Electric tricycles for recyclable material collection
**TECHNICAL TEAM**

Project RE-CICLO  
Fortaleza (CE), 2020/2021

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¹ Through the Contract nº 21/2020/SCSP, whose objective is to acquire electric tricycles for use in the social program E-Catador in the Municipality of Fortaleza, Ceará, which also includes the mechanics repair workshops.

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Collectors are professionals that collect solid waste such as plastic, cardboard, aluminum, and PET bottles from city streets. In general, the material is transported in carts that they pull along their collection routes. They perform a fundamental role in the chain of solid waste management and are responsible for 90% of all the reusable or recyclable material collected in the country. The increased lifetime of landfills and the supply of the recycling industries instead of using raw materials can be attributed to them as a result.

Although the professional activity of the collectors is recognized by the Ministry of Labor and Employment since 2002, they are a vulnerable group, working under fairly precarious conditions and receiving low pay.

Re-ciclo is a project implemented in the city of Fortaleza since 2020 that replaces the carts of collectors from Accredited Associations with electric tricycles. This change impacts the workers’ self-esteem, brings benefits to their health, provides greater visibility and safety in the streets, and increases their income while increasing their carrying capacity and ability to go farther while exerting less energy.

This document presents the results of the implementation of this pilot project as well as its challenges and lessons learned. It can also serve as a basic manual for replication in other cities in Brazil and around the world.
Located in the northeast region of Brazil, Fortaleza is the capital of Ceará. With a tropical semi-humid climate featuring a rainy period between the months of January and April, the coastal city is surrounded by large dunes and a green ocean. It has a population of just over 2.6 million inhabitants distributed across an area of 314km². It is the fifth-largest city in Brazil population-wise and the capital with the largest demographic density in the country, estimated at 8,290 inhabitants per km².

The capital of Ceará represents the largest economy in all the Northeast of Brazil with the largest Gross Domestic Product GDP. According to a survey released by the Brazilian Institute of Geography and Statistics (IBGE) in December 2020, Fortaleza comprises 1% of Brazil’s GDP. The services sector corresponds to the largest portion of wealth produced in the capital (70%), approaching R$40.3 billion, highlighting in particular the city’s educational services.

The capital remains one of the ten largest urban concentrations in Brazil, alongside the cities of São Paulo (SP), Rio de Janeiro (RJ), Brasília (DF), Belo Horizonte (MG), Porto Alegre (RS), Curitiba (PR), Campinas (SP), Salvador (BA) and Recife (PE), a list that comprises around 42.5% of GDP.

Introduction
Project Re-ciclo

Project Re-ciclo has three objectives:

- Improve the collectors' quality of life and work;
- Improve the rate of recycling in the city;
- Test the use of tricycles in the collection of recyclables and urban logistics.

Re-ciclo was submitted by the City Hall of Fortaleza in 2018, via the Secretary of Conservation and Public Services (SCSP) in partnership with the Development Bank of Latin America (CAF) and the Transformative Urban Mobility Initiative (TUMI). Fortaleza was selected by TUMI as one of ten award-winning cities, with the City Hall of Fortaleza celebrating a technical cooperation agreement with the German Agency for International Cooperation for Sustainable Development (GIZ), TUMI’s coordinating institution, which provided the technical and financial assistance to ensure the project’s viability. The Project has been implemented by the Science, Technology and Innovation Foundation of Fortaleza (CITINOVA).

In a year and a half of implementation, the project delivered 16 tricycles, in 12 accredited associations, totaling 31 benefited collectors. The project is beginning a second phase in which it will deliver another 31 tricycles. Of these, some vehicles will be used toward selective collection in the municipality.

In addition to the tricycles, the project also provided Personal Protective Equipment (PPE) such as boots, gloves, masks, goggles, hats, pants, and shirts, as well as first aid kits for the tricycles.

Training workshops were offered in:
- Following the collection routes
- Adapting to the tricycles
- Communication
- Basic mechanics
- Health and Safety at Work

Bicycles in Fortaleza

The Fortaleza City Hall has been incentivizing the use of bicycles as a means of transportation since 2013, when there were only 68 km of bike routes in the city and a bike lane network of 4,400 km. Today, the municipality contains 406 km of connected and continuous bike routes, an increase of around 436%.

