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CUSA PROJECT

Global Gateway Support to Transport Corridors in Africa

Consolidated report

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Global Gateway Support to Transport Corridors in Africa

CONSOLIDATED REPORT

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Abstract

This report provides consolidated comparative assessment of eleven Global Gateway-supported transport corridors in Africa. The report concludes that all these eleven corridors are attractive for investments. The largest benefits are expected from interventions in transport infrastructure and accessibility. The investments in reducing carbon footprint and preserving biodiversity also appear quite promising. The most challenging area for intervention seems to be digitalisation. Synergies with investments in transport and accessibility could be exploited, to reduce the cost of digitalisation interventions. The challenges in boosting productivity appear as the most diverse ones and need to be further assessed by corridors, areas and sectors. A potential high-productivity cluster is identified in Western Africa. Large urban agglomerations and major transport and logistics infrastructure entities often demonstrate different intervention profiles from the remaining wide corridor area. Additional in-depth studies are needed to better understand their specific challenges, opportunities and trade-offs. The provision of specific recommendations or the impact assessment of particular ongoing projects or potential future interventions is outside the scope of this study.

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The authors would like to thank Paul Riembault (INTPA), as well as the colleagues from other EC Services and EU Delegations, for the fruitful exchange, advice and information.

AUTHORS

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Executive Summary

In context of the 2021-2027 EU programming exercise, the identification and prioritisation of key strategic corridors in Africa, and focus on their development, is an opportunity to deepen the Africa-EU partnership by prioritising investments that can have the greatest mutually beneficial impact. Strategic corridors are also meant to support territorial development, both rural and urban, through the deployment and maintenance of reliable transport and logistics networks, and services, as well as digital and energy-related infrastructure.

The Political Guidelines for the European Commission 2024-2029[1] envisage the development of a range of new Clean Trade and Investment Partnerships, as part of the New Economic Foreign Policy. These partnerships are intended to help secure critical minerals, raw materials and clean energy along diversified and resilient supply chains. Within this framework, the European Commission foresees a new impetus in the partnership with Africa, including investments through Global Gateway in transport corridors, ports, renewable energy generation, green hydrogen production and raw material value chains.

In line with the Comprehensive Strategy with Africa[2] and Global Gateway[3], since 2020 two departments of the European Commission – the Directorate-General for international Partnerships (INTPA) and the Joint Research Centre (JRC) have been jointly performing studies on '**C**orridors and **U**rban **S**ystems in **A**frica' (**CUSA**). Based on these studies, a shortlist of 11 envisaged strategic corridors was announced at the 6th European Union-African Union Summit, February 2022. Following a series of later political evolutions, the delineation of two corridors has been adjusted, while in November 2023 a new, twelfth corridor was added to the priority list. The CUSA team has analysed and assessed 11, out of these 12 corridors (**Figure A**), namely:

- **Corridor 1:** Abidjan-Lagos (Western Africa) – Côte d'Ivoire, Ghana, Togo, Benin, Nigeria;
- **Corridor 2:** Abidjan-Ouagadougou (Western Africa) – Côte d'Ivoire, Burkina Faso;
- **Corridor 3:** Praia-Dakar-Abidjan (Western Africa) – Cabo Verde, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire;
- **Corridor 4:** Cotonou-Niamey (Western Africa): Benin, Niger;
- **Corridor 5:** Libreville-Kribi-Douala-N'Djamena (Central Africa) – São Tomé and Príncipe, Gabon, Equatorial Guinea, Cameroon, Chad;
- **Corridor 6:** Douala-Kribi-Bangui-Kisangani-Kampala (Central Africa) – Cameroon, Central African Republic, Democratic Republic of the Congo, Uganda;
- **Corridor 7:** Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti (Eastern Africa) – Tanzania, Kenya, Ethiopia, Somalia, Djibouti;

[1] Ursula von der Leyen, Candidate for the European Commission President, 'Europe's choice – Political Guidelines for the next European Commission 2024-2029', Strasbourg, 18 July 2024.

