Value Chain Case Study
Developing a Value Chain for a New Product: Compost in Accra, Ghana

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The Challenge: Creating a “New” Value Chain

CHF Ghana YES Program

The CHF Ghana Youth Engagement in Service Delivery (YES) Program is a learning initiative funded by the Bill and Melinda Gates Foundation which supports the creation of employment opportunities for youth, especially in low-income and indigenous communities in Ghana. At its inception, the YES Program utilized an inclusive value chain approach to identify youth focused employment opportunities in the solid waste management value chain, and in the process, identified and pursued an opportunity to develop a new sub-sector value chain for compost in Accra, overcoming challenges and learning throughout the process. This case study presents the unique challenges the YES Program faced and the solutions it has implemented while growing and strengthening a new value chain.

The Value Chain Approach

Projects that use the value chain approach select target sub-sectors through market research and rankings based on institutional mandates, program interests, and donor priorities. These criteria often include current and projected market demand, unmet demand for existing products, number of Micro, Small and Medium Enterprises (MSMEs) operating in sector, potential for enterprises to create new employment, and potential for productivity increases.¹ The selection process tends to focus on existing products and markets, because the information is accessible, stakeholders are familiar with them and able to discuss them, and they typically represent the highest potential for economic growth.

In this case however, despite being virtually absent from the market at the start of the YES Program, the compost value chain displayed strong potential for job creation and income generation, as well as the ability to address landfill capacity issues in Accra. Initial research showed potential demand and interest on the part of potential suppliers, as well as some potential early adopters for the use of compost in agricultural production. If developed, the new compost value chain would use input supplies that were an offshoot of another value chain (organic materials from the solid waste management sector) and would connect the new product to an existing market (farmers, landscapers, etc) as a substitute input (compost rather than chemical fertilizer). Creating compost from Accra’s abundant organic waste posed a unique set of challenges, including:

- Identifying the first movers (entrepreneurial producers) and early adopters (consumers) to take on the risk of entering a new industry;
- Aligning the growth of supply and demand during the initial stages of development;
- Raising awareness and understanding of the new product amongst both industry actors and users of the product or service;
- Establishing the required “industry infrastructure” including regulations and standards, technical knowledge, and a pool of skilled labor;
- Developing income generating opportunities for youth.

¹ “Value Chain Program Design,” Frank Lusby and Henry Panlibuton, Action For Enterprise, October 2007
Hypothesis and Learning Questions

The YES Program entered into the development of the compost value chain with the hypothesis that identifying opportunities and managing constraints in a previously non-existent sector can result in the establishment and growth of a healthy value chain. Moreover, stimulating the growth of the fledgling compost market in Accra can create economic opportunities for poor urban youth. As part of a learning program, the YES team began working with a set of questions in mind, including:

- In underdeveloped markets, what are effective strategies for getting new stakeholders interested and engaged in those markets?
- What are effective strategies for identifying and stimulating end-user demand in a nascent market?
- How do the efforts to build a new value chain result in meaningful impacts in terms of incomes and/or employment?

Contextual Analysis

Solid Waste Management in Accra

According to the Accra Metropolitan Assembly (AMA) Waste Management Department (WMD), Accra’s municipal solid waste is estimated to be 2,200 tons per day, with about 80% collected and disposed of daily. This leaves a deficit of 20%, which is subject to alternative disposal methods, including burying, burning and/or disposal in open gutters, drains and other unauthorized locations. While there are various reasons for such a substantial portion of waste remaining uncollected, it is well known that logistical challenges, such as Accra’s critical traffic problem and low income high-density neighborhoods with limited vehicle access, contribute to traditional waste management firms’ inability to service entire areas within their jurisdictions. Additionally, the city of Accra is currently facing a scarcity of landfill and dump sites, due to unwillingness of land owners and managers to release land for waste dumping and storage. Health, environmental and social concerns have often been cited as impediments to landfill or dump site acquisitions. According to the AMA WMD, Accra’s solid waste, by weight, consists of 65% organics, 6% paper, 3.5% plastics, 3% glass, 2.5% metals, 1.7% textiles, 17.1% inert2, and 1.2% of other materials. Recognizing both the potentially valuable content of the city’s waste and the existing challenges in waste management, it is clear that there is an untapped opportunity to add value to the various waste components rather than sending them to landfill sites.

