Digitizing Informal Transit in Nairobi, Kenya

Irene Terpstra, Maks Groom, Angelos Assos
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

UN: Women still at centre of sexual harassment in matatus

by Nancy Njau | 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

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
Past Work: Digitization

**Digital Matatus Project:** Digitalized the ‘informal’ transit routes of Nairobi
Policy Intervention

Pocket Matatus

Bus1 - 120 ksh
Bus2 - 150 ksh
Service Details

- Public Fare Prices
- Route Planning
- Record of Transactions

Bus1 - 120 KSH
Bus2 - 150 KSH
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 ...

- **Smartphone**
  - Lebanon: 86%
  - Jordan: 85%
  - Vietnam: 67%
  - South Africa: 63%
  - Colombia: 58%
  - Philippines: 53%
  - Tunisia: 51%
  - Venezuela: 45%
  - Mexico: 42%
  - India: 36%
  - MEDIAN: 53%

- **Feature phone**
  - Lebanon: 1%
  - Jordan: 1%
  - Vietnam: 6%
  - South Africa: 17%
  - Colombia: 14%
  - Philippines: 8%
  - Tunisia: 4%
  - Venezuela: 11%
  - Mexico: 21%
  - India: 4%

- **Basic phone**
  - Lebanon: 4%
  - Jordan: 14%
  - Vietnam: 29%
  - South Africa: 26%
  - Colombia: 26%
  - Philippines: 19%
  - Tunisia: 23%
  - Venezuela: 37%
  - Mexico: 11%
  - India: 40%

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.


"Mobile Connectivity in Emerging Economies"

PEW RESEARCH CENTER

Mobile device usage by type in emerging economies (including Kenya).
Accessibility

Partner with drivers to give them smartphones

Accessible to users on a basic phone
**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

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<th>Task</th>
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<td>Incorporate phones with matatu drivers</td>
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Pilot - Budget

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

200 Smartphones

Potential Funding:

Cost Breakdown

- Partnerships ($6000) 20.0%
- Phones ($4000) 13.3%
- Salaries ($20000) 66.7%

Total funding: $30,000
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

Drivers

Passengers

Strategic Partners

Government
Partners

Matatu Owners’ Association (MOA)

Safaricom/M-Pesa

Nairobi Government

World Bank
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
- Operational
- Strategic
- Political

- On-going development and support
- Shut off phones if operators don’t participate
- Financial incentives that overcome reservations
- Partnership with government
### Equity and Ethical Considerations

Drivers: Smartphones and training on system

Users:

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<th>Route Planning</th>
<th>Digital Payment</th>
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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

Stakeholders —> Data/Feedback: Oversight board —> Application
Refinements: Technical, support
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

- 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
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- https://www.ifc.org/wps/wcm/connect/e0d2a9bd-16b9-4a36-8498-0b2650b9af8b/Tool%2B6.%2BCase%2BStudy%2B-%2BM-PESA%2BKenyap%2B.pdf?MOD=AJPERES&CVID=jkCVy-n (M-Pesa)