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ECO-PESA: AN EVALUATION OF A COMPLEMENTARY CURRENCY PROGRAMME IN KENYA'S INFORMAL SETTLEMENTS

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ABSTRACT

The aim of the Eco-Pesa programme was to promote and facilitate environmental social service work and economic development in impoverished informal settlements (slums) through the innovative use of a complementary currency. This complementary currency, called Eco-Pesa, was backed by the national currency and introduced through the registration of 75 small local businesses, price discounting, community service work, and community events in three neighbouring informal settlements in Kongowea, Kenya. An estimated \$4,176 USD worth of trading was facilitated through the circulation of only \$352 USD worth of Eco-Pesa. The use of Eco-Pesa resulted in a 22% average increase in participating businesses' incomes, the collection of 20 tonnes of waste, and the creation of three youth-led community tree nurseries. The programme was cost effective (only \$4,698 USD was spent over seven months), and provided an improved mechanism for tracking development funding and increasing overall accountability. This paper presents a study of the programme, describing seven months of design, implementation and results. The successes of the Eco-Pesa programme demonstrated in these findings, indicate that complementary currencies are a valuable tool to promote development, warranting further implementation and research.

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1. INTRODUCTION

Complementary currencies, sometimes called local currencies or community currencies, involve the development of a medium of exchange, physical and/or digital, that can be used for a variety of purposes including: facilitating trade, targeting development, and creating customer loyalty. According to Lietaer (2001), a complementary currency can be defined as any means of recorded exchange other than legal tender. The term complementary refers to the currency's ability to complement a national currency as opposed to replacing it. There are over 2,500 initiatives around the world using the complementary currency concept (Lietaer 2001).

'Eco' is short for ecological and 'Pesa' is the Kiswahili word for money. The purpose of the Eco-Pesa programme was to help facilitate and promote environmentally targeted social service work and economic development activities in Kenyan informal settlements. The initial target for the currency was assisting in the lack of waste management. Hundreds of tonnes of waste were being piled in the informal settlements with no practical means of removal, causing a serious health and environmental hazard (Henry 2006). Paying residents with Eco-Pesa to assist in waste collection provided a cost effective means of removing the waste while also getting the entire community involved. Once received by residents, Eco-Pesa could then be used at local small businesses in the community, who in turn could continue using it at other businesses, thus creating local circulation and boosting local trade. After collecting 20 tonnes of waste from the community, the programme began youth-led tree planting operations, paid for using Eco-Pesa, to assist in local reforestation and beautification.

The design and model used for implementation was developed by the author, while implementation was done in co-ordination with Eco-Ethics International Union, Kenya Chapter (Eco-Ethics), a registered Kenyan Non-Governmental Organization since 2002. Eco-Ethics provided local presence, a programme officer, a local office and 50% of salaries. The model was a synthesis of three complementary currency programmes; One found in Berkshire Massachusetts, United States of America, and the other two in Curitiba and Palmeras, Brazil. The Berkshire model (Witt 1995) was initially selected because it targeted local businesses and provided a discount on the currency as a means of introduction; The Curitiba model (Karis 2006) was selected because of its impact on unemployment and waste management; and the Palmeras model was selected because of its effectiveness in providing development to low income areas and its integration of micro-finance (Freire 2009).

Design and community assessment began in May 2010; while circulation of Eco-Pesa began in August 2010. This study details the programme's design, implementation and results through November 2010. The programme was carried out in three neighbouring informal settlements, also called villages or slums, of Kongowea, Kenya: Kisumu Ndogo, Shauri Yako and Mnazi Mmoja. Community mem-

bers of the three villages, live under extremely impoverished conditions. Businesses in the area experience low amounts of local trade, inability to obtain loans, and residents suffer from unemployment and lack of social services such as waste management (Rakodi 2000).

2. RELEVANCE

"Development doesn't only entail the acquisition of material things, although everyone should have enough to live with dignity, without fear of homelessness and starvation. Instead, it is a means of achieving a quality of life that is sustainable and of allowing the expression of the full range of creativity and humanity."

Nobel Peace Prize winner, Wangari Maathai (2009).

By this definition, Eco-Pesa can be seen as a development effort to empower impoverished people to increase their incomes in a manner that provides for public health and environmental conservation. It can also be seen as part of a global effort to realize the Millennium Development Goals (Jensen 2010), specifically: MDG 1. Eradicate extreme poverty and hunger, was addresses through increases in income and trading in informal settlements; MDG 6. Combat HIV/AIDS, malaria, and other diseases, was addresses through community sanitation by waste collection; MDG 7. Ensure environmental stability, was addressed through reduction in waste burning and tree planting.

While complementary currencies have been attempted in impoverished areas in the past, their use in the context of informal settlements is a neglected area of research. The benefits of such a programme to impoverished residents may lead to solutions for alleviating endemic poverty. Finally, complementary currencies have the potential to ensure that aid money remains in target communities.

2.1. Economic Development

The fairly recent adoption of cash economies and capitalism in Africa has meant abandoning old cultural norms of living in harmony with nature and the beginning of foreign concepts such as owning, destroying and denying access to the environment (Maathai 2009).

This loss of the cultural importance of harmony with nature is strikingly apparent in slum life, where many residents struggle daily to provide for themselves and their families. Residents in the Kongowea informal settlements are often living on less than \$1 USD per day (Calverton 2010). In this context, just trying to pay one child's school fees becomes a daunting hurdle. These living conditions mean care for the environment is utterly not a priority. Complementary currencies have the amazing ability to refocus a local economy, and to harmonize, by design, the relationship between a cash economy and the environment.

Kongowea comprises of fifteen villages. It was decided to work with the three most impoverished for the programme: Kisumu Ndogo, Shauri Yako and Mnazi Mmoja (Rakodi 2000). Over a quarter of residents are either unemployed or underemployed in Mombasa District (of which

Kongowea is a Location) (Rakodi 2000) and, in the settlements targeted, this percentage fluctuates up to 80%. While there are many people without regular work in slum areas, there are local goods and services that residents can offer one another, such as: water, knowledge sharing, child care, garbage collection, local transport, haircuts, laundry and general cleaning. Unfortunately, because of a lack of national currency and local networking, these services are not being exchanged regularly, creating an under-utilization of local trade. This is shown in Illustration 1, in which the national currency enters into the community through residents who earn an income from outside the community. These residents then purchase goods and services locally. Once money reaches businesses or youth it rapidly finds its way back out of the community, leaving underutilized local trading and labour.

