

DIGILOGIC

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# Deliverable 1.2

## Map of the ecosystem, video narration and brief on levers for change

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| <b>Authors</b>          | Claudia Knobloch (ENDEVA), Paola Zisman (ENDEVA)  |
| <b>Reviewers</b>        | Francesca Pozzar (FINN), Thorsten Huelsmann (ECM)   |
| <b>Abstract</b>         | The DIGILOGIC consortium focuses on investigating and mapping the critical mile logistics in Africa as a relevant system to understand the larger systems of smart logistics. A deep understanding of the systems' core wiring and driving forces were uncovered through a comprehensive multi-stakeholder engagement and consultation process. Subsequently, the most promising opportunities for engaging the system in ways that could help push it toward greater health were identified. |
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**\* R:** Document, report (excluding the periodic and final reports)

**DEM:** Demonstrator, pilot, prototype, plan designs

**DEC:** Websites, patents filing, press & media actions, videos, etc.

**OTHER:** Software, technical diagram, etc.

## EXECUTIVE SUMMARY

The DIGILOGIC consortium focuses on investigating and mapping critical mile logistics as a relevant system to understand the larger systems of smart logistics. Deliverable D1.1 provided a vision to guide this quest: the DIGILOGIC consortium aims for digital solutions to transform the logistics sector through collaboration between Digital Innovation Hubs (DIHs) in Africa and Europe. These dynamic partnerships will lead to a more efficient, affordable, inclusive, and sustainable logistics system in Africa. With deliverable D1.2, DIGILOGIC aims to understand how to make DIGILOGIC's vision for the critical mile logistics in Africa a reality.

**Critical mile logistics** in Africa represent a powerful system for smart logistics innovation and impact. The critical mile can be defined as a product's journey from a local warehouse to the end consumer. It includes numerous support services between those two points, representing opportunities for smart innovations, such as mapping, tracking, cold chain management, geo-localisation, and hardware. The critical mile is also a key logistics segment to achieve the socio-economic development goals in Africa. It enables access to markets and, in return, to goods and services and strengthens key functioning supply chains like agriculture, health or manufacturing.

**DIGILOGIC's systems change methodology** set out to understand and map how innovation might make critical mile logistics more efficient, affordable, inclusive and sustainable, through the facilitation of DIHs. Two online expert consultations complemented the primary and secondary research. **The more than 50 stakeholders engaged** and consulted ranged from smart logistics startups to larger logistics providers, government bodies, multinational companies, non-governmental organisations (NGOs), research institutions, and telecommunication operators to cover Africa's full critical mile logistics system. Such a multi-perspective approach ensured a comprehensive analysis of how critical mile logistics works in Africa.

This mapping of the transport and logistics sector includes understanding the **inner workings of the critical mile logistics in Africa**, its landscape of relevant stakeholders, its most promising opportunities for change and finally, a video narration of the system.

Despite a range of promising digital solutions, the critical mile in Africa continues to suffer from weak support structures, limited collaboration, duplication and fragmentation. This leads to inefficiencies and increased costs. These **challenges** prevent existing smart solutions from scaling and from transforming the critical mile logistics system. From this clearer understanding of the core wiring of the system, the most **promising opportunities for engaging the system in ways that could help push it toward greater health** were identified. Fostering transparency through readily available information on the active players, the regulations and funding opportunities could provide greater incentive for collaboration. Through greater ecosystem transparency, a collaboration platform for key actors to meet and explore their synergies could be developed and orchestrated by unbiased third parties such as DIHs. Even the informal sector of distributors and retailers could be included in such an improved and coordinated system by leveraging current intermediary initiatives. A better structured and collaborative landscape would enable and scale more transformative use cases and business models for smart logistics solutions at the critical mile.

The insights gained from the mapping exercise provide inspiration for DIGILOGIC's upcoming activities looking to foster collaboration, capacity building and innovation for smart logistics. The DIGILOGIC activities that could specifically leverage the D1.2 output are the e-learning platform, peer-to-peer exchange, mentoring, co-creation labs and innovation challenges.

# TABLE OF CONTENTS

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>INTRODUCTION .....</b>  | <b>7</b>  |
| 1.1      | Objectives .....   | 7         |
| 1.2      | Methodology .....  | 7         |
| <b>2</b> | <b>MAPPING OF THE SYSTEM .....</b>   | <b>11</b> |
| 2.1      | Scope of the system.....   | 11        |
| 2.1.1    | Critical mile logistics .....  | 11        |
| 2.1.2    | Reasoning behind the scope selection .....                                       | 11        |
| 2.1.3    | Vision for the system.....   | 12        |
| 2.2      | Actors .....   | 12        |
| 2.3      | Current status: Enablers and inhibitors .....                                    | 15        |
| 2.4      | Current status: Feedback loops, core story and map of core system .....          | 17        |
| 2.5      | Future changes: Leverage points .....  | 22        |
| <b>3</b> | <b>VIDEO NARRATION .....</b>   | <b>25</b> |
| 3.1      | Storyline .....  | 25        |
| 3.2      | Video script.....  | 25        |
| <b>4</b> | <b>CONCLUSIONS AND RECOMMENDATIONS.....</b>                                      | <b>28</b> |
| <b>5</b> | <b>ANNEX .....</b>   | <b>31</b> |
|          | Annex 1: Smart logistics startups active in Africa.....                          | 31        |
|          | Annex 2: Full list of enablers and inhibitors .....                              | 33        |
|          | Annex 3: All feedback loops of the transport and logistics system in Africa..... | 35        |
|          | Annex 4: Interview partners and resource persons.....                            | 45        |
|          | Annex 5: Bibliography .....  | 47        |

## LIST OF FIGURES

|  |           |
|--|-----------|
| <b>FIGURE 1: OVERVIEW OF DIGILOGIC SYSTEMS MAPPING PROCESS .....</b>                         | <b>8</b>  |
| <b>FIGURE 2: THE CRITICAL MILE .....</b>   | <b>11</b> |
| <b>FIGURE 3: CATEGORIES OF RELEVANT STAKEHOLDERS AFFECTING CRITICAL MILE LOGISTICS .....</b> | <b>13</b> |
| <b>FIGURE 4: FEEDBACK LOOP EXAMPLE .....</b>   | <b>17</b> |
| <b>FIGURE 5: THE CORE STORY .....</b>  | <b>18</b> |
| <b>FIGURE 6: FULL MAP OF THE SYSTEM .....</b>  | <b>22</b> |
| <b>FIGURE 7: THE LEVERS FOR CHANGE .....</b>   | <b>23</b> |
| <b>FIGURE 8: SCRIPT OF THE VIDEO ON THE CRITICAL MILE SYSTEM .....</b>                       | <b>25</b> |

## ABBREVIATIONS

|               |   |
|---------------|---|
| <b>AI</b>     | Artificial intelligence   |
| <b>AfCFTA</b> | African Continental Free Trade Area                               |
| <b>ALICE</b>  | Alliance for Logistics Innovation through Collaboration in Europe |
| <b>AU</b>     | African Union   |
| <b>BoP</b>    | Bottom of the pyramid   |
| <b>COMESA</b> | Common Market for Eastern and Southern Africa                     |
| <b>CSO</b>    | Civil society organisation  |
| <b>DIH</b>    | Digital Innovation Hub  |
| <b>EU</b>     | European Union  |
| <b>FMCG</b>   | Fast moving consumer goods  |
| <b>GHG</b>    | Greenhouse gas  |
| <b>ICT</b>    | Information and communication technology                          |
| <b>IFC</b>    | International Finance Corporation                                 |
| <b>ILO</b>    | International Labour Organization                                 |
| <b>IoT</b>    | Internet of things  |
| <b>(M)SME</b> | (Micro,) Small and medium-sized enterprise                        |
| <b>NGO</b>    | Non-governmental organisation                                     |
| <b>SAIS</b>   | Southern Africa Innovation Support                                |
| <b>SMS</b>    | Short message service   |
| <b>SSA</b>    | Sub-Saharan Africa  |
| <b>UNCTAD</b> | United Nations Conference on Trade and Development                |
| <b>USSD</b>   | Unstructured supplementary service data                           |
| <b>WP</b>     | Work package  |
| <b>ZICTA</b>  | Zambia Information and Communications Technology Authority        |

# 1 INTRODUCTION

Systems change methodology aims to develop a deep understanding of the system at hand, through primary and secondary research, to build a map that captures the key forces and patterns driving the system's behaviour. Once in-depth clarity has been established, steps are taken to explore the most promising opportunities for engaging the system in ways that could help push it toward greater health. Endeava followed these methodological steps to conduct a rapid system's map of the most promising and actionable part of Africa's critical mile logistics system. The results should shed light on how innovation might make critical mile logistics more efficient, affordable, inclusive and sustainable, through the facilitation of Digital Innovation Hubs (DIHs).

## 1.1 OBJECTIVES

The DIGILOGIC systems change approach helps understand and tackle root causes of lacking collaboration between and among EU-AU innovation ecosystems in the logistics sector. Thinking systemically keeps at bay negative unintended consequences as time is dedicated to understanding the interconnected relationships within a system.

Endeava followed a systems thinking approach to ensure large scale systems change that only happens if the entrenched patterns that drive the system are changed themselves. Working with a system in such a way can generate more sustainable and resources efficient outcomes. When one exploits areas of leverage in a system by affecting key dynamics, it can result in wider positive ripple effects that ultimately help the system change itself.

Digital Innovation Hubs (DIH) are localised entities fostering the adoption of emerging technologies for innovative solutions, products and services and are well placed to orchestrate such a nascent and promising sector as smart logistics. **The DIGILOGIC systems change methodology allows us to see the broad context of patterns affecting DIHs' potential impact and the significance of their interconnection.** It suggests that with increased awareness and attention paid to internal barriers, and by taking a broad-based approach to systemic improvements, European and African DIHs together could become more effective, progressive and proactive in shaping the digital transformation in Africa's logistics sector.

## 1.2 METHODOLOGY

Endeava applied a qualitative systems change methodology. Endeava mapped the actors, enablers, inhibitors and forces connecting them. The DIGILOGIC system methodology revealed enabling and inhibiting drivers and brought to light their interconnections through theoretical feedback loops. To complete the systems change methodology, Endeava held a second consultation webinar to identify the leverage points leading to the intended change. Figure 1 provides an overview of the process



FIGURE 1: OVERVIEW OF DIGILOGIC SYSTEMS MAPPING PROCESS

### Desktop research

As a first step in coming to terms with the core dynamics of the system, Endeava conducted desk research. The type of secondary data consulted included academic journals and grey literature (see bibliography D1.1). Due to the developing nature of smart logistics in Africa, the Endeava team also consulted newspapers articles and recordings from online conferences to grasp the upcoming trends and players.

### Semi-structured interviews

Endeava completed the desktop research by **50 in-depth semi-structured interviews** to get qualitative insights and anecdotes about the sector and its development. The interviewees included a wide variety of stakeholders operating in the logistics systems in Africa, including the DIGILOGIC consortium partners, the DIGILOGIC consortium's network and key actors identified through the desk research's findings. The 30 minutes interviews were semi-structured with open-ended questions following these three themes:

- How does your organisation/project connect to the (smart) logistics in Africa?
- Which challenges and opportunities do you perceive in transport and smart logistics in Africa?
- Which other key players do you perceive in this sector?

### Identify the stakeholders of the system

The primary and secondary data collected allowed to highlight the key stakeholders operating in the system. Endeava engaged and consulted most of these stakeholders via bilateral interviews and through the two online consultation webinars. Endeava included the key stakeholders who were not engaged directly in the methodology through literature findings and other stakeholders' testimonies. For instance, the consultation process did not engage drivers trade union, but this group was highlighted as important by large logistics provider, especially in West Africa.

A detailed list of stakeholders engaged can be found in *chapter 2.2*.

### Identification of the guiding and the near star as well as the guiding questions

The primary and secondary research informed the focus area of the system analysed. In this step, the consortium guided by Endeava identified an aspirational state (guiding star) and a nearer-term desired outcome (near star) and a guiding question. The guiding question helps to focus on understanding the system. The mapping journey will seek to answer this question.

Further information on the visioning process can be found in *D1.1 Vision and Stakeholder List*.

### Identify the enabler and inhibitor

To clarify the driving forces in the system (enablers and inhibitors) and map them accordingly, Endeava held a consultative webinar with the stakeholders engaged. The consultative session allowed us to uncover the core forces that keep the system of critical mile logistics in Africa unhealthy (inhibitors) and the forces that can nudge that system toward a healthier state (enablers). Enablers are significant forces in the environment that supports, encourages or increases the health and effectiveness of the system as defined in the guiding star. In contrast, inhibitors are a significant force in the environment that undermines or prevents the health and effectiveness of the system as defined in the guiding star.

The consultative webinar brought together the full spectrum of diverse and dissenting voices into the process to avoid bias in this exploration. This ensured a comprehensive and multi-perspective analysis.

### Discover the feedback loops

From the enablers and inhibitors collected during the consultation multi-stakeholder webinar, thematic clusters appear. Endeava sent a survey to the webinar's attendees to prioritise the clusters mentioned during the multi-stakeholder consultative webinar.

Endeava prioritised about ten clusters before analysing them to understand their upstream causes and downstream effects. For each prioritised theme, the analysis focuses on what causes the theme to occur and the consequences and effects. The upstream causes and downstream effects for each theme can be structural (political, social and economic institutions and infrastructure) or attitudinal (beliefs, values, norms). Endeava completed this step by further desk research.

By rigorously looking at all the causes and effects by themes, Endeava brought the most important drivers in the system to light. The causal relationships uncovered in this step provided key inputs for drawing connections between factors in the systems map moving forward. In systems thinking, no force exists in isolation. Each force has a cause and effect, and they are interrelated. The forces that drive the system are always tied together in feedback loops. The feedback loops are built by connecting the upstream causes and downstream effects for each key theme and between themes to map out the entrenched patterns that drive the system.

In other words, the feedback loops embody the complex chains of events that reinforce themselves through a causal loop that feeds back to itself. A virtuous circle has favourable results, while a vicious circle has detrimental results.

Endeava built about 20 feedback loops to map out the various dynamics that drive the logistics system in Africa. These loops become the building blocks for the systems map.

### Discover the core story

The multitude of vicious and virtuous loops created are structured and anchored by a core story. The core story serves as the anchor point for most of the loops in the systems map.

To uncover the core story of the system, Endeava looked at all the loops created, noticing the most important and repeating elements (e.g., factors, causal relationships) and the relationships between the loops. The synthesis of these core repeated elements provided a unified narrative for the various loops created, the crux of the system. The core story holds the centre of the map and allows to arrange the loops around it in thematic regions.

Endeava test and refined the core story through rounds of feedback with consortium members and stakeholders engaged in the consultative process.

### Build the map

Once the core story had been anchored, Endeava brought all the loops together, highlighting the overlapping factors and shared intersections between them to create the first map—a holistic and cohesive visualisation of the critical mile logistic system in Africa. As the loops were knitted together, some needed to be synthesised, combined or deleted if they were either too general or too specific.

Once the loops have been organised around the core story, the map represents a visual table of contents for a rich, holistic, and dynamic story of the current system. Endeava socialised and refined the map through bilateral feedback rounds with consortium members and stakeholders engaged in the consultative process.

### **Discover the levers for change**

After gaining clarity and understanding of the system's current state, steps can be taken to uncover leverage points to change the system in accordance with the guiding star. Leverage points are places in the current system that, if engaged, have the greatest potential to create positive change with comparatively modest effort.

