

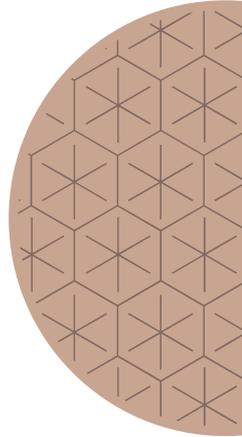
Digitizing Informal Transit in Nairobi, Kenya

Irene Terpstra, Maks Groom, Angelos Assos

Background



Informal transit in Nairobi, Kenya



Background: Public Safety

Drivers Warn of Increase in Matatu Extortion Gangs on Nairobi Routes

by [GEOFFREY LUTTA](#) on Tuesday, 7 February 2023 - 8:32 am



by [JOHN MUCHANGI](#)
Science Editor

Nairobi

21 December 2021 - 22:00

UN: Women still at centre of sexual harassment in matatus

News By Nancy Nzau | Jan 26, 2022



Kamagira: Nightmare as Matatu Crews Terrorise Passengers [VIDEO]

by [MARTIN SIELE](#) on Wednesday, 9 September 2020 - 2:12 pm

HARASSMENT

Women facing sexual abuse in matatus — report

Study shows 80 per cent of women using matatu report this form of harassment

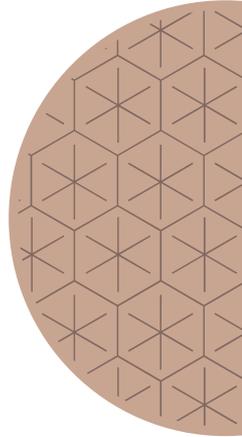
In Summary

- Transport PS Joseph Njoroge said public transport has perpetrated gender inequalities.
- Report aims to promote gender-responsive policymaking and influence decision-making towards gender equity in this essential service.

Background: Congestion



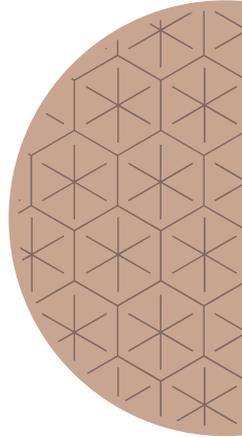
Congestion caused by Matatus in Nairobi, Kenya.



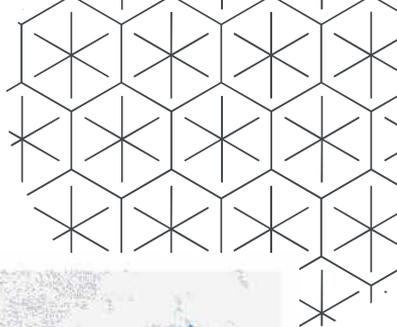
Background: Air Pollution



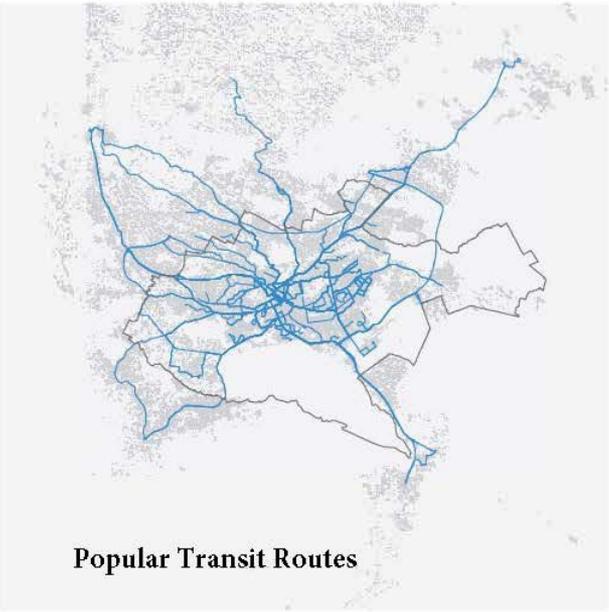
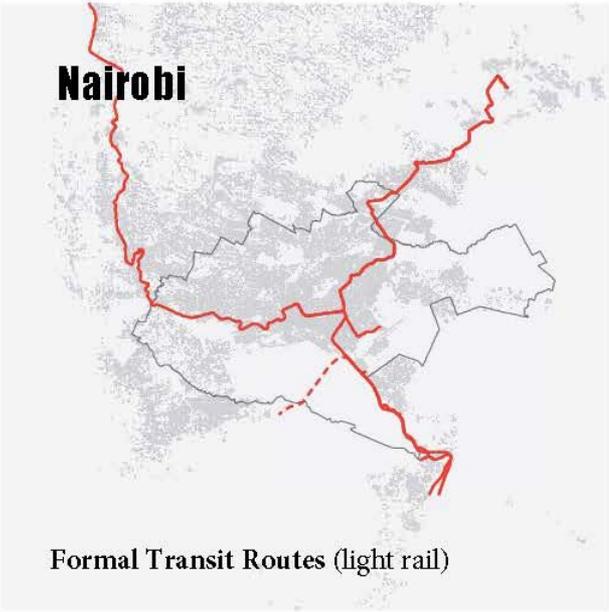
Air Pollution in Nairobi, Kenya