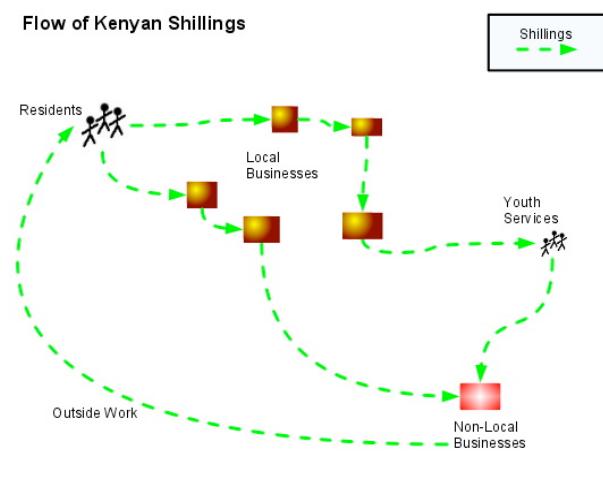


Illustration 1: Flow of Kenyan Shillings

2.2. M-PESA

Kenya was known for its early adoption of mobile phone banking using a digital complementary currency called M-PESA, by the telecommunications corporation, Safaricom. Much of the work implementing the Eco-Pesa programme was made easier due to residents' prior understanding and acceptance of M-PESA. Unfortunately, M-PESA was not being used as a regular medium of exchange in the target informal settlements because of the high price of mobile phones and high tariffs associated with mobile phone banking (Hughes 2007).

2.3. Environmental and Health Problems in Informal Settlements

Informal settlements are the most densely populated areas in Kenya and are expected to more than double in population within the next ten years (Rakodi 2000). In slum areas traditional waste collection by the municipal council was either all but lacking, or impossible, due to extremely dense physical layouts and lack of funds (Henry 2006). As a result waste continues to pile to dangerous levels, affecting health

and the environment. Much of the waste that collects in slum areas comprises of thin plastic bags. These bags are often thrown away after a single use and cause a risk to domestic and wild animals that eat them. They also create ideal collectors for stagnant water, which breeds mosquitoes, increasing incidents of malaria. Stagnant water, mixed with waste and sewage, is also a breeding ground for cholera and other diseases.

Burning waste reduces their bulk by over 80%, with the remaining ash being dispersed by wind or rain. In the Kongowea informal settlements, it was common to find more than ten open burning sites existing within an area of less than 50 square meters. Unknown to the majority of Kenyans, such burning leads to the assimilation of toxic substances (Persistent Organic Pollutants many of which are carcinogenic, weaken the immune system and cause birth defects) by their bodies through different pathways such as inhalation and consumption of contaminated water and animal products (UNEP 2008).

In addition to being inundated with waste, the targeted settlements were nearly completely deforested. Maathai (2009) claims that Kenya as a whole is down to less than 2% forest cover. After trees are cut down, the land loses fertility and biodiversity, water supplies dry up and desertification increases (Maathai 2009).

2.4. Aid Money

Aid money may not only have an unsustainable positive impact, but may even contribute to the continuing instability of society and the creation of a culture of dependency (Collier 2008). Without communal reciprocity, donors come to be seen as merely gift givers. Today, donor aid is often met with an attitude that one does not need to be accountable for it (Maathai 2009). Accountability of funds, community involvement and decentralized local governance are all possible through the use of complementary currencies (Freire 2009).

3. METHODOLOGY

The Eco-Pesa programme began with three months of community discussions, research and awareness raising (for example, a role-play simulation was used to introduce the concept to potentially participating businesses and youth groups). Local businesses and youth groups then registered to participate in the programme and were invited to a workshop where they were given their first Eco-Pesa to use amongst each other for business to business (B2B) trade. They were given a discount upon purchasing Eco-Pesa for Kenyan shillings. They also were charged a fee upon returning the Eco-Pesa for shillings. The purpose of this period was to establish familiarity and acceptance within the business community. A flowchart of this period is shown in Illustration 2.

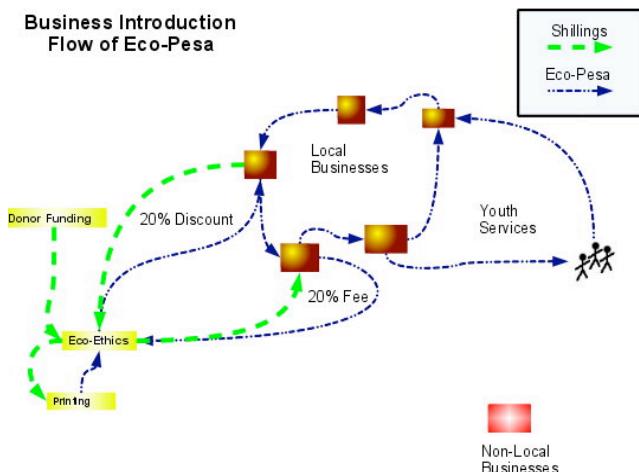


Illustration 2: Flow of Eco-Pesa, During Business Introduction

After one month the discount and fee were removed, thus making Eco-Pesa directly exchangeable with shillings. This was immediately followed by community-wide waste collection events, in which residents were paid in Eco-Pesa collected waste. After receiving Eco-Pesa the residents could then use the Eco-Pesa at any participating business in the community. The participating businesses could then use them among each other, to pay youth for additional services, or to return for shillings at a local exchange shop (marked as Eco-Ethics in Illustration 2 & 3). While continuing waste collection, community tree nurseries were also developed. This period is shown in Illustration 3. Photos (Ruddick 2010a) and videos (Ruddick 2010b) of these activities were also recorded.