In fact, the YES program’s value chain analysis revealed that some solid waste markets do exist for plastics, scrap metals and electronic waste, and Accra is home to fledgling recycling centers for these products. However, the compostable organic market remains latent and little has been done to turn organic waste into a useful commodity. One reason the market has yet to develop is environmental concerns regarding the anaerobic decomposition of organic waste and its subsequent release of methane gas. In 1997, the Kyoto Protocol was established to help ameliorate the amount of global methane gas release, including emissions from composting. The Protocol includes a provision for countries to finance the decrease in such emissions through the Clean Development Mechanism (CDM). Under the CDM, countries are encouraged to use innovative approaches to solid waste management, including recycling of the organic component in composting. This innovation has been successfully used in Bangladesh, India, and Indonesia for example, to earn carbon credits which are traded globally.

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2 Waste, such as sand and rock, is considered inert if it does not undergo any significant physical, chemical or biological transformation; it does not react with other matter that it contacts in a way likely to cause pollution; and its leachate does not endanger surface or groundwater.
What is composting?
Composting is a closely monitored process of decomposing organic materials into a soil conditioner or natural fertilizer. A quality compost material is usually achieved under controlled conditions, managing temperature, moisture, aeration and the Carbon: Nitrogen ratio. The use of compost improves the properties of soils for food production, including the ability to replenish soil nutrients; improve soil texture; improve soil structure and consistency; improve moisture retention capacity of soils; regulate soil temperature; improve activeness of soil fauna and flora etc. The primary users of compost are landscapers, gardeners, and a wide range of farmers from smallholders to large commercial farms.

In addition to its agricultural benefits, composting significantly reduces the volume of waste going to landfill. Also, both entrepreneurs and the government have the potential to benefit financially through the CDM. Moreover, by saving methane emissions through composting, the country’s environmental performance is vastly improved, improving the attractiveness of other sectors of the economy including tourism.

Composting in Ghana
Market assessments early in the YES Program indicated that there was an unmet demand for high quality, locally produced organic compost, including among smaller niche markets such as small-scale vegetable producers, organic farmers, high-end real estate developers, and landscape companies. Small-scale farmers tended to use a combination of poultry droppings and chemical fertilizer to prepare their soil and crops. The poultry droppings were provided at a very low cost by poultry farmers who were happy to sell it rather than pay for its disposal. The chemical fertilizer was subsidized by the government, but even with the subsidy, the combination of poultry droppings and fertilizer was more expensive than compost.

Despite the predominant use of fertilizers and poultry droppings, there was some knowledge and limited use of compost. For example, several small scale farmers produced their own compost, but typically did not produce any additional compost to sell. Many other farmers had used or were at least aware of the use of compost, but acknowledged that they did not have the time or space to create their own compost. Some farmers had previously had bad experiences with compost which included human and animal waste and were therefore averse to trying compost again. An AMA operated compost plant had been built in 1976 and was closed in 2002. During its operations, the primary users of the plant were real estate developers, vegetable farmers, and the AMA WMD themselves.

On the supply side, initial research also indicated a willingness of citizens – especially in target neighborhoods – to separate their organic waste to ensure a substantial supply of raw materials for the composting process.

Compost Value Chain Analysis in Accra
As the compost value chain did not exist at the start of the YES program, the initial value chain analysis included information from the period of 1976-2002, when the AMA facility was operational, and global best practices in the compost industry, as well as current market information for the small scale agriculture and solid waste value chains.
Compost value chain opportunities and constraints identified:

- **Supply**: Large volume of compostable material in the waste stream; lack of source separation and awareness of the value of organic waste;

- **Market Access**: Current low sales of compost; low use and low perceived value of compost; high cost of compost compared to poultry droppings;

- **Technology and Product Development**: Availability of low cost, labor intensive composting technology; lack of technical education for compost producers; lack of compost research facilities;

- **Infrastructure**: Lack of compost facilities at both municipal and community levels;

- **Regulatory/Policy**: Low incentives for source separation or reduction of waste going to landfill or dump sites; absence of regulations and guidelines for construction and operation of compost facilities; no standardization or certification of compost;

- **Organization and Management**: Well established waste collection and transport systems in urban areas.

