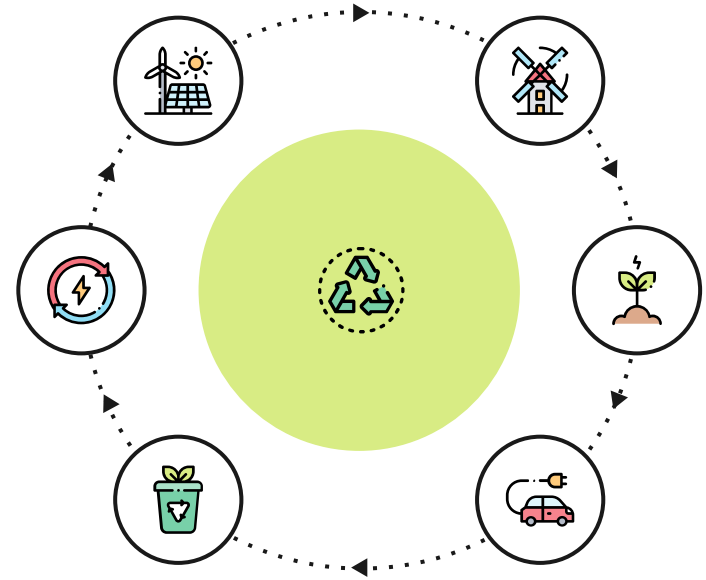


Adrio Consulting presents:

Project Cyclo: Leveraging Technology and Community to Address the Medical Waste Problem in Jakarta



Rio



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The Consultants



Rio

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Together, we are bringing you **Project Cyclo**

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Executive Summary

Problems

Huge volume of medical waste in Jakarta due to Covid-19 (soaring by as much as 500%)

Law requires medical waste to be incinerated, but there's a catch...

The few incinerators available are struggling to keep up with the influx of medical waste. Moreover, incinerating is not the most environmentally-friendly or healthy option

These medical waste are infectious and dangerous to the community and environment

Medical wastes have to be treated differently from general waste

Medical waste are not supposed to end up in landfills, yet they do anyway. This is because medical waste are not properly segregated at the outset.

Questions



How can we **decrease** current medical waste in Jakarta?



How can we **prevent** excessive medical waste disposal in the future?

Solutions

Project Cyclo's practical three-pronged approach to medical waste management and disposal

Solution #1 (Community):
Volunteer Programme

Solution #2 (Technology):
Smart Hospital Bin Programme

Solution #3 (Partnership):
Local Collection Programme

Prevention

Data collected in our Smart Hospital Bin Programme will assist the prevention of incorrectly managed waste disposal across Jakarta. It will help us adopt better and more efficient practices in the future.

Background



High volume of medical waste due to Covid-19

- The rate of medical waste disposal in Jakarta has risen by **500%**
- The surge of medical waste during Covid-19 is a public health problem
- Before the pandemic, hospitals across Indonesia produce **290 tonnes** of medical waste/day. During the pandemic, **493 tonnes/day**
- **Infectious waste** is also produced by largely unsupervised isolation facilities and households that rarely separate infectious waste from ordinary rubbish

This is an old problem made worse by Covid-19, so what can be done?

Why? Gaps in Status Quo



- Number of medical waste facilities in Indonesia do not have access to on-site waste disposal
- Proper disposal is costly
- Waste produced by self-isolating patients/other citizens are difficult to monitor
- Few hospitals hold licensed incinerators (110 out of 2889, **<4%**)
- Respirators and surgical masks take up to **500 years** to degrade in the ocean
- PPE disposed of carelessly
- Wastes are **not segregated** properly



*"Most of the medical waste I find is **mixed with regular waste** inside plastic bags. As the waste is concealed, it is **difficult to track** how it enters the landfill, or to trace it back to its source."*

— **Bagong Suyoto**, National Waste Coalition

Key points



Think beyond the pandemic



Segregation is key to medical waste management



Embrace digitalization of waste management to minimize human error and improve tracking system

The Solution - Smart Hospital Bins & Recycling of PPE



Collection



Incineration/Recycling & Selling



3 Collection Programmes



Volunteer Programme

- Work with **volunteers/not-for-profit organisations** to collect PPE (eg. surgical masks) in certain areas with high volume.
- Provide **free shipping labels** for waste to be sent to recycle.