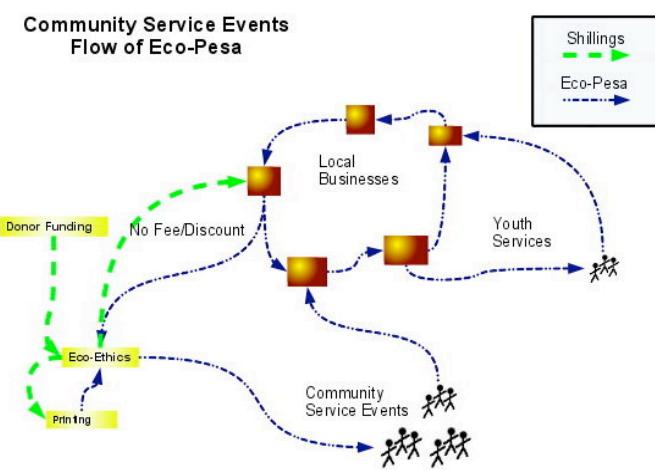


Illustration 3: Flow of Eco-Pesa, During Community Service Events

3.1. Activities

The following is a chronological break down and description of the different activities in Table 1.

Activity	Time line			Prep	Intro	Waste	Waste & Trees	Future Plans	
	M1	M2	M3	M4	M5	M6	M7	M8	M9
Community Discussions									
Currency Role Play									
Currency Design and Printing									
Work shop									
Monthly Community Meetings									
Business Trading and Data Keeping									
Local Exchange Shop									
Outreach									
Waste Collection Events									
Tree Nursery									
Micro-Finance Meetings									
Business Monitoring									
Micro-Finance Exchange Shop									
	2010	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
									Jan

Table 1: Schedule of activities

3.1.1. Community Discussions

The programme's first action was to meet with the village elders. Six formal meetings were held with community elders, leaders, business people, youth groups, the Kongowea Chief and the Mombasa Town Clerk.

3.1.2. Complementary Currency Role-Play

Thirty businesses and 20 youths in the community were invited to three in-depth trainings involving a role-play. During this role-play participants were given roles as various types of businesses. Coloured index cards with pictures were used to represent the various goods of the businesses. Another set of cards was used to represent service items, such as haircuts. Finally, two more sets of cards represented currencies: one for the national currency and one for the proposed complementary currency. The participants were given various goods and services they could sell and were asked to walk through a typical week of purchases and sales by trading with each other.

3.1.3. Currency Design and Printing

Youth selected by village elders were asked to design and choose local images for the different denominations of Eco-Pesa. A printer specializing in security features was selected. A month-long process of revisions produced a bill with slightly smaller dimensions than the national currency, ultraviolet ink, a watermark, and unique serial numbering. The type of paper used is generally for bank checks in Kenya. Denominations of 5, 10 and 20 Eco-Pesa were printed to match the denominations of coins or 'change,' in Kenya. The value of Eco-Pesa in the community was matched directly to Kenyan shillings, i.e. a 5-Eco-Pesa bill was worth 5 shillings.

3.1.4. Business Registration, Introductory Workshop and Trading

A village elder from each settlement assisted in the business selection process. Businesses were given a brief inter-

view about their knowledge of the programme and their type of business and were asked to complete a questionnaire. The questionnaire asked quantitative questions about their type of business, length of operations, contact information, registration and average monthly income. The questionnaire also asked businesses qualitative questions about what benefits they expected from the program. Registered businesses were then invited to a workshop where they were educated on the concept of the programme. The vouchers were introduced to them and they were given a training on local methods of environmental conservation, including: sack gardening, composting and the importance of solid waste management.

Local circulation between businesses and several youth groups that collect trash began immediately after the introduction. Each registered business received 50 Eco-Pesa as part of their registration fee of 200 shillings. They also received an Eco-Pesa sticker which stated 'Eco-Pesa inatumika hapa' (Eco-Pesa is used here) to advertise at their business. Finally, they received a booklet and pen and were asked to keep records of the Eco-Pesa they used. They were instructed to record what they purchased or sold with Eco-Pesa, with whom they transacted, the cost of items or services, the date, and finally the unique serial numbers of Eco-Pesa used.

3.1.5. Monthly Business Meetings

Meetings were held monthly with businesses to talk about how the programme was going.

3.1.6. Local Exchange Shop

The programme rented space inside Maweni Health Clinic (also a registered Eco-Pesa business), centrally located in Mnazi Mmoja. This shop was attended by staff on Wednesdays and Fridays, 9:00AM to 2:00PM. A sign was erected to advertise events centred on the shop. For the first month of circulation, registered businesses were offered a 20% discount upon purchase, (100 Eco-Pesa could be purchased for 80 shillings) at the local exchange shop. In addition, registered businesses could return Eco-Pesa for shillings at a 20% fee, (100 Eco-Pesa could be sold for 80 shillings). A maximum of 500 Eco-Pesa could be bought or sold per day per business.

3.1.7. Business Monitoring

After a month of trading 31 businesses were interviewed and again, after 3 months of trading 41 businesses were interviewed in Kiswahili and a questionnaire was filled out.

Quantitative questions included:

- What is your average monthly, weekly and daily income in shillings and Eco-Pesa?
- What is number and frequency of customers you get using Eco-Pesa?
- What are the names of the top three clients using Eco-Pesa and what do they purchase regularly?

- What is the number and frequency of purchases you make at other businesses using Eco-Pesa?
- That are the names of the top three other businesses where you spend Eco-Pesa and what do you purchase?
- Qualitative questions included:
- How do you experience the Eco-Pesa programme?
- Have you seen any changes to your business since the programme started (If so, what are they? If not, why?)
- Have you paid youth for services using Eco-Pesa. (If so, how? If not, why?)
- What recommendation do you have for the program?

3.1.8. Community Outreach

A community outreach was undertaken to raise awareness among residents about the programme, inform businesses of changes in the operations of the programme, and to prepare the community for a waste collection event.

3.1.9. Waste Collection Events

Events started with outreach using a public address system, speeches, youth-performed skits and music. Residents were given trash bags and asked to fill them with waste from public areas such as streets, alleys and fields. After returning a filled trash bag they were given a single 5-Eco-Pesa bill (worth 5 shillings) to use in the community. These events were done in coordination with the Mombasa Municipal Council who supplied trucks near the area and hauled the waste to a landfill.

3.1.10. Tree Nursery

Seeds were gathered locally, then planted in seed beds constructed and monitored by youth in the community. All of these activities were paid for using Eco-Pesa.