The second consultative webinar with multi-stakeholder experts allowed us to identify the most promising ways to shift the system to a healthier state potentially. This leverage identification process was done through a curated small group exercise during the second consultative webinar.

- First, participants identified which stakeholders in the system feel the greatest pain regarding specific feedback dynamics in the core story. These are places where there could be energy to disrupt the status quo or reorganise and cause new patterns to emerge.
- Subsequently, the participants identified which stakeholders benefit the most from the current core story of the system. These are places where system behaviour could be deeply entrenched and unlikely to change soon.
- Lastly, with the most promising and frozen areas in mind, participants collaboratively discussed opportunities to trigger intended change for a healthier system. These are areas of leverage in a system that affect key dynamics and result in wider positive ripple effects that ultimately help the system change itself.

With the guiding question and near star in mind, potential leverage areas were prioritised based on the probability of targeted impact and feasibility. Endeava did this process through bilateral feedback rounds with consortium members and stakeholders engaged in the consultative process.

Accordingly, the findings from the leverage points are fed into other DIGILOGIC work packages based on the most appropriate format (e-learning, mentoring, challenges, etc.) for these opportunities to change the system.

## 2 MAPPING OF THE SYSTEM

This mapping of the system sheds clarity on the current status quo of critical mile logistics in Africa. The mapping provides an understanding of the key stakeholders and how positive or negative forces connect them. The mapping also reveals **the system's core structure and driving narrative: the one of a weak ecosystem preventing collaboration across the critical mile logistics value chain and leading to inefficient silo endeavours**. This clarity helps to find strategic opportunities to trigger virtuous systemic change.

### 2.1 SCOPE OF THE SYSTEM

#### 2.1.1 Critical mile logistics

From the findings of the primary (bilateral multi-stakeholder interviews) and secondary (desk research) data collected, the critical mile appeared as a promising focus system for smart logistics in Africa.

The critical mile can be defined as a product's journey from a local warehouse to the end consumer, as shown in Figure 2. On the ground, **critical mile logistics includes an array of steps beyond simple transport considerations, such as tracking, geo-localisation, cold chain management to hardware with considerations for environmental-friendly vehicles**.



FIGURE 2: THE CRITICAL MILE

#### 2.1.2 Reasoning behind the scope selection

The critical mile is a relevant system to look at within the broader logistics system in Africa. The pattern of challenges and opportunities present in the African critical mile are visible in other logistic segments of the full logistics value chain in Africa and globally. This fact is noticeable with the need to increase volume closer to the demand or matters of corruption and bribery. Similarly, the actors mapped in the critical mile systems also operate further up the value chain, such as larger logistics providers and government bodies. Therefore, **systemic learnings from the critical mile logistics in African can provide insights beyond the scope of this system**.

The critical mile has seen a burgeoning of innovation and smart logistics startups over the last decade. The increasing affordability of mobile technology across the continent has laid the ground for this development. Simple digital platforms enabled by smartphone have allowed transferring decision-making for delivery options, processes, and navigation to software. Solutions have emerged to fill market gaps such as cold chain, underutilisation of existing assets like trucks or the lack of formal addressing system. These solutions can

substantially increase the efficiency of service delivery and the organisation and management of the supply chain.

The impact of improving critical mile logistics will be considerable. Providing access to markets and, in return to goods and services, contributes to creating key functioning supply chains (agriculture, health, etc.). They are crucial to ensure socio-economic sustainable development goals in Sub-Saharan Africa. This undeniable potential for a knock-on effect for other industries enables smart logistics to gain traction and investors interests. Furthermore, the economic potential is motivated by the still untapped Bottom of the Pyramid (BoP) market to be reached by the critical mile.

Further detailing of the relevance of critical mile logistics as a systems' scope can be found in the *D1.1 Vision and Stakeholder List*.

### 2.1.3 Vision for the system

Smart solutions leveraging innovation play a pivotal role in optimising steps in the critical mile. They are reducing operational cost, increasing transparency, bridging market gaps and strengthening critical supplies chains. However, despite their impact, many challenges remain. We ask ourselves how we might go from a system where tech and innovation are optimising small steps in the critical mile to one where tech and innovation transform the system.

For the critical mile logistics in Africa, **the long-term vision is to make critical mile logistics more efficient, affordable, inclusive and sustainable in Africa through innovation supported by Digital Innovation Hubs (DIHs)**. This vision provides a direction which the solutions developed by DIGILOGIC should aim to meet.

As the guiding star is a rather long-term goal, it is key to develop a more short-term mission in systems change methodology, the near star. After rounds of iteration with the DIGILOGIC consortium partners, **the near star** was set to be: **Pan African – EU ecosystem partnerships, facilitated by DIHs, have created, promoted, and scaled technological innovations that strengthen critical mile logistics in ways that are beneficial for the economy and the society in Africa**. This near start will guide the DIGILOGIC project to create new solutions in smart logistics, support existing solutions to scale with the help of their new partners and support from DIHs.

Finally, to operationalise this vision and mission, a guiding question was set: "How might we create partnerships, facilitated by DIHs within the logistics ecosystem, that leverage technology to make critical mile logistics in Africa more efficient, affordable, inclusive and sustainable?". The guiding question helps identify the pathway that will lead to the desired envisioned future for critical mile logistics in Africa.

## 2.2 ACTORS

The mapping of the stakeholders in the ecosystem included actors engaged through bilateral interviews and the two consultation webinars and other relevant actors at the critical mile. Figure 3 shows the most important categories of the actors in critical mile logistics.

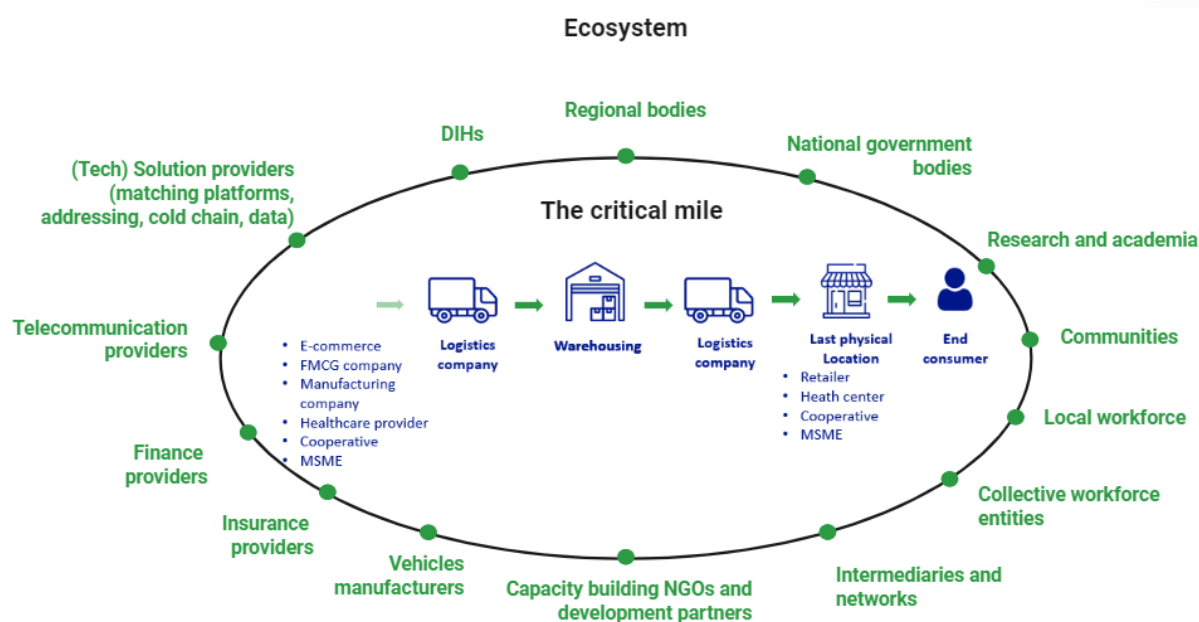


FIGURE 3: CATEGORIES OF RELEVANT STAKEHOLDERS AFFECTING CRITICAL MILE LOGISTICS

The stakeholders in critical mile logistics can be broadly put into the following categories with specific roles and challenges:

- **African hubs and programmes** are numerous on the continent providing technology entrepreneur training, funding and incubation (like the consortium partners MEST and Bongo-Hive). Some are directly connected to University such as iBizLab in Kenya with the Strathmore University. In contrast, others have closer ties with regional governments and provide ecosystem support, such as Southern Africa Innovation Support Programme (SAIS). Networks of innovation hubs also play a key role in structuring this growing ecosystem, with actors such as AfriLabs, Seedstars and ImpactHub.
- **European DIHs** specialising in logistics, e.g. from the DIGILOGIC consortium (ECM, VTT), hold considerable knowledge regarding high-end digital solutions but lack a greater understanding of the local African contexts adequate and impactful knowledge transfer.
- **Other Horizon2020 projects** under ICT 58 such as AEDIB, AfriCon and Hubiquitous provide key support for European and African DIHs on various topics from capacity building to ecosystem support.
- **Startups operating in critical mile logistics:** they provide solutions to bridge gaps in the critical mile logistics such as cold chain management (Vakava, ColdHubs, Nexleaf), addressing (SnooCode, Addressya), integrated warehousing (ParcelNinja), platforms matching drivers of under-utilised vehicles with customers needing delivery (Kobo360, Lori, Sendy, Max ng, Amitruck). These startups benefit from the increasing availability of mobile phone technology accompanied by the rise of on-demand online retailing. However, regardless of the value of their services, these players face challenges in accessing equity and working capital, in establishing contact with relevant public bodies, in being cheated by larger players, in overcoming structural barriers like poor physical and digital infrastructure. In turn, startups struggle to scale while those with sufficient resources spread themselves thin by vertically integrating to cover the gaps in the ecosystem (financing, insurance, driver training, etc.).
- **Large logistics providers** include African companies such as RTT in South Africa and BHL Logistics in Nigeria and more global players such as DHL and Bolloré Logistics. These players have to dedicate considerable resources to overcome some of the weak ecosystem conditions by training and employing reliable drivers, importing high-quality fuel or developing their fleet of high-quality vehicles withstanding bad road quality.
- **Multinational companies** operating on the continent and using critical mile logistics to bring their products to markets or source input. These include FMCG companies (Procter&Gamble, Unilever, Dallmayr), pharma companies (Pfizer, Sanofi, GSK) and industrial manufacturers (GE, BMW, Toyota).

Despite their size and larger resources, such players still face challenges in overcoming lack of transparency, corruption, costly and inefficient cross-border trade for critical mile logistics.

- **E-commerce and online retailers** are growing on the continent. They include large players such as Jumia and Copia or marketplaces for specialised goods such as Kasha (hygiene products) and Twiga (food). As e-commerce tends to leverage economies of scale, such players struggle to reach remote rural areas cost-effectively.
- **Vehicles manufacturers** such as MAN Truck face challenges regarding the lack of common standards across the sector and difficulty with the flow of cheap imported used vehicles on the continent.
- **Government and regional bodies** impacting critical mile logistics are numerous. They include local municipalities, ministries of transport and trade, and ICT ministries such as the Zambia Information and Communications Technology Authority (ZICTA). Such national policymaking and regulatory bodies resort to risk-averse behaviour, which prevents introducing a conducive environment for introducing innovative solutions. Furthermore, public bodies speak different languages and measure success differently from smart logistics startups regarding job-created, tax revenue, etc. Regional bodies, such as Regional Economic Communities like the Common Market for Eastern and Southern Africa (COMESA) or the African Continental Free Trade Area (AfCFTA), struggle with implementing and executing their measures epitomised with the cross-border trade challenges.
- **Local communities** are end-users benefiting from the deliveries of goods and services. However, this access to goods and services is sometimes compromised for communities located in remote rural areas. The low population density and poor physical infrastructure make reaching the last mile end user a complex endeavour. The local community also provide an active workforce operating in critical mile logistics.
- **The local workforce** operating in critical mile logistics includes various actors ranging from smaller holder farmers, drivers, informal retailer, distributor and cross-border traders. Each of these actors faces specific challenges revolving around accessing markets, information and limited bargaining power.
- **Collective workforce entities** are key to better structure the different entities operating in critical mile logistics. Farmers collective can contribute to a greater local pulling of resources (input and output) and offer smallholder farmers greater bargaining power. Similarly, drivers trade union are also key to better formalise and ensure adequate pay and decent working conditions. In Zambia, the drivers' trade unions successfully pushed to introduce minimum wages for truck and bus drivers in 2020.
- **Non-profits** supporting the critical mile include capacity building NGOs such as Transaid and Lalala ONG, which provide drivers and road safety training. While foundations, such as Siemens Stiftung, work on fostering local pilots for e-vehicles. Such projects often lack contextualisation and self-sustaining business models to scale.
- **Intermediaries and networks** also exist in the non-profit space to structuring informal players such as Global Distributor Network with last-mile distributors in Africa. Similarly, drivers trade unions are important stakeholders to acknowledge. They are represented through larger organisations such as the International Transport Worker Federation.
- At the **European level, intermediaries and networks** also play key directional roles. The Alliance for Logistics Innovation through Collaboration in Europe (ALICE) brings together key logistics providers to foster innovation. Other private sector intermediaries may include stakeholders such as the UK and Ghana Chamber of Commerce, which facilitates the entry of UK businesses into the Ghanaian economy.
- **Development partners** are strengthening key segment of the critical mile logistics such as postal service through the Universal Postal Union (UPU) or fostering the local digital innovation ecosystem (e.g. Make-IT GIZ). The humanitarian sector is also known for driving process and product innovation in supply chains and holds great insight on leveraging technology to address logistic challenges in Africa (e.g. UNICEF). Yet, development projects often fail to scale sustainably and remain pilots. An example of this is the introduction of drones for the delivery of blood to remote rural areas.
- **Research institutions and academia** active in critical mile logistics cover a wide range of focus areas such as humanitarian logistics (Kühne Logistics University), smart mobility and e-vehicles (CSIR), platform economy (Lagos Business School) and last-mile distributors (BopInc). Such stakeholders can be key to provide advocacy and build a strong narrative for the sector. However, this endeavour is often limited due to the lack of quality data and silo academic endeavours.
- **Financing bodies** such as banks (Bank of Industry in Nigeria) and investors (Prospero, Access View Africa) are increasingly interested in the logistics sector. However, the creditworthiness or solvability of smaller innovative actors often fall short and deter investment. Financing bodies mapped also include actors providing grant funding, such as AFFORD.

- **Insurance providers** are key stakeholders to map as currently, logistics remain in Africa a high-risk endeavour considering the exposure to theft, hijacking and robbery at the critical mile. Insurance is, therefore, often a service that is not provided by the ecosystem. Logistics providers need to find other risk mitigation measures themselves.
- **Telecommunication operators** such as MTN, Airtel, Vodacom are offering key support services for smart logistics at the critical mile, such as mobile money and support API integration for various smart logistics solutions to plug into one another. Similarly, Orange has developed solutions to strengthen cold chain management, tracking and last-mile delivery for rural areas in partnership with development organisations. However, for users, connectivity coverage falls short given the variability of telecoms tower infrastructure and the high cost of prepaid mobile data plans in relation to local median incomes.

As an example of the actors' palette, each of the categories mentioned above includes a detailed long-list of the African and European smart logistics startups mapped can be found in *ANNEX 1: Smart Logistics startups active in Africa*.