Context Overview



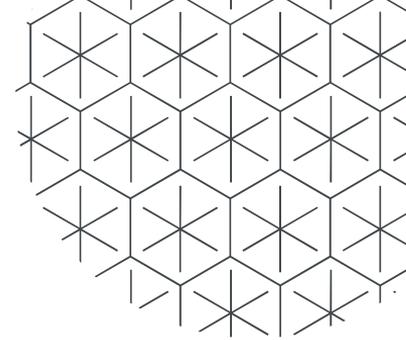
Nairobi, Kenya



- | | | | |
|---------------------|----------------------------------|--------------------------|--------------------|
| Urban area | Light rail | Metro | Cable car |
| Administrative city | Light rail under construction | Metro under construction | Ferry |
| | Boarding & regional rail | Bis rapid transit | Freight or disused |
| | Regional rail under construction | | |
- 0 10 km
- Urban area
 Administrative city
 Popular transit routes

Formal vs. popular transit routes in Nairobi, Kenya

Big Picture



Project Development objectives

Short term goals: make market more efficient, protect passengers, digitize payments

Long term goals: decongest traffic, vehicle maintenance, urban planning

Project Beneficiaries

4.5 million passengers

Drivers and operators of 10,000 matatus

Other road/city users

Past Work: Regulation



Matatus minibuses reckless operation

Past Work: Payment

M-PESA: Money transfer without a bank account



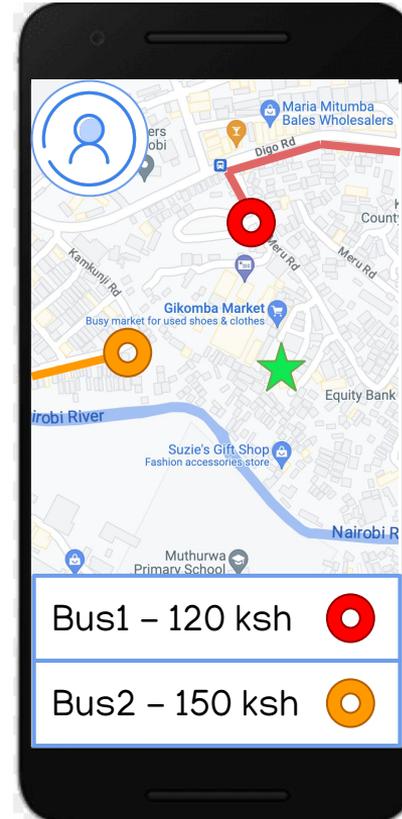
Past Work: Digitization

O-City: Introduced a cashless payment platform for Matatus + public transit



Policy Intervention

Pocket Matatus