3.1.11. Micro-Finance Loan Preparation

Meetings were held with a local micro-finance bank for the purpose of offering loans to qualifying residents using a mixture of Eco-Pesa and shillings. The intention of the program was to hand over the local exchange shop operations to this bank in December 2010.

4. DISCUSSION

The charts and tables in this section represent three months of data, starting from August 11th, 2010 and ending on November 11th, 2010. Data sources include: exchange shop log books, serial numbers of each voucher coming into and going out of the exchange shop, business log books, business registration forms, business monitoring forms and interview questionnaires, and field reports.

4.1. Activities

After discussing the programme with the community, the Kongowea Chief and the Mombasa Town Clerk, and using a role-play simulation to educate residents and highlight various challenges in the programme, Eco-Pesa design and printing began. It was decided to print denominations of five, ten and twenty Eco-Pesa to match the denominations of coins in Kenya because of the small scale of currency introduction targeted. Another reason for the small denominations was to slowly build trust in the currency and also assure people that it would cost more to counterfeit the Eco-Pesa than it was worth. While only five damaged and unreadable bills were received back from residents, after three months of circulation the paper used for printing Eco-Pesa started to show serious signs of wear and a higher quality of paper is recommended for future printing.

During the first month of trading, awareness and understanding of the programme was a challenge. Interviewed businesses mentioned that some registered businesses were spreading false information to other businesses about the programme. Specifically these registered businesses told non-registered businesses that they could not use Eco-Pesa and that the programme was unhelpful. Some of these businesses were actively taking Eco-Pesa, saving them and returning them for shillings, while others simply did not understand the programme. Throughout the programme and especially at the beginning, awareness was lacking by both the general public and businesses. This improved greatly after waste collection events began and more youth involvement started.

The purpose of the introductory period, in which businesses received a discount for purchase and a punitive fee for exchange of Eco-Pesa, was to get local businesses acquainted with and adjusted to accepting and transacting in Eco-Pesa. The discount for purchase was intended to be an initial incentive and input of Eco-Pesa into the registered businesses. The fee was used to discourage businesses from exchanging it for shillings. Both purchases and returns of Eco-Pesa were utilized by only 20% of the businesses. When asked why this was the case during interviews, businesses explained that they did not understand or were worried about giving up their shillings. Some businesses were actively refusing Eco-Pesa. One interviewed business owner stated:

"I don't want to accept Eco-Pesa because I have no where to spend it and I can't afford a 20% fee on exchanging it for shillings."

After the discount and fee were removed and Eco-Pesa was input into the community through social service work, businesses' acceptance increased. The first business monitoring, after a month of circulation, showed that only 26% (8) of the 31 businesses interviewed noticed positive increases in customers and monthly income. One interviewed business owner stated:

"There has been little change. More people need to know about Eco-Pesa"

The second business monitoring, after three months of circulation, showed that 80% (32) of the 41 businesses interviewed noticed changes in their businesses, showing on average a 22% increase in monthly income and a positive increase in customers (Figure 1 & 2). Youth in the community also expressed that they were getting more work and had a higher morale due to the programme. Two interviewed business owners expressed:

"Eco-Pesa has brought the youth together and cleaned our village and brought work for the youth."

and

"I am happy to pay youth to collect my trash, to clean and to carry water using Eco-Pesa. It has given the youth much more work here."

While there was initial resistance to the programme this all disappeared after waste collection events started. Businesses were then eager to accept Eco-Pesa and had begun to trust its value. Both residents and businesses took pride in having their own currency. The programme has also created a stronger and more positive community identity. People from outside the target area have come to know about the three villages of Mnazi Mmoja, Shauri Yako and Kisumu Ndogo in a positive light through Eco-Pesa. Other communities have also expressed interest in bringing the programme to their areas. One interviewed business owner stated:

"I have gotten more customers for my business even when they don't have shillings. I am very honoured. People all around know something special is happening here"