In addition, the city possesses a bike-share system, Bicicletar, with 192 stations (estimated to reach 350 stations by 2024) in 61 neighborhoods for a total of around 1,200 bicycles — the largest number in Brazil. Since its inauguration in December 2014, the system brought over 3.6 million trips and has registered more than 280,000 people.

Cyclogistics is a reality in Fortaleza. According to the study, Origin and Destination of Fortaleza (PASFOR 2019), the tricycles and bicycles accounted for 17% of all freight trips carried out in the city with around 30kg in their luggage on average per ride.

Solid waste in the capital of Ceará

The city of Fortaleza does not use selective collection. Around 80% of the reusable or recyclable waste that is collected in the city, is picked up by collectors. In 2019, 8,156.8 tons of recyclables were collected. In addition to individual door-to-door selective collection initiatives, there is also a network of 90 Ecopoints that offer the benefit of a discount in the energy bill or credit on a social card for donors of recyclables.

The collection fee for household trash in the municipality reaches 100% of the population, however door-to-door selective collection is only 13%.
THE COLLECTORS

There are around 800,000 active collectors in Brazil, according to estimates by the National Movement of the Collectors of Recyclable Materials (MNCR). Women represent 70% of this category, responsible for collecting 90% of all recyclable waste in Brazil.

Despite the essential service that they provide, the collectors form a marginalized group in society. Many stigmas float around them; when they are not invisible to the eyes of the population, they are seen as dirty, sick and violent. Many of them live in the streets. These professionals walk the streets collecting materials, selling them to passersby, or placing them directly in recycling bins.

One of the guidelines of Re-ciclo from the beginning has been to only accredit professionals linked to the collectors’ associations, communal societies where, generally, the workers associated with it equally share the profit from the materials collected.

This guideline is in accordance with the National Policy of Solid Waste (Law No. 12.305/2010), that encourages the organization of the collectors in associations; it recognizes that reusable and recyclable waste are a good with societal value that generates work, revenue, and promotes citizenship and further proposes the recognition of the collectors as professionals responsible for selective collection, sorting, processing, commercialization, and recycling of reusable materials.

Working with accredited collectors also enables the collection of data regarding the use of tricycles and the collection that takes place.

The survey of socio-economic data made by Re-ciclo is the first of its kind in the city. It discovered that the member collectors have the following profile:

**COLLECTORS’ PROFILE**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>58%</td>
<td>men</td>
</tr>
<tr>
<td>42%</td>
<td>women</td>
</tr>
<tr>
<td>61%</td>
<td>are over 40 years old</td>
</tr>
<tr>
<td>14%</td>
<td>white</td>
</tr>
<tr>
<td>3%</td>
<td>white</td>
</tr>
<tr>
<td>59%</td>
<td>mixed race</td>
</tr>
<tr>
<td>24%</td>
<td>black</td>
</tr>
<tr>
<td>52%</td>
<td>married or in a common-law-marriage</td>
</tr>
<tr>
<td>75%</td>
<td>have low level of education</td>
</tr>
<tr>
<td>78%</td>
<td>receive up to half of minimum wage</td>
</tr>
<tr>
<td>74%</td>
<td>have children</td>
</tr>
<tr>
<td>75%</td>
<td>own a cell phone and of that 75% are smartphones</td>
</tr>
<tr>
<td>30%</td>
<td>have some kind of chronic illness</td>
</tr>
<tr>
<td>67%</td>
<td>have experienced some kind of work-related accident</td>
</tr>
<tr>
<td>100%</td>
<td>electric energy</td>
</tr>
<tr>
<td>96%</td>
<td>water pipelines</td>
</tr>
<tr>
<td>33%</td>
<td>public sewage</td>
</tr>
<tr>
<td>96%</td>
<td>collection of solid waste</td>
</tr>
<tr>
<td>100%</td>
<td>bathroom</td>
</tr>
<tr>
<td>96%</td>
<td>refrigerator</td>
</tr>
<tr>
<td>38%</td>
<td>washing machine</td>
</tr>
<tr>
<td>85%</td>
<td>satisfied with their profession</td>
</tr>
</tbody>
</table>

78% receive up to half of minimum wage

74% have children

85% of the collectors are satisfied with their profession

100% have electric energy

96% have water pipelines

33% have public sewage

96% have collection of solid waste

100% have bathroom

96% have refrigerator

38% have washing machine
03 Planning the Project
Context

To understand the reality of the collectors, the SCSP technical team conducted on-site visits and meetings with representatives of the associations between the months of June and August of 2019.