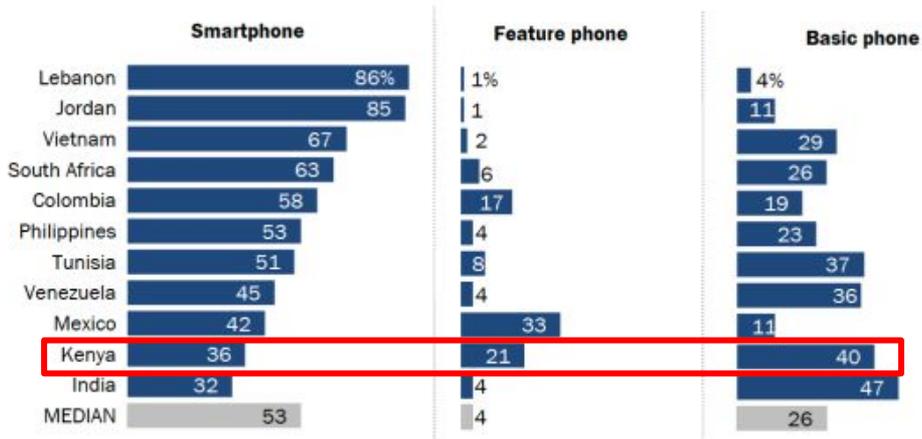
Service Details



Context Specific Considerations

Across emerging economies, smartphones – rather than basic or feature phones – are often the most widespread type of mobile device

% of adults who say the type of mobile phone they use is a ...



Note: Mobile phone users include those who say they own or share a mobile phone. Smartphone users include those who say they use or share a smartphone. Feature phone users include those who say their phone can connect to the internet but is not a smartphone. Basic phone users include those who say they use a mobile phone but that it cannot connect to the internet.

Source: Mobile Technology and Its Social Impact Survey 2018, Q7 & Q8.

"Mobile Connectivity in Emerging Economies"

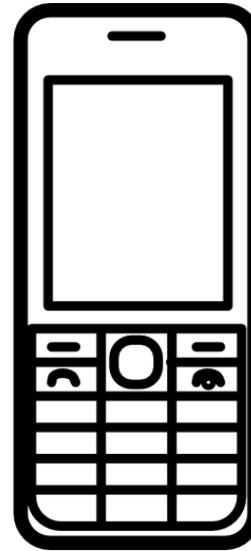
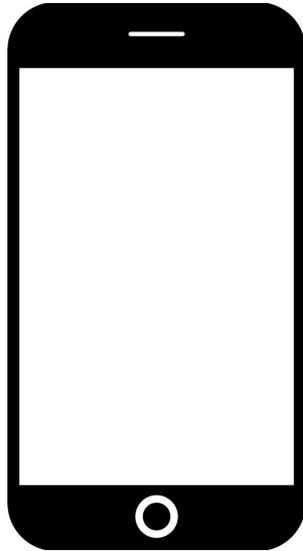
PEW RESEARCH CENTER



Accessibility

Partner with drivers to
give them smartphones

*Accessible to users
on a basic phone*



Theory of Change

Problem:

Public safety
Market efficiency

Program:

Digitize matatu
minibus services
and payment

Outcome:

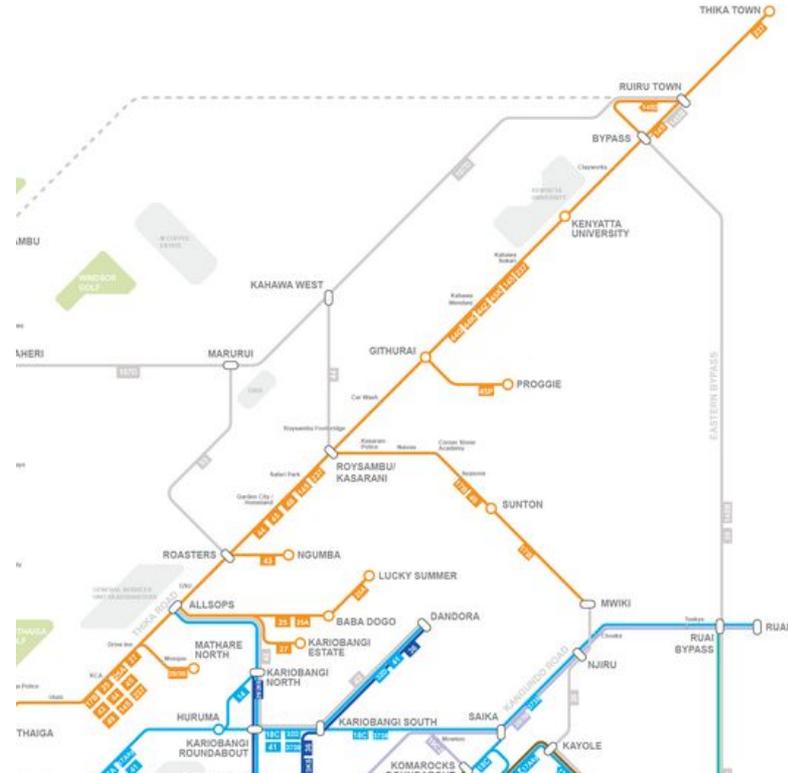
Lower crime,
reliable fares &
routes

Goal:

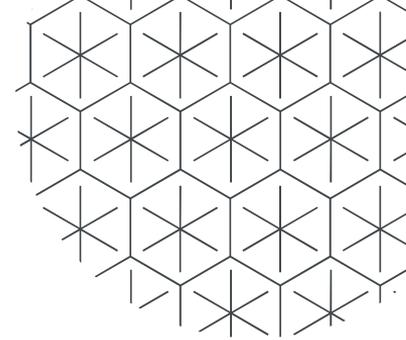
Increased safety,
less congestion,
lower fares, higher
income

Pilot Structure

- Recruit participants from 3–5 operators in the same area
- Target pilot area with easily identifiable passenger groups



Timeline: Phase I



Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Market Research	Pink bar											
Initial Funding	Yellow bar											
Initial iteration of the app	Blue bar											
Cooperation of incentives with stakeholders			Red bar									
Incorporate phones with matatu drivers				Orange bar								
Run Pilot					Red bar							
Driver and passenger survey and analysis					Green bar							

Pilot - Budget

Personnel:

- 3 Project Managers
- 1 Software Engineer
- 1 Data Analyst



200 Smartphones

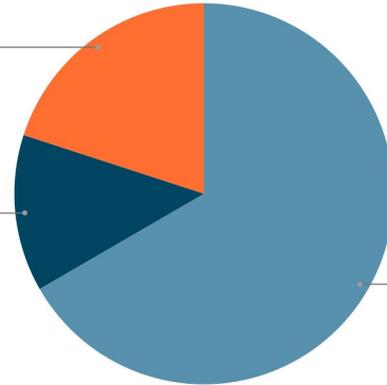


Cost Breakdown

Partnerships (\$6000)
20.0%

Phones (\$4000)
13.3%

Salaries (\$20000)
66.7%



Total funding:
\$30,000

Potential Funding:



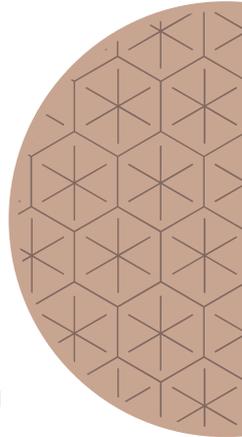
Extended Program

Phase 1: Expansion/capture market

- Strong financial incentives: smart phones, waived transaction costs

Phase 2: Leverage for regulation

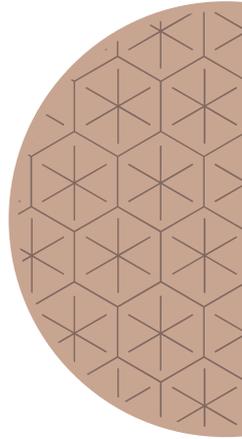
- Network access becomes powerful incentive, gov can use platform to provide a measure of regulation



Phase 2: Leverage for Regulation

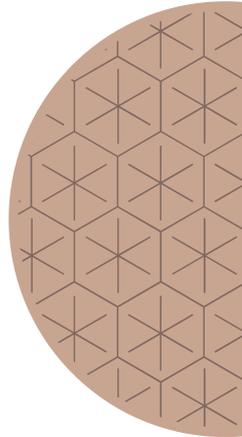
Incentives and Regulation through the app:

- Congestion incentives
- Safety/Environmental
- Data collection for social benefit