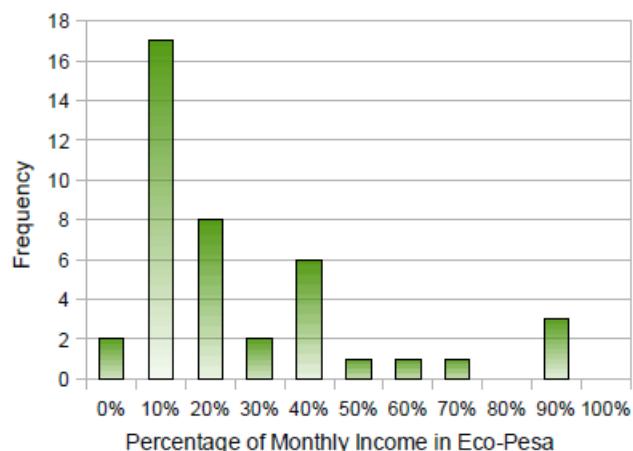


Figure 1: Percentage of Monthly Income in Eco-Pesa of Registered Businesses

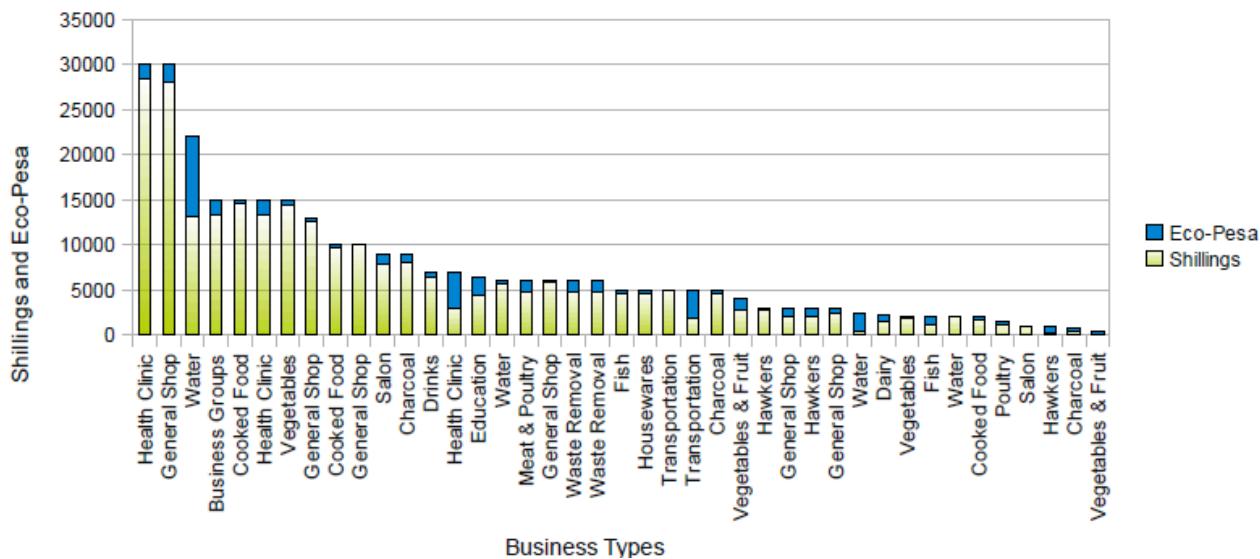


Figure 2: Monthly Income in Shillings and Eco-Pesa of Registered Businesses

While no official governmental acceptance has been given to Eco-Pesa, the Head of National Payment Systems of the Central Bank of Kenya was consulted on several occasions and offered no legal resistance to the programme. In order to avoid legal issues, an amount of Kenyan shillings equal to the amount of Eco-Pesa in circulation was kept in reserve at all times by Eco-Ethics. These reserve shillings were used as backing when residents wished to exchange their Eco-Pesa for shillings.

4.1.1. Waste Removal

Twenty tonnes of trash was removed from the community. This waste was being burnt daily causing the release of toxic fumes and was also contributing to annual outbreaks of cholera and other illnesses. Over one thousand local residents, mostly youth, were mobilized using Eco-Pesa to collect waste. Each resident was paid five Eco-Pesa for each bag of waste he or she filled. The Eco-Pesa was then used by the participants for various purposes, such as those shown in Figure 2. On September 17th, 2010 the first trash collection event was held, in which the community collected 4 metric tonnes of waste, in 500 polythene bags, averaging eight kilograms each. On October 16th, 2010 the second trash collection event was held, in which the community collected 16 tonnes of waste, in 2000 polythene bags, averaging eight kilograms each. This waste was hauled away in part by trucks delivered by the Municipal Council of Mombasa and also by youth with handcarts to a local landfill. These events also included outreach and were effective in expanding awareness of the programme.

These events were a temporary solution to removing the bulk of waste collecting in the informal settlements. Continued waste collection was being done by youths in the community on a daily basis. The Eco-Pesa program pro-

moted local residents and business owners to pay youth with Eco-Pesa.

4.1.2. Tree Planting

Three seedbeds have been built by youth in the community and nine more were in the process of being built. The goal was to plant 12,000 trees by 2012 in the community and surrounding areas, to create shade and beauty. Specifically, planting trees in cleared informal dumsites was targeted to promote residents to collecting and properly disposing of waste. Seedlings were also to be sold to neighbouring areas as an income generating activity for local youth.

4.2. Economic Development and Funding Accountability

Over a three month period 26,400 Eco-Pesa (\$352 USD) was introduced to the community (Figure 3), facilitating an estimated 313,200 shillings (\$4,176 USD) worth of trading (Table 3). Since this trading was limited to the informal settlements it brought more business to small shops who made on average only \$5 USD daily (Table 2). Funds input to the community in the form of Eco-Pesa could be tracked moving from Eco-Ethics to community residents, who would then use the Eco-Pesa to purchase goods and services. Some of these transactions (10%) were tracked through business log books. Finally when a business returned Eco-Pesa to the local exchange shop for shillings the type of businesses and clients of the business were recorded. While 100% accountability of each transaction was not possible, this is an improvement on most development funding models where funds are traced through forgeable receipts and not limited to a local area.

One of the effects of Eco-Pesa was to encourage general trade, chronically underutilized in the three villages, and facilitate business to business trade, both of which were weak due to the sparsity of shillings. This is illustrated by the increased amount of local trading in Illustration 3, as opposed to Illustration 1. During the programme, a com-

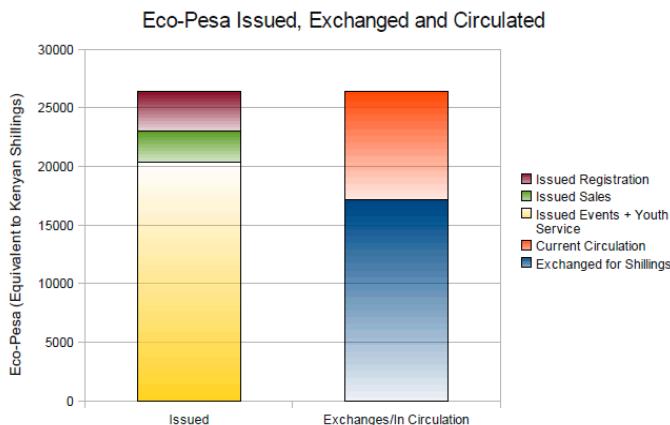


Figure 3: Eco-Pesa Issued, Exchanged and Circulated

mon situation was one where one business owner might seek specifically to pay with Eco-Pesa for another business' goods or services because she or he believed that the other business' owner was likely to come back to her or him to spend the same Eco-Pesa later for other services, hence creating a barter loop and a future customer. One business owner stated:

"I am happy because the Eco-Pesa I spend comes back to me."

Another common situation was one where a group of three or more businesses used Eco-Pesa as a means of recording barter between them on a more frequent basis than they had when using the national currency, since the national currency was harder to find, because of the ease of its flow out of the community as in Illustration 1.

Incomes	Average		Standard Deviation	
	KSH	USD	KSH	USD
Monthly	11369	\$152	12226	\$163
Daily	367	\$5	394	\$5
Age	Average		Standard Deviation	
			41	12
Gender	Female		Male	
			35	40

Table 2: Registered Business Owner Demographics from Registration Data

Eco-Pesa created cash-on-hand that continued to circulate in the community. Businesses claimed a noticeable increase in clients and monthly income due to the Eco-Pesa programme (Figures 1 & 2). Several businesses, as well as youth using Eco-Pesa, have seen it as a way for them to save, by storing their shillings and using Eco-Pesa for their daily needs. One interviewed youth stated:

"I use Eco-Pesa and save my shillings. I have never saved before now."

