BCG
THE BOSTON CONSULTING GROUP

CICO Economics in Nigeria

Executive Deck

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Overview of documents available

Overview & key highlights from the research

Role of CICO for financial inclusion

Sizing the CICO access challenge

Exploring potential interventions

Illustrative country deep-dives

This document

Executive summary

While CICO economics are viable today in urban, peri-urban and rural "oases", we reach the limits to CICO viability as we enter the rural frontier

For providers, economics for an incremental agent point can be favorable in areas with sufficient transaction volume
- Most agents today are found in urban, peri-urban, or rural "oases", where breakeven points are ~5 txn/day
- However, economics challenged if providers choose to invest to improve customer demand / agent viability or enter frontier
- Because most recurring costs are borne by the agent, providers ultimately need to consider agent viability, given higher agent break-even point of ~27 txn/day ("if an agent is viable, a provider will be viable")

Agents similarly face favorable economics in some geographies, but are stressed to the point of unviability at the frontier
- At the frontier, agents expected to experience low transaction volumes below their breakeven points, while at the same time needing to deal with increased liquidity management costs (~13-50% above rural "oases" and >500% above an urban agent)

Existing agent model should be able to scale to reach 51% of Nigeria's adult population
- Based on % of Nigeria's population living in location with power, in 5km radius of cell tower, 45 min drive from bank/ATM, and in locations with "sufficient" economic activity (>3,000 adult population)

Further expansion would require intervention… digitization of G2P, agent subsidies, and float runners could have significant impact; however, stakeholder engagement and more robust intervention assessment required to answer open questions
- E.g., digitized G2P payments could have unintended consequence of increased liq. mgmt costs – intervention assessment will require forecasting net impact of any one intervention, how they interact with each other, and requirements to operationalize

Study aims to understand the economics of the mobile money agent channel plus key barriers to reach

Sustainable and Inclusive Digital Financial Services (SIDFS) at the **Lagos Business School (LBS)** works to further the case for financial inclusion, through focused research as well as active engagement with all stakeholders in the industry.

In 2018, LBS engaged the **Boston Consulting Group (BCG)** to support a deep dive to understand the economics of the leading CICO models – especially mobile money agents – and potential interventions to enhance economic viability and reach of these services to rural populations.

BCG's analysis leverages primary research across Nigeria, as well as findings from our global study

Mobile Money Providers across Nigeria (incl. banks, super agents, and 3rd party providers)

10+

Agent Research through in-depth interviews across Lagos and Kano (both urban and rural)
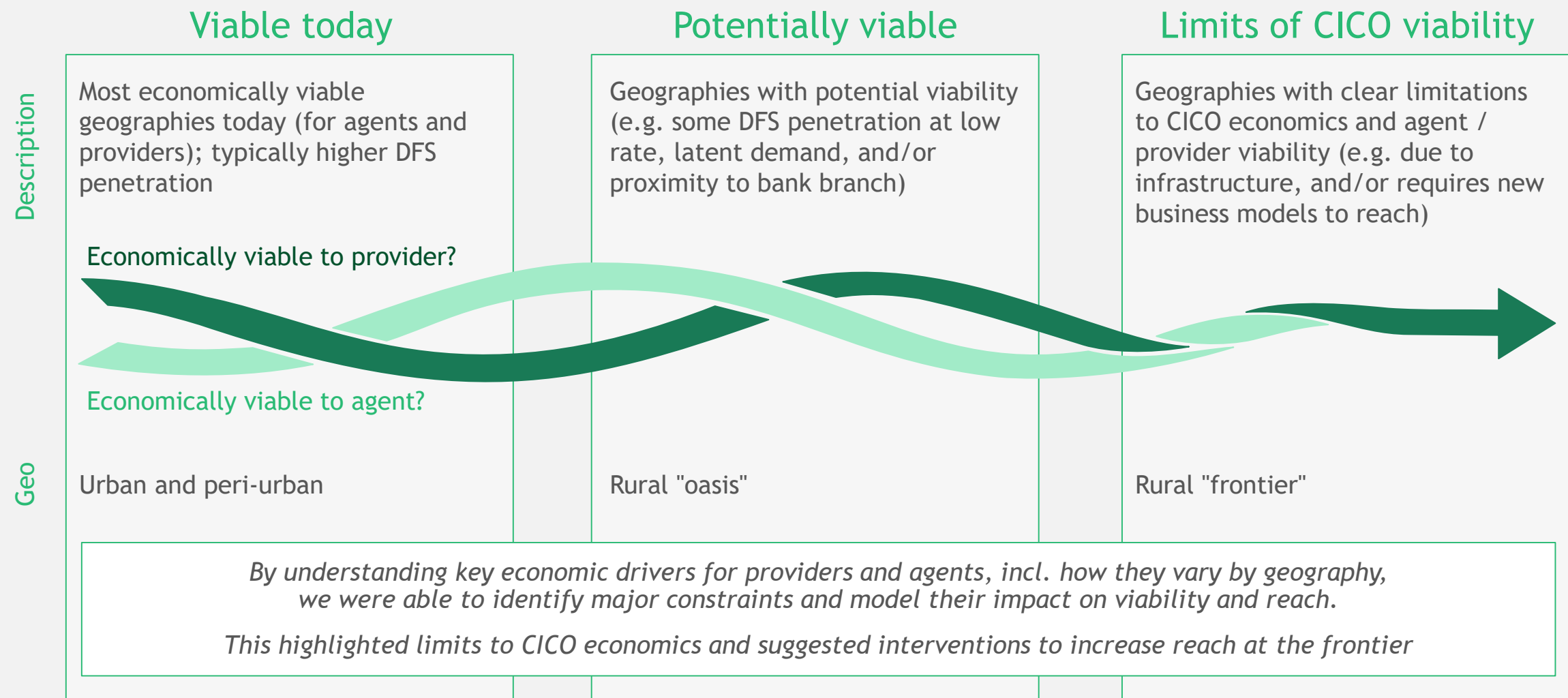
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Global insights from similar studies in other focus countries (India, Bangladesh, Kenya, Tanzania)

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CICO economics creates zones of viability

Viable today	Potentially viable	Limits of CICO viability

Description

Most economically viable geographies today (for agents and providers); typically higher DFS penetration

Geographies with potential viability (e.g. some DFS penetration at low rate, latent demand, and/or proximity to bank branch)

Geographies with clear limitations to CICO economics and agent / provider viability (e.g. due to infrastructure, and/or requires new business models to reach)

Economically viable to provider?

Economically viable to agent?

Geo

Urban and peri-urban

Rural "oasis"

Rural "frontier"

By understanding key economic drivers for providers and agents, incl. how they vary by geography, we were able to identify major constraints and model their impact on viability and reach.

This highlighted limits to CICO economics and suggested interventions to increase reach at the frontier

Detail: Most rural expansion to-date seen in "oases", expanding to the frontier involves additional challenges

Rural Oasis
(potentially viable)

- Regions of high economic activity in an otherwise low economic "desert"; agents typically located near markets, village centers, busy streets

- Moderate DFS penetration – many customers have bank accounts and are familiar with DFS

- 30-100 transactions/day[1]

- Some existing infrastructure (e.g. bank presence, paved roads, power and mobile connectivity)

- Covered in agent sample; agents present in rural areas today are the ones who are able to make the business work; 85% of rural sample are profitable

Rural Frontier
(limits to CICO economics)

- Remote rural locations with low population size and density, and lower economic activity

- Low DFS penetration – few customers with bank accounts

- <10 transactions/day[2]

- Limited existing infrastructure (e.g. bank presence, paved roads, power and mobile connectivity)

- Not covered by agent sample (due to economic unviability)

1: Range taken from agent interviews
2: Range estimated from assumptions and triangulated with secondary research; see compendium for full details

For providers, agent point economics are favorable in areas with sufficient transactions / revenue...