## 2.3 CURRENT STATUS: ENABLERS AND INHIBITORS

During the consultative webinar, stakeholders attending collectively identified inhibitors and enablers to change the transport and logistics system at the critical mile in Africa. The participants captured over 40 different enablers and 50 inhibitors. The full list is provided in *ANNEX 2* of this document. The survey among experts provided a snapshot of their importance and supported the prioritisation of the system's forces.

The strongest and most cited **enablers** in the system were:

- The **decreasing cost of technology**: the availability of mobile technology enables supply chain management platforms and optimises supply chain processes by allowing digital solutions such as virtual addresses.
- The **growing e-commerce market**: smart logistics companies have benefited from the growth of on-demand culture and mobile payment solutions, representing an established status quo in large African cities. Additionally, the COVID-19 pandemic also reinforced the relevance of e-commerce and online retail in the face of limited physical movement. Another growing contributing trend is the rise of one-stop-shop platforms for multiple services. For instance, ride-hailing startups integrate delivery options, mobility services and financial products in one mobile application.
- The **potential for far-reaching partnerships along the logistics value chain**: despite structural gaps in the ecosystem, currently, different actors reach the most remote last mile. These far-reaching players, especially in remote low-density areas, represent an opportunity for logistics companies to leverage these existing networks of informal traders or communities of innovators. Such structured networks of informal critical mile logistics players do not exist yet in many countries. But if these were in place, they would enable more efficient coverage of the end to end logistics chain at the critical mile.

The strongest and most cited **inhibitors** in the system were:

- The **lack of financing** is many-fold. It affects startups and small local innovative players who face an overestimation of risk and therefore struggle to access loans from banks or adequate ticket size from investors. Additionally, the rise of grant funding from the development sector is result-based and hard to match for small tech startups with limited direct social impact. The lack of working capital is also an inhibitor for startups and small and medium-sized companies. They often have to pay their drivers sooner than they can invoice their clients – not talking about the long payment schedules of many companies. For investors, on the other hand, the lack of access to foreign currency exchange prevents exit strategies for their investments and deters them from investing.
- The **poor state of digital and physical infrastructure** is a challenge for every stakeholder across the critical-mile logistics value chain. The physical infrastructure is absent or weak and further damaged by climate change and lack of maintenance. Roads' useability varies depending on the seasons. In parallel, the lack of a formal and widespread addressing system complicates delivery to the last mile. Regarding

digital infrastructure, the variability of telecoms tower infrastructure across providers forces users to have multiple SIM cards to access better coverage.

- Additionally, Sub-Saharan Africa has the world's most **expensive prepaid mobile data plans** in relation to median incomes. This state of digital infrastructure and connectivity affects logistics providers in various ways. It complicated the providers' actions to ensure traceability of delivery to maintain the integrity of the cold chain or the safe arrival of deliveries. Drivers' efficiency is also compromised as they switch their geo-localisation apps on and off to orient themselves to save data. As a result, little data can be continuously collected on operations that prevent the potential for automation and routing and the development of data-supported use cases. Overall, the weak state of physical and digital infrastructure is a fundamental constraint to logistics' time- and cost-efficiency.
- The **skills needed to develop and use smart logistics solutions are lacking**, e.g., digital literacy and readiness. This problem affects job seekers who may lack the digital literacy required. Drivers, for example, may lack the ability to read a GPS map. The human physical capacity element to implement and use these technology-enabled services remains a challenge. A root cause of this gap is the **lack of adequate contextualisation of the smart solutions that do not match the uptakers' reality** (e.g. language barrier or lack of access to a smartphone and stable internet connection).

## 2.4 CURRENT STATUS: FEEDBACK LOOPS, CORE STORY AND MAP OF CORE SYSTEM

By clustering of feedback loops highlighted key themes in the system, ranging from the weak state of physical and digital infrastructure, the uneven playing field based on actors' size and resources endowment (e.g. financing and access to government) and the lack of effective collaboration and trusts across players. The detailed loops can be found in Annex 3. From these interconnected patterns, a core story was uncovered for the critical mile logistics in Africa: "The critical mile logistics ecosystem in Sub-Saharan Africa is weak and prevents efficient collaboration among players, leading to a fragmented landscape rigged by duplications. Without a common direction advocating for collaboration across actors, only limited awareness can be raised on smart logistics use cases and potential. Consequently, smart solutions stay small and cannot positively transform the critical mile logistics". Subsequently, Endeava created a rapid visualisation of the critical mile logistics system, highlighting the core story and how the different feedback loops are interconnected and support this narrative.

### The feedback loops

For the different thematic clusters of enablers and inhibitors, upstream causes and downstream effects are detailed to form feedback loops. Loops can be virtuous or vicious and represent more macro-level or micro self-reinforcing dynamics. Endeava created a variety of feedback loops. The step by step process of creating a feedback loop is shown below in Figure 4.

The feedback loop below embodies the limited collective awareness and lack of storytelling around smart logistics and relevant use cases:

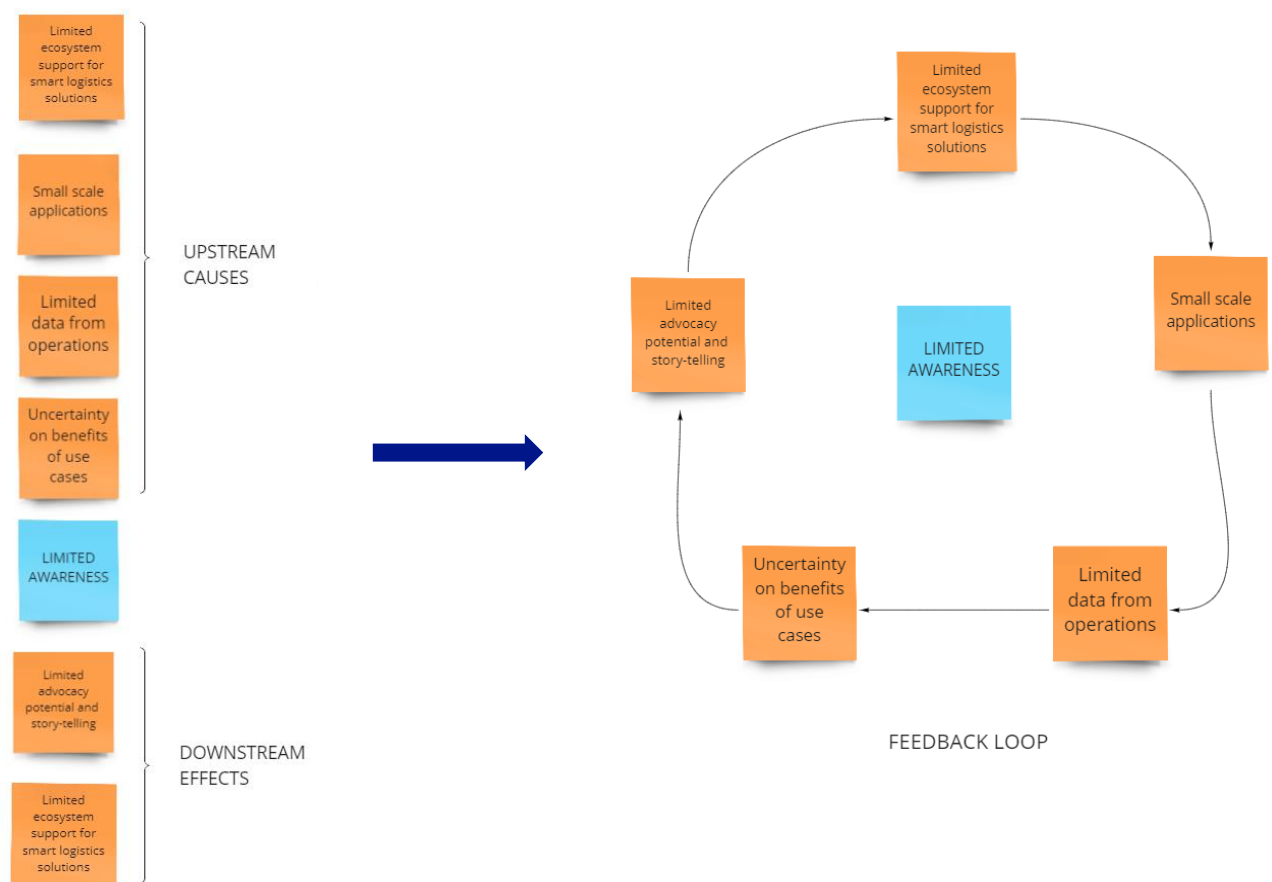


FIGURE 4: FEEDBACK LOOP EXAMPLE

Currently, the foundations of the logistics ecosystem are weak and underdeveloped. Physical and digital infrastructure is lacking, adequate financing and insurance opportunities are limited. Under such conditions, smart logistics operators remain relatively small scale and manage to gather only limited data to prove a tangible and scalable use case. Having fewer and smaller operations reduces the potential to show the beneficial impact that smart logistics solutions can have on society at the critical mile. Thus, the narrative of smart logistics remains one of risky endeavour rather than one where the benefits out-weigh the initial investment. Overall, there are not many success stories or role models for smart logistics entrepreneurs, limiting the incentive to invest in a sector that seems to have limited opportunity and benefits. Thus, in turn, it weakens further development of the ecosystem.

### The core story that drives the behaviour of the system

The anchor narrative for most of the loops in Africa's smart critical mile logistics system is the following: **Currently, the critical mile logistics ecosystem in Sub-Saharan Africa is weak. Collaboration of actors across the logistics value chain becomes a costly endeavour, leading larger players to vertically integrate while smaller innovative players remain scattered and struggle to scale. Consequently, no strong, unified narrative and actors emerge for a sector where inefficient silo endeavours and duplications prevail, weakening the ecosystem.**

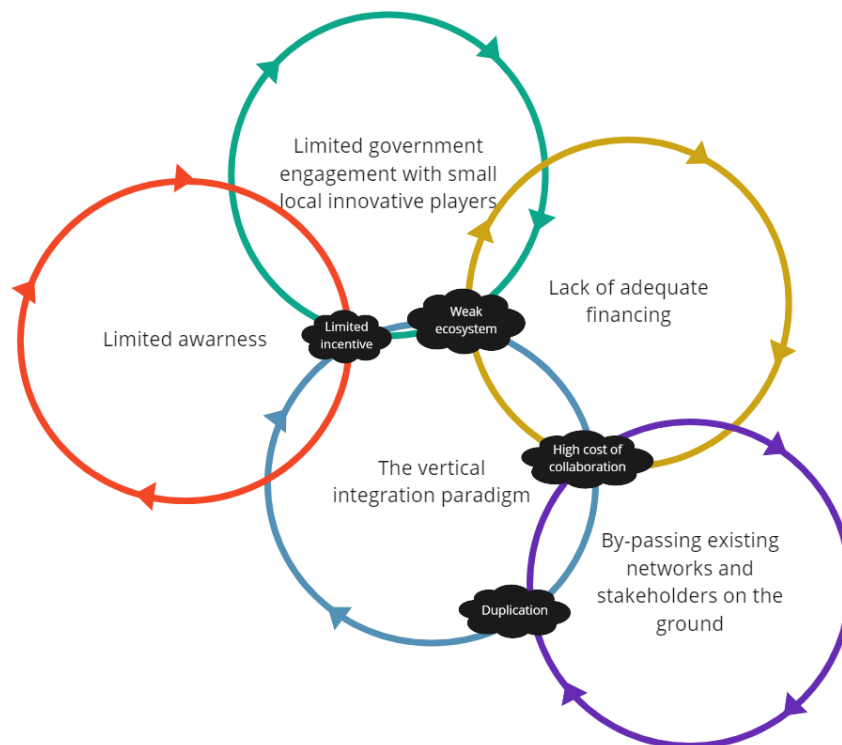


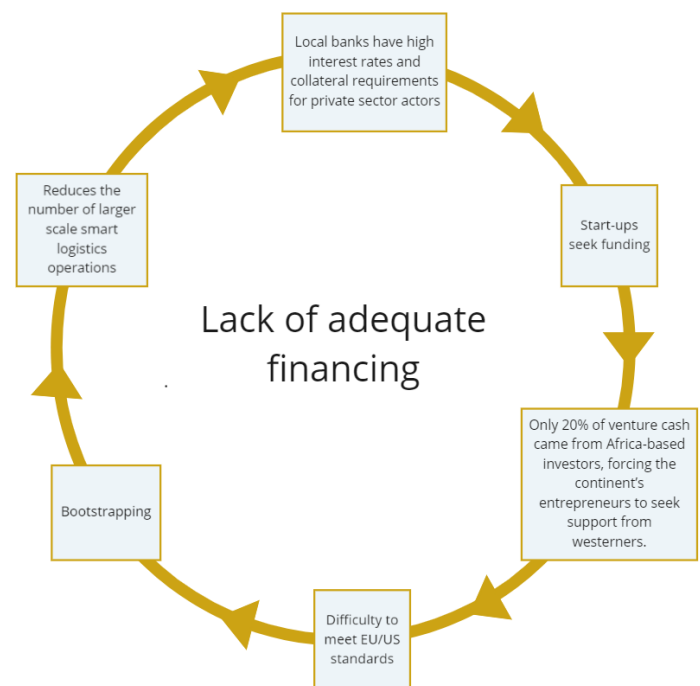
FIGURE 5: THE CORE STORY

This core story is supported by five central feedback loops with self-reinforcing narratives:

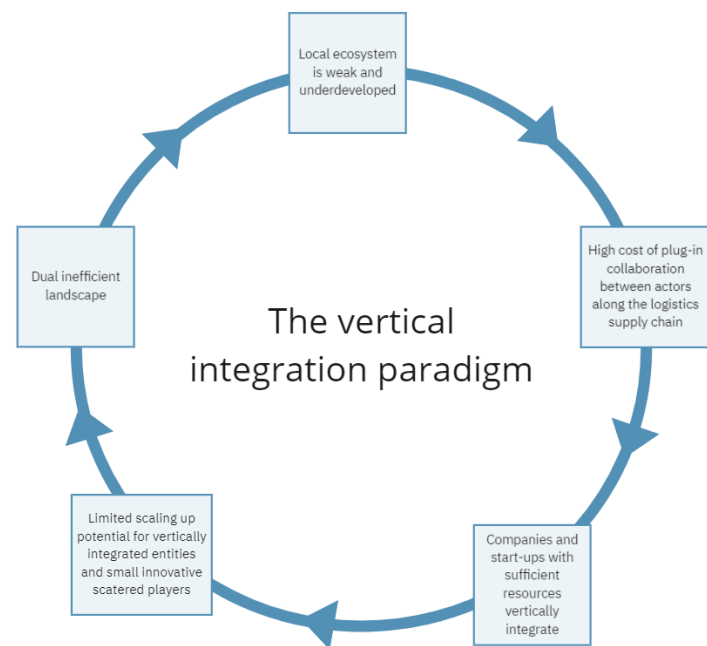
**Limited government engagement with small local innovative players:** the government has little incentive to engage and consider smaller local innovative players in the smart logistics space. Therefore, when it comes to policymaking, little attention is given to smaller local players. The policy environment is cumbersome for smaller innovative players. Larger players manage to overcome these rigidities thanks to greater resources and clout. However, under such constraining conditions, fewer smart logistics innovative players and startups manage to grow and scale successfully. With fewer operations and limited size, there is less pressure and less apparent need for government actors to engage with these small local innovative players to support and leverage their tech solutions.