Aiming to identify the main demands among the workers and within the sector required understanding the way in which the professionals work, the main materials collected in the city, how much is earned, how the production line works in the associations, the social issues they face, and more.

Through these visits and the secondary data research about the recycling sector in the country, a work plan was developed and presented to the associations in a round table to verify if it met the needs of the collectors and associations.

Establishing the Legal Framework - The importance of public policy

Article 10 of the National Solid Waste Policy, Law No. 12.305, of August 20, 2010, charges the municipalities with the integrated management of the solid waste generated in their respective territories. In accordance with the aforementioned law, the prioritization of the implementation of selective collection is outlined, with the participation of cooperatives or other forms of association of collectors of reusable and recyclable materials formed by low-income individuals.

As such, and in celebration of the agreement with GIZ, the Municipality of the city of Fortaleza instituted Law No. 10.975 on December 20, 2019, which established the social programs E-Carroceiro and E-Catador in Fortaleza, to support the cart drivers and collectors with the following objectives:

1. To develop actions that aim to encourage the correct allocation of solid waste in the municipality of Fortaleza;
2. To improve the sanitary conditions of the cart drivers and collectors that work with solid waste in Fortaleza;
3. To facilitate cart drivers and collectors’ access to adequate equipment for conducting their services;
4. To provide low-income cart drivers and collectors with equipment that will facilitate the transportation of materials in the city of Fortaleza;
5. To propose means for enabling cart drivers and collectors to generate income;
6. To collaborate the improvement of the cart drivers’ and collectors’ quality of life.

The accreditation of the associations in the Program E-Catador occurs through complementary norms (ordinances) that establish conditions for it.

In this way, the City Hall of Fortaleza has created an environment for evolving the Reciclo Project while working with the Associations of Collectors in the capital of Ceará.
The starting point for establishing the tricycle’s specifications was a market survey and look into projects in Brazil similar to Re-ciclo. A supplier and model were found and adaptations were solicited based on the necessities reported by collectors, such as the dimensions of the cart.

Initial considerations had the project offering mechanical vehicles and some electric vehicles. The electric vehicles would be designated for those working in neighborhoods with uneven topography and elderly collectors with reduced mobility or who traverse long distances on a daily basis. The proposal, however, was quickly adjusted during tests conducted with the mechanical prototype in one of the accredited associations.

In a few excursions with the collectors, it was found that although Fortaleza is a relatively flat city, when the mechanical tricycle is loaded, it becomes heavy and it is difficult to pedal and perform routine maneuvers like navigating curves and avoiding small obstacles in the road. After a test with an electric prototype, it was thus decided that all the tricycles delivered for the project would be electric with assisted pedaling.

The initial delivery to the associations consisted of 15 tricycles. The technical team monitored the use of the vehicle weekly, compiling collectors’ insights as well as their use of the tricycle and its compatibility with their real demands. It was concluded that the tricycle’s specifications required adjustments: the cart had larger dimensions than necessary. This resulted in reduced maneuvering speed, difficulty in storing them in the associations’ warehouses, and difficult handling due to the weight. Furthermore, the tricycle’s electrical system presented technical problems (described in detail below).

After meetings with the collectors, the supplier and manufacturer of the tricycles opted for a more compact model, with the cart attached to the chassis — no longer connected — and a different type of electric motor, more common in the country. The new model was tested in an association and the results were very satisfactory.

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**TRICYCLE**

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**Technical specifications of the first tricycle model:**

1. Front wheel: rim 26
2. Rear wheels: rim 20
3. Manual seven-speed shifter
4. V-brake system
5. Rear wheels, disc brake
6. Rear wheels, disc brake
7. Rear axis of 15mm as a differential traction system capable of providing traction to each of the individual rear wheels to compensate the curves as a double-side traction differential
8. High-resistance shielded pivot system to attach the cart
9. Capacity of 200kg of material
10. Dimensions: 1.80m long x 0.70m wide x 0.97m high
11. Back door with lock
12. Solid rear wheel - 8-inch rim
13. Rear basket with box (measurements: 58 x 79 x 31 cm).
14. Electric motor
   - Maximum nominal power of up to 350 watts;
   - Maximum speed of 25 km/h;
   - Assisted pedaling
The supplier made a prototype to test a new cart model for use on the first tricycle, to positive results. According to the collector, the vehicle had increased agility, the battery had greater durability, and despite the smaller dimensions, it did not affect carrying capacity since they generally did not carry maximum capacity in the large cart.