The YES team’s value chain analysis also identified value chain actors, some of whom already existed in other value chains and some of whom would be new, including:

- **Individual “value” pickers**: At the start of the program, these actors were not engaged in value addition activities with organic waste. Urban youth from target communities were identified as potential pickers who could gather solid waste from local households and other waste producers and deliver it to collection centers for value addition.

- **Compost facility operators**: At the start of the program, these actors did not exist. Urban youth in local associations were identified as potential community based compost facility technicians, managers, and salesmen.

- **Waste haulage (collection) firms**: These firms haul waste from residential or commercial sources to composting facilities. At the start of the Program, no value addition was being undertaken by the waste haulage firms but lead firms such as Zoomlion and JSO had plans to begin composting activities. In low income, densely populated communities, such as in Accra, this collection and haulage is most effectively achieved using small-scale operators with tricycles and/or push-trucks.

- **Distributors**: At the start of the Program, these actors were not engaged in compost sales. It was envisioned that entrepreneurs would stock compost and sell to household gardeners, small holder farmers, real estate developers, landscaping contractors etc.

- **Environmental Protection Agency**: Provides compost permits.

- **Local NGOs**: At the start of the Program, these actors were not engaged in compost activities. It was envisioned that community-based and youth organizations would be responsible for educating households on source separation and monitoring the door-to-door collection of organic waste from households to compost plants.

The value chain analysis revealed that there were no environmental regulations that would hinder the production of compost in the Greater Accra Metropolitan Area. In fact, the local government actors in the area recognized the value of introducing composting in order to reduce the amount of organic waste going to landfills and littering the streets. In addition to the compostable materials coming from households, fruit and vegetable markets, restaurants and hotels were identified as significant potential suppliers of organic waste. The new value chain would be dependent on some source separation of waste, as well as sorting at collection facilities. Composting facilities would also depend on private waste haulage companies and individual waste pickers for their supply of raw materials, and would also depend on connections with agricultural input suppliers as key partners for local distribution.
Developing the Compost Value Chain

The YES Program team recognized that the establishment and growth of the compost market were dependent on a number of factors, including identification of both a steady and growing supply of raw material and a growing end market; increased end-user, entrepreneur and supplier awareness of the potential value of the compost market; interest and support from government to regulate, educate and encourage development of the market; and opportunities for entrepreneurs to improve the efficiency of their work within the value chain. With this in mind, the program focused on interventions that would facilitate the initial growth of the compost industry in a way that would reduce landfill waste while at the same time generating livelihood opportunities for youth in poor neighborhoods. Interventions were designed to alleviate the identified constraints, engage government in the development of the value chain, and promote private sector investment and action. The YES Program primarily facilitated training and pilot demonstration activities, supplemented with technical and equipment support for government and youth entrepreneurs in target communities. These interventions included:

**Establishment of two pilot composting facilities:** In two communities, youth entrepreneurs who were identified by local youth groups established compost production facilities. The capacity of each facility was determined based on the potential market demand and potential supply of organic materials from households in the adjacent neighborhoods. The compost facilities were responsible for ensuring collection of raw materials, production of compost, and packaging and sales.

**Pilot initiative for source separation:** Target households received compost bins and basic information on what materials to place in the bins. Local youth used specially designed waste collection tricycles, purchased or leased individually, to visit the target households and collect the separated waste.

**Technical Assistance to:**

1. Waste haulage firms and waste collectors: Firms’ supervisors and field workers and community based youth waste collectors were trained on hygiene, productivity, and costs involved in solid waste management.

2. Youth: Practical and theoretical trainings on the technical aspects of compost production, usages, and value was provided to youth employed at the composting facilities.
3. Government Entities: The Biotechnology and Nuclear Agriculture Research Institute (BNARI), a research and technology transfer institution that provides cutting edge solutions for a variety of agricultural issues in Ghana, conducted research and educational initiatives on the development of high quality compost and high-impact uses of compost on Ghanaian crops. BNARI also developed a curriculum to train entrepreneurs on the composting process and compost usage.

**Compost demonstration testing on vegetables:** Several small-scale farmers participated in a demonstration to compare the results of the traditional use of poultry droppings and chemical fertilizers with the use of compost, and with a hybrid approach utilizing both methods. Results showed that the plots using compost achieved the same crop volume, and the same weight and size vegetables as the traditional method, but that the green vegetables grown with compost did not appear as green as the ones grown with the traditional and hybrid methods. Results also showed that water retention of the soil increased in the locations that used compost. Before this field test, the YES Program worked with the Ghana Standard Authority to conduct a lab analysis of the compost produced by the youth facilities.