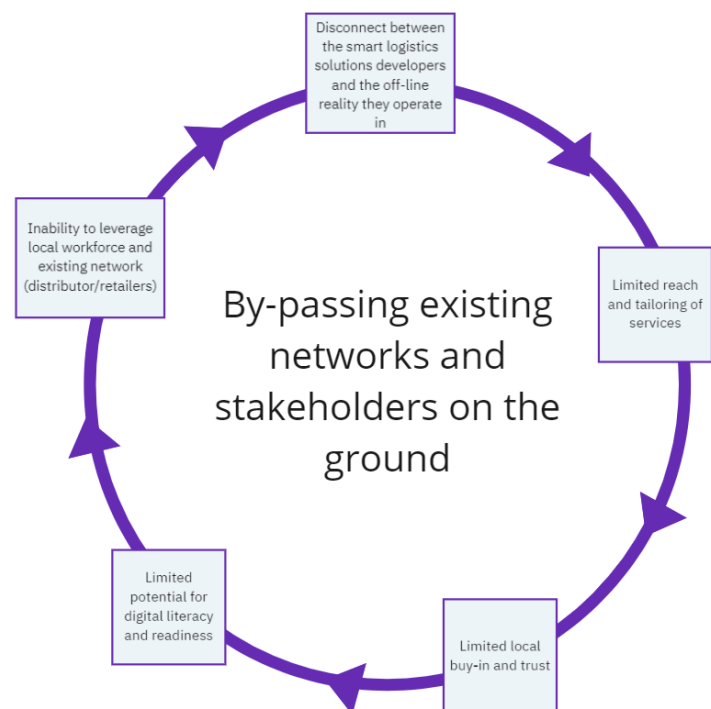
**Lack of adequate financing:** Currently, local banks have high interest rates and collateral requirements for smaller private sector actors due to the high failure rate and low scaling potential of new local businesses. Banks are thus not an option for startups when looking for funding. They rather look for financing sources such as VC investors, angel investment or crowdfunding. This search for alternative financing sources is complicated because only 20% of venture cash came from Africa-based investors, forcing the continent's entrepreneurs to seek support from westerners with foreign standards. These EU and US standards are harder for local African startups to match when they also face an over-estimation of risk due to the systemic racism that prevails in "Western" VC funding. For instance, according to the Harvard Business Review, black founders receive roughly 1% of VC funding in the US. Overall, this means that local African small private sector players struggle or hardly get external financing. Startups rely on bootstrapping financing, which reduces their chance to scale their business and increase their chance of failure, thus reducing their credibility even more and their likelihood of getting a loan from a bank.



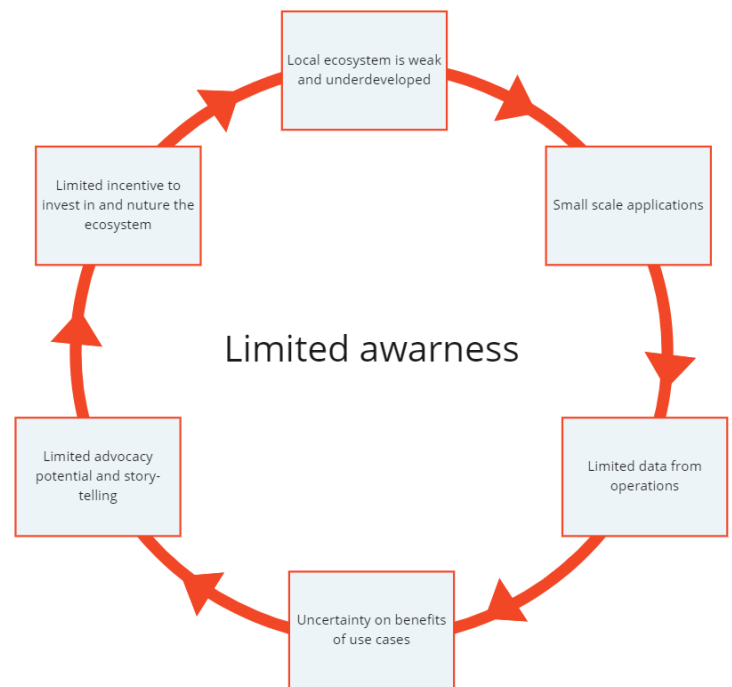
**The vertical integration paradigm:** Currently, the foundations of the logistics ecosystem are weak and underdeveloped. Physical and digital infrastructure is lacking, adequate financing and insurance opportunities are limited as well as a prevalence of adequate skills. Under such conditions, the collaboration between different actors across the logistics supply chain becomes costly. This is caused by the high cost, as the main foundation (function infrastructure, access to insurance, finance, fuel, adequate vehicle, cooling tech, training etc.) are weak. When actors collaborate, a lot of resources and time must be invested (train drivers, buy them phones, etc.). This state of the ecosystem prevents collaboration and incentivises actors with sufficient resources to vertically integrate. In other words, one actor will start covering more steps of the logistics supply chains by creating its own ecosystem (financing system, importing fuel, covering more and more last-mile delivery, etc.). As a result, an inefficient binary landscape appears. Vertically integrated actors are spreading themselves thin to cover everything themselves and thus reduce their chance of scaling cross-border. At the same time, smaller innovative actors remain small and struggle to scale through partnerships.



**By-passing existing network and stakeholders on the ground:** Currently, smart solutions being developed for critical mile logistics tend to be disconnected from the offline reality in which they operate. In other words, some of the solutions are not very users friendly or considerate of the needs and reality of the context (lack of access to a smartphone, good connectivity, ability to read a GPS map, ability to use e-payment, etc.). Under such circumstances, smart logistics services and products can only have a limited reach and adequate tailoring, which leads to limited local buy-in and trust towards these smart logistics solutions which do not speak to the users. This, in turn, hampers the digital literacy and readiness of users and stakeholders operating on the ground in the critical mile, who would have to go out of their way to use a foreign service that does not respond to their needs. Consequently, there is limited potential to leverage the local workforce and existing networks (of drivers, distributors and retailers), informing the solutions and further their reach. The situation, in turn, reinforces this disconnect between the potential users on the ground and the smart logistics solutions being developed.



**Limited awareness:** Currently, the foundations of the logistics ecosystem are weak and underdeveloped. Physical and digital infrastructure is lacking, adequate financing and insurance opportunities are limited. Under such conditions, smart logistics operators remain relatively small scale and manage to gather only limited data to prove a tangible and scalable use case. Having fewer and smaller operations reduces the potential to show the beneficial impact that smart logistics solutions can have on society at the critical mile. Thus, the narrative of smart logistics remains one of risky endeavour rather than one where the benefits outweigh the initial investment. Overall, there are not many success stories or role models for smart logistics entrepreneurs, limiting the incentive to invest in a sector that seems to have limited opportunity and benefits. Thus, in turn, it weakens further development of the ecosystem.



## The mapping of the system

Once the core structure of the system has been uncovered, the previously crafted feedback loops were revisited and accordingly mapped around the five central loops. As the loops are difficult to read on this overview, they are listed in Annex 3.

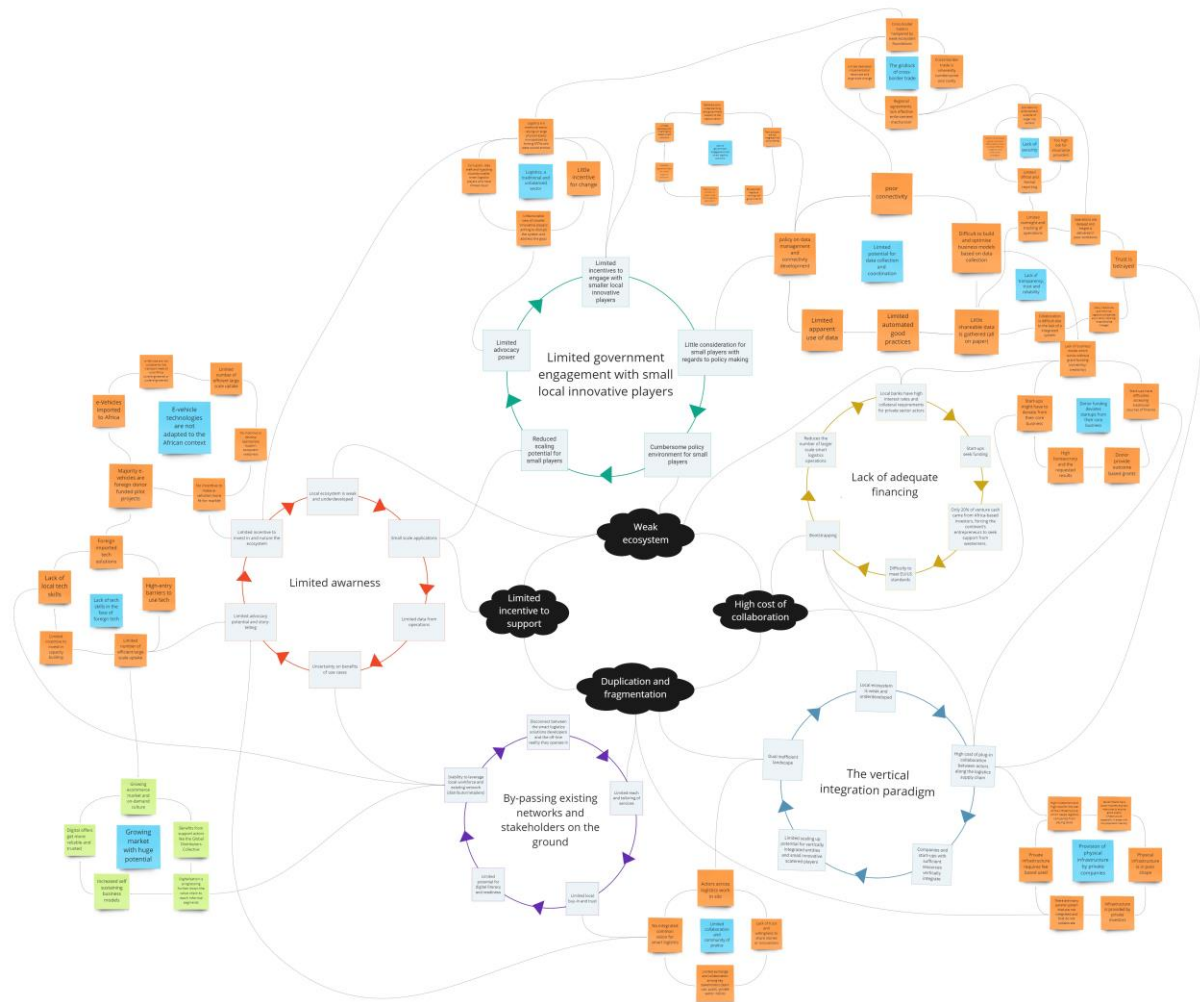


FIGURE 6: FULL MAP OF THE SYSTEM

## 2.5 FUTURE CHANGES: LEVERAGE POINTS

Understanding and mapping the system is a powerful tool for visualising the current system in a way that helps to identify opportunities for impactful desired change. The narrative of the leverage points establishes connections between the parts of the system that could be engaged. It also shows how these actions are expected to affect key dynamics and contribute to broader, long-term systems change.

The narrative for the leverage points in the DIGILOGIC system is the following: Providing readily available information on the innovative small and large players in smart logistics will affect the regulations in the transport and logistics sector at the critical and funding opportunities for the companies. Through this greater ecosystem transparency, a collaboration platform for key actors to meet and explore their synergies can be developed and orchestrated by unbiased third parties such as DIHs. Once actors have the structure and incentives to collaborate,

smaller players would gain guarantor credibility by collaborating with established larger actors to access financing. Even the informal sector of distributors and retailers can be included in such an improved and coordinated system by leveraging current intermediary initiatives and enable greater collaboration. A stronger and more structured ground for collaboration allows building more consequential use cases and business models for the sector. Figure 6 provides an overview of this story.

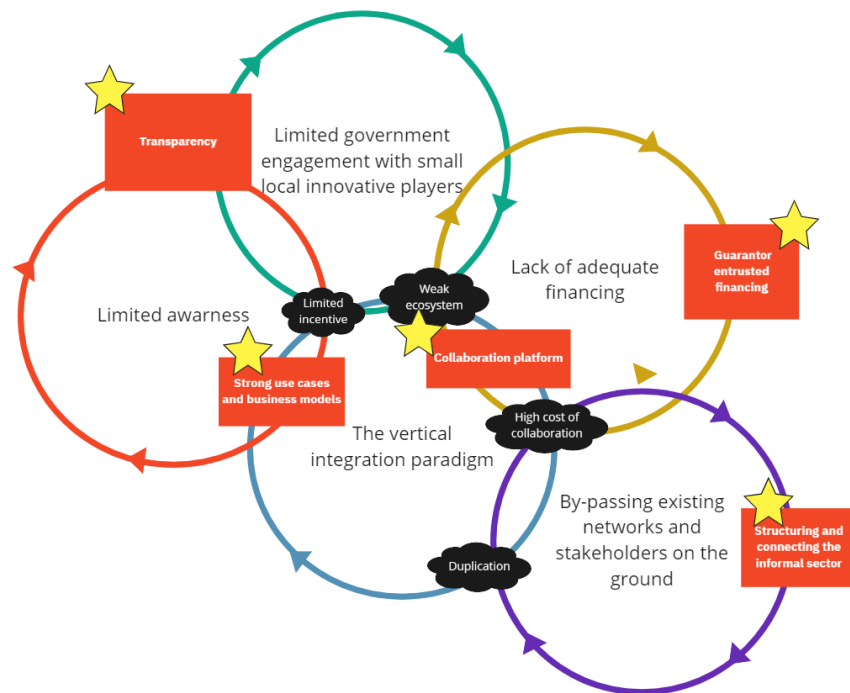


FIGURE 7: THE LEVERS FOR CHANGE

The levers for change identified in the system are the following:

**Transparency:** Across the board, the critical last mile ecosystem remains relatively opaque, preventing players from being aware of each other. Transparency and access to readily available information for all parties would allow regulators to better overview actors operating in their jurisdiction. While easily accessible information could provide startups with a better overview of their peers, providing similar or complementary services, and better awareness of the regulations affecting them. Lastly, financing partners such as investors could benefit from a better overview of promising trends and potential investees to support.

**Collaborative platform:** Once key stakeholders in critical mile logistics have become aware of their mutual existence and scope of actions, incentives for collaborations might be stronger. Such collaboration could take place through the intermediary of a third-party operated platform to overcome symptomatic trust issues. An existing example of such a collaborative platform includes the National Australian Telematics Framework, run by the government, allowing actors to anonymously share their data and grant them access to specific roads and other logistical benefits. In Sub-Saharan African, DIHs could play such a facilitating role, connecting stakeholders and fostering trust regardless of the players' size.

**Guarantor entrusted financing:** Currently, African startups and small innovative players suffer from an over-estimation of risk regarding their potential to receive loans or investments. Once the critical mile smart logistics landscape has acquired more transparency, thus paving the way for clear collaboration potential, smaller innovative actors can easily access financing opportunities. Larger established players working with local startups can provide them with greater credibility potential to banks, thus acting as guarantors during loan processes.

**Structuring the informal sector:** Last mile distributors and retailers play a vital role in alleviating global poverty and contributing to the Sustainable Development Goals in remote rural areas. Current initiatives are looking to

strengthen their structures into networks. Such endeavours allow distributors to learn from and collaborate, unlock economies of scale (e.g., developing joint training materials or ordering shared containers of products) and implementing best practices. This improves their readiness to be integrated into the formal logistics supply chain and leverage digital solutions for inventory, customer management, etc.