**Technical specifications of the new tricycle model**

1. Front wheel: rim 26
2. Rear wheels: rim 20
3. Manual seven-speed shifter
4. V-brake systems
5. Rear wheels, disc brake

**Luggage basket**
- Width: 0.7cm
- Length: 1.10 meters
- Height: 1 meter

**Tricycle**
- Length: 2.70 meters
- Width: 0.92cm

**Specifications of the wire basket**
- Width: 56cm
- Height: 142cm
- Depth: 77cm

The structure of the box consists of a square profile with galvanized steel and black electrostatic paint containing an opening on the top and a rear-access door.
Establishing the project’s impact
(the indicators)

To evaluate the results of the project that will be presented throughout this document, a series of indicators were established based on the three objectives of Re-ciclo: social inclusion of the collectors, mobility, and recycling. There were many challenges, beginning with the absence of primary data regarding the collection of materials in the city. The pandemic further interrupted collection in the city in two instances, affecting the data. As did the challenges the collectors faced in utilizing equipment such as GPS.

Social inclusion
Socioeconomic information was gathered regarding the collectors connected to associations.

Mobility
Data about collectors who used carts was gathered via GPS first; those who used a tricycle had their data collected later. The survey was conducted through tracking, distance traveled, average speed, total collection time, and stops, as well as archives (shapes in .kmz format) of the routes traveled by the collectors. This data favors the survey of information for the baseline indicators and also as the base defining the routes followed door to door.

Recycling
The data surrounding the collection of recyclables was researched monthly, when several numbers were collected along with the associations. Among the data gathered was the type of material collected, the quantity sold by the association and by the collector, the weight collected by each worker, and the pay received monthly. Despite all of the difficulties of the survey, this data was unprecedented in the city of Fortaleza.

Defining the implementation processes in the associations

Three accreditation ordinances were published (Ordinance N° 028/2019, of December 26, 2019, Ordinance N° 046/2020, of December 14, 2020 and Ordinance N° 052/2021, of July 14, 2021) outlining criteria for the accreditation of associations and collectors in the project. Each association has a representative responsible for the tricycles. In general, it is the leader of the association that ends up signing the assignment documents as a legal representative. The collector who drives the tricycle also ends up being informally responsible.
Implementation of the project
Accrediting the associations and the collectors

After the publication of the ordinances of accreditation which occurred in three phases (three were registered in the first phase, five in the second, and four in the third), visits were initiated to the associations to present Re-ciclo, leadership, and the associates. The meeting took place in the form of a round table in which the Re-ciclo team listened to the history and the particularities of each association as well as their collectors and presented the activities of the project. As soon as the association responded positively, another visit occurred to collect data from the association and the collectors intended for accreditation. A questionnaire was also applied to survey the socioeconomic data that comprises the baseline of Re-ciclo data.

The initial idea was to distribute tricycles for each of the accredited collectors, but after the continued visits and experiences lived by the first three accredited associations, they opted to reduce the number of provided tricycles to two per association at first. The decision was based on the condition of the bicycle market, which has been fairly hot since the beginning of the pandemic, the lack of space to store the tricycle in the associations as well as the understanding that the change in collectors’ behavior would be one of the project’s challenges.

Changing from the cart to the tricycle

Through a local partner, the City of Fortaleza acquired two mechanical tricycles to be tested before purchase. Tests were conducted with the mechanical tricycle in the Aran association over the course of two months. In follow-ups with the collections and collectors’ and the collectors’ reports, the team found that the electric tricycles performed better.

The test with the mechanical tricycles revealed:
- The mechanical tricycle, though empty, had difficulty navigating curves in roads with an incline.
- When the tricycle was at half load, pedaling required a lot of force, especially when starting the ride. With a full load, the collector was often obligated to push.
- The collector was not able to pedal while climbing.
- The resistance to behavioral changes on the part of the collectors would be greater with the mechanical tricycle.
Map of the associations in Fortaleza

The 15 associations or groups of collectors of Fortaleza are, for the most part, located in neighborhoods in the outskirts of the city. In the map on the side, those accredited for Re-ciclo are denoted in light blue.