Average recurring provider margin from single agent point

% of revenue

100%	45-55%	15-40%	0-10%	10-20%

5 — Txn/day to breakeven

9 — txns/day on average
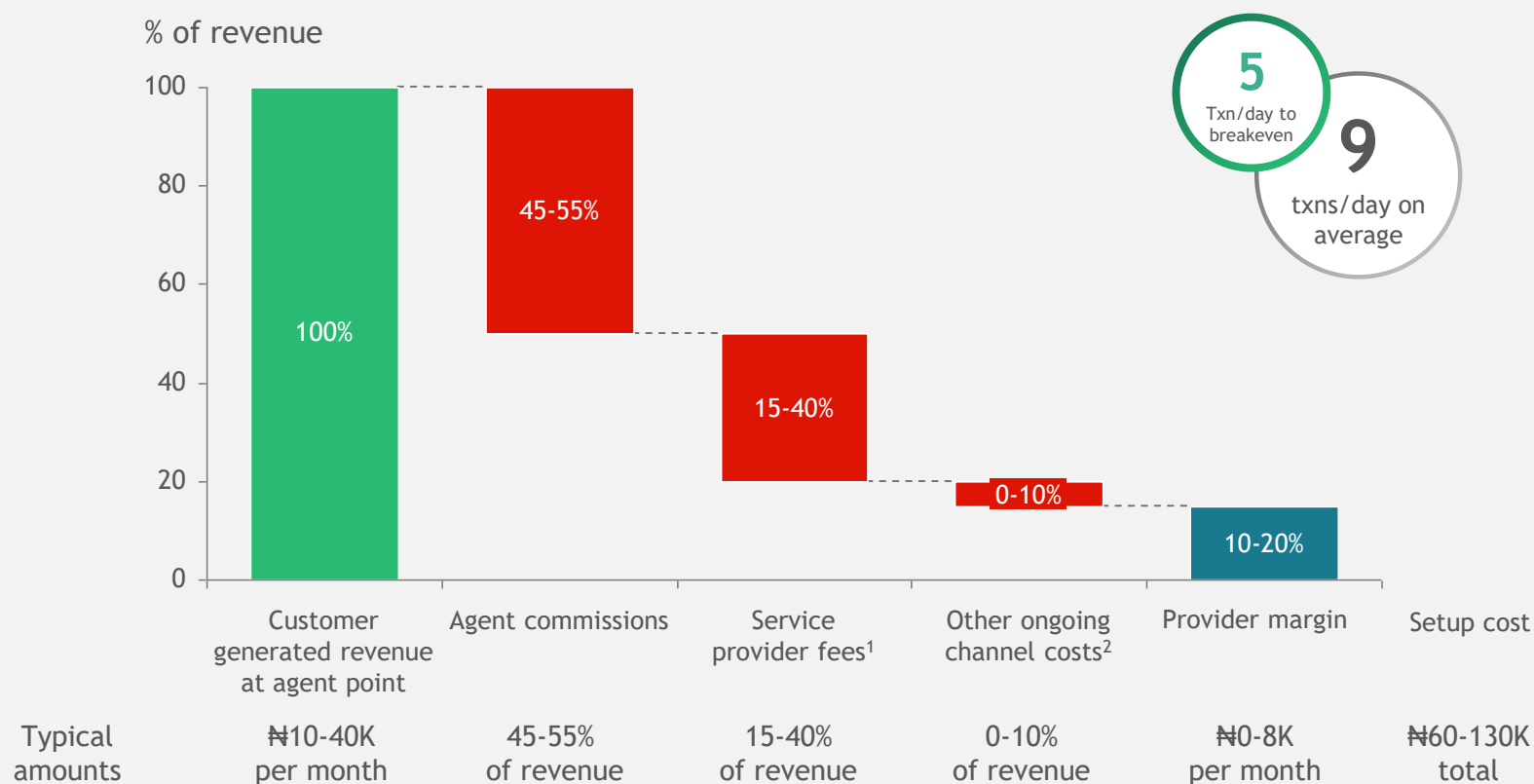
On average, slim but positive margins at each agent point

Note: does not include upfront capital investments or corporate overhead costs, as incremental agent point economics are the fundamental driver of network expansion

	Customer generated revenue at agent point	Agent commissions	Service provider fees[1]	Other ongoing channel costs[2]	Provider margin	Setup cost
Typical amounts	₦10-40K per month	45-55% of revenue	15-40% of revenue	0-10% of revenue	₦0-8K per month	₦60-130K total

1: Includes any fees to NIBSS, Telcos, Banks, and Intermediaries; Higher range seen when intermediaries are used
2: Includes recurring costs of agent management, agent training, and marketing/branding at agent point; lower range seen when intermediaries are used
Source: Interviews with providers, 2018

...but cost position impacted (at least in short-term) if they invest in customer demand or agent viability

Minimize costs

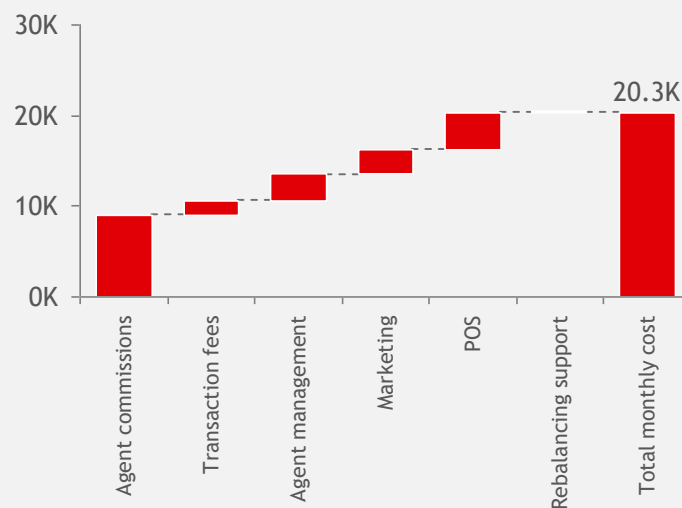Monthly recurring costs (thousand Naira)
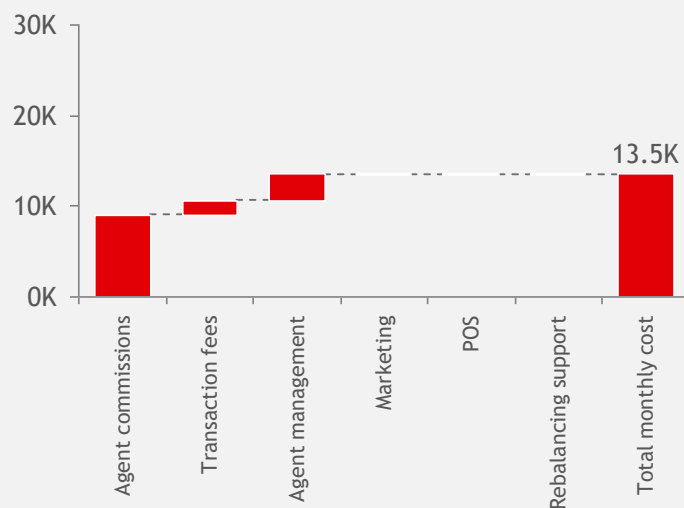
Operational choices:
- Low agent commissions
- No ongoing marketing material
- No POS provided
- No liquidity management support

3 Txn/day to breakeven

Maximize customer demand

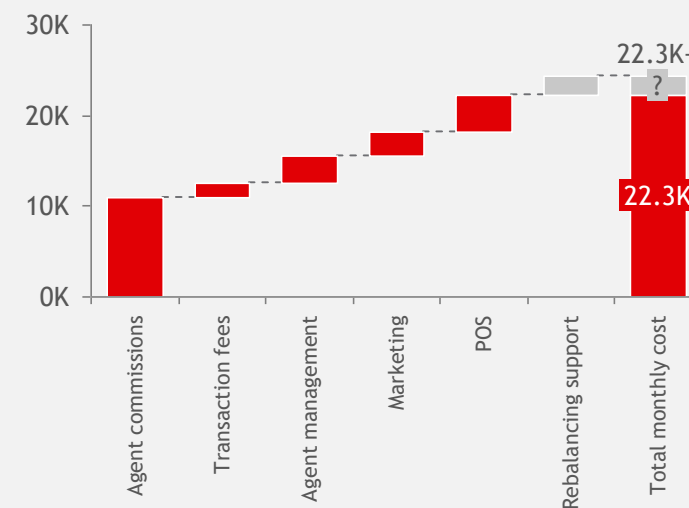Monthly recurring costs (thousand Naira)