**Stronger use cases and business models:** Bridging the gaps between actors along the smart and physical critical mile logistics allows showcasing stronger use cases and business models collaboratively. With all the segments and actors structured and collaborating, the smart logistics narrative becomes one where the benefits outweigh the risks. Greater incentive to foster the ecosystem could be created around local assembly and repair for the hardware that supports the smart logistics solutions (sensors, e-vehicles, cold chain casing, etc.). This approach would localise and empower the smart logistics ecosystem.

## 3 VIDEO NARRATION

The video will help to digest the result of the research easily.

The video is available at <https://youtu.be/i2aGTXTS3i4>

### 3.1 STORYLINE

The video script has six parts following the storyline shown in Figure 8.

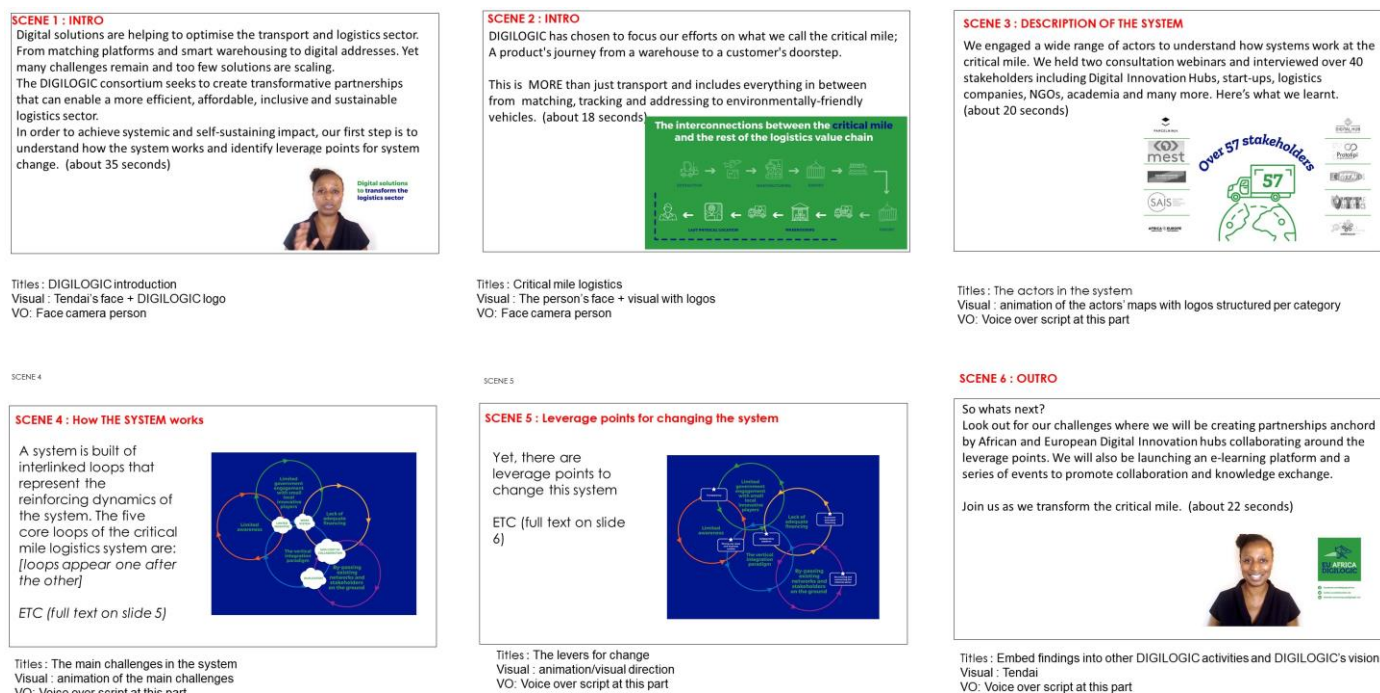


FIGURE 8: SCRIPT OF THE VIDEO ON THE CRITICAL MILE SYSTEM

### 3.2 VIDEO SCRIPT

The narration of the video is the following:

#### INTRODUCTION

Digital solutions are helping to optimise the transport and logistics sector - from matching platforms and smart warehousing to digital addresses. Nevertheless, many challenges remain, and too few solutions are scaling. Optimising parts of the logistics sector is not enough.

The DIGILOGIC consortium is on a quest. We want digital solutions to transform the logistics sector. To do this, we will take a systemic approach and spur collaboration between DIHs in Africa and Europe. Our aim is to create dynamic partnerships that lead to a more efficient, affordable, inclusive and sustainable logistics system in Africa.

## CRITICAL MILE LOGISTICS

DIGILOGIC has chosen to focus our efforts on what we call the critical mile A product's journey from a warehouse to a customer's doorstep.

This is MORE than just transport and includes matching, tracking, cold chain management and addressing to environmentally-friendly vehicles. Our work also considers the interconnections between the critical mile and the rest of the logistics value chain.

## INVOLVED ACTORS

We engaged a wide range of actors to understand how systems work at the critical mile. We held two consultation webinars and interviewed over 50 stakeholders from Africa and Europe, including Digital Innovation Hubs, startups, logistics companies, NGOs, academia and many more. Here's what we learnt.

## FORCES of the SYSTEM

*[Here the clouds and loops would come in one after the other]*

Despite a range of promising DSs. The critical mile in Africa continues to suffer from weak support structures, limited collaboration, duplication and fragmentation. This leads to inefficiencies and increased costs.

Currently, there are crucial gaps in supporting innovation, such as insufficient government engagement with innovative, small, local players *[loop appears]* and a lack of adequate financing *[loop appears]*.

Due to the weak ecosystem, *[first cloud appears]* actors must create these support structures themselves. For example, they may have to provide digital literacy, access to financing or insurance. This increases costs. *[second cloud appears]*. *Challenges in easily identifying reliable partners further limits collaboration with existing networks and stakeholders on the ground. [loop appears]*

As a result, larger players typically move towards vertical integration *[loops appears]* to fill in gaps and increase quality control. They incorporate additional services to their core operations to cover many steps without partners *[loops appears]*

All this drives duplication and fragmentation *[third cloud appears]* and reduces the potential for DS to scale. This, in turn, limits awareness *[loop appears]* and the incentive *[cloud appears]* to support smart logistics *[loop appears]*

## LEVERAGE POINTS

For smart logistics solutions to transform the critical mile, we need to get the system to start operating differently. DIGILOGIC identified these leverage points that have the potential to do just that.

*( first star appears)* Providing up to date and accessible information on active small and large players, regulations and funding opportunities would foster transparency.

*( second star appears)*, a collaboration platform could build on this and enable key actors to meet and explore synergies.

*(third star appears)* Once actors have the structure and incentives to collaborate, smaller players could gain greater credibility by collaborating with established larger actors who could even serve guarantors enabling greater access financing such as loans.

*( fourth star appears)* Even the informal sector of distributors and retailers can be included in such an improved and coordinated system, by leveraging current intermediary initiatives.

*(fifth star appears)* A better structured and collaborative landscape would enable and scale more use cases and business models for smart logistics solutions at the critical mile.

### **Call to ACTION**

So, what's next?

Look out for the DIGILOGIC challenges where we will be creating partnerships anchored by African and European Digital Innovation Hubs collaborating around the leverage points. We will also be launching an e-learning platform and a series of events to promote knowledge exchange within and beyond the African logistics ecosystem.

Join us as we transform the critical mile!

## 4 CONCLUSIONS AND RECOMMENDATIONS

The ecosystem mapping and opportunity spotting reinforce the importance of the DIGILOGIC project's endeavour. Logistics and transport in Africa, especially in the critical mile, holds pivotal importance. DIHs could play an important role in unleashing this sector's potential by bringing key stakeholders together to create, promote and scale technological innovations that strengthen critical mile logistics in transformative ways beneficial for the economy and society in Africa.

The work on the deliverables D1.2 and D1.1 provided a fruitful and insightful array of output. These include an understanding of the inner workings of the critical mile logistics in Africa, its landscape of relevant stakeholders and actors, its core inhibiting and enabling dynamics, its most promising opportunities for change and finally, a video narration of the system. The findings from the systems mapping will be integrated into DIGILOGIC's upcoming activities. Sometimes the activities address the levers of change directly (e.g. by creating skills); sometimes, it might be the specific approach that ensures the system impact (e.g. how companies collaborate). The following recommendations provide ideas that will be detailed when designing the different activities.

- **Trend radar and the strategic research and innovation agenda:** the trend radar should take up the topics identified in this mapping and when designing the strategic research and innovation agenda. Among them could be the idea of platform solutions integrating the informal sector, of applications matching actors in the logistics chain, of smart logistics solutions, e.g. in warehousing, that are adapted to the local context, or for scaling solutions for addressing, cold chain management or skills enhancement.
- **E-learning platform:** the e-learning platform can work on overcoming the lack of relevant skills. **Course in digital literacy and technical skills in smart logistics** could address this challenge. For startups learning content on **investor-ready book-keeping practices and pitching** would be helpful to access financing by proofing credibility and scaling potential. Regarding the disconnect between smart logistics solutions being crafted and the local reality, content on the platform could be dedicated to **better engage with the market and tailor products and services to match the local demand**. The platform could share good practices on designing and testing products in consultation with last-mile distributors and their customers.
- **Peer-to-peer exchange:** peer exchange and peer-learning should upskill the DIHs to better support innovators and ensure that the DIHs play the role of a facilitator in the ecosystem to foster collaboration in the sector. DIGILOGIC should empower them with a good overview of the sector to increase transparency in the sector and raise awareness about successful business cases.
- **Digital and entrepreneurship capacity plan:** for the training for unemployed youth and vulnerable groups, there will be two relevant aspects: DIGILOGIC should do the training in collaboration with existing startups and logistics providers to ensure that the skills are in demand from the labour market. The training can also aim at including the trainees as micro-entrepreneurs in business models like delivery or transport. This training would also require some basic entrepreneurship skills like financial literacy and communication.
- **Co-creation labs:** The co-creation labs are opportunities to collaborate on creating, testing and improving solutions that address the **challenge that networks are not considered, and that solutions are not context-specific**. DIGILOGIC will provide African small businesses with digital solutions to relieve logistics obstacles that hinder profitability and business scale-up. DIGILOGIC could direct one use case at female informal cross-border traders who currently face considerable hardship in conducting their business. Solutions could range from leveraging phone technology as a channel of receiving and communicating market information, handling inventory or improving border infrastructure to cater to the needs of small-scale traders. The labs are also an opportunity **for startups to collaborate with large companies**, supporting the scaling of solutions.
- **Call for Challenges:** From the overall learnings and output of the system mapping, DIGILOGIC should design the challenges to support the levers.
  - The innovators should always **apply with the company using the solution and the partners to implement the solutions**. It will be key for the startups to leverage other local ecosystem

players such as investors, informal networks (retailers, distributors), other local innovative players, etc. This approach would strengthen the ecosystem and specific use cases they provide solutions to and ensure the more systemic nature of their impact.

- The innovators **should be in a startup phase**. They should have developed the solution and have some traction; the challenges should either adapt the solution to the context or **bring in partners to scale the solution**. By this, we support existing solutions which have difficulties scaling so far.
- The innovators should **include existing structures and networks** and optimise transport and logistics by introducing technology. Better engaging with the local ecosystem player will reduce the inefficient duplication and silo dynamics that have been impeding the smart logistics sector at the critical mile. This could mean leveraging another players' mobile money platform rather than creating a new one from scratch for payment. Similarly, engaging established networks of informal rural distributors and local drivers could facilitate logistics service providers' reach into rural areas.
- **Large companies should partner with small and medium-sized innovators** to ensure that they get access to finance and clout
- **DIGILOGIC should disseminate the results and innovations** to showcase the good practices and increase awareness about smart logistics solutions

Regarding the scope of the solutions, different approaches are equally relevant:

- DIGILOGIC could do the challenges in collaboration **with four different large companies, organisations or public actors looking for a smart logistics solution**. The advantage of this approach will be the direct implementation of the solution.
  - For example, an FMCG company might want to **increase volume closer to the demand** or have **greater tracking to collect better data** and atomise routing, deliveries, and stocks. Such coordination improvement could also connect better the first and last mile regarding recycling of FMCGs packaging or getting access to farmers' produce **as raw material for the food and beverage production**.
  - Pharmaceutical companies might look for a solution to ensure the integrity of their **cold chain**.
  - An e-commerce company could be interested in integrating informal drivers or pick-up points or using **e-vehicles for the delivery**.
  - National and municipal government bodies might want to solve the **topic of addressing** where formal addresses and postal codes are non-existent.

Alternatively, the scope of the challenges could also look at the different steps in the critical mile logistics chain:

- Transport: This would cover solutions for on-demand delivery and transport of commercial goods and food products. Smart logistics solutions positively impacting transport could include environmental-friendly vehicles, matching, routing and tracking technologies, cold chain monitoring and solutions improving vehicles and drivers' security.
- Warehouses: This would cover storage facilities where raw materials or manufactured goods can be stored before further distribution or collection. Smart logistics solutions positively impacting warehousing could include tracking, pooling of resources, cold chain storage, automatising of processes, etc.
- Point of sales: This would deal with the physical and digital places where the retailing transaction is completed, whether it be an e-commerce platform or an informal retailer. Smart logistics solutions could include tracking and addressing for the identification and routing of the points of sales and inventory and ordering technologies for retailers and distributors.
- End consumers: This would cover solutions for the final customer, whether it be a company or an individual. Smart logistics solutions could include addressing, tracking and "know your customer" analytics.

- **Mentoring:** The mentoring programme aiming at tech upskill and networking can overcome the fragmentation of the African logistics sector and the lack of technical skills. Linkages to finance partner or strategic investors would be also beneficial as access to finance is one of the biggest obstacles to the growth of existing solutions.