Legend
1 - Acores II
2 - Socrelpe
3 - Moura Brasil
4 - Viva a Vida
5 - Brisamar
6 - Maravilha
7 - Raio de Sol
8 - Mulheres em Cena
9 - Reciclando
10 - Aran
11 - Acores
12 - Ascabonja
13 - Rosa Virginia
14 - Rosalina
15 - Ascajan
Delivering the tricycles

The delivery of the tricycles to the associations proved festive. On the day of their arrival, members waited at the door for the delivery truck, and everyone helped to unload. The Re-ciclo team was always present. The consultant on the adaptation assembled the tricycle, showing each part of the tricycle and its functions. The delivery marked the beginning of all the other activities, relayed below in the order of implementation:

1 - Adaptation workshop
2 - Individual accompaniment workshop
3 - Basic mechanics’ workshop
4 - Health and safety at work workshop
5 - Communication workshop
6 - Door-to-door campaign

Training the collectors

One great outcome of Re-ciclo was the setup of training repair workshops both for the use and preservation of the tricycles as well as for the health and improvement of the quality of the work done by the collectors.

- Adaptation to the Tricycles and Road Safety — basic notions of safety for travelling in the streets with the tricycle and how to drive a tricycle;
- Route accompaniment — individual accompaniment of the facilitator to the collector in their daily collection route to promote greater driver safety and help in occasionally improving this route.
- Basic bicycle mechanics — training for the collectors to make them capable of conducting small repairs on the tricycle, like replacing and patching a tube, regulating the brakes and shift adjustment, and basic maintenance
- Health and safety at work — information to execute the work safely and how to avoid the most common illnesses and accidents among this class of workers
- Communication — training to enable the collectors in door-to-door campaigns along their routes and widen the actions in the region where they work
- Door-to-door campaigns — the day after the communication workshop, the team accompanied collectors to houses and businesses throughout the route to promote the association.
Communicating about the project: The strategy of the door-to-door campaign and the use of social media

Communication was a fairly important part of the Re-ciclo project. Beyond spreading word about the project, a main objective lay in getting the population more engaged in recycling and the correct disposal of solid waste. The door-to-door campaign has proven to be the most effective tool for the engaging residents in actions related to recycling.

Two campaigns were conducted in partnership with Ecofor, a company responsible for the public cleaning of Fortaleza. They provided four environmental agents, a car with a loudspeaker, and printed material for promotion. In the end, however, it was agreed that the collectors would continue to be dependent on someone else to conduct their campaigns. To give them more autonomy and empowerment, training for the collectors through communication workshops was arranged so they could better conduct their own campaigns. There were three campaigns in three associations, involving more than 30 collectors and volunteers.

Re-ciclo also had profiles created on Instagram and on Facebook to spread awareness of the project, narrate daily activities and implementation and discuss topics related to the objectives. The social media work became compromised by a temporary ban during the 2020 electoral campaign and later was suspended by a decision of the area of communication of the new municipal administration.

Communicating about the project: The strategy of the door-to-door campaign and the use of social media

Re-ciclo created a methodology for empowering the collectors to conduct communication activities in order to raise awareness among residents and business owners.

Territory
The campaign area is determined according to the needs of the group. It can be done on the existing route or expand the territory. From this point, the route to be done on foot is designated on the map, street to street to reach all the collection points.

Support materials
It is recommended that a document be created and delivered to houses and businesses; it should contain information about how to separate the collected items, the telephone number of the collector/association, and collection days.

Training the Environmental Agents (Volunteers)
The more people on the street, the more strength the campaign gains. The association should search for volunteers — besides member collectors perhaps their family members. All volunteers should undergo training. Each association can, if possible, find a way to pay the volunteers.

The Approach
The texts addressing the approach should be written with the help of the collectors. The information should be clear and concise. They knock on doors, identify themselves, pass the message, present the collector, Re-ciclo. Upon leaving, they deliver the folder and plan for collection.

In the street
The volunteers should be in uniform and wearing IDs. With two pairs on each block following the route, the approaches should be made in pairs. It is important to have a coordinator organize the work.

Spreadsheet
The volunteers should take note of the following in a spreadsheet: name, address, phone number (optional), and whether the resident joined the campaign.

Data
The association can use this information to plan the collection, create WhatsApp transmission lists, etc.
WORKSHOP FOR ADAPTING TO THE TRICYCLE AND TRICYCLE RIDING SAFETY
These two- to four-hour long workshops are conducted in groups, with a maximum of 5 collectors participating. As this is the collectors’ first contact with the tricycle and the instructor, it is interesting to know a bit of each person’s history with recycling to allocate the adequate amount of time to each collector in the practical part of the workshop.