Operational choices:
+ Ongoing marketing material provided
+ POS provided[1,2]

9 Txn/day to breakeven

Maximize agent viability

Monthly recurring costs (thousand Naira)

Operational choices:
+ High agent commissions
+ Liquidity management support

11 Txn/day to breakeven

Providers must believe their investment will increase transaction volume 3-4x and ultimately improve overall ecosystem profitability

Note: Variable cost amounts calculated using average provider revenue per agent point (~20K per month); Incremental cost of operational choices estimated from provider interviews; Breakeven transactions calculated using average customer fee per CICO transaction (~80 NGN)
1: POS typically considered a setup cost for providers; for calculations on this slide, have assumed an amortization of POS value over 24 months
2: Some MMOs limit POS costs by only providing to top agents

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...or if they move into the rural frontier

Low txn volumes ⊕ Higher set-up costs ⊕ Higher recurring costs

Overview:
Despite greater risk to agents, low transaction volume also impacts provider viability at frontier

Overview:
Providers require more time and resources to recruit and onboard new agents

Overview:
Fixed costs of agent network management and marketing can be higher in rural areas for providers

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Direct impact:
Risk of negative margins on recurring monthly basis

Indirect impact:
Low agent viability leads to high agent churn

Recruiting/onboarding:
"Although we have some data on the viability of rural locations, we always have to send a team to the field to verify things like latent demand, mobile coverage, and power connectivity"

– Bank in Nigeria

Agent network management:
Lower geographical concentration of agents means it takes more agent managers to support the same number of agents

Marketing:
Low familiarity with national bank brands and digital financial services requires higher marketing spend to create demand

Provider economics are more challenged at an incremental agent point in the rural frontier

For providers to expand agent network into the frontier, they must believe that on a long-term basis these agent points will be profitable

Detail: Higher costs to support frontier agents raises breakeven points from 5 to 7 txn/day for providers

Cost to support each agent point expected to increase at the frontier...

~50% higher

Higher marketing costs[1]:
To offset lower brand awareness, lower DFS penetration

~30% higher

Higher agent network management costs[2]:
Due to decreased ratio of agent managers to agents; managers can support less agents when distances increase

...resulting in a higher breakeven threshold for providers

NGN/month

+37%

5.4K

4.0K

2.0K

1.3K

3.4K

2.6K

Recurring costs (today)[3]   Recurring costs (frontier)
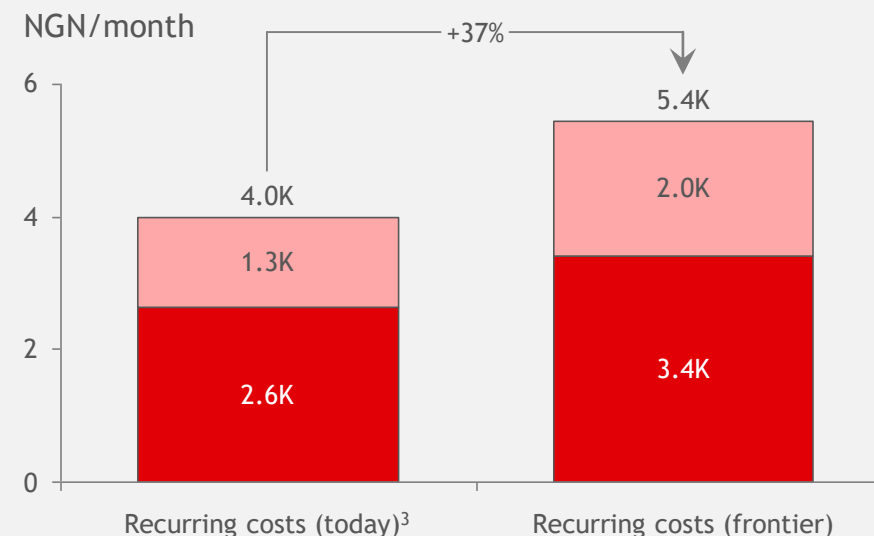
Breakeven transactions   5 txn/day ——— +37% ——➤ 7 txn/day

■ Marketing   ■ Agent management

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Ultimately, providers must help solve for agent viability in order for agent network to stick

In most observed models, agents bear majority of startup and recurring costs...

	Provider	Agent
Startup costs		
• Recruiting	✓	
• Onboarding/training		Varies[1]
• Branding/marketing		Varies[1]
• Technology (mobile/POS device)		Varies[2]
• Real estate (shop setup, security)		✓
• Cash/float capitalization		✓
Recurring costs		
• Training/monitoring	✓	
• Rent		✓
• Utilities		✓
• Internet/data		✓
• Fraud/theft		✓
• Utilities		✓
• Liquidity management		✓

...as a result, average agent breakeven point is significantly higher than provider breakeven point

Daily transactions required to breakeven

+15-25 txns/day

Providers   Agents

▢ Upper range   ▇ Lower range
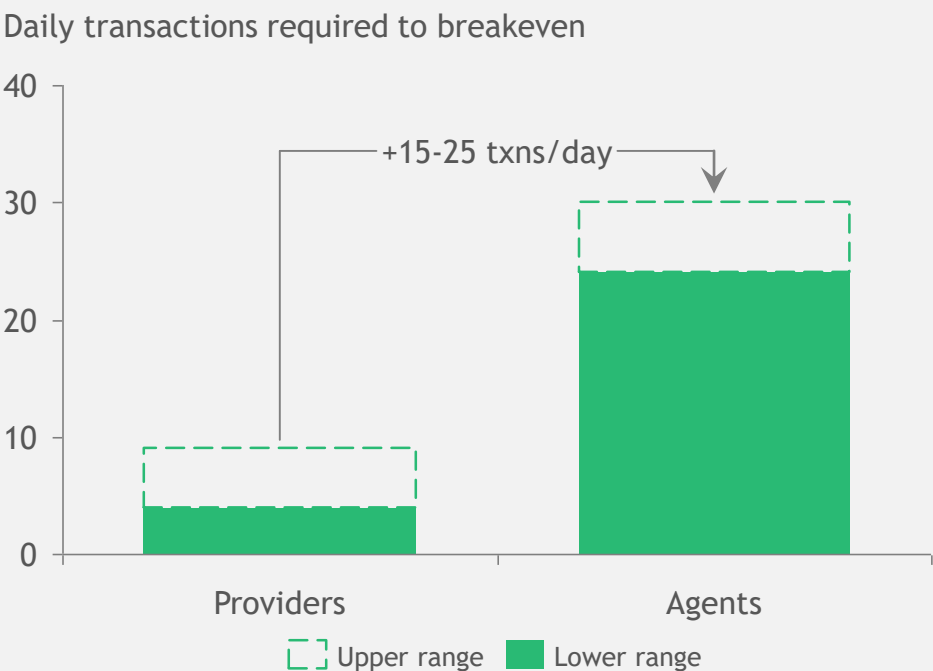
Understanding of CICO economics and agent expansion should therefore focus, as a starting point, on key drivers to agent viability

For agents, DFS is on average a viable business

NGN (thousands)

Sample includes dedicated and non-dedicated agents. Detailed breakout in compendium

72 Avg CICO txns/day

27 Txn/day to breakeven

₦400K

₦304K

₦300K

₦200K

₦100K

₦0K

₦96K

62% margin

₦59K

₦155K

Avg of **8 months** to breakeven on startup[3]