## 5 ANNEX

### ANNEX 1: SMART LOGISTICS STARTUPS ACTIVE IN AFRICA

| Focus area      | Name of organisation | Contact person                       | Country                            |
|-----------------|----------------------|--------------------------------------|------------------------------------|
| Addressing      | Addressya            | Karoline Beronius, CEO and founder   | Sweden and Rwanda                  |
| Addressing      | M-Post               | Abdulaziz Oma, co-founder            | Kenya                              |
| Addressing      | SnooCode             | Sesinam Flyd, Co-founder and CEO     | Ghana                              |
| Booking         | MVXchange            | Tonye Membere-Otaji, founder and CEO | Nigeria                            |
| Booking         | Swiftly              | Edem Kwame Dotse, CEO                | Ghana                              |
| Cold chain      | Cold Hubs            | Nnaemeka Ikegwuonu, CEO              | Nigeria                            |
| Cold chain      | FreshBox             | John K. Mbindyo, CEO                 | Kenya                              |
| Cold chain      | NexLeaf Analytics    | Audrey Lukela, Data Analyst          | Kenya                              |
| Cold chain      | Vakava               | Juha Kunnas, Founder and CEO         | Kenya                              |
| Hardware        | Arone                | Emmanuel Ezenwere, CEO               | Nigeria                            |
| Hardware        | Mobility for Africa  | Shantha Bloemen, Founder             | Zimbabwe                           |
| Hardware        | Zembo                | Étienne Saint-Sernin, co-founder     | Uganda                             |
| Health          | Mobile School Health | Grant Byron, CEO                     | South Africa                       |
| Health          | VIA Global Health    | Noah Perin, CEO and co-founder       | South Africa                       |
| Informal Retail | Sokowatch            | Daniel Yu, co-founder and CEO        | Kenya, Uganda, Tanzania and Rwanda |
| KYC data        | VerifyMe             | Bolaji Iwayemi, Head of Marketing    | Nigeria                            |

|                    |                   |   |                         |
|--------------------|-------------------|---|-------------------------|
| Last mile delivery | DMM.HeHe          | Clarisse Iribagiza, CEO                   | Rwanda                  |
| Last mile delivery | Lifebank          | Temie Giwa-Tubosun                        | Nigeria                 |
| Last mile delivery | Pargo             | Lars Veul, co-founder                     | South Africa            |
| Last mile delivery | Wumdrop           | Simon Hartley, founder and CEO            | South Africa            |
| Matching           | Amitruck          | Mark Mwangi, founder and CEO              | Kenya                   |
| Matching           | Bongéni           | Philipp Demidoff, founder                 | Mauritius               |
| Matching           | Gozem             | Raphael Dana, co-founder                  | West Africa             |
| Matching           | Kamatar           | Bamba Lô, co-founder and CEO              | Ivory Coast,<br>Senegal |
| Matching           | Kobo 360          | Kagure Wamunyu, Chief Strategy Officer    | Nigeria                 |
| Matching           | Lori Systems      | Njavwa Mutambo, Global Product Operations | Kenya                   |
| Matching           | MAX               | Chinedu Azodoh, Chinedu Azodoh            | Nigeria                 |
| Matching           | Musanga Logistics | Njavwa Mutambo, Co-founder and CEO        | Zambia                  |
| Matching           | Sendy             | Malaika Judd, Co-founder and CEO          | Kenya                   |
| Matching           | Truckr tech       | Tshepo Morabane, co-founder               | Ghana                   |
| Tracking           | Cartrack          | Trish Vermeulen, General Manager          | South Africa            |
| Warehousing        | ParcelNinja       | Justin Drennan, co-founder and CEO        | South Africa            |

## ANNEX 2: FULL LIST OF ENABLERS AND INHIBITORS

|                                    | Enablers   | Inhibitors  |
|------------------------------------|--|---|
| <b>Technology</b>                  | Decreasing cost of technology  | Lack of localisation of tech (e.g. e-vehicles)  |
|                                    | Increasing penetration of mobile phones  | The cost of introducing tech (everything has to be built from scratch)  |
|                                    | Increasing penetration of smart phones   |   |
|                                    | Localisation of tech through hubs  |   |
| <b>E-commerce and mobile money</b> | Increase of on-demand culture and raising traction of e-commerce                             | Limited mobile money uptake in rural East Africa and West Africa  |
|                                    | Covid-19 and physical movement restriction   | The low limit for mobile money payment per transaction  |
|                                    | The increasing availability of mobile money  |   |
| <b>Partnerships</b>                | Existing networks (Global Distributor Collective)  | High cost of collaboration due to lack of well-functioning support ecosystem (physical and digital infrastructure, financing, insurance, skills, etc.)              |
|                                    | Engaging with drivers trade unions in West Africa  | Vertical integration of all steps of the logistic chain in one company  |
|                                    | Increase volume by centralising purchase/distribution  | Lack of trust among actors  |
|                                    |  | Idea theft  |
|                                    | Better collaboration and matching reduce "empty trips" by connecting the first and last mile | Actors work in silos  |
| <b>Government engagement</b>       | Government providing sector subsidies  | The bureaucratic hassle of working with governments   |
|                                    | In Rwanda government helps innovators to move fast and scale through legislative instruments | Poor understanding and government support to the logistics sector resulting in policies that are not very sensitive to the sector, especially for SMEs and startups |
|                                    |  | Jurisdiction conflict between ministries and municipalities when it comes to logistics matters, such as addressing  |
|                                    |  | Aversion to take risks and be blamed leading to bans  |
|                                    |  | Corruption and political instability  |
| <b>Cross-border trade</b>          | African Continental Free Trade Area (AfCFTA) and Regional Economic Communities (RECs)        | Lack of integration of policies when it comes to cross-border transport   |
|                                    | Promote one-stop border post concept to simplify cross-border administrative checks          | Bribery at the border   |
|                                    | Use tech to report corruption and trade obstacle   | Lack of enforcement mechanisms and implementation power   |
| <b>Physical Infrastructure</b>     | The abundance of solar energy  | Poor quality and coverage of roads  |
|                                    | Tolls to finance road maintenance  | roads cannot withstand seasonality  |
|                                    |  | Lack of recycling facilities  |
|                                    |  | Lack of continuous access to electricity  |
| <b>Digital Infrastructure</b>      | Mobile connectivity and coverage are increasing  | Poor connectivity in remote rural areas   |

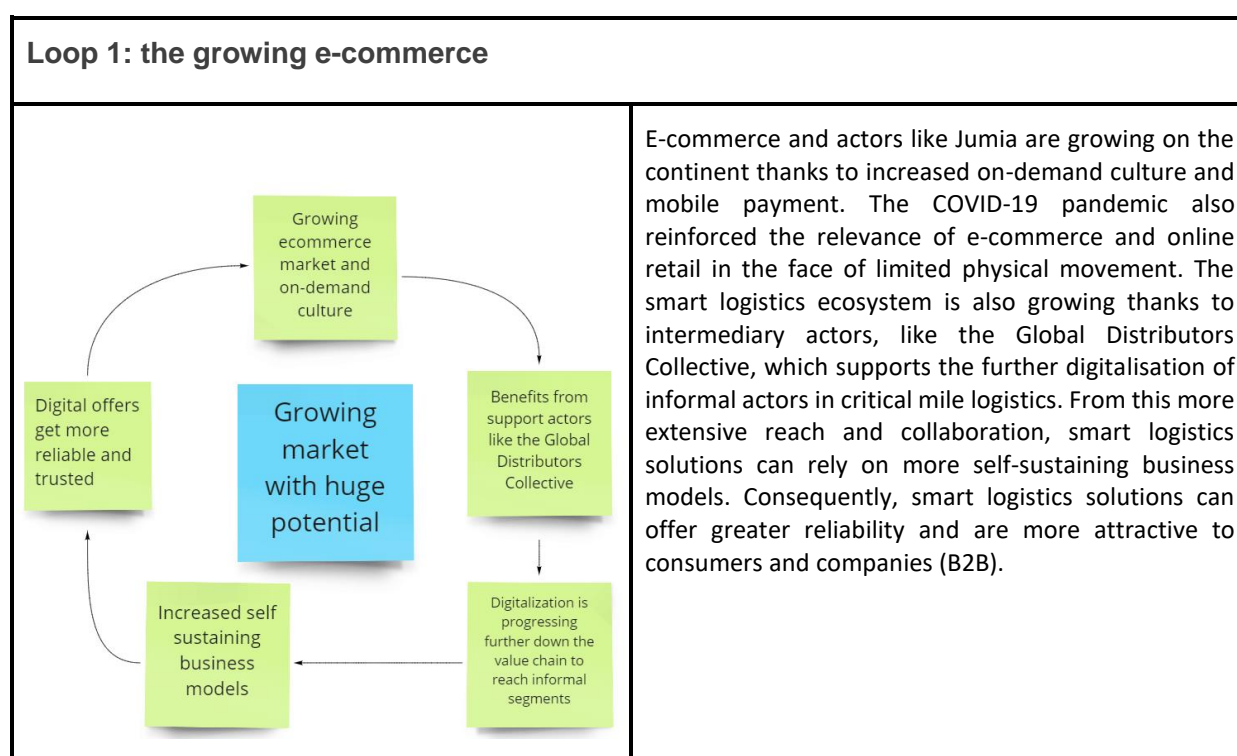
|                                     |   |   |
|-------------------------------------|---|---|
|                                     |   | Variability of telecoms tower infrastructure across providers, users have access to better coverage with multiple SIM cards |
|                                     |   | World's most expensive prepaid mobile data plans in relation to median incomes  |
| <b>Tech Skills</b>                  | Young tech-savvy population                       | Low digital literacy  |
|                                     | Increasing capacity-building trainings            | Lack of technical trainings/practical, more apprenticeships, internships, funds etc   |
|                                     |   | Lack of standardised vocational training and local skills   |
|                                     |   | Drivers have no training, e.g. cannot read GPS maps   |
| <b>Financing</b>                    | Greater push by donors and funders                | High cost of capital (25% interest and more) similarly to micro-financing   |
|                                     |   | Payment schedule difference between payment to drivers and invoicing clients resulting in difficulties with the cash flow   |
|                                     |   | In some countries, difficulties in accessing foreign currency exchange  |
|                                     |   | Result-based financing by impact-driven investors and donors  |
|                                     |   | EU/US investor standards for due diligence hard to meet   |
|                                     |   | Security challenges inhibit investors from supporting innovation as investments are too risky                               |
|                                     |   | Lack of self-sustaining business models   |
| <b>Storytelling</b>                 | More and more smart logistics solutions providers | People are not willing to share their stories or innovations  |
|                                     | Hubs promote innovation and entrepreneurs         | No common vision for the logistics and transport sector   |
|                                     |   | Lack of data and strong use cases   |
|                                     |   | Lack of tech advocacy, little data on what the "benefits vs cons" are   |
|                                     |   | Traditional sector, resistant to change   |
| <b>Security and safety concerns</b> | Biometrics and electronic ID                      | The high number of robbery and truck hijacking; low political stability in some countries                                   |
|                                     | Tracking and geofencing for truck                 | Lack of proper drivers training and safe driving practices  |
|                                     |   | Large informal sector   |

## ANNEX 3: ALL FEEDBACK LOOPS OF THE TRANSPORT AND LOGISTICS SYSTEM IN AFRICA

The DIGILOGIC system methodology revealed enabling and inhibiting driving smart logistics at the critical mile. Endeava captured the interconnections of these driving forces through feedback loops and clustered the loops into five different themes: Awareness, government engagement, financing, support ecosystem and collaboration of actors across the logistics value chain at the critical mile.

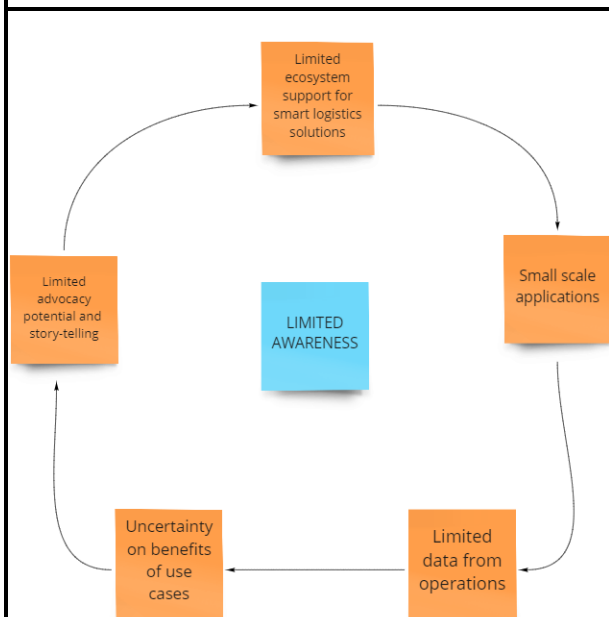
### A. AWARENESS CLUSTER<sup>1</sup>

Storytelling is key to raise awareness around the key role that logistics play and its current prominent trends, such as e-commerce. The feedback loops further capture how awareness of smart logistics and key trends impact the localisation of smart logistics technologies and incentives into capacity building for relevant tech skills.



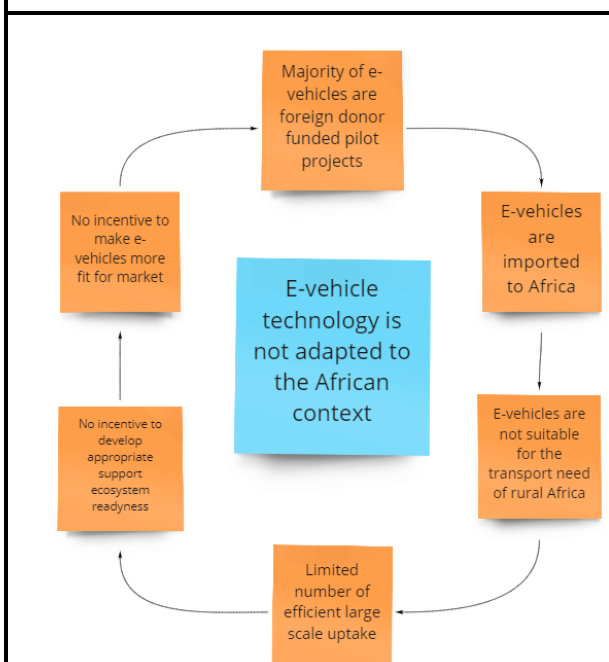
<sup>1</sup> Red post-its contain inhibitors, green ones show enablers.

## Loop 2: Limited awareness



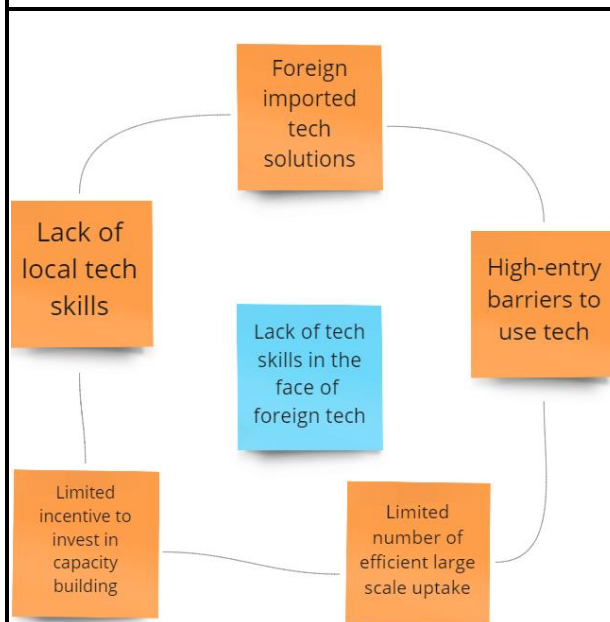
Currently, the foundations of the logistics ecosystem are weak and underdeveloped and fragmented. Physical and digital infrastructure is lacking, adequate financing and insurance opportunities are limited. Under such conditions, smart logistics operators remain relatively small-scale and only gather limited data to prove a tangible and scalable use case. Having fewer and smaller operations reduces the potential to show the beneficial impact that smart logistics solutions can have on society at the critical mile. Thus, the narrative of smart logistics remains one of risky endeavour rather than one where the benefits outweigh the initial investment. Overall, there are not many success stories or role models for smart logistics entrepreneurs, limiting the incentive to invest in a sector that seems to have limited opportunity and benefits. This further weakens the development of the ecosystem.

## Loop 3: E-vehicle technology is not adapted to the African context



Currently, most large-scale e-vehicles manufacturers are based in the US, Europe and Asia. They have limited experience in successfully designing and testing e-vehicles adapted to the African context. When used in the African context, these e-vehicles remain too expensive and have limited repair and maintenance opportunities. As a result, only a limited number of operations conducted on the continent can be truly cost-efficient and successfully reach scale. This considerably reduces the size of the local e-vehicle market and the incentive to manufacture e-vehicles tailored to match the continent's use cases.