The few products produced in the informal settlements include: water (from private boreholes), firewood, eggs, locally brewed alcohol, soap, cooked foods. Other local sources of expenditure include services such as laundry, transportation and the cutting and styling of hair. The ratio of local to non-local goods and services exchanged by registered businesses for Eco-Pesa was 38% local to 62% non-local (Figure 4). The majority of returns of Eco-Pesa for shillings were in order to restock goods sold which originated from outside the community. This limited the amount of circulation and raised the need for many businesses to regularly exchange their Eco-Pesa for shillings. Interviews with businesses suggested that shillings left the community through two major sources:

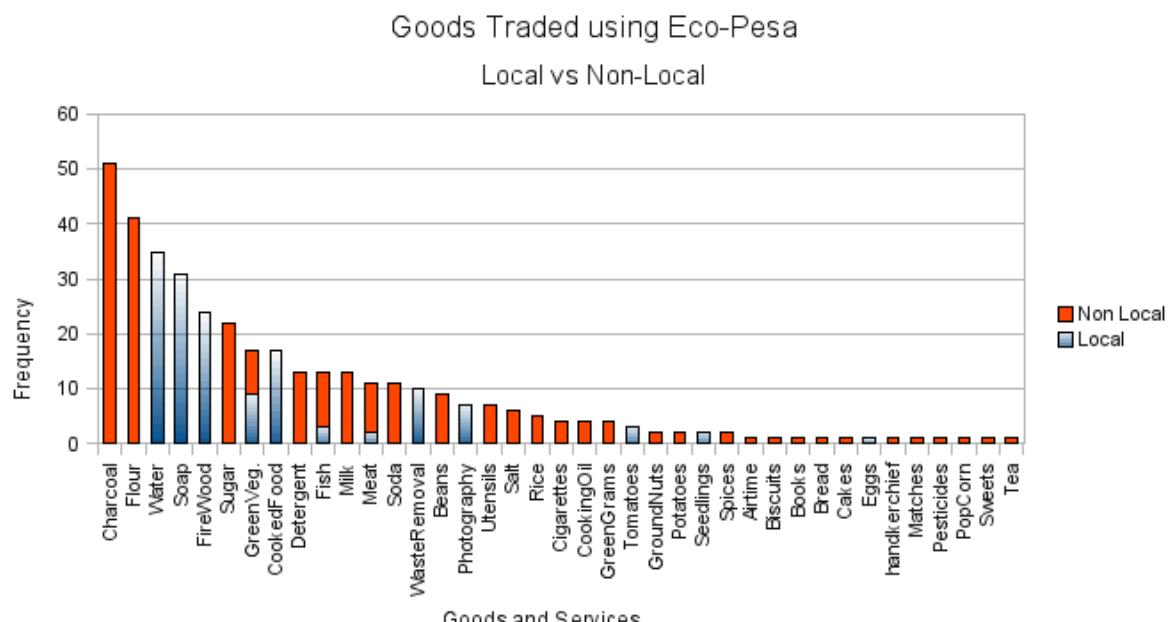


Figure 4: Goods and Services Traded with Eco-Pesa.

Foreign-run businesses: those whose owners live outside the community, bring in products from outside the community to sell, and return profits to where they live. According to residents, illegal drug use is a large source of outside-community spending.

Residents seeking goods that can not be found in the community, such as some detergents and spices.

4.3. Circulation and Trade

The line labelled In-Use in Figure 5, is the difference between the issued and exchanged Eco-Pesa. The slope of the linear regression in shown to be roughly 98 Eco-Pesa per day. This slope or rate of currency input, will be further referred to as the Acceptance Rate.

$$\text{Acceptance Rate} = \frac{\text{Inputs} - \text{Exchanges}}{\text{time}}$$

Two large increases in Eco-Pesa can be seen on September 17th and October 16th. These correlate to the dates of the waste removal events. Also correlated on Figure 9 is the amount of trading data from business log books scaled for visibility. Noticeable are spikes in local trading around event dates. The following downturn a week later after each event on September 24th and even more so on October 23rd signify that there was not enough incentive or availability for local trading to keep all of the input Eco-Pesa in the community, hence businesses returned much of it for shillings. Inputting Eco-Pesa any faster than the rate of roughly 2000 Eco-Pesa per month met strong resistance in the form of high numbers of returns for shillings. The Acceptance Rate was expected to increase as more businesses in the community accept Eco-Pesa, especially those that produced local goods and services.

Table 3 estimates the amount of trading taken place over a three month period using Eco-Pesa. The first form of calculation, on row five of Table 3, utilized data from business records. Businesses were asked to record daily details about the Eco-Pesa they used. This was a serious burden of time for businesses that saw considerable numbers of Eco-Pesa. As a result, only 23 of the 75 registered businesses kept records and out of these there was a considerable amount of missing data. Using this data it was found that an average of sixty Eco-Pesa were being exchanged daily by each business. Expanding this to all 75 businesses over a one month period yielded 126,000 Eco-Pesa (\$1,680 USD) being exchanged monthly in the community.

The second form of calculation, on row ten of Table 3, was done using data from interviews with 41 businesses. They were asked on average how much Eco-Pesa they used in a week. The average came to 276 Eco-Pesa. Expanding this to all 75 businesses over a one month period gives 82,800 (\$1,104 USD) Eco-Pesa being exchanged monthly in the community.

The average of these three methods gives us 313,200 Eco-Pesa (\$4,176 USD) worth of local trading in three months. 77% (20,325 Eco-Pesa) of the input Eco-Pesa was issued through service events (Figure 3). The remaining 23% (6,075 Eco-Pesa) of input Eco-Pesa, issued through Eco-Pesa sales and registrations, was a replacement of the national currency already existing in the community. So while a large amount of Eco-Pesa circulated in the community, some of this trading would have happened regardless of the programme but would not have been limited to the local area.