	Startup cost	Ongoing revenue[1]	Ongoing costs[2]	Ongoing profit
Urban	475K	109K	41K	68K
Peri-urban	304K	202K	62K	140K
Rural	207K	159K	68K	91K

Startup costs

	% of total
Buying minimum liquidity	38%
Setting up the shop	32%
Buying mobile phones	8%
Buying laptop/computer	6%
Buying POS	5%
Buying generator/solar panels	4%
Fraud prevention/security	3%
Branding/marketing	2%
Licensing fees	1%

Ongoing costs

	% of total
Liquidity management	23%
Staff/employees	23%
Generator	16%
Opportunity cost of capital	14%
Rent	6%
Internet/data	6%
Power, water, refuse	4%
Other	4%
Cost of fraud/theft	2%
Maintenance	1%
Taxes	1%

Revenue

	% of total
CICO	83%
Transactions[4]	9%
Adjacencies[5]	4%
Transfers[6]	2%
Accounts[7]	1%

Source: Agent interviews, 2018
1: Average revenue excludes extra fees (upcharges); 2: Average cost blends dedicated and non-dedicated agents (note: non-dedicated agent costs do not include rent, utilities, generator, or store maintenance); 3: Breakeven calculation assumes 6 month ramp-up to steady state revenue; 4: Bill payments; 5: SIM registrations, SIM replacements, and airtime; 6: P2P transfers (note: many agents did not distinguish between CICO transactions and transfers, which may contribute to the relatively low %); 7: Account openings
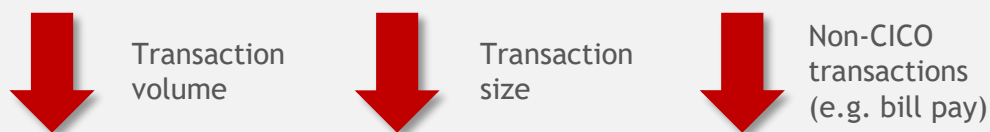
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Several factors impact an individual agent's viability

	Agent business model	**Power reliability**	**Transaction volumes**	**Financial infrastructure**	**Cell infrastructure**
Description	• Non-dedicated agents have lower marginal costs (-13% startup and -28% recurring), and breakeven two months faster • As transaction volumes decrease, non-dedicated models are much more viable	• Unreliable connectivity to power grid is consistent across geographies (urban, peri-urban, and rural)	• Most recurring costs are fixed, so agent profitability highly dependent on txn volumes • At the frontier, est. txn volume (<10/day) falls below expected breakeven threshold (~24/day)	• Liquidity management costs are higher for rural vs. urban agents • Because of limited bank/ATM presence, liquidity management costs at the frontier expected to be ~13-50% higher than those at a rural oasis	• Without cell infrastructure, agents are unable to operate • No direct economic impact, but a necessary condition for agent viability and reach

Mitigating choices

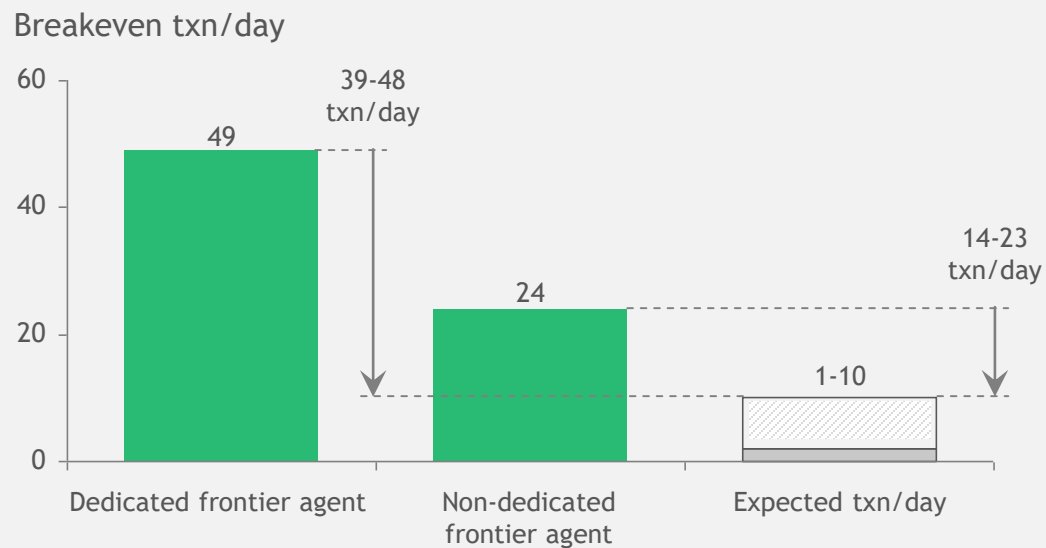|		**Reliance on generator**	**Investing in POS**	**Reduced rebalancing freq.**	**Fraud and theft**
	N/A	• Agents often cope by spending money on generators • Generator fees cost agents an average of ₦12K per month (fuel and maintenance)	• Despite lower costs, no-POS agents take longer to breakeven due to lost revenue from cash outs (12 months vs. 3 months) **Charging extra fees** • Most agents charge extra fees (80% of agents in sample), providing a 20-25% lift on margins	• Agents offset higher travel costs by taking fewer trips/month: urban/peri-urban (53) vs. rural (26) **Alternate rebalancing points** • Agents with limited access to financial infrastructure often cope by finding unofficial rebalancing points	• Agents currently do not appear to have high theft costs, but qualitative interviews suggest this may become a factor at the frontier, or as the CICO agent market matures

Particularly relevant at frontier

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Source: Agent interviews, 2018; See compendium for full details

However, agent economics likely unviable at frontier due to low txn volumes & limited financial infrastructure

Transaction volumes

Lower transaction volume in frontier geographies[1]...

Transaction volume

Transaction size

Non-CICO transactions (e.g. bill pay)

...which falls below required transactions for agents to breakeven[2]

Breakeven txn/day

39-48 txn/day

49 — Dedicated frontier agent

24 — Non-dedicated frontier agent

14-23 txn/day

1-10 — Expected txn/day

Financial infrastructure

Limited financial infrastructure means frontier agents are often 60+ min from rebalancing point, resulting in increased rebalancing costs[3]

Avg cost of rebalancing / month (Naira)

+13-50%

	Urban	Peri-urban	Rural (oasis)	Frontier (estimated)[5]
	3.5K	8.0K	18.3K	27.5K (6.8K / 20.7K)
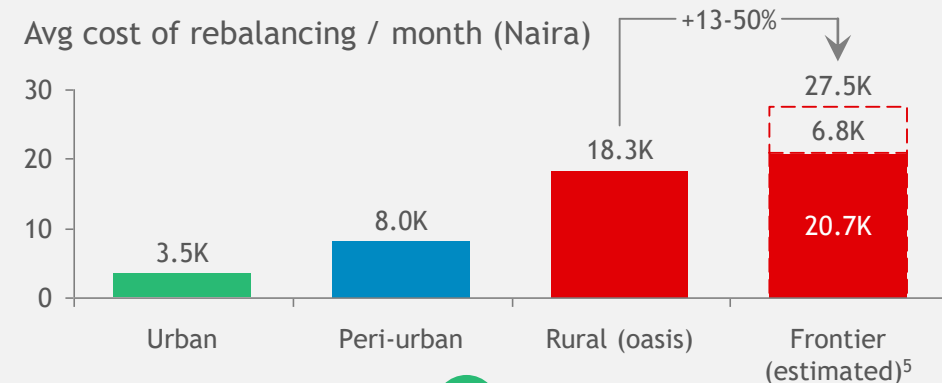
Operational burden also impacts agent viability at frontier. Long rebalancing trips[4]...