PERSONAL PRESENTATION
The activity begins with a conversation circle, where the facilitator introduces himself or herself. At this moment, it should be highlighted what their relationship with bicycles, with recycling, and with the cities looks like and how they will support the progress of the instructions during the workshops.

PERSONAL PRESENTATION OF THE COLLECTORS AND PRESENTATION OF THE ASSOCIATION
Encourage the participants to present themselves in a quick and dynamic way, aiming to comment about the recycling work (time, satisfaction, challenges, etc.) as well as what to expect from the tricycle before beginning to use it. In the same way, one of the participants should present a brief history of the activities of the association.

PRESENTATION OF THE TRICYCLE
Brief explanation on “why use a tricycle” and the main advantages of using this vehicle in the streets of Fortaleza, which has been working to improve cycling traffic conditions for some time. Afterwards, explain the mechanical and electrical parts, quickly demonstrating how to use them and answering specific questions from the participants. During the practical portion, there will be more time to respond to the questions in more detail.

DRIVING PRACTICE
Adjust the seat height and position of the collector in the tricycle after responding to questions about the tricycle. Then begin the practical part...

1. Even before the collector gets on the tricycle, the collector becomes as comfortable as possible.

2. Explain the two secrets to driving the tricycle (always look forward and keep pedaling) and discuss the ways the tricycle responds to the irregularities of the road/street. Allow the collector to try the first rides without any intervention to gauge what initial difficulties will need to be corrected throughout the workshop.

3. Hold the handlebar to help guide the tricycle, not letting it “keep pulling on.” With the other hand, help provide strength, pulling the tricycle so that the collector does not need to push as hard on the pedals.

4. If the collector loses significant control of direction, it is quite likely that they are looking at the ground or front wheel. Whenever this happens, reinforce the two secrets (always look forward and keep pedaling).

5. Once you feel the collector has achieved control of the tricycle, try letting them ride the vehicle more freely and independently.

Attention:
Always respect the will of the collector on whether to continue the practical part. Ask whether the collector feels good or is physically tired. It is important not to force it or cause discomfort.
The big challenges
Challenges in changes in behavior

When it comes to replacing the human-driven cart with an electric tricycle, the collectors’ eyes light up. But when it comes time to make the exchange or at least test the change, the situation changes significantly. The majority of them feel insecure. Some collectors have never pedaled in their lives. And those that know how to will discover, upon riding, that driving this vehicle can be quite different than riding a bicycle. After learning to ride, they see the difference in the work routine. There’s a new posture in their body, differences in the way of collecting, occasional changes in previously established routes.

The adaptation workshops and the individual accompaniment workshops were fundamental in this first moment, as was the established relationship based on the confidence and respect of the Re-ciclo team with the associations.

Five collectors were pioneers. They got on the tricycle and acclimated to the change right away: Carliane, César, Jerson, Cassiano, and Tarciano. Their experience was important to engage those that still were not convinced or who still had not received the tricycle.

Cassiano and Tarciano started to film their collection work with the tricycles and shared the experience with the other collectors in Fortaleza’s WhatsApp group. The challenge is still large, but the need to convince the others has already been reduced significantly.

Technological challenges

The electrical system of the first models of the tricycle was, certainly, the most significant challenge confronted by the Re-ciclo team and the collectors as well as the supplier and the producer. Within a few weeks of use, some tricycles encountered problems. A failure in the electrical system prevented the engine from starting. Over the course of six months, there were many attempts at understanding the failure to fix it. It was necessary to send the modules to the producer, in China, who discovered a failure in the program. The modules were replaced and the tricycles began to work again.

The failures occurred at a delicate moment — the adaptation to the tricycle. The collectors that were getting accustomed to the new vehicle were unable to use it due to the problems. The team’s transparency in dealing with the problem, the commitment of the supplier in responding with promptness to each call and involving the collectors and their experiences to the resolution of the problem were fundamental in maintaining the motivation of the group.