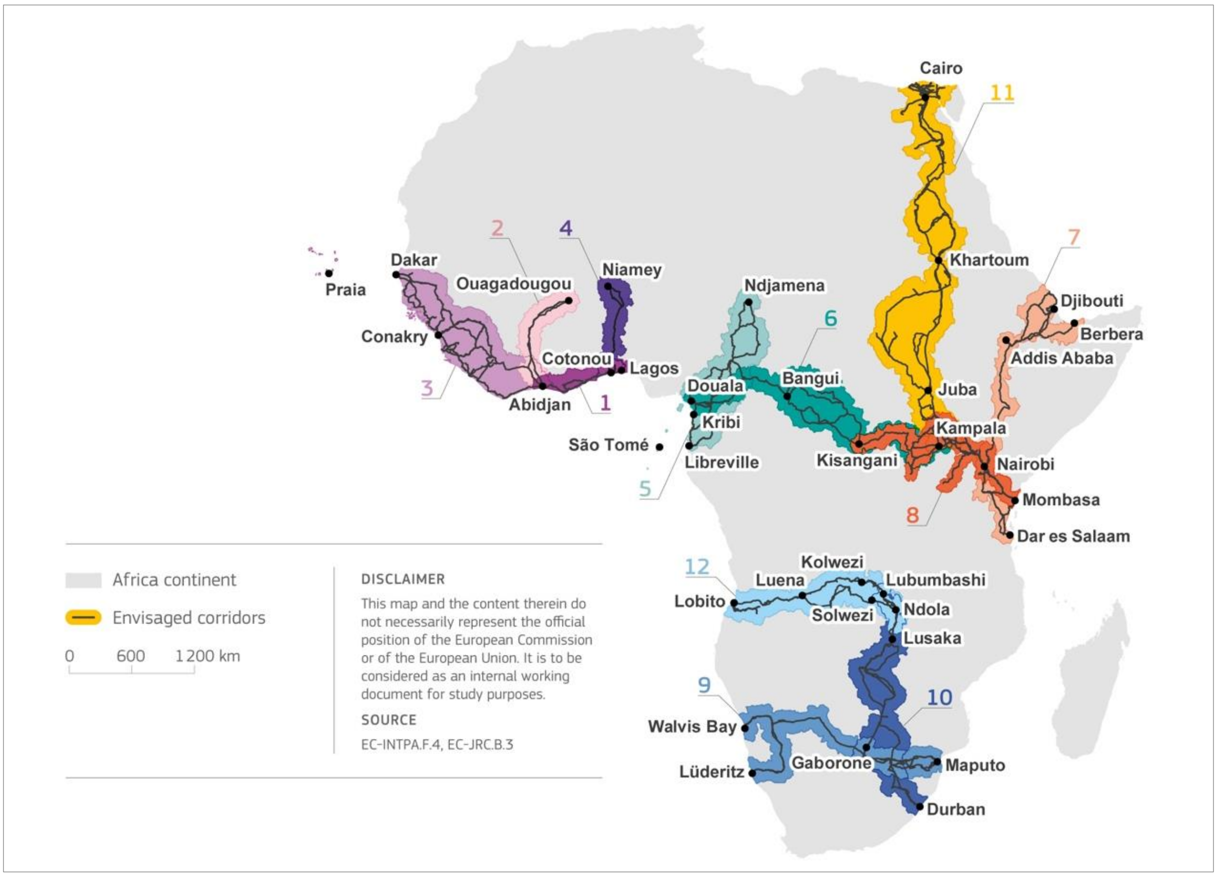
[2] JOIN(2020) 4 final, Brussels, 9.3.2020

[3] JOIN(2021) 30 final, Brussels, 1.12.2021

- **Corridor 8:** Mombasa-Kisangani (Eastern Africa) – Kenya, Uganda, Rwanda, Democratic Republic of the Congo;
- **Corridor 9:** Maputo-Gaborone-Walvis Bay-Lüderitz (Southern Africa) – Mozambique, South Africa, Eswatini, Botswana, Namibia;
- **Corridor 10:** Durban-Lusaka-Lubumbashi (Southern Africa) – South Africa, Botswana, Zimbabwe, Zambia, Democratic Republic of the Congo;
- **Corridor 12:** Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola (Southern Africa) – Angola, Democratic Republic of the Congo, Zambia[4];

against **four sub-objectives:** 1) **Reduce carbon footprint** and **preserve biodiversity;** 2) **Digitalise the corridors;** 3) **Improve accessibility:** access to public services in the corridor territory, linking also rural road networks, urban mobility and connectivity in and between cities; 4) **Unlock productive areas** and support value chains' development, e.g. mining / including raw materials, agriculture / agri-business, industry, etc.; and the **overall objective** to **strengthen transport and trade corridor efficiency.**

Figure A: The 12 envisaged corridors.