- May not be perceived as "worth the hassle" by new agents or non-dedicated agents with alternate income

- May become a bottleneck as rural txn volume grows and need for rebalancing increases

- Result in long periods of store closure, which negatively impact customer experience

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Existing agent model likely to reach 51% of Nigeria's adult population

Deep-dive on interventions

% of adult population

- Total adult population — 100%
- No power connctivity — 13%
- No cell coverage — 21%
- No financial infrastructure — 6%
- Not economically viable — 9%
- Population in agent-viable areas — 51%

Note: Values in waterfall show incremental percentage of population excluded with each additional filter.

E.g. 87% (100%-13%) of the adult population has power connectivity, while 66% (100%-13%-21%) of the total population has both power connectivity AND access to cell coverage

Data from Rural Electrification Agency; assumes 20km catchment around electrified communities

Data from OpenCellID; assumes 5km catchment radius around cell towers

Data from ESRI; assumes 45 minute catchment radius around banks/ATMS[1,2]

Data from GRID3; assumes settlement requires 3,000 adults to support a single agent (detailed assumptions in compendium)

Interventions likely needed to increase desired reach for CICO agents

1: Assumed agents located maximum of 30 minutes from bank + customer willingness to travel 15 minutes to agent location
2: Drive times from ESRI likely optimistic, actual road conditions may result in drive times much longer than estimated

Interventions can allow agents to be viable in more challenged locations, leading to an increase in reach

Agents must be able to reach settlements of ~500 adults in order to cover ~80% of the adult population

| Population segment	Share of adult population (%)	Cumulative share of adult population (%)
>10,000	47%	47%
8,000 – 9,999	4%	51%
6,000 – 7,999	5%	56%
4,000 – 5,999	5%	62%
2,000 – 3,999	8%	69%
1,000 – 1,999	6%	75%
500 - 999	5%	81%

To improve agent viability, consider interventions to address low revenues and high operating costs

Low revenue potential a factor of...

	Potential improvement levers
Low population sizes	• Critical, but taken as a given
Low DFS penetration	• Customer education • Marketing • Bank account registrations • Technology reliability
Low transaction frequency	• Digitizing G2P payments • Creating products with human-centered design

Other potential levers: Offering recurring monthly subsidies, increasing average transaction size, increasing agent commissions

Liquidity management the most significant cost driver...

Liquidity management — 49%
All other costs — 51%

% of total costs (rural agent)[1]
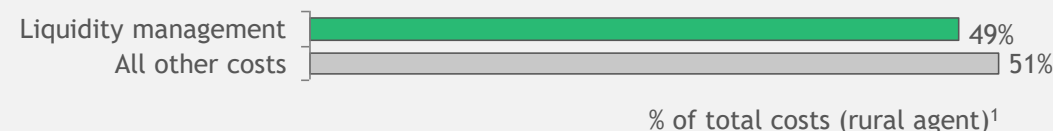
However, cost of float runners must be borne by provider (or subsidized by a 3rd party, e.g. government or NGO)

Source: Population data from GRID3
1: Avg cost structure of rural agent in sample; includes dedicated and non-dedicated agents; costs of rent, utilities, generator, and maintenance excluded for non-dedicated agents

Detail: Interventions to address low transaction volumes can extend viability at the frontier

Improvement levers can change a location from unviable → viable

Assumptions

Population size = 500 adults

Avg recurring cost = ₦51.2K per month[1]

Avg revenue per transaction = ₦72 per transaction[2]

Agent profit per month	DFS penetration (% of adult population)					
	10%	12%	14%	16%	18%	20%
1	-₦47.6K	-₦46.9K	-₦46.1K	-₦45.4K	-₦44.7K	-₦44.0K
2	-₦44.0K	-₦42.5K	-₦41.1K	-₦39.6K	-₦38.2K	-₦36.8K
3	-₦40.4K	-₦38.2K	-₦36.0K	-₦33.9K	-₦31.7K	-₦29.6K
4	-₦36.8K	-₦33.9K	-₦31.0K	-₦28.1K	-₦25.2K	-₦22.4K
5	-₦33.2K	-₦29.6K	-₦26.0K	-₦22.4K	-₦18.7K	-₦15.1K
6	-₦29.6K	-₦25.2K	-₦20.9K	-₦16.6K	-₦12.3K	-₦7.9K
7	-₦26.0K	-₦20.9K	-₦15.9K	-₦10.8K	-₦5.8K	-₦0.7K
8	-₦22.4K	-₦16.6K	-₦10.8K	-₦5.1K	₦0.7K	₦6.5K
9	-₦18.7K	-₦12.3K	-₦5.8K	₦0.7K	₦7.2K	₦13.7K
10	-₦15.1K	-₦7.9K	-₦0.7K	₦6.5K	₦13.7K	₦20.9K

Transaction frequency (per person, per month)

Potential levers to increase DFS penetration

- Increased customer education
- Increased marketing
- Increased bank account registrations
- Increased technology reliability

Potential levers to increase transaction frequency

- Digitizing G2P payments
- Creating products through human-centered design
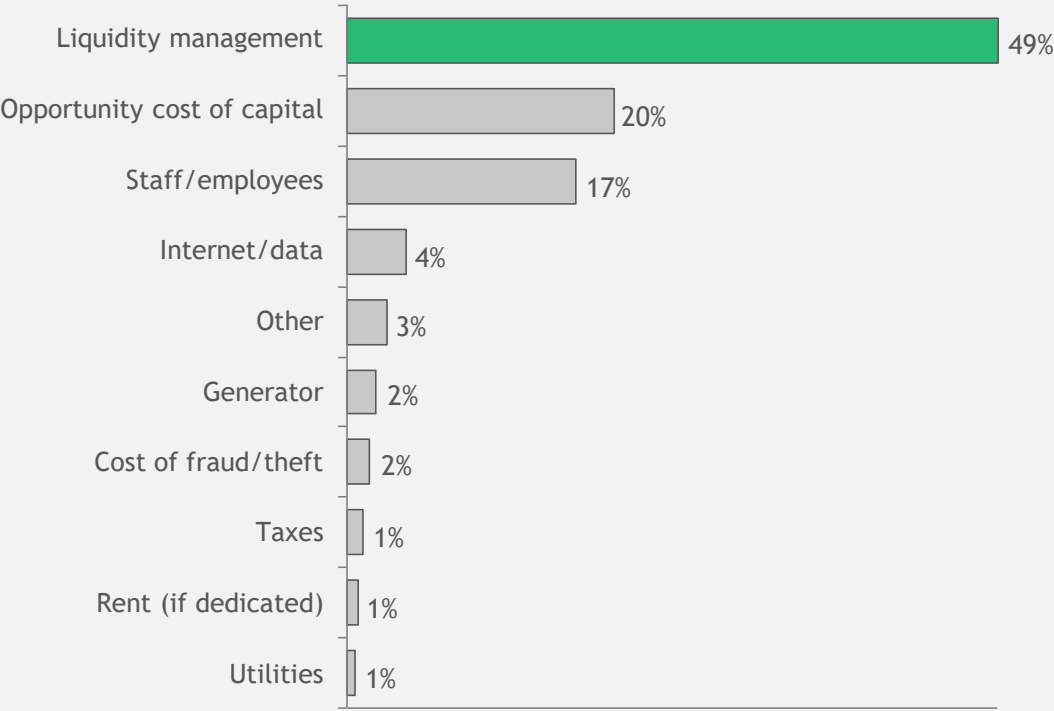
Other levers to address low revenues

- Offering recurring monthly subsidies
- Increasing average transaction size

1: Avg recurring cost of a rural, non-dedicated agent (from agent interviews)
2: Avg revenue per transaction for an agent in sample (from agent interviews)

Detail: Similarly, addressing high liquidity management costs can also improve agent viability

Rural agent operating costs can be decreased by ~50% with float runners

Cost category	%
Liquidity management	49%
Opportunity cost of capital	20%
Staff/employees	17%
Internet/data	4%
Other	3%
Generator	2%
Cost of fraud/theft	2%
Taxes	1%
Rent (if dedicated)	1%
Utilities	1%

% of total costs (rural agent)[1]