The experience was fundamental in the decision to replace the equipment. The engine of the new model of the tricycle, which is much lighter, is the same one utilized by most electric bicycles in Brazil. This commonality guarantees the availability of technical assistance, and, according to the tests conducted, good functioning.
Challenges with engagement

The collectors formed a closed group among themselves and were wary of external intervention. This behavior appears to be a natural response when you consider how invisible these professionals are in the streets. The few that see them are, generally, afraid and avoid them. Many are taken for drug addicts, thieves, or drunks. According to the collectors’ anecdotes, the population sees this professional as someone dirty and sick. Many are called “vulture” and “trash man.”

That is why the creation of a strong bond based on transparency, listening, and dialogue between the Re-ciclo team and the leaders of the associations and the collectors was a months-long process. The previous team’s routine saw a minimum of one monthly visit to each association. This frequency, however, increased as the team was present in the warehouses weekly, whether for the realization of the workshops, the delivery of the tricycles, the PPEs, data collection, accompaniment of the collection or simply just to talk.

With this, the team came to understand many questions that involve the life of a collector — as much in the professional environment as in the personal one — and what moves them. The collector has a free spirit, chose this profession because they don’t want to have a boss, rigid hours, or work in a way that they did not choose. This perception was fundamental at the time when activities were proposed, the tricycle was presented, and mainly, gave real scale to the expectations of the Re-ciclo team. We gained confidence mutually.

All were committed to making the project happen, whether by the returns they saw from experiences, by the attempts to collect with the tricycle, or the expanded availability.

Challenges of recycling

The challenge of managing solid waste in Brazil begins inside the home. The population does not have the habit of conducting waste separation and its correct disposal. In the door-to-door campaigns conducted by Re-ciclo, we understood the scale of the educational/environmental work that is needed. Many of the residents that were contacted, despite living in neighborhoods where there are ecopoints and many collectors circulating through the streets, don’t separate because they never heard of separation or because they don’t have the habit of doing so. Therefore, upon implementing a project such as this, it is fundamental to include door-to-door campaigns.

The challenges continue in the streets as well. Doing away with the stigmas about the collectors needs to occur as does the need to raise the awareness of autonomous workers to organize themselves in associations, and the recognition and valorization of the work of these professionals.
Empowering the collectors so they can conduct their own door-to-door campaigns provided an opportunity for the collector to gain autonomy and no longer depend on the state to conduct the campaigns, get new clients, and to find ways to increase pay/earnings. But the experience of the training and of going out together brought a larger and more immediate impact in the self-esteem of each collector.

During the workshop, many collectors talked about quitting to avoid going out on the streets because they were too shy to talk to residents. They felt embarrassed to admit that they did not know how to write to fill out the spreadsheets and feared being treated poorly by the public. The Re-ciclo team proposed the formation of pairs in which at least one knew how to write, and it was decided to conduct the first approaches along with those most shy until they gained confidence.

The result came quickly. The consultants in Re-ciclo began the approach and asked the collectors questions which they answered to with confidence. A few hours after beginning, the majority were already comfortable with doing the approach without the team nearby. Many collectors reported at the end of the campaign that they discovered an ability that they never imagined that they had. To hold presentations, treated with attention and respect by the residents and still express the large amount of knowledge that they knew about the subject, brought empowerment, enthusiasm, and joy to the collectors. There are moments in a project where these indicators are so potent and are as fundamental as the growth in volume of the collection.
One of the most significant benefits of Project Re-ciclo was to provide the rapprochement between the Municipal City Hall of Fortaleza and the Associations/Collectors’ groups, resulting in the visibility and recognition of these workers who are so important to the chain of recycling. Today, solid waste management is not only an important agenda for the municipality, it has entered into the government’s plans.

Facing all the processes and challenges during the execution of the project, the team was always available, willing to adapt and to work in partnership with the collectors.

This initial stage is ending, however there is still much to be done, new deliveries, adaptations, expansion, etc. Re-ciclo is entering into a new phase in which it will distribute another 31 tricycles to the associations as well as select collection projects of the municipality.

Continuing in this new phase is the accompaniment of the collectors, the collected recyclables, and the benefits workers receive as well as the partnership with the associations. The continuity of the project contributes to the constant updating of a secure and reliable data base.

The results obtained with the monitoring of the indicators demonstrate that more important than the numbers are the cultural change and the change in collection habits that is occurring with the inclusion of the electric tricycles in the associations. The collectors constantly mention during the visits with the team how happy they are to get more recognition and to be better known and seen in the streets as important agents in the chain of recycling, beyond being more comfortable with less bodily pain with the use of tricycles than pulling the carts.
Lessons learned
Upon writing the term of reference on an innovative project, it is necessary to give more attention to what one wants, rather than the way one wants it to permit flexibility in decision-making.