Smart Hospital Bin Programme



- Work with DKI Jakarta government & private hospitals to use smart bins as their medical waste disposal channel.
- Smart hospital bins use **IoT software along with machine learning algorithms** to optimise the collection of medical waste across Jakarta.
- Smart hospital bins able to detect filling level, the weight and the precise location of the bin.
- **Cloud software** connected to smart bins across Jakarta will **plan the most time-efficient route** for collection by using Machine Learning.



Local Collection Programme

- Work with local governments and organisations to place bins as **collection points** where **people can throw away their used PPE**.
- Provide **free shipping labels** for waste to be sent to recycle.



Medical waste from Hospital Programme are sent to **incinerators** as per **Indonesian government regulations**.

Waste from **other programmes** sent to recycling plant for the extrusion process.

The **reclaimed product** from the waste sent to the recycling plant is then **sold again in the form of pellets**.

How do we help?

By **segregating medical waste at the source** and properly channeling them to recycling facilities and incinerator plants (for infectious waste, as required by Indonesian government regulations)



Proper segregation at the source at collection points

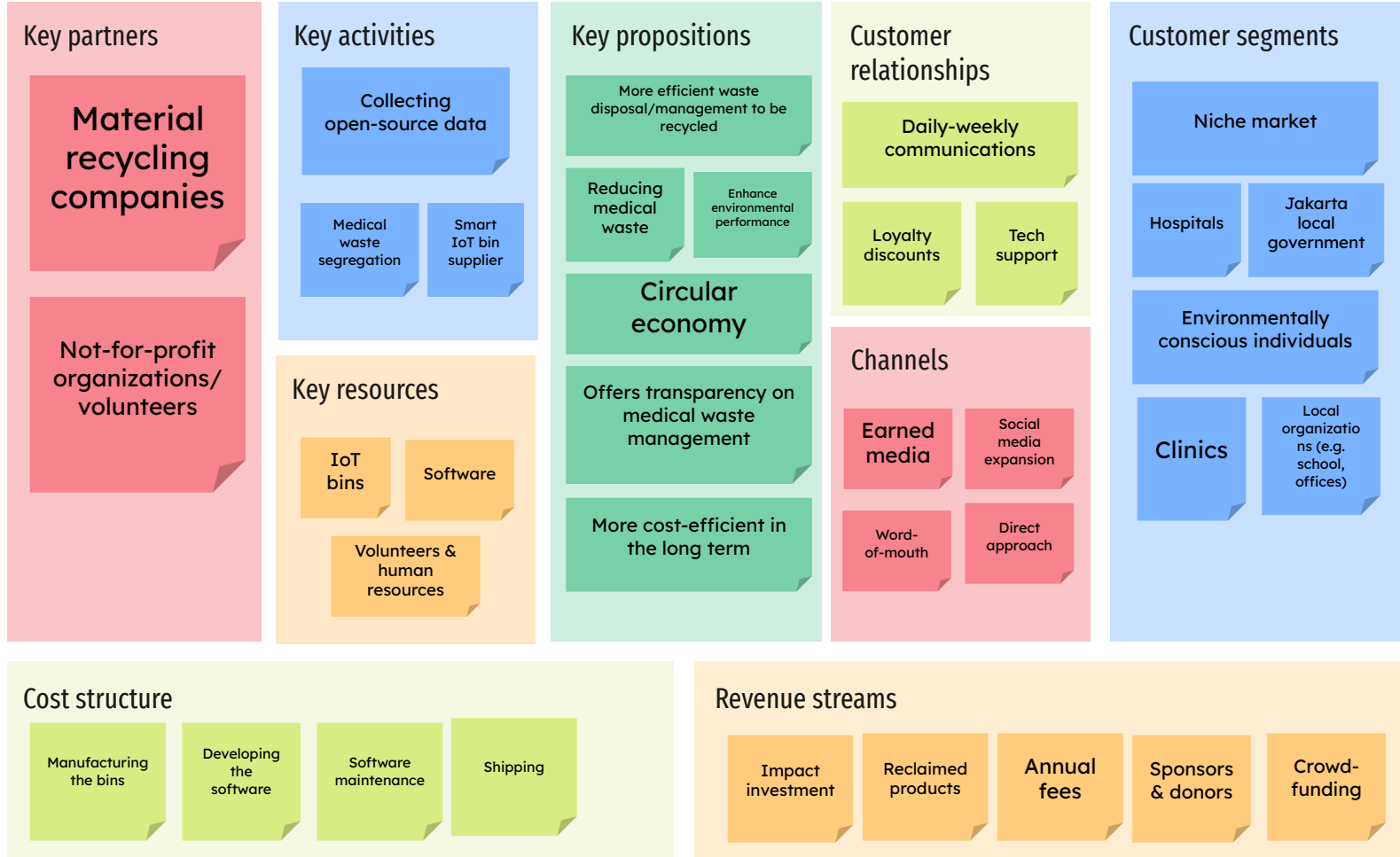