**End market linkages:** The program facilitated connections between the compost facilities and two end market user groups: small-scale farmers operating near the community, and the AMA parks department which manages the landscaping of a large number of green spaces throughout the city.

**Supply chain linkages:** In addition to linking the compost facilities with community based youth waste collectors, the program also facilitated connections with local markets that had significant organic waste, and with the city’s waste collection firms.

**Lessons Learned**

Due to the nature of the typical value chain selection process and criteria, identifying potential new value chains requires creative thinking. As the process and criteria consider the current situation for MSMEs, income generation, employment, and other common program goals, it is unlikely that a new industry will be considered without some analysis “outside the box.” Once a new industry is among the potential sub-sectors being assessed, programs must be open-minded to the possibilities, but realistic about expectations. The YES Program, as an outside party with a targeted set of goals, analyzed the compost market as a unique potential solution to solid waste management challenges and a potential income generating industry for youth. While implementing the program, the YES team frequently reflected on the process, the results, and the lessons learned about overcoming the challenges.

**Early Adoption**

Youth entrepreneurs, unemployed at the start of the program, were eager to take the risk of being first movers in the organic waste collection market, but struggled with the challenges of defining a new industry. In addition to their role physically removing waste, the youth collectors became the primary source of communications and training outreach to households that were piloting source separation. While struggling to get enough households to uptake source separation, the youth began to collect from nearby vegetable markets and other sources to supplement the raw materials collected from households.

Small scale farmers who were directly engaged in the program became early adopters as a result of their participation in the demonstration vegetable plot which tested traditional, compost, and hybrid methods. The program facilitated farmer visits to the compost facilities so that farmers would be educated about and comfortable with the compost production. The demonstration plots enabled them to understand the economic value of using compost and they recognized that with compost usage the same volume of crop production could be achieved at lower cost than with chemical fertilizer and with added benefits to the long-term maintenance of the soil. However, they also acknowledged that the less full green color of crops grown with compost alone would result in a lower volume of sales because buyers would choose the greener produce first, if available. Despite the success of the demonstrations, few additional farmers have taken up the practice of using compost.
While the program focused primarily on small scale community-based compost production, large waste management firms were engaged in order to provide greater market linkages and uptake of composting. As a result, large waste firms such as Jekora have recognized that having less waste to bring to landfills will reduce their fuel and dumping costs and they are considering building their own larger compost facilities. Meanwhile, they have initiated discussions about bringing the organic waste they collect in nearby neighborhoods to the community compost facilities in order to start achieving positive economic and environmental impacts.

Alignment of supply and demand

One of the biggest challenges was to ensure that both supply and demand grew in step with each other as the value chain was established. While the value chain analysis showed significant potential demand, substantial unused supply of raw materials, and willingness on the part of waste producers to provide those raw materials, in practice both supply and demand were slow to materialize and their growth was been mismatched at times.

The youth running the compost facilities and collecting waste suffered an early setback when awareness raising and bin distribution in the communities successfully encouraged households to start separating waste before the composting facilities were ready to begin production. Households were discouraged when they learned that their organic waste was not being used for compost, so many of them stopped separating. The youth then struggled to regain credibility and convince people to separate their waste again when the production facilities began operations. In an effort to compensate for low collection from households, the youth turned to nearby markets and restaurants – more stable suppliers – to source the bulk of their organic waste and keep the production facilities continuously operating.

The compost facilities, once operational, began selling compost to small-scale farmers and landscaping companies. However, when new substantial sales were made, the compost facilities needed extra time to collect sufficient raw materials and to produce the volumes required. With awareness raising activities amongst potential clients continually being implemented, there were several occasions when a potential new client expressed interest in quantities that the compost facilities could not provide in a short time frame. Despite the attractiveness of large sales, these deals actually caused challenges because timeliness, quantity and quality were at risk of not meeting customer expectations. Further, these deals also drew producers’ focus away from the steadily growing demand from small-scale farmers. The early development of a more focused approach to servicing targeted client segment(s) would have enabled the production facilities to build a solid client base through consistent production and on time delivery of quality compost products.