Which could reduce the need to increase revenues or provide subsidies

Assumptions

Population size = 500 adults
Avg revenue per transaction = ₦72 per transaction[2]

Agent viability (*no liquidity management support*)

Agent profit per month		DFS penetration (% of adult population)		
		16%	18%	20%
Txn vol (per person, per month)	7	-₦10.8K	-₦5.8K	-₦0.7K
	8	-₦5.1K	₦0.7K	₦6.5K
	9	₦0.7K	₦7.2K	₦13.7K

Agent viability (*float runners*)

Agent profit per month		DFS penetration (% of adult population)		
		16%	18%	20%
Txn vol (per person, per month)	7	₦14.0K	₦19.1K	₦24.1K
	8	₦19.8K	₦25.5K	₦31.3K
	9	₦25.5K	₦32.0K	₦38.5K

1: Avg cost structure of rural agent in sample; includes dedicated and non-dedicated agents; costs of rent, utilities, generator, and maintenance excluded for non-dedicated agents
2: Avg revenue per transaction for an agent in sample (from agent interviews)

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Next steps required include analysis refinement, stakeholder engagement and intervention design

Analysis refinement

- Refresh with latest data (e.g. updates to GRID3; GSMA; refreshed bank/ATM locations)
- Refine estimates of economic activity to reflect movement beyond where people live (e.g. markets)

Stakeholder engagement

- Share preliminary findings with relevant stakeholders (incl. providers, regulators)
- Start (or continue) discussions on critical agent viability drivers such as upcharging
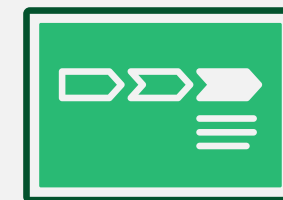
Intervention design

- Develop robust analyses of expected costs, benefits and impact for specific intervention
- ...incl. any unintended consequences
- ...and how they layer upon / interact with one another

Detail: While potential interventions come to mind, more action needed to explore further

While key drivers of agent viability suggests potential interventions

...several economic and operational factors to consider

<u>Low txn volumes</u> a significant economic driver for frontier agents. Digitizing G2P suggests win-win way to stimulate demand and provide distribution channel for government programs

- How will agents manage increased liq. mgmt needs from G2P payments?
- How to ensure this does not become a month-end mass "cash-out" of system (not building DFS ecosystem)?

<u>Extra fees</u> also instrumental to agent profitability, driving ~20-25% of margin on avg (and viability in some agents); Suggests consideration of fee caps required

- How to ensure consumer protection esp. of the most poor and vulnerable?
- Is the agent the right point to set market-based pricing, or the provider?

<u>Liquidity management</u> costs are significant – highest of recurring cost items and increasing in frontier, suggesting float runners could have significant impact

- Can float runner model be operational in Nigeria? (sig. less financial infrastructure relative to Bangladesh)
- With provider margins stressed at frontier, who would pay for service?

Deep-dive analysis required, as well as stakeholder engagement

Critical to also understand any unintended consequences and how interventions can interact positively or negatively with one another

***Examples only** – not comprehensive list of drivers, interventions or implications*

Appendix: Details on methodology

Provider methodology

Overview

Objective to understand economic drivers of providers, incl. key drivers of economic profitability

We focused on <u>incremental agent expansion</u> (vs. end-to-end profitability) given the focus on CICO economics and interest in expanding reach in Nigeria

We engaged 10+ organizations in Nigeria
- FSPs, super agents and others
- Some had been offering services for years, others more recently or about to begin operations

Initial interviews explored strategic objectives, operating model and challenges faced…

…then data from 7 providers helped highlight key factors impacting agent point economics
- Complete data from 3 providers; partial from 4
- Triangulated with findings from global study

What this is not intended to be

- <u>Not</u> intended to provide "definitive benchmark" for provider offering services

- <u>Not</u> assessment of past performance — nearly all providers shared data based on "new" models from the past 6–12 months

What this enables

- Understanding ranges for provider cost and revenue and key differences in model driving differences

- Estimating breakeven volume and profitability for incremental agent points …

- … and how this changes between urban, peri-urban, rural oasis and rural frontier geographies

Agent methodology

Overview

Objective to understand key drivers of agent viability, incl. endogenous and exogenous factors

We conducted in-depth interviews with agents
- 90+ min interviews incl. standardized questions for quantitative analysis, open-ended sections
- Observational study of each interview site to complement feedback from agents

Sample of 30 agents to get cross-section of variables of interest
- Urban, peri-urban and rural in Lagos and Kano, incl. many 60-180 min from nearest bank / ATM
- Mix of bank and 3rd party providers
- Mix of dedicated / non-dedicated
- Efforts to include agents with low transaction volumes (difficult with survivorship bias)

What this is not intended to be

- Not a representative study – sample selected to ensure cross-section for variables of interest

- Rural sample not representative of "frontier" – rural agents interviewed were in "oases" therefore impact of exogenous factors was modeled

What this enables

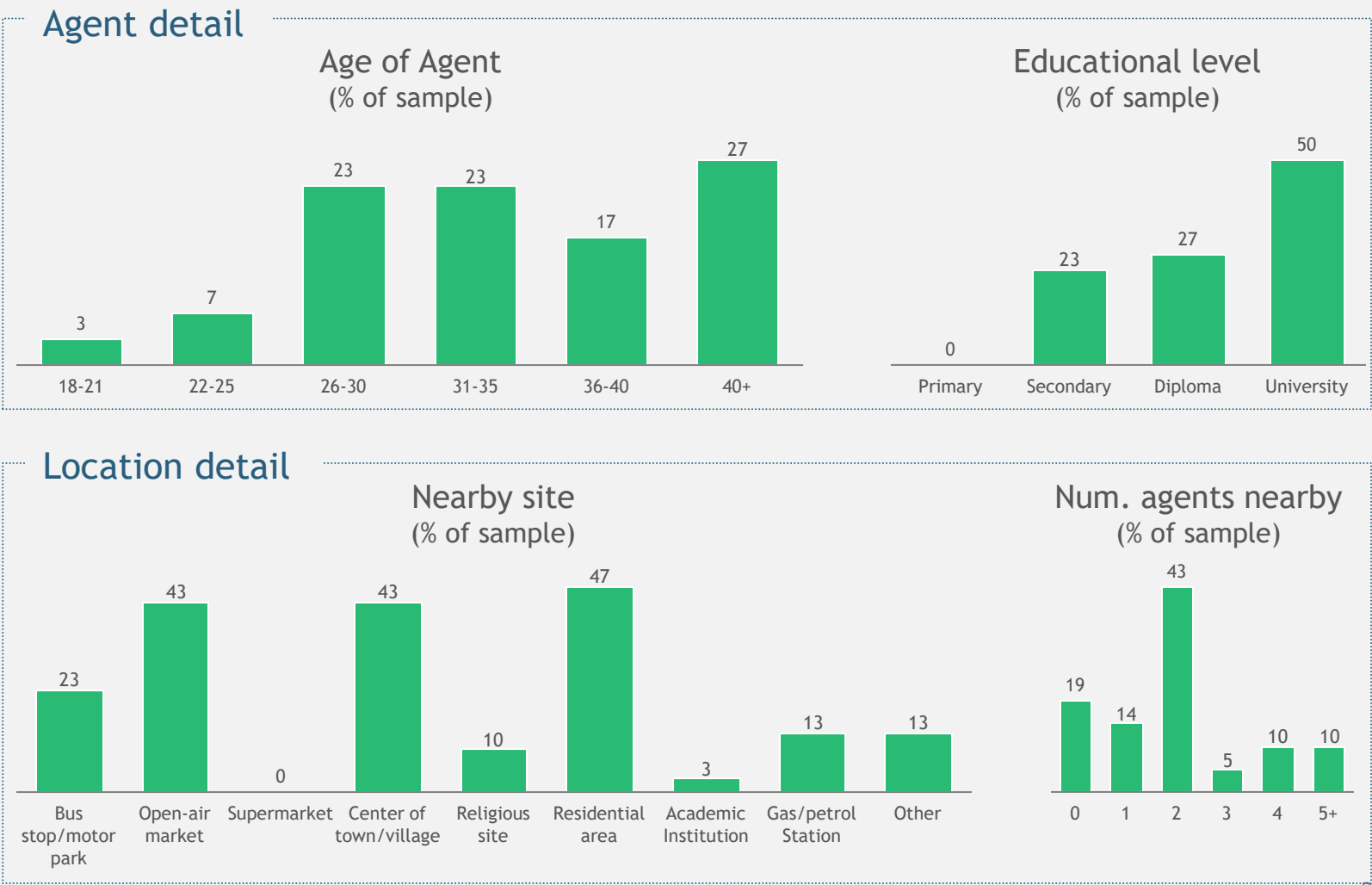- Sizing of magnitude and direction of impact of exogenous constraints, and the operational choices agents make to mitigate their effects