Data stored in the cloud ensures monitored, timely collection and tracking



Channeling to recycling facilities and incinerator

Business Model Canvas

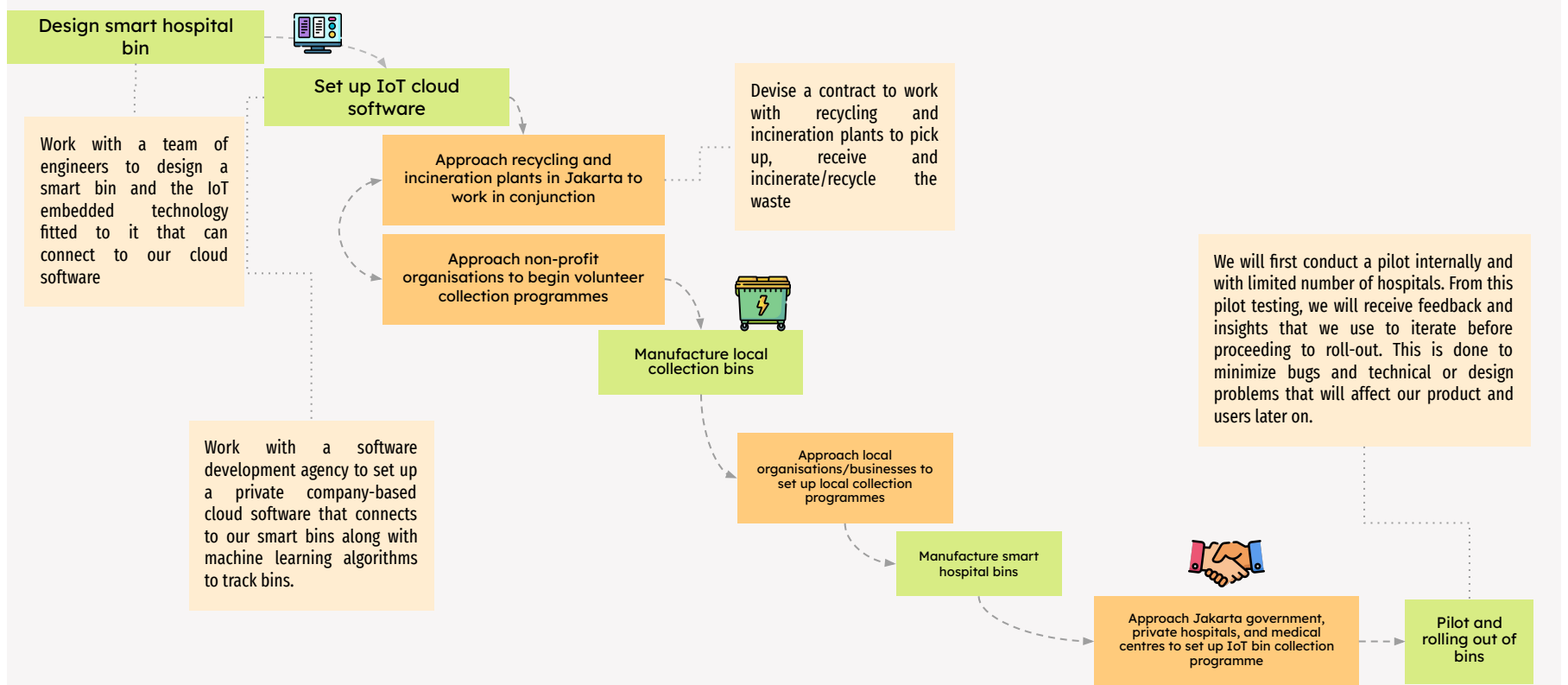


Project Timeline



2022

2023



SWOT & Stakeholders Analysis

Strength

- ★ Leveraging technologically feasible solutions to achieve circular economy
- ★ Community-based solution for medical waste management
- ★ Large (potential) market base
- ★ Scalable business model
- ★ No direct competitors

Opportunities

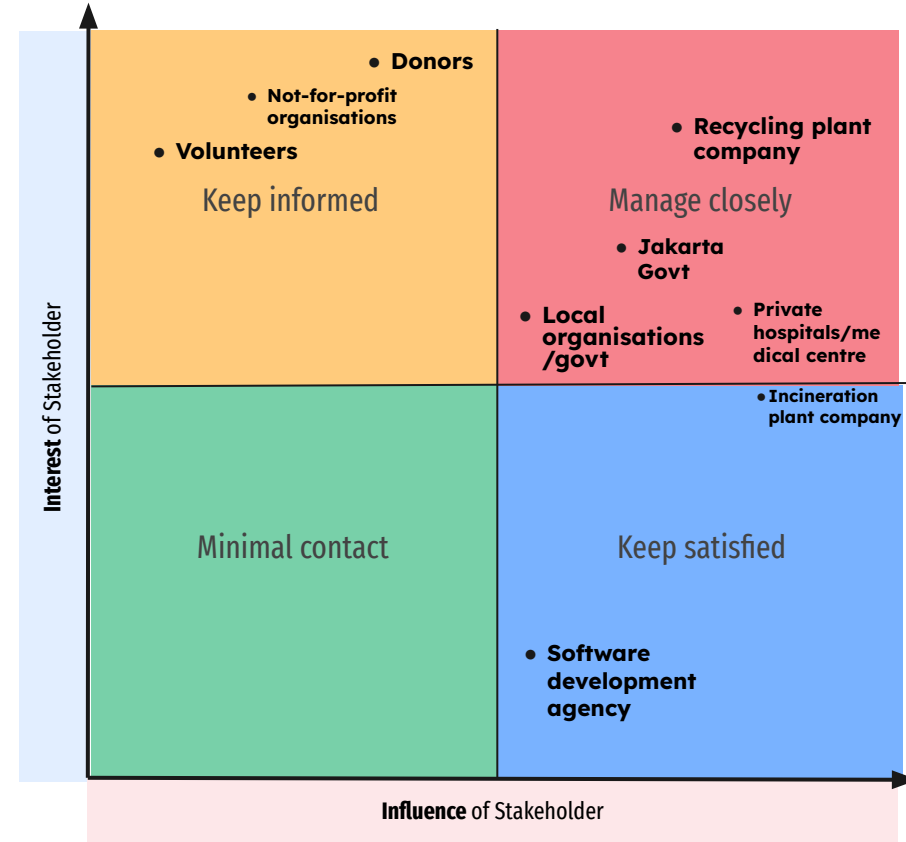
- ★ Medical waste surge due to Covid-19
- ★ Increasing digitalization
- ★ More people environmentally conscious, esp. Gen Z
- ★ Companies and institutions have an interest to be environmentally friendly