#### Loop 4: Lack of tech skills in the face of foreign tech

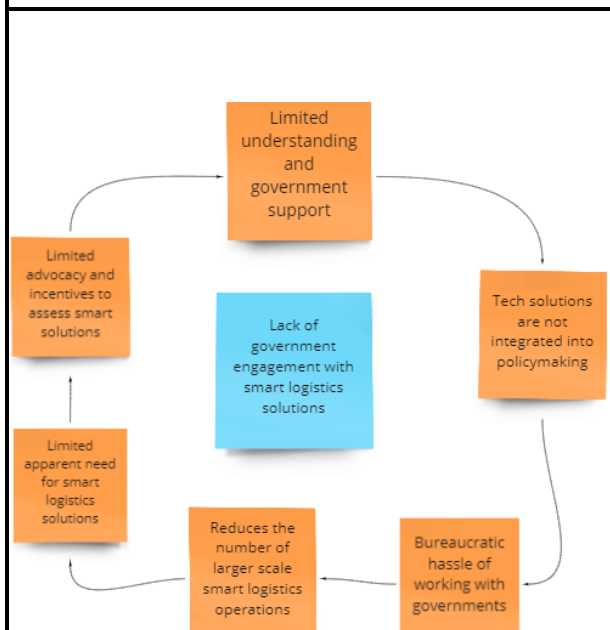


High-end tech solutions for smart logistics relying on AI and IoT hold their blueprint from EU and US contexts. African startups face high entry barriers to use these smart logistics technologies. Uptaking of these technologies is expensive as it requires specific skills and necessary physical and digital infrastructure, which are scarce. Therefore, few local companies use these technologies, and there is a limited number of relevant use cases for the African context. This, in turn, results in limited investment opportunities from larger companies, governments or development partners. Without these investment opportunities, there is limited interest in nurturing the right local tech skills to uptake smart logistics technologies. The limited tech skills result in tech solutions being imported and not adapted.

## B. GOVERNMENT ENGAGEMENT CLUSTER

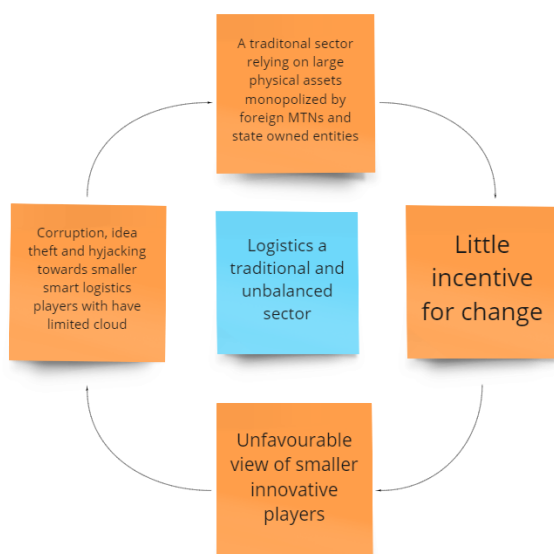
The government plays a key role in fostering or inhibiting innovation. By creating conducive policy and regulatory incentives, innovative players can scale their smart logistics solutions. Instead, complex and inadequate bureaucratic processes can constrict and run innovative players out of business.

#### Loop 5: Lack of government engagement with smart logistics solutions



Technological solutions to manage the critical mile logistics (e.g. platform economy, blockchain, IoT) are currently relatively complex, disruptive, and ever-evolving as new and improved solutions are currently being developed. This makes it more work for government officials to look further into these tech solutions, assess their relevance, and gauge trustworthy actors. At the decision-making level, little consideration is given to the needs of smart logistics solutions. Larger players manage to overcome these rigidities thanks to greater access to resources and clout. However, under such constraining conditions, fewer smart logistics innovative players and startups manage to grow and scale successfully. With fewer operations and limited size, government actors have less pressure to engage with these small local innovative players to support and leverage their tech solutions.

### Loop 6: Logistics, a traditional and unbalanced sector

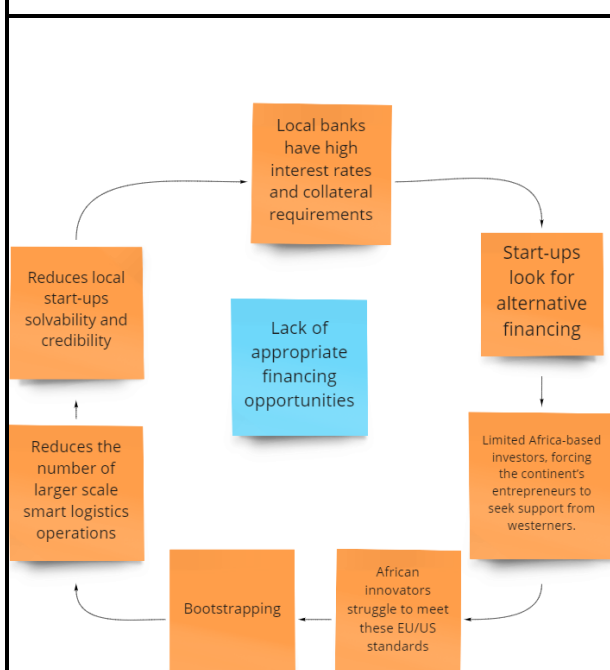


Logistics is a traditional sector relying on large physical assets monopolised by international corporate companies and state-owned entities. These actors control most of the decisional power in the sector and currently benefit from some ecosystem inefficiencies. Such a status quo has little incentive to change. Smaller innovative players like smart logistics startups are seen unfavourably as their solutions aim to disrupt the system to address its gaps and inefficiencies. However, startups have limited clout and access to resources, which leads them to be confronted with issues of corruption, idea theft, and hijacking from bigger private and public players.

## C. FINANCING CLUSTER

Financing is a key component of ecosystem supports to foster innovation. Smaller players, such as startups, face a high risk estimation which negatively impacts their chances of accessing capital from banks or investors. Grant funding is growing in the smart logistics sector but has the unintentional side-effect of generating less sustainable and solvable business models.

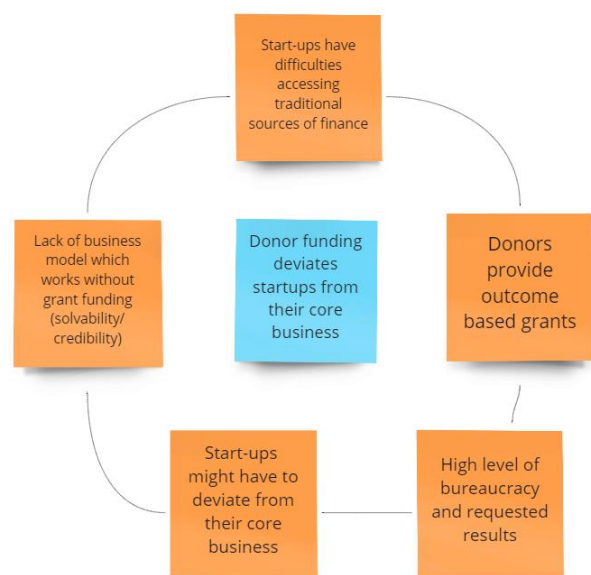
### Loop 7: Lack of appropriate financing opportunities



Currently, local banks have high interest rates and collateral requirements for smaller private sector actors due to the high failure rate and low scaling potential of new local businesses. Banks are thus not an option for startups when looking for funding. They rather look for financing sources such as VC investors, angel investment or crowdfunding. This search for alternative financing sources is a complicated one. Only 20% of venture cash came from Africa-based investors, forcing the continent's entrepreneurs to seek support from westerners with foreign standards. These EU and US standards are harder for local African startups to match when they also face an over-estimation of risk due to the systemic racism that prevails in "Western" VC funding. For instance, according to the Harvard Business Review, black founders receive roughly 1% of VC funding in the US. Overall, this means that local African small private sector players struggle or hardly get external financing. Startups, in turn, rely on bootstrapping financing, which reduces their chance to scale their business and

increase their chance of failure, thus reducing their credibility even more and thus their likelihood to get a loan from a bank.

### Loop 8: Donor funding deviates startups from their core business

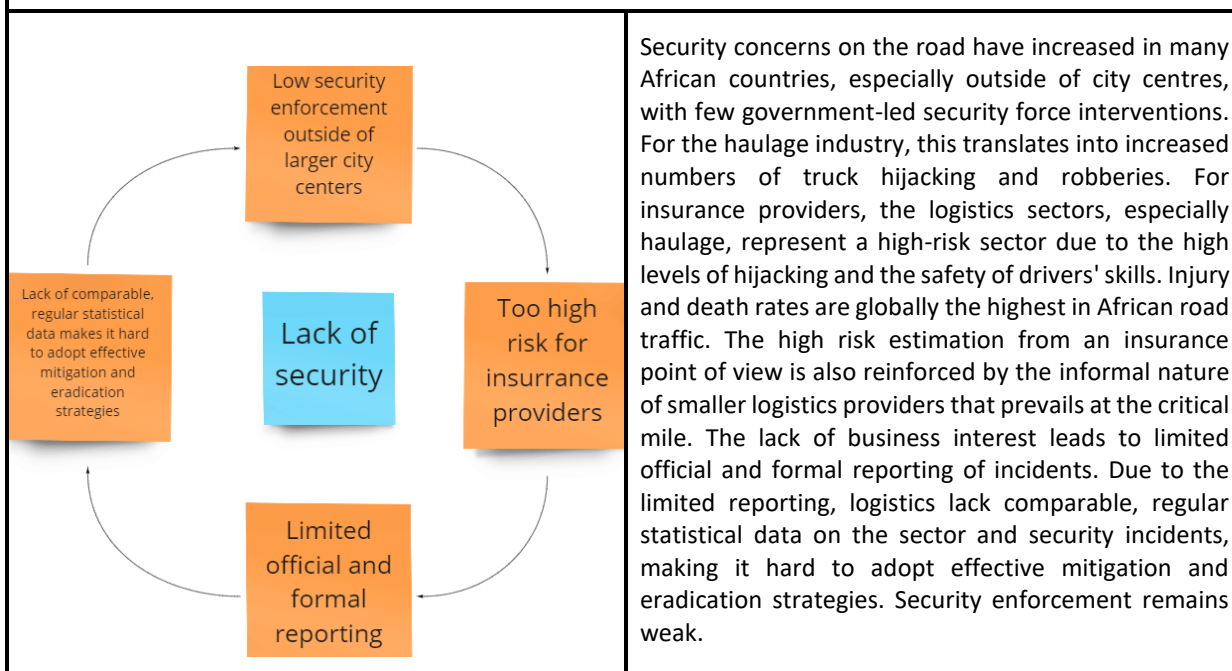


Accessing loans is a difficult endeavour for startups who face high interest rates and collateral requirements. The high failure rate and over-estimation of risk prevent them from accessing traditional financing. Startups turn to grant funding, growing in the development donor field, as logistics is a key sector to achieve many other SDGs. However, the grant funding comes with high bureaucratic requirements and is result-based. To comply with donor requirements, startups may have to deviate from their core business and keep them from developing sustainable business models that could work without grant funding. Such unsustainable models reinforce the image of startups as entities with limited solvability and credibility in the eyes of traditional financing players like banks

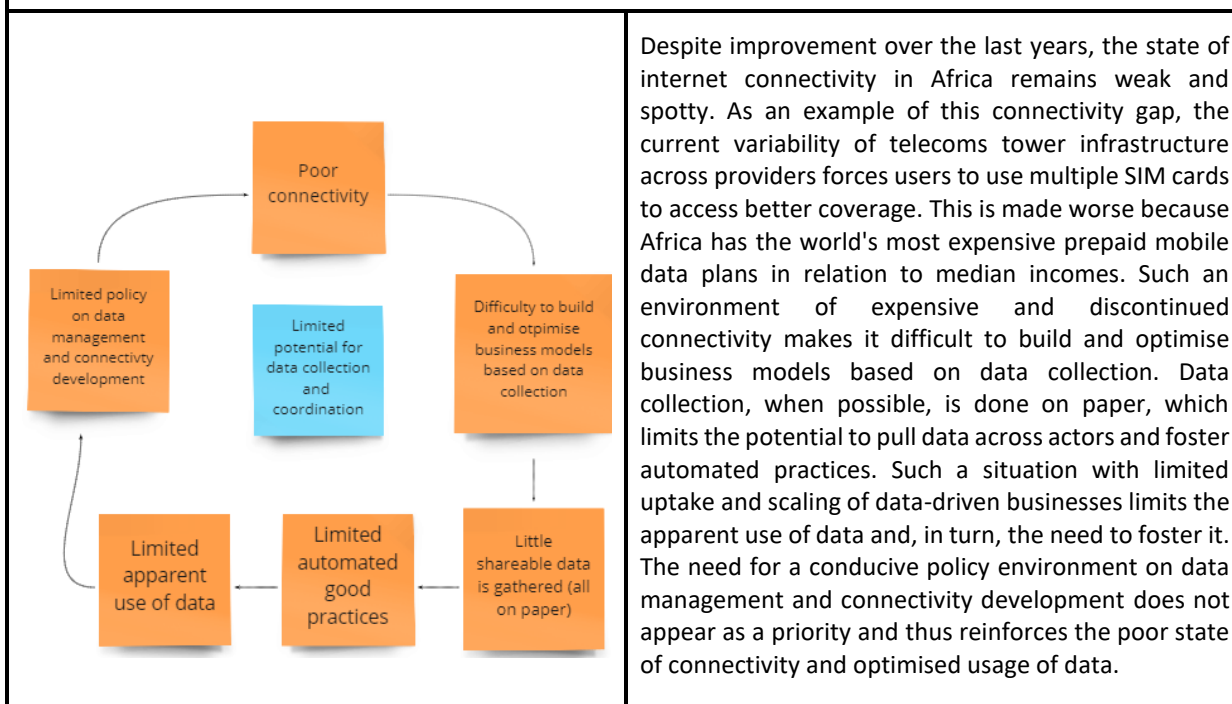
## D. SUPPORT ECOSYSTEM CLUSTER

Transport and logistics actors in Africa rely on key support foundation which include the state of physical and digital infrastructure, security challenges and adequate enforcement mechanism nationally and across-borders.

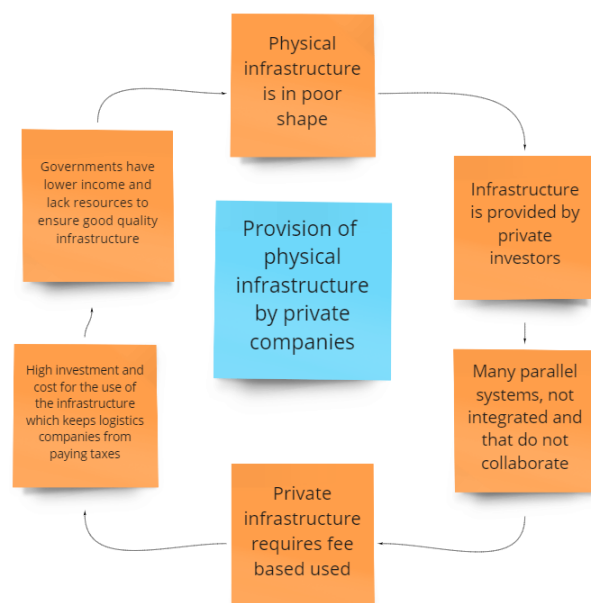
### Loop 9: Lack of security



### Loop 10: Limited potential for data collection and collaboration

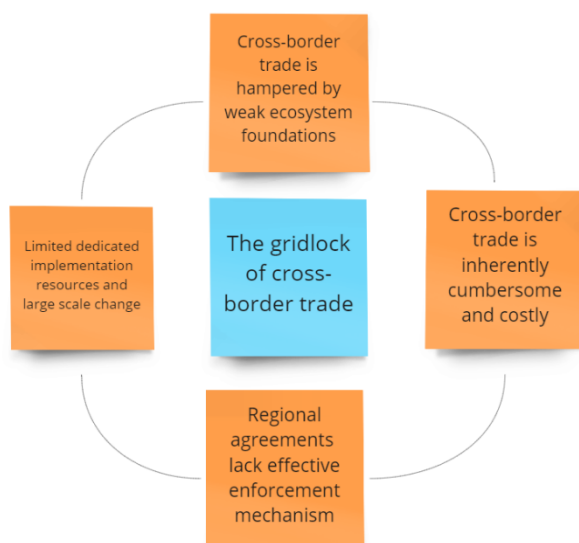


### Loop 11: Provision of physical infrastructure by private companies



The state of physical infrastructure in Africa remains weak. Private investors (foreign and national; either specialised or vertically integrated) finance and provide the infrastructure needed for logistics operations. Different players create their independent parallel infrastructure system. Infrastructure built by private investors usually requires fees like roads that are toll-based. Therefore, the cost of using the infrastructure is high and keeps logistics companies from paying taxes. In turn, this lowers the government's incomes. With limited resources, the government struggles to ensure good quality infrastructure, especially in remote areas with a low-density population.

