the capital to help set in motion the technologies in the production processes.

An example that highlights the success of licensing and gives an in-depth explanation of this option is the Q Drum Manufacturing Campaign being currently carried out by Invent for Humanity and their various partners. The Q Drum is a durable donut-shaped plastic container designed to roll easily, and can transport seventy-five liters of clean and potable water (Stathis, Miller, and Filarski, 10). The uniqueness of this product lies in the design of the longitudinal shaft or central hole, through which a rope is tied, to pull or roll the drum along all terrain types. The effort required to move the Q Drum allows children to be active helpers in a very important domestic duty, which is typically the responsibility of women. It effectively reduces what is generally a daylong process of repeated trips to the fresh water well, sometimes miles away from the village, to a single trip.

Q Drum began efforts to bring their successful technology from South Africa, where it is currently manufactured, to places of need such as Mexico and the Philippines. A structured licensing agreement has been created between members of the international intellectual property (IP) community, needs organizations focused on water reclamation and potential distributors. The purpose of this campaign is to license required IP to establish the manufacture and distribution of the Q Drum technology (Stathis, Miller, and
Filarski, 10). Specialists in IP will work with the manufacturer in Johannesburg to create molds in order to ensure consistent manufacturing standards, and document the appropriate manufacturing “know-how.” Sending these drums to communities is clearly not enough. An understanding of the design and manufacturing and a presence working on the ground is needed in order to function with the correct tools. This type of enterprise gives the community a chance to elevate their living conditions and overall quality of life.

The final option excludes patenting the technology, at least initially. Founder of Solar Ear, Howard Weinstein, does not patent his work because the cost of patenting his low cost hearing aids and batteries for developing nations would force him to double or triple his selling price (Ashoka - Innovators for the Public, 2012). In fact, he wants larger companies to copy his design and use their distribution power as a way for his products to reach even more people in developing nations. But he retains his “know how,” or the secret of his success, and transfers that knowledge when certain humanitarian conditions are met.

Weinsten thus sets criteria for organizations that want to replicate his work. They must be nonprofit organizations; hire deaf people to work in production process because of their manual dexterity and highly developed hand-eye coordination; and have at least 20 percent of their start-up capital locally raised (Ashoka - Innovators for the Public, 2012). Once organizations meet these criteria, Weinstein will teach them the manufacturing “know-how” of the technology.

The quality of the hearing aids is guaranteed because it must meet industry quality standards to be put on the market. Under Weinstein’s approach, the transfer of
appropriate technology to the manufacturing site puts the power back into the hands of the people who benefit from the technology and allows for the community to harness their knowledge to create more opportunities for wealth generation.

**BUILDING THE COMMUNITY UP AROUND YOU THROUGH PREVENTION PROJECTS**

The last part to the community-based model is to focus on projects that provide essential needs. There is a Haitian proverb that states “giving drugs without food is like washing your hands and drying them in the dirt.” A villager cannot take his or her HIV/AIDS medication if the water is unsanitary and it is taken on an empty stomach. A NGO or micro-business model must support projects that focus on providing water, food, education and housing for the communities’ poorest people.

The lack of clean water is among the most severe human rights challenges faced by the people of Haiti today. In 2010, Haiti ranked 101 of 127 countries in terms of the quantity and quality of fresh water (Varma et al.). The problems with Haiti’s water systems did not develop in isolation. They were weakened by political violence, tampered with by external parties and crippled by a long history of crushing debt. This failure continues to feed the people of Haiti a vicious cycle of contaminated water, deficient public sanitation, poor health, and chronic poverty.

In 1985, PIH brought clean water to the village of Cange, Haiti by establishing a major hydraulic system. This water project was one of the most effective ways to save lives and one of the most cost-effective investments in disease prevention (Partners in Health). These projects typically reduce diarrheal disease by upwards of 50 percent, with even higher reductions during water-borne epidemics, such as cholera and typhoid.
In one fell swoop the project in Cange eliminated child deaths caused by diarrhea. PIH has learned that while many of the challenges to improving health in Haiti would take decades to address, making clean water available can save and improve lives right away.

The next area to focus on is the nutritional health of the community. The destructive impact of hunger and malnutrition on health care must be taken into account. People whose bodies and immune systems that have been weakened by hunger are far more likely to fall ill, far more likely to suffer serious or fatal complications and when they do, are far less able to benefit from treatment (Partners in Health). At Zanmi Lasante, clinicians and community health workers evaluate the needs of the patients and identify those who require food support. Food supplements are automatically given once a week to any patients taking HIV/AIDS or tuberculosis medicine (Saving Lives in Rural Haiti Part 1). This prevention project improves the effectiveness of the medications and alleviates the burden of hunger.

Education is a human right – our constitution is based on the Declaration of Independence, and while human rights are not specifically stated in the Constitution, one can say that they are embedded in its words. Partners in Health strive to educate the community about their health and about their lives. The accompagnateurs (community health workers) not only educate their neighbors about HIV and AIDS but they also conduct workshops and training sessions on themes such as building local health care systems, mental health, sexually transmitted infections, conflict resolution and environmental health. Education is the corner stone to keep a community from self-inflicting themselves with disease and destruction.
For many in Cange, home is not a place of comfort but an incubator for disease and despair. Poor housing affects health in many different ways such as compromising a family’s access to water, sanitation and safe food preparation and storage. Poor temperature and humidity regulation can lead to respiratory disease and overcrowding greatly increases the risk of disease spreading rapidly across all members of a household (Partners in Health). PIH’s housing project focuses on constructing simple and decent homes in six days for families in need. Jean, the director of housing for Cange, holds his job with great respect because someone once built him a new home and it changed his life forever. The impact of focusing on these four essential needs are felt on every level of a community.

There are many NGOs specializing in the development of technology that provide assistance in these essential areas of water, food, education, and housing. These NGOs include organizations such as Uber Shelter, whose mission is to provide temporary and transitional shelter to meet the needs of people displaced by natural disaster and conflict (Uber Shelter) and Plumpynut, who created a ready-to-eat, vitamin-enriched energy bar that has proven to greatly improve the overall health of malnourished children in three weeks (CBSNews, 2009). Transferring this type of aid to the developing world in a manner similar to the Farmer model as discussed will allow needy communities to distribute and manufacture such products through their own enterprise, spurring economic growth and a better quality of life.
CONCLUSION

Zanmi Lasante’s model of care is properly designed to reflect the needs of the patients and strengthens and complements the existing public health infrastructure. Partners in Health learned decades ago that people in these areas typically suffer from more than one disease at a time, whether it is AIDS, hunger, or some other affliction, and that solving the problem requires understanding the culture and history of the community in addition to capital resources. It is not possible to provide one-dimensional aid programs to poor rural areas.

When transferring appropriate technology to underdeveloped areas, NGOs and micro-businesses should partner with governments, put effective tools into the hands of locals, recruit community workers to look after their neighbors, and help the poorest people get better water, food, education, and housing. In doing so, the quality of life and economics of the people will improve and so will the community.