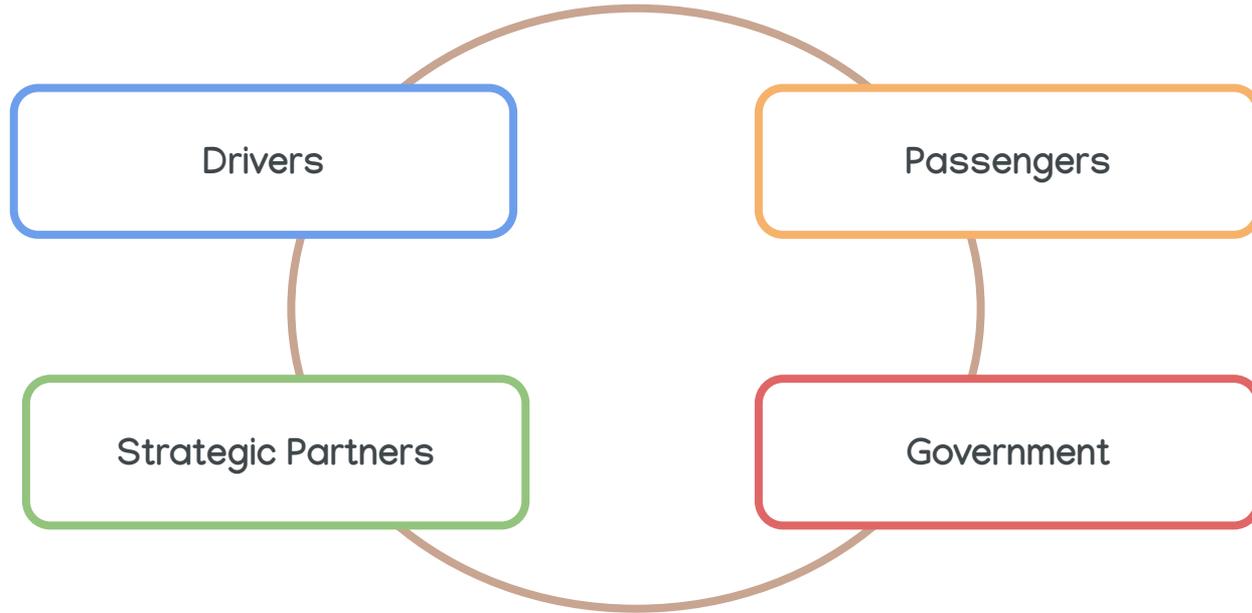


Assumptions

- Most operators opt into system
- Government acceptance
- Riders use app
- Commercial partners are supportive (Safaricom)



Stakeholders



Partners

Matatu Owners' Association (MOA)



Matatu Owners Association
(MOA).

Safaricom/M-Pesa



Nairobi Government



**NAIROBI CITY
COUNTY**

World Bank



WORLD BANK GROUP

Task Organization

NGO



Board of directors which include stakeholder representatives

Customer support team



Technical product development team



Business analyst team



Marketing

Partners



Risk Assessment

- Technological
 - Unreliable/unusable system
- Operational
 - Drivers opt-in but don't fully participate
- Strategic
 - MOA refuses to allow data collection
- Political
 - Inconsistent regulation



Risk Mitigation Plan

- Technological
 - On-going development and support
- Operational
 - Shut off phones if operators don't participate
- Strategic
 - Financial incentives that overcome reservations
- Political
 - Partnership with government



Equity and Ethical Considerations

Drivers: Smartphones and training on system

Users:

	Route Planning	Digital Payment	Rides	Reporting System
Smartphone	✓	✓	✓	✓
Phone		✓	✓	✓
No Phone			✓	



Expected Impact

Safety – increased perception of safety

Market efficiency – observe stable, uniform fares

Reduction in crime and fares expected
and measurable within rollout



Monitoring and Evaluation Plan

Public safety

- Perception surveys, crime reports

Market efficiency

- Fare cost and stability, route frequency and reliability

Usability

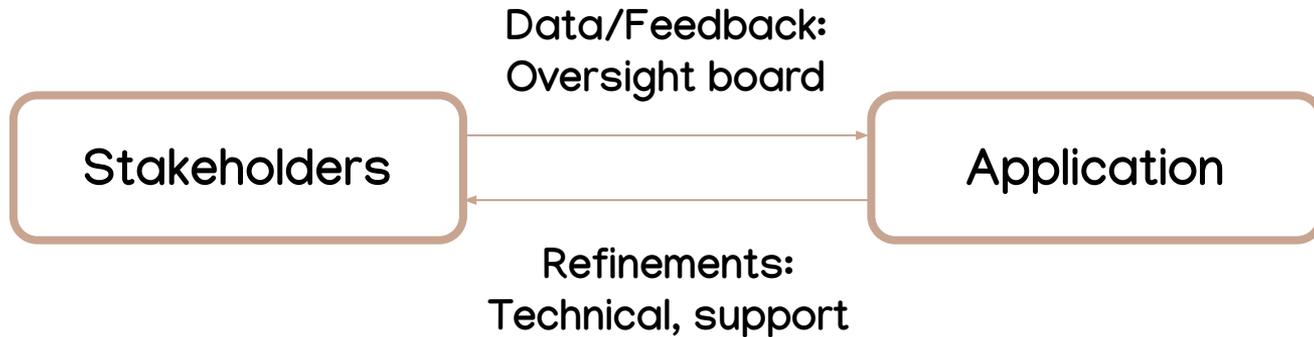
- Active driver and passenger enrollment
- Driver and passenger satisfaction