### Loop 12: The gridlock of cross-border trade

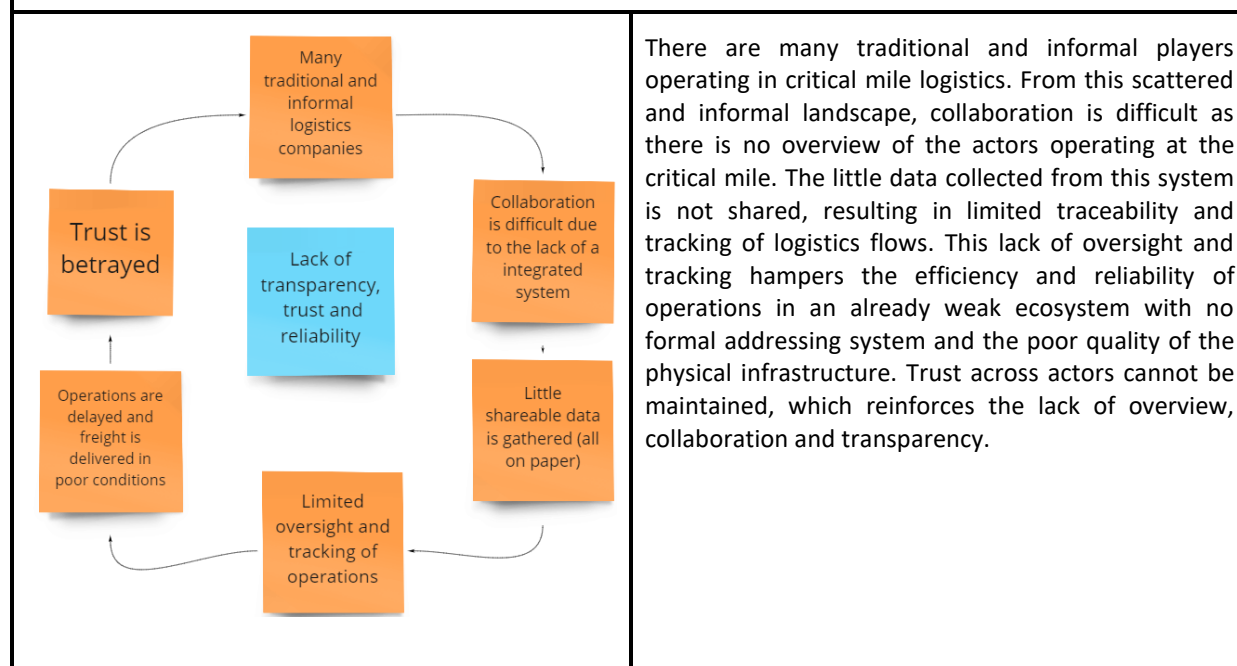


Cross-border trade is hampered by weak ecosystem foundations, ranging from weak domestic transport infrastructure to vehicle congestion and foreign currency shortages. Cross-border trade is, therefore, a cumbersome and costly activity. Despite regional agreement to smooth these challenges, effective enforcement mechanisms are lacking. This leaves room for more grey areas reinforcing weak governance, implementation and poor behaviour from border officials.

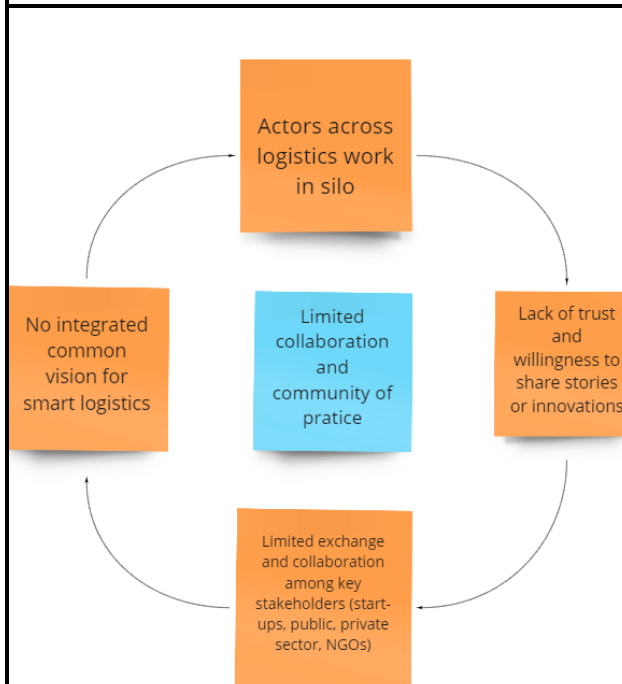
## E. COLLABORATION CLUSTER

Collaboration across the logistics supply chain at the critical mile is key to smooth operations, pull resources, and aligning other activities with collaborative chain members to increase efficiency. Technology also offers the potential to further the reach and scope of collaboration across geographies and stakeholder categories. But collaboration can only occur and be impactful under certain conditions ranging from transparency, trust and overall well-functioning ecosystem support (infrastructure, skills, financing, etc.).

### Loop 13: Lack of transparency, trust and reliability

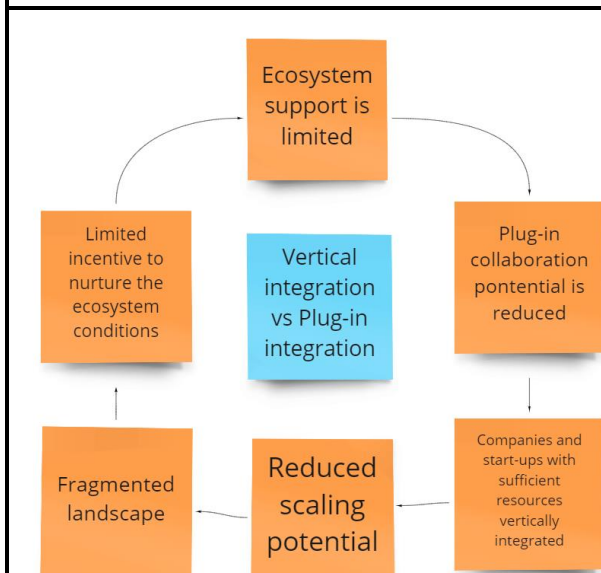


### Loop 14: Limited collaboration and community of practice



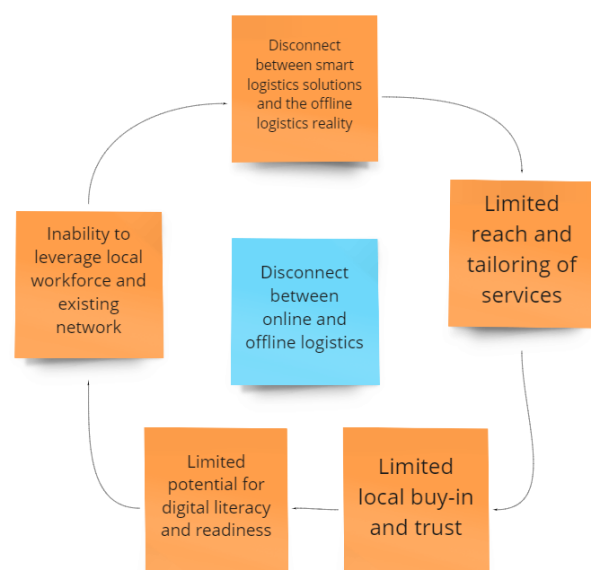
Actors across the value chain work in silos in a fragmented fashion, leading to inefficient duplications. Such a fragmented landscape fosters a generalised lack of trust and willingness to share stories and innovations. In turn, limited collaborations prevent exchanges on commonalities and shared goals. Under such conditions, no integrated vision for smart logistics can be created and incentives actors to collaborate at the critical mile.

### Loop 15: Vertical integration vs Plug-in integration



Currently, the critical mile support ecosystem in Africa is weak, from the state of the infrastructure to the access to finance and insurance and the capacity of actors. Under such conditions, the collaboration of actors across the logistics value chain becomes costly and reduces the incentive to plug-in services. Companies and startups with sufficient resources vertically integrate by creating their support ecosystem (payment, fleet, fuel) to cover more steps of the value chain. Vertically integrated companies spread themselves thin and limit their potential to scale cross-border. In parallel smaller innovative players with limited resources struggle to scale as well and establish partnerships. This fragmented and divided landscape, prone to duplications and similar services, prevents creating a clear narrative advocating for the sector's potential. In turn, such a polarised landscape limits the incentive to nurture the smart logistics landscape.

### Loop 16: Disconnect between online and offline logistics



Currently, smart solutions being developed for critical mile logistics tend to be disconnected from the offline reality in which they operate. Some of the interfaces, tools, and processes they rely on are not very user-friendly or considerate of the needs and reality of the context. They might not consider the lack of access to a smartphone, good connectivity, ability to read a GPS map or ability to use e-payment. Under such circumstances, smart logistics services and products can only have a limited reach and adequate tailoring, which leads to limited local buy-in and trust towards these smart logistics solutions which do not speak to the users. This, in turn, hampers the digital literacy and readiness of users and stakeholders operating on the ground in the critical mile, who would have to go out of their way to use a foreign service that does not respond to their needs. Consequently, there is limited potential to leverage the local workforce and existing networks (of drivers, distributors and retailers), informing the solutions and further their reach. The situation, in turn, reinforces this disconnect between the potential users on the ground and the smart logistics solutions being developed.

## ANNEX 4: INTERVIEW PARTNERS AND RESOURCE PERSONS

| Organisation  | Name                 | Position  |
|---|----------------------|---|
| Access View Africa  | Nkechi Akunyili      | Managing Partner  |
| Addressya   | Karoline Beronius    | Founder and CEO   |
| Africa International Trade & Commerce Research                            | Sand Mba Kalu        | CEO   |
| Africa-Europe Innovation Partnership (AEIP)                               | Sainabou Jallow      | Tech Innovation & Entrepreneurship Specialist                       |
| African Foundation for Development (AFFORD)                               | Onyekachi Wambu      | Executive Director  |
| AfriConEU   | Ana Solange Leal     | Area Manager  |
| Alliance for Logistics Innovation through Collaboration in Europe (ALICE) | Sergio Barbarino     | Chairperson   |
| BHN LOGISTIC  | Mandhir Singh        | Business Developer  |
| Bop Inc   | Emile Schmitz        | Programme manager   |
| Briter Bridges  | Dario Giuliani       | Director  |
| Cold Hubs   | Nnaemeka Ikegwuonu   | Co-founder and CEO  |
| Cole Collective   | David Coleman        | Chief Marketing Officer   |
| Common Market for Eastern and Southern Africa (COMESA)                    | SILAVWE Joseph       | Programme Manager - Regional Integration                            |
| Copia Kenya   | Willem Palthe        | VP Supply Chain & Logistics   |
| Council for Scientific and Industrial Research (CSIR)                     | Isabel Meyer         | Researcher at Smart Mobility cluster                                |
| Council for Scientific and Industrial Research (CSIR)                     | Christopher de Saxe  | Principal Research Engineer   |
| Dallmayr South Africa   | Steve Giddings       | Founder and CEO of Frontier Coffee (a member of the Dallmayr Group) |
| Digital Hub Logistics Hamburg   | Johannes Berg        | Managing Director   |
| Economic & Trade Section European Union Delegation to Nigeria             | John Taylor          | Director  |
| EU delegation in Zambia   | Njira Bweupe         | Programme Manager   |
| FurtherMarkets  | Fabio Scala          | Managing Director   |
| Global Distributors Collective (GDC)                                      | Gerwin Jansen        | Program manager   |
| GIZ   | Michael Schuster     | Transport Advisor   |
| Hubiquitous   | Elke Goering         | General Manager   |
| INESC TEC   | Clara Sofia Gouveia  | Area Manager  |
| Jumia   | Abdesslam Beniztouni | Group Head of Communication & Public Relations                      |
| Kühne Logistics University  | Dr. Maria Besiou     | Dean of Research and Professor of Humanitarian Logistics            |
| Lagos Business School   | Prof. Olayinka David | Academic Director and Professor of Information Systems              |
| Lalana  | Ana Luísa Silva      | Research Advisor  |
| MAN Impact Accelerator / Yunus Social Business                            | Lisa Guggenmos       | Senior Director   |

|  |                                  |   |
|--|----------------------------------|---|
| MAN Truck  | Fabian Maier                     | Logistics and Production Expert   |
| Mobile School Health                                   | Grant Byron                      | Chief Operating Officer   |
| MTN Zambia   | Chikondi Mwanza                  | Senior Manager: Fintech Products and Strategy                           |
| Musanga Logistics                                      | Njavwa Mutambo                   | Co-founder and CEO  |
| NexLeaf Analytics                                      | Audrey Lukela                    | Data Quality Assistant  |
| Orange   | Ralph Ankri                      | Senior Project Manager Business Development MEA Region                  |
| ParcelNinja  | Justin Drennan                   | Co-founder and CEO  |
| Pfizer   | Yogan Govender                   | Digital Cluster Lead  |
| Procter & Gamble (P&G)                                 | Chuka Alumona                    | Director –Global Go-To-Market Transformation and Distributor Operations |
| Prospero   | Namaya Morero Mbikusita-Lewanika | Sector Lead   |
| RTT  | Mark Allison                     | Head of business development  |
| SAIS Southern Africa Innovation Support                | Flora Ismail                     | Programme Director  |
| Seedstars  | Bianca Bonetti                   | Continuous Improvement Lead   |
| Sendy  | Malaika Judd                     | Co-Founder and CFO  |
| Siemens Stiftung WeTu                                  | Marah Köberle                    | E-Mobility and Circular Economy at Siemens Stiftung                     |
| SnooCode   | Sesinam Flyd                     | CEO   |
| Strathmore Uni @iBizAfrica                             | Merryl Adhiambo                  | Assistant Manager   |
| Transaid   | Caroline Barber                  | CEO   |
| Vakava   | Juha Kunnas                      | CEO   |
| VIA Global Health                                      | Noah Perin                       | Co-founder and CEO  |
| Wumdrop  | Simon Hartley                    | CEO   |
| Zambia Information Communication and Technology Agency | Eric K. Lwao                     | Director of Postal Services   |

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