Implementing projects in the final stage of management is always a topic to be approached with care so that all the efforts taken up to that moment were not made useless. Whenever possible, avoid these periods. Or organize implementations in a way that doesn’t depend on public service.

The size of the tricycle with the freight cart demands storage space in the associations, therefore, it is recommended that in future projects, in addition to the focus groups in the offices of the associations and the information provided by possible users, it is important that the places where they will implement the project be visited, to better understand their routine, needs, and infrastructure, etc.

One option would be choosing different tricycle models to test which one better meets the locations’ and the professionals’ needs. However, if there is only one model available, there should be flexibility in the specifications of that model.

It is important that PPEs are selected to meet the collectors’ need for protection, that they actually use them, and that they can later acquire them. In other words, it is recommended that they be economically accessible.

The visits to the associations provide proximity with the collectors and the understanding of the universe into which they are inserted. In addition, the visits to the warehouses favor the creation and strengthening of the bonds with the target audience.

It is important to consider hiring a designer to meet the demands of social media, promotion and other graphic materials that a project such as this requires.

The collection of data, especially as concerns mobility, is of extreme importance for the progress and improvement of the project, however it is seen to be challenging to incorporate the equipment into the collectors’ routines. The use of equipment that has a long battery charge and that are attached to the tricycles will facilitate continued use. It is worth noting that the accompaniment during use and contact with the collectors and associations is indispensable to easing any existing doubts.

The definition of the indicators of the project should take into consideration the dynamic and conditions of each association; a lack of equipment, as in this case the scale, made collection of pertinent data more difficult and sometimes impossible. Support in the structurization or improvement of the conditions of infrastructure and equipment of the accredited associations to the project would bring countless benefits to both parties.

It is important to restate that in the acquisition contract, maintenance of the tricycles for a period of three months is included, as is the realization of maintenance training and tricycle repair after the end of the project. It is important to consider establishing a greater maintenance period.

At the time of planning, it is fundamental to live the reality of the associations, of the collectors and of the work they conduct. This widens the view and perspective of the team to be able to better evaluate what is said by the group and what is really viable. It is also necessary to take into account what conditions and environments the collectors are in; generally speaking, the outskirts and poor regions in the city. Accompany a collection day and a day in a warehouse, for example, as they are fundamental to completing the information obtained in a focus group.
“Before the tricycle, the people ran away from me in the street. Now they stop and ask to take a selfie with me! Many ask me to stop just to donate material that they have at home.” Carliane, 29, collector from Aran

“The tricycle put an end to the pain I had in my knees and arms. I carry more weight than with the cart and return home in a better mood.” Fábio, 23, collector from Ascajan

“Collecting with the tricycle is much more enjoyable than with the cart. When we get on the bicycle path, I feel like I’m a kid playing on a bicycle.” Tarciano, 27, collector from Mulheres Luta em Cena

“With the tricycle, I do more trips per day. I carry a larger volume and arrive at home less tired. Besides that, pedaling is much more pleasant and enjoyable than pulling a cart.” Cassiano, 45, collector from Mulheres Luta em Cena

“The tricycle improved my life. Before I used to carry 120 kilos in my arms. Now I only have to pedal. The effort that I make it’s only to place the material in the cart.” Flávio, 23, collector from Ascajan

“Besides carrying more with less effort, I also feel more secure with the tricycle than with the cart in the street. It asserts itself and cars respect it more.” Luciano, 58, collector from Reciclando

“The tricycle is an important tool to help raise the collector out of obscurity and help achieve improvements in their quality of life and recognition of the profession.” Dona Nete, 75, founder of Socrelp, the first association of collectors of Fortaleza

“I like using the tricycle because people look at us differently, with more sympathy and without that fear that they have of the collector pulling their cart.” Aloisio, 35, collector from Rosa Virginia
Commissioned by
Municipality of Fortaleza
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Development Bank of Latin America (CAF)

This document was produced with the support of the Transformative Urban Mobility Initiative (TUMI), on behalf of the Federal Ministry of Economic Cooperation and Development (BMZ) of Germany.

TUMI supports projects of mobility and policy makers with the tools that allow them to make decisions that positively transform the mobility in their cities (https://www.transformative-mobility.org/)

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Date
March 2022