Monitoring and Evaluation Plan

Before rollout: survey drivers

After rollout: ongoing refinement



Monitoring and Evaluation Plan: Phase 2

Transition criteria – perception of value of market access

Within Phase 2: Actively develop and rollout incentive measures

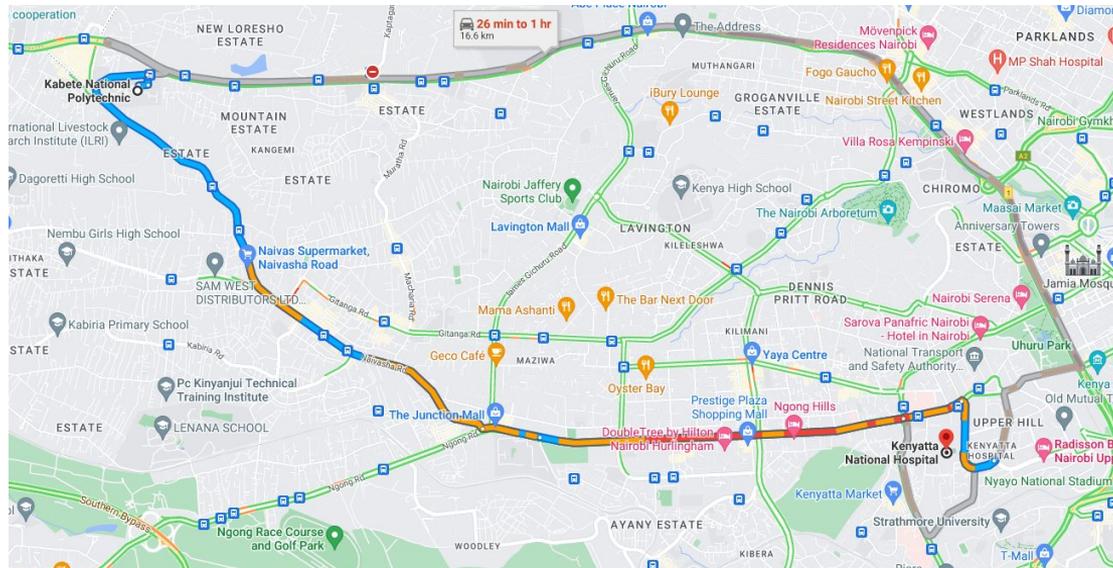
- Individual participation and efficacy metrics

Latency in overall metrics



Monitoring and Evaluation Plan: Phase 2

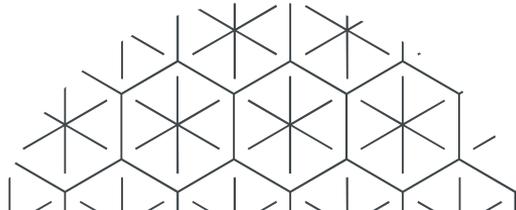
Phase 1 data to optimize routing of matatus around the city, incentivize socially efficient routes





Pocket Matatus

A Matatus bus stop in your pocket



References

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- https://i.guim.co.uk/img/media/7d32a7bd13b6cc8d3d2dfb36f8ecb42f19e336b3/0_305_5136_3083/master/5136.jpg?width=880&quality=45&dpr=2&s=none
- <https://civicdatadesignlab.mit.edu/Digital-Matatus>
- <https://www.downtoearth.org.in/blog/world/the-matatus-of-nairobi-a-necessary-bane-84157>
- <https://www.ifc.org/wps/wcm/connect/e0d2a9bd-16b9-4a36-8498-0b2650b9af8b/Tool%2B6.7.%2BCase%2BStudy%2B-%2BM-PE-SA%2BKenya%2B.pdf?MOD=AJPERES&CVID=jkCVy-n> (M-Pesa)
- <https://www.linkedin.com/pulse/major-strategies-olas-success-edify-accelerators/> (OLA)
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