Source: *Authors' own elaboration.*

[4] The assessment of corridor 11: Cairo-Khartoum-Juba-Kampala (Northern & Eastern Africa) – Egypt, Soudan, South Sudan and Uganda, has been postponed.

The goal of this exercise has been to support the decision-making of the EU Delegations, European Investment Bank, EU Member States, International Financial Institutions, etc., in the context of the Team Europe Initiatives and beyond, with regard to specific funding and project decisions.

This report provides **consolidated comparative assessment of the 11 analysed corridors.** The following **main conclusions** could be drawn:

1. All 11 shortlisted corridors are attractive for investments.
2. The largest benefits are expected from interventions in transport infrastructure and accessibility.
3. The investments in reducing carbon footprint and preserving biodiversity also appear quite promising.
4. The most challenging area for intervention seems to be digitalisation. Synergies with investments in transport and accessibility could be exploited, to reduce the cost of digitalisation interventions.
5. The challenges in boosting productivity appear as the most diverse ones and need to be further assessed by corridors, areas and sectors. A potential high-productivity cluster is identified in Western Africa.
6. Large urban agglomerations and major transport and logistics infrastructure entities often demonstrate different intervention profiles from the remaining wide corridor area. Additional in-depth studies are needed to better understand their specific challenges, opportunities and trade-offs.

The above conclusions have been drawn taking into account several important limitations, starting with the availability, accessibility and affordability of plausible data and information (especially – geo-localised ones), also because they were beyond the budget of the project. As modelling represents an abstraction of the real world, the modelling scenarios provide indicative results only, but do not suggest specific interventions. All scenarios presume stable political and security situation. The impacts of the service sector and tourism have not been analysed. No field visits have been performed, but the EU Delegations in Africa provided extremely useful local insights.

The potential follow-up steps could include analysis and assessment of urban specifics, sustainable territorial development aspects, critical raw materials, logistics and transport, cross-border issues and bottlenecks, etc., in close collaboration with the other EU Services, in particular the EU Delegations in Africa.

1. Background

In context of the 2021-2027 EU programming exercise, the identification and prioritisation of key strategic corridors in Africa, and focus on their development, is an opportunity to deepen the Africa-EU partnership by prioritising investments that can have the greatest mutually beneficial impact. Strategic corridors are also meant to support territorial development, both rural and urban, through the deployment and maintenance of reliable transport and logistics networks, and services, as well as digital and energy-related infrastructure.

The Political Guidelines for the European Commission 2024-2029[5] envisage the development of a range of new Clean Trade and Investment Partnerships, as part of the New Economic Foreign Policy. These partnerships are intended to help secure critical minerals, raw materials and clean energy along diversified and resilient supply chains. Within this framework, the European Commission foresees a new impetus in the partnership with Africa, including investments through Global Gateway in transport corridors, ports, renewable energy generation, green hydrogen production and raw material value chains.

In line with the Comprehensive Strategy with Africa[6] and Global Gateway[7], since 2020 two departments of the European Commission – the Directorate-General for international Partnerships (INTPA) and the Joint Research Centre (JRC) have been jointly performing studies on '**C**orridors and **U**rban **S**ystems in **A**frica' (**CUSA**).