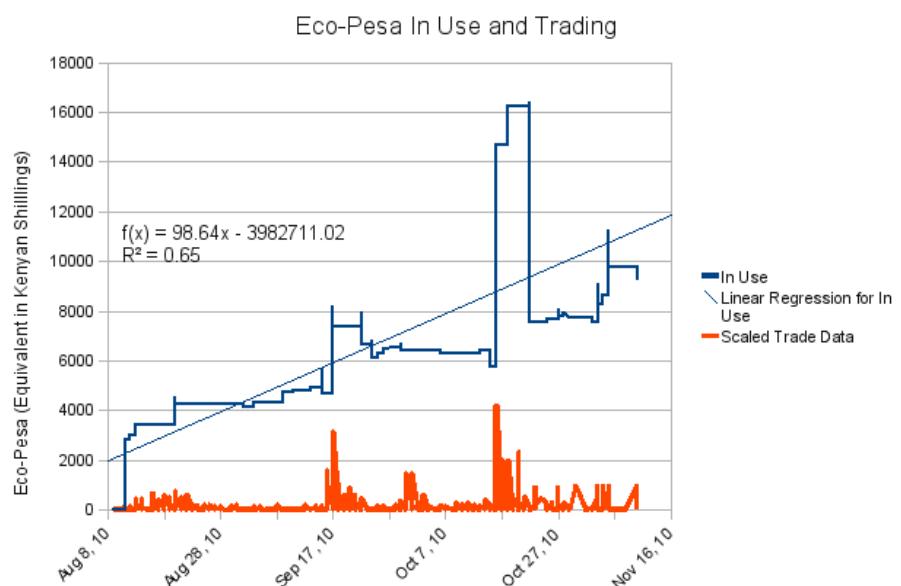


Figure 5: Eco-Pesa in Circulation (blue-above) and Scaled Trade Data (red-below).

#	Trading Facilitated		
1	Business Records: (23 Businesses 413 entries)		
2	3 Month Total	Avg Daily Trading / business	stdev.
3	13,145	60	97
4	* Daily 75 Businesses	* Weekly Trading /75 Businesses	* Monthly
5	4,500	31,500	126,000
6	Monitoring Data: (31 Business Interviews)		
7	Total Trading / week	Avg. Weekly Trading / Business	stdev.
8	8,825	276	417
9		* Weekly Trading /75 Businesses	* Monthly
10		20,700	82,800
11	Logs: (1239 Log Entries and Records)		
12	# of 5-Eco-Pesa Issued	Sub-total	
13		2,400	12,000
14	# 10-Eco-Pesa Issued	Sub-total	
15		450	4,500
16	# 20-Eco-Pesa Issued	Sub-total	
17		495	9,900
18	Total # Vouchers Issued	Total Eco-Pesa	
19		3,345	26,400
20	* Avg. # of Trades / Voucher	12	
21	TOTALS	KSH	USD
22	* Avg. Monthly Trading	104,400	1,392
23	* Avg. Trading (3 Mon.)	313,200	4,176

* = Estimations

Table 3: Trading Facilitated with Eco-Pesa

Finally, on row 20 of Table 3, the exchange shop log book and the results from the above calculations were used to determine how many times on average an individual Eco-Pesa was used. On average an Eco-Pesa voucher was found to have been used 12 times. This number was continuing to grow as Eco-Pesa stayed in circulation.

4.4. Cost Analysis

A total of \$4,698 USD was spent (Table 4) implementing this programme. This was considerably less initial funding than other similar programmes, such as Rubem Burta's complementary currency in Brazil. The Rubem Burta programme, started on a budget exceeding \$50,000 USD and showed only a 10% raise in the incomes of 69.2% of participants, over a 3 month period (Carneiro de Silvia 2005).

4.4.1. Waste Removal

11,370 (Eco-Pesa) (\$152 USD) and 17,500 shillings (\$233 USD) for a total of 28,870 shillings (\$385 USD) was spent on trash collection events. The cost of hiring a company to remove 20 tonnes of waste from an informal settlement can be estimated at roughly 50,000 shillings (\$700 USD). Not only were these activities done with less cost than using traditional paid labour, but by mobilizing hundreds of residents to do this work it was finished in two days, taking a

total 6 hours. All the Eco-Pesa going to pay the residents in turn was spent at local small businesses.

4.4.2. Tree Planting

After an investment of 3,000 Eco-Pesa, three tree nurseries had been started and trees were beginning to germinate. Ten local youth were responsible for this project and were being paid entirely in Eco-Pesa. Nine more nurseries were planned, targeting 12,000 trees of indigenous varieties.

4.4.3. Community Trading

A total of 26,400 Eco-Pesa (\$352 USD) worth of Eco-Pesa was input to the community. This Eco-Pesa circulated in the community, facilitating an average of 313,200 Eco-Pesa (\$4,176 USD) worth of local trading (Table 3). Results from business interviews show that this trading resulted in increased employment for youth in the community as well as increased incomes for small businesses. As of November 10th, 9,280 Eco-Pesa (\$124 USD) was still in circulation and expected to increase through additional social service events.

4.4.5. Community Involvement, Education and Moral

Beyond the 75 registered businesses there were more than 25 other businesses participating by accepting Eco-Pesa. Twenty community youths were given waste management and tree planting training. Over 2000 residents, including over 500 children were mobilized to collect community waste.

4.4.6. Eco-Pesa Voucher Printing

The cost to print each voucher was 4.25 shillings. The initial batch printed contained 5,000 5-Eco-Pesa vouchers, 2,500 10-Eco-Pesa Vouchers and 2,500 20-Eco-Pesa Vouchers for a total of 10,000 vouchers with a value of 100,000 Eco-Pesa, at a cost of 42,500 shillings (\$566.67 USD) to print. After three months of circulation only 3,500 vouchers had been issued. The remaining Eco-Pesa vouchers were to be used to replace the vouchers which showed signs of wear and to expand the programme.