Weakness

- ★ Initial funds
- ★ Bins require maintenance
- ★ Overdependence on the market
- ★ Requirement of internet
- ★ Doesn't manage waste end-to-end

Threat

- ★ Unwillingness of stakeholders to cooperate/engage
- ★ Uncertain regulatory environment
- ★ Lack of awareness
- ★ Reluctance to change (aversion to digitalization)



Cost/Benefit Analysis



Scaling



Cost (-)	Initial Amount	Recurring Amount
Smart Hospital Bins (Design & Manufacturing)	~ \$15,000 USD (Initial Design)	~ \$ 1,000 Every unit made (Wholesale Purchase)
Deal with Incineration Plant	Possible initial contract fee	~ \$5,000 USD Per Hospital Per annum
Deal with Recycling Plant	Possible initial contract fee	~ \$2,500 USD Per annum
Eco-Friendly Small Bins	~ \$ 200 USD (Initial Design)	~ \$10 USD Every unit made (Wholesale Purchase)
Bin Tracking Cloud Software	~ \$10,000 USD	~ \$1,000 per month
Benefit (+)	Amount	Frequency
Reclaiming of Recycled Products (eg. PP Pellets)	~ \$1,000 - \$2,000 USD per tonne (depending on material)	Every time reclaimed products are sold
Annual packages	Smart Bins Programme ~ \$12,500 USD per hospital	Per annum
Eco-Friendly Small Bins	~ \$35 USD	Per unit sold

*Amounts displayed are approximate figures

Advocate for a better regulation on medical waste

Currently, medical waste must be incinerated under Indonesian law. We believe **medical waste can be recycled** and should not be sent to **costly** incineration plants that **expel dangerous chemicals**. Advocating to the government for the addition of recycling to the management of medical waste is of paramount importance.

Infrastructure development

Building our own plants that can **sort, disinfect and recycle** medical waste in a **regulated and proper fashion** along with our own fleet of waste delivery vehicles.

Diversification

- We believe Indonesia as a whole must embrace recycling and adopt frequent recycling habits. We aim on **recycling reclaimed products** in Indonesia to benefit Indonesia as a country.
- We aim to **spread awareness of recycling** to all parts of Indonesia and plan on the continuation of our recycling collection programmes across all types of waste, not just medical.
- We plan on tackling **underdeveloped and under-recognised** areas of Indonesia such as Papua and East Nusa Tenggara.

Why will our solution work?



Smart bins will ideally be designed by experts with Arduino-like embedded technology along with sensors that are affordable to manufacture.



Actionable, feasible technology



The technology is feasible, easy to make, and is affordable. This solution also aligns with Indonesia's vision to accelerate digitalization in the country.

Hospitals have an incentive



Hospitals are accountable for the majority of medical waste, they thus have an interest in becoming more efficient without harming the environment and stressing out their resources. Finding a feasible solution for hospitals will translate to a great reduction of medical waste disposal. Since they can be held accountable with proven data, hospitals are encouraged to be more conscious of their waste management practices.

Business opportunity means viable project



There's a business opportunity with the surge of medical waste. Medical waste and PPEs have economic value, are recyclable, and can be resold for much more than it takes to recycle them. We are also seeing a trend in the society of people becoming more environmentally conscious and responsible. We can tap into this market.

These data will also be published to public as an open-source report for greater accountability.



Address and prevent

We address the problem by implementing a practical three-pronged project and prevent excessive medical waste disposal by leveraging data from our IoT bins. This data will allow us to track sources of medical waste and find insight that can be used to develop more efficient practices.

Project Cycle

We address the problem holistically by leveraging technology, community, and partnership

Efficiency



While investment is higher in the beginning, our solution will be more efficient in the long-term compared to conventional waste disposal and significantly reduce overhead cost



Supports circular economy

We have a sustainable business model. Our solution is circular-first and we always opt for the most environmentally friendly solution whenever the law permits. We aim to keep the waste in the loop for as long as it could.