To fully develop the compost market, it is also necessary to reach beyond the end-users of compost (farmers) to incentivize market sellers and consumers to buy produce grown with compost. Despite the fact that chemical fertilizer is subsidized, compost has a slight cost advantage as well as long-term environmental benefits. However, small-scale farmers in Accra sell more products grown with chemicals than with compost because market sellers do not place any value on composted produce and agricultural consumers themselves are not aware of the benefits. An awareness campaign amongst consumers about the nutritional and environmental benefits of compost could enable farmers and markets to create a premium price for composted products that would incentivize uptake.

Raising Awareness

In a new industry, such as compost in Ghana, a key challenge is defining the product and its value proposition, and raising awareness of it in the marketplace. The YES Program’s awareness raising efforts were initially successful at creating an understanding of the compost process and product, and at piquing interest of various industry actors. However, there were challenges to sustaining this interest. As mentioned above, an early misstep built household buy-in through free bin distribution and community based education efforts which sparked some immediate source separation behavior change. Unfortunately, the timing of the behavior change preceded the opening of the compost facility and by the time the facility was opened, many households had lost interest and ceased separation activities. Despite this early challenge, the youth waste collectors have seen progressive improvements in the community’s ability to separate organic waste, but acknowledge that there may be similar setbacks again in the future.

Overall, the pilot source separation and compost production initiatives demonstrated to community residents and youth that by separating trash, they could create value through sales and reduce their disposal costs. The pilots also provided an example to entrepreneurs and investors of the potential value of this new market. Likewise, the demonstration plots raised awareness amongst a small number of small holder farmers and they began to use compost as a result. Continued awareness raising is expected to generate more growth amongst small holder farmers, albeit slowly. The demonstration plots would also provide an opportunity to demonstrate how the composting process works and to encourage continued participation.
projects were meant to educate and raise awareness amongst other entrepreneurs and other communities, as well. AMA
WMD and some waste management contractors have expressed an interest in seeing the projects replicated in other
locations, but have not yet acted on this possibility themselves.

Industry “Infrastructure”

As the market began to develop, the YES Program recognized that there were not enough incentives (or penalties) to
courage some of the behavior change necessary to spark the growth of composting. Therefore, the program has been
working to encourage the adoption of regulations that encourage source separation of waste. It is important to note that
this action was identified in order to benefit the entire solid waste management sector, not only compost. To date, no mea-

sures have been taken to create minimum standards for compost (e.g., acceptable/unacceptable raw materials, nitrogen/
phosphate/potassium levels, standard labeling for different types of crops) leaving open the possibility of poor quality com-
post, discouraging end-users from continuing compost use. Additionally, the program has been investigating the possibil-
ity of a government subsidy to encourage compost use, similar to the current subsidy applied to chemical fertilizer. The
Ministry of Agriculture is open to the idea, but so far has stated that it will require substantial product testing with volumes of
compost which the current small enterprises are unable to provide at this time.

BNARI has established a research facility for compost and is experimenting with a wide variety of raw materials and
crops. The institute has also provided some training to the youth engaged in compost businesses, though the distance
between their communities and the institute has impeded their ability to participate in further training.

Employment and Income Generation

An initial market demand survey showed tremendous potential demand for compost, but the youth compost
businesses have faced challenges in initially reaching those markets. The most stable clients to date have been
small customers in a small market. Fortunately, this is generating enough income for the young participants to
invest in continuous improvements to their products, expanding awareness of the benefits of compost, and expanding
their supply of raw materials. As part of a nascent industry, the youth who are running the composting facilities and
raw materials collection have found that they must play several roles at the same time (awareness raising, waste
collection and separation, demonstrations, sales, etc.) in order to ensure the continuity of their businesses.

Discussion Questions

There are still a number of open questions as the compost market continues to evolve in Accra, Ghana.

1. In launching the compost market, YES and stakeholders chose the smallest, simplest market to start with – small-
scale farmers. How can this scale-up to larger, more demanding markets? Can the current compost sector be scaled-
up or does the model need to change? How will the sector attract new market entrants?

2. When other market actors enter the value chain, how can government, NGOs, and small entrepreneurs ensure that
this does not result in large firms simply pushing the small players out of the market? What can be done to leverage
these large investments for continued growth of the small players?