5. RECOMMENDATIONS

The Acceptance Rate shown in Figure 5 will only continue to climb if there is a regular input of Eco-Pesa into the community. If a steady input of Eco-Pesa into the commu-

Expenses	Description	Ksh	\$USD
1 Transport & Incidentals	Bi-weekly transport for two people	18,000	240
2 Salaries	Two part-time staff members 6 months	90,000	1200
3 Workshops & Meetings	Meetings for stakeholders and businesses	27,445	365.93
4 Outreach & Materials	Stickers, Banners, Stationary, etc.	84,000	1120
5 Community Events	Plastic Bags, Seedlings, equipment etc	55,000	733.33
6 Shop Rent	Monthly Rent for 3000	9,000	120
7 Voucher Printing	10,000 Vouchers were printed	42,500	566.67
8 Voucher Backing	Equal to the number of issued vouchers	26,400	352
	TOTAL	352,345	\$4,698

Table 4: Program Expenditure

nity continues, eventually the Acceptance Rate may decline to the benefit of residents. In this scenario the Acceptance Rate may decline as the local economy picks up and more national currency can be found flowing in the community. By creating healthy cash flows into and within the community, as well as increased employment, Eco-Pesa in the long run makes itself less needed. This anti-cyclical effect has been seen with the Swiss WIR complementary currency programme (Freire 2009). In the WIR programme it was seen that as the national economy increases there is less need for the complementary currency, and as the national economy decreases WIR exchanges pick back up. This implies that sustainability and success of the Eco-Pesa programme should be based on the long improvement to the community rather than the long term circulation.

Should Eco-Pesa stop being injected into the community the Acceptance Rate would eventually turn negative and all the Eco-Pesa would leave the community through exchanges for shillings. While the training, effects of activities and business networks would stay in the community, any dependency that was built on the events and presence of Eco-Pesa in the community would leave a gap in terms of employment, income and morale.

While the events were a success in terms of community participation and the removal of twenty tonnes of waste from the community, there was a large amount of Eco-Pesa exchanges for shillings following the second waste collection event on October 16th. Future inputs of Eco-Pesa into the community will seek to input only as much Eco-Pesa as the community can realistically hold, based on circulation statistics. In addition to inputs of Eco-Pesa being kept at reasonable levels, youth involvement should continue and grow.

In order to keep Eco-Pesa moving into the community, the programme had two long range prospects. The first was to continue to expand social service events in the community, including waste collection, a community dumpster and dump-truck, tree planting, area beautification, composting, and recycling. Funding for these activities would come from both local and international donors, as well as government funds for waste management. Because of Eco-Pesa's ability to target a local area and increase trade and employment, aid money targeting reduction in poverty and assistance in informal settlements could be converted to Eco-Pesa to fund development projects in order to increase accountability. Increased partnership with the municipal government is also important because of the nature of the services Eco-Pesa supports. Included in this prospect was the hope to reach out to the tourist industry that surrounds the informal settlements. Domestic and international tourists, through partnership with local hotels and resorts, could change their money to Eco-Pesa and use it to buy souvenirs from the local area.

The second prospect is a partnership with a local micro-finance bank. This bank would issue Eco-Pesa as a part of a loan, and receive interest, as well as charge membership and possibly exchange fees. The proposed flow of Eco-Pesa

in this system is shown in Illustration 4. The Eco-Pesa vouchers themselves could be used as a branding opportunity in order to bring in more banking clients. Using Eco-Pesa for loans may also increase return rates, by assisting in the economic development of the community. Loans could also be targeted toward creating more environmentally conscious local products, such as funding the local charcoal suppliers' conversion to using cleaner briquette technology.

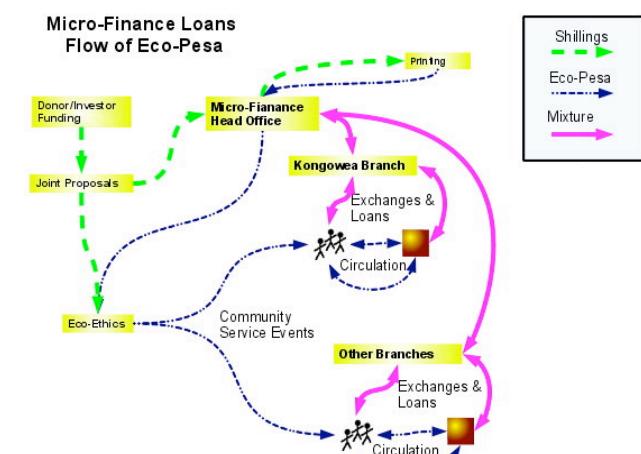


Illustration 4: Flow of Eco-Pesa, Proposed Introduction of Micro-Finance

Efforts were under way to continue service events as well to begin a micro-finance programme where businesses would receive loans using a mixture of shillings and Eco-Pesa. Because of the relatively cheap cost of implementation, expansion of the Eco-Pesa programme was also being considered. The three villages where Eco-Pesa has been adopted have a population of roughly 20,000 people and are part of a much larger Kongowea Location consisting of over 106,000 people (Calverton 2010). Continued study of the Eco-Pesa programme is highly recommended. There are also dozens of other very large informal settlements in Kenya that need social services like trash collection and an increase in local trade and employment. Similar programmes could be attempted in both impoverished rural and urban communities. There is also a need to investigate and implement other complementary currency models such as time banking and mutual credit systems.

6. CONCLUSION

Through a community-based effort, a complementary currency was developed and introduced to over 75 businesses, and over 20,000 residents, in three neighbouring informal settlements. Eco-Pesa, was introduced to businesses to facilitate local trading, and to community members and youth groups to foster community service work. By inputting the equivalent of \$352 USD worth of Eco-Pesa into the community, \$4,176 USD worth of trading was facilitated through local circulation. This increase in local trade resulted in a 22% average increase in net monthly incomes of participating businesses.

The Eco-Pesa programme has shown that by creating a complementary currency as a voucher for the national currency, funds targeted at local development could be encouraged to remain in circulation within the community. Funds spent on local activities could be tracked facilitating transactions between local residents and businesses. Eco-Pesa also provided a cost effective means of mobilizing community efforts for waste collection and tree-planting operations. While the data from this evaluation was based on only three months of circulation, the programme showed clear signs of increasing small business incomes and provided increased employment for local youth.

Eco-Pesa was an attempt to harmonize, by design, the relationship between a local cash economy and its environmental base. Eco-Pesa created direct incentives for residents to take an active role in conserving and improving their surroundings and boosted the local economy in a cost effective and scalable manner. Based on the results of this study, the Eco-Pesa complementary currency programme has demonstrated promising innovative approaches to promoting development in impoverished informal settlements, warranting further implementation and research.

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