- Strong understanding of cost (recurring cost esp. had tight variance)

- Understanding of key challenges to CICO economics for agent channel, including estimations for the frontier

- Understanding of linkages between provider operational choices and impact on agent viability

Detail: Overview of agents interviewed (I)

Date visited: August 2018
No. of interviews: 30
Sites visited: Lagos, Agege, Ikorodu,
Badagry, Rogo, Fagge, Karaye,
Dawanau, Wudil, Kiru
10% female, 90% male

Agent detail

Age of Agent
(% of sample)

Age	%
18-21	3
22-25	7
26-30	23
31-35	23
36-40	17
40+	27

Educational level
(% of sample)

Level	%
Primary	0
Secondary	23
Diploma	27
University	50

Location detail

Nearby site
(% of sample)

Site	%
Bus stop/motor park	23
Open-air market	43
Supermarket	0
Center of town/village	43
Religious site	10
Residential area	47
Academic Institution	3
Gas/petrol Station	13
Other	13

Num. agents nearby
(% of sample)

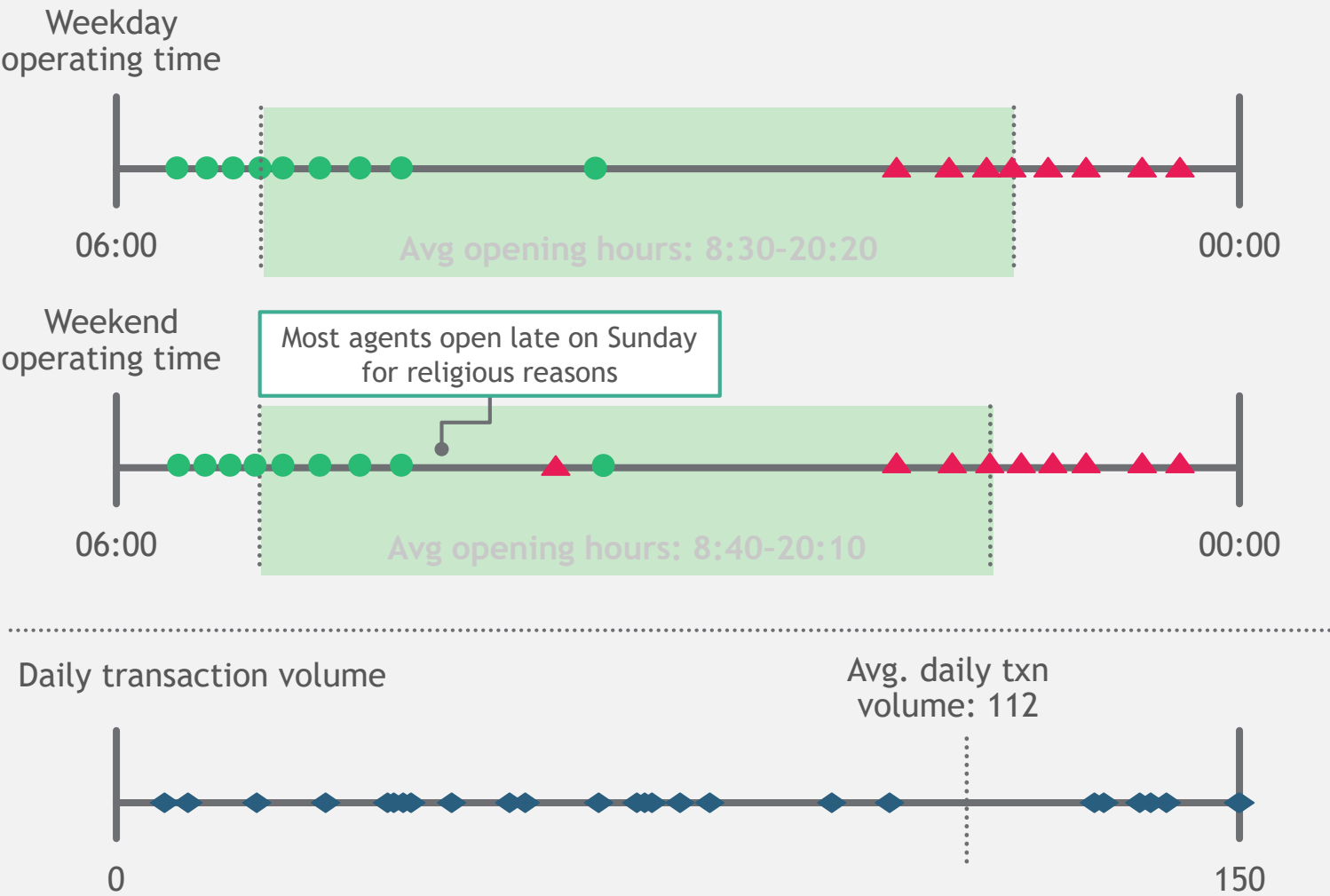| Num	%
0	19
1	14
2	43
3	5
4	10
5+	10

Detail: Overview of agents interviewed (II)

Date visited: August 2018
No. of interviews: 30
Sites visited: Lagos, Agege, Ikorodu, Badagry, Rogo, Fagge, Karaye, Dawanau, Wudil, Kiru
10% female, 90% male

73% of agents work 7 days in a week

2.6 average number of years in operation

Weekday operating time

06:00   00:00

Avg opening hours: 8:30-20:20

Weekend operating time

Most agents open late on Sunday for religious reasons

06:00   00:00

Avg opening hours: 8:40-20:10

Daily transaction volume

Avg. daily txn volume: 112

0   150

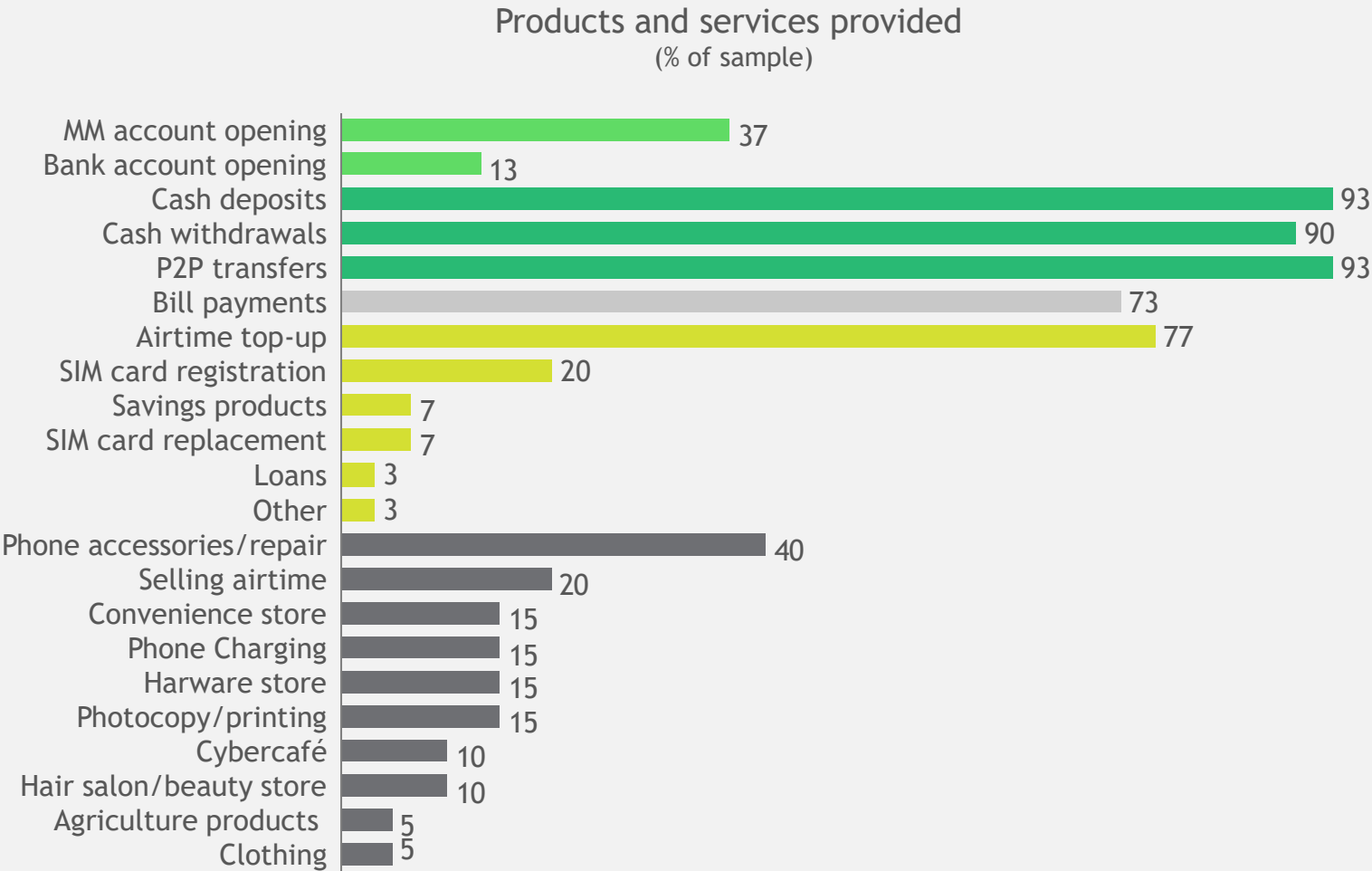# Detail: Overview of agents interviewed (III)

Date visited: August 2018
No. of interviews: 30
Sites visited: Lagos, Agege, Ikorodu, Badagry, Rogo, Fagge, Karaye, Dawanau, Wudil, Kiru
10% female, 90% male

Products and services provided
(% of sample)

Group	Product/service	Value
A	MM account opening	37
A	Bank account opening	13
C	Cash deposits	93
C	Cash withdrawals	90
C	P2P transfers	93
T	Bill payments	73
A	Airtime top-up	77
A	SIM card registration	20
A	Savings products	7
A	SIM card replacement	7
A	Loans	3
A	Other	3
+O	Phone accessories/repair	40
+O	Selling airtime	20
+O	Convenience store	15
+O	Phone Charging	15
+O	Harware store	15
+O	Photocopy/printing	15
+O	Cybercafé	10
+O	Hair salon/beauty store	10
+O	Agriculture products	5
+O	Clothing	5

Geospatial methodology

A	Data acquisition & processing	B	Population based catchment analysis	C	Spatial intersection	D	ArcGIS online visualizations

A1 Geocoding of street addresses to get coordinates

A2 Preprocessing of LAT/LON to spatial point locations

B1 Generated drive time polygons using street n/w dataset – 5,10,15 mins etc.; tools used: ArcGIS and Alteryx
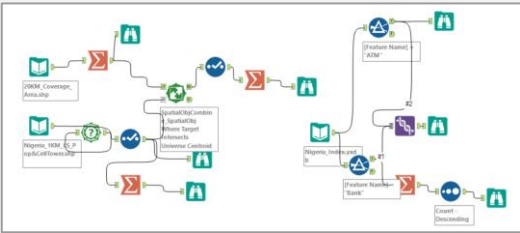
C1 Intersected multiple polygon layers to perform catchment analysis; tools used: Spatial Analyst/Network Analyst

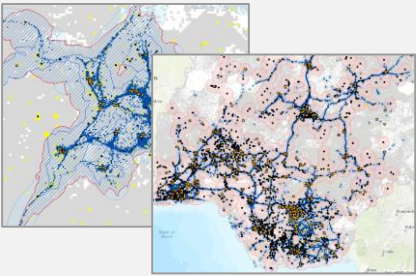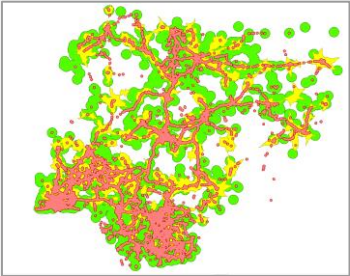**D1** Mapping of layers—Power, cell, population coverage, financial infrastructure etc.

Google API converting addresses to LAT/LON

Population based catchment analysis- Alteryx Model

Key data sources and tools

ArcGIS Network Analyst

okresv-0005.json	791.9 KB
okresv-0005.zip	337.45 KB
okresv-005.json	136.62 KB
okresv-005.zip	57.21 KB
okresv.json	8.56 MB
okresv.zip	3.48 MB
slovensko-0005.json	92.58 KB
slovensko-0005.zip	44.51 KB
slovensko-005.json	14.96 KB
slovensko-005.zip	9.01 KB
slovensko.json	
slovensko.zip	

TOMTOM MAPS

LandScan™ Geographic Information Science & Technology

THE SCIENCE OF WHERE

alteryx

esri

ArcGIS Online

GEOPODE Geographic, Population & Demographic Data

Detail: Geospatial methodology

Financial infrastructure

Economic activity

Cell towers

Power connectivity

a Data preparation and preprocessing
- Processed and converted addressed of ~4,000 POIs into LAT/LON
- Prepared data using Alteryx
- Mapped banks, cell locations, power infrastructure, and economic activity POIs

b Population based Catchment Analysis
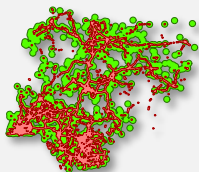- Generated drive time polygons across various scenarios—5 mins, 10, 15, 30 mins etc. using street network dataset
- Population catchment summary to achieve 80% of the population

c Spatial Intersection and Funnel Methodology
- Calculated population coverage for individual layer—cell towers, economic, power and financial POIs
- Performed geospatial intersection using geoprocessing tool in ESRI's Spatial Analyst
- Created layers and intermediate report/summary using Alteryx modules

d Visualizations
- Visualized multiple layers with their corresponding coverage areas using ESRI's ArcGIS online
- Added dynamic functionality, allowing use to zoom in/out, select layers, and see corresponding details

Single view and spatial framework of multiple layers

Population based catchment analysis summary report

Visualization dashboard—ArcGIS online

Generated catchment summaries

Modeling proposed locations/territories on an interactive dashboard

		Banks		Banks + ATMs		Banks + ATMs + Power/Mobile Connectivity	
	Scenarios						
No.	Drive time (Mins)	Total Population Covered	Population Coverage (%)	Total Population Covered	Population Coverage (%)	Total Population Covered	Population Coverage (%)
1	5	43,591,548	23%	44,052,530	24%	43,356,363	23%
2	15	79,499,180	43%	79,859,470	43%	77,304,241	42%
3	30	104,986,214	56%	105,377,549	57%	95,149,814	51%
4	45	124,786,740	67%	125,159,839	67%	104,340,443	56%
5	60	139,798,211	75%	140,129,729	75%	108,877,141	58%
6	70	148,012,657	79%	148,229,498	80%	110,715,907	59%
7	72	149,515,568	80%				

Catchment Summary Report

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