During the first CUSA phase (2020-2021)[8], totally 55 potential strategic corridors at Africa *continental level* (**Figure 1, Level 1**), comprising 52 African countries, have been identified and analysed in close collaboration with other EU Services, in particular – the EU Delegations in Africa[9], on the basis of **three main criteria:**

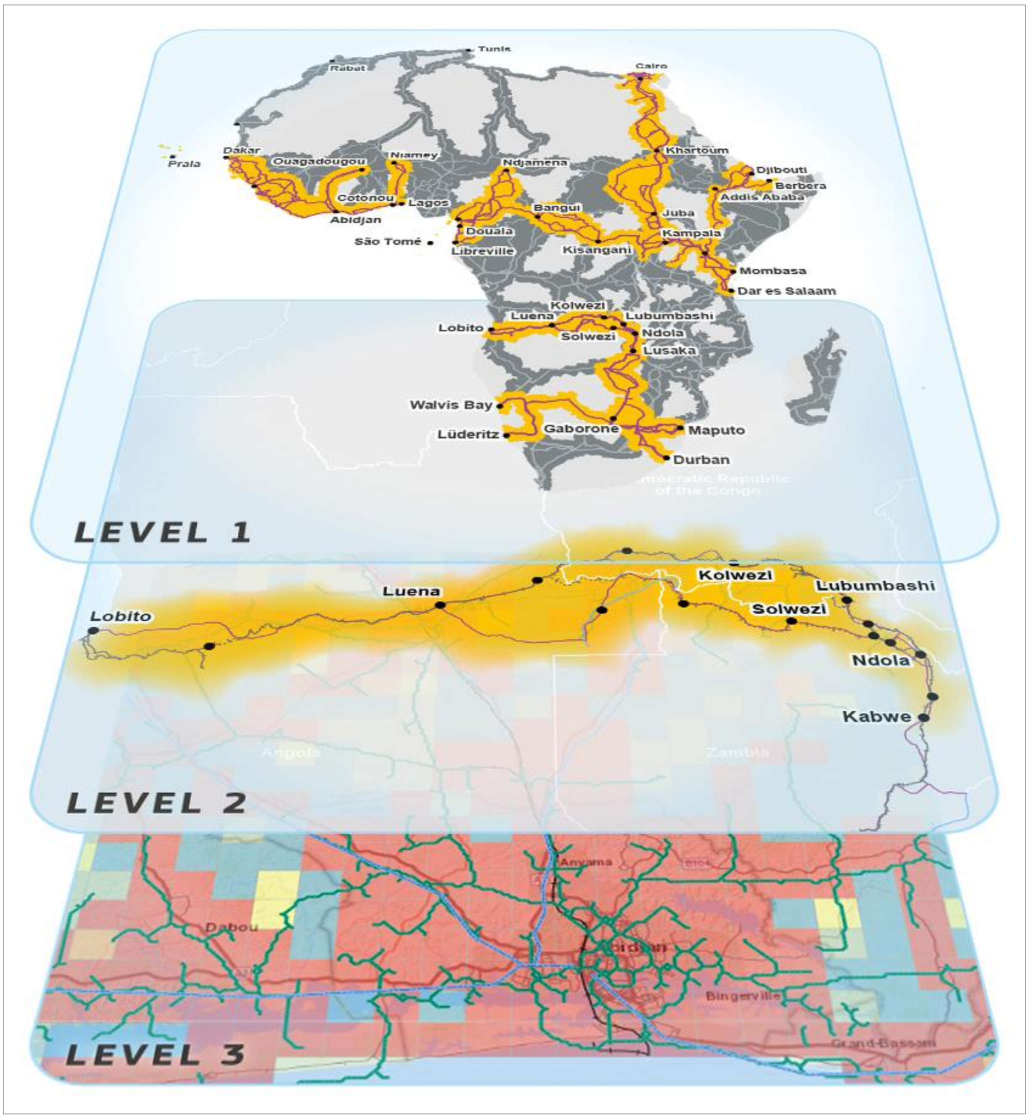
- facilitate Africa-Europe and intra-African trade,
- improve sustainable, efficient, safe and secure connectivity between the two continents, and
- develop diversified value chains in Africa that can benefit both African and European industries.

under **four policy scenarios:**

I. Sustainable Growth and Jobs;
II. Protecting the Environment;
III. Human Development, Peace and Security;
IV. Strengthening EU-Africa Connectivity, which represented an evolution of the Growth & Jobs scenario.

[5] Ursula von der Leyen, Candidate for the European Commission President, 'Europe's choice – Political Guidelines for the next European Commission 2024-2029', Strasbourg, 18 July 2024.
[6] JOIN(2020) 4 final, Brussels, 9.3.2020
[7] JOIN(2021) 30 final, Brussels, 1.12.2021
[8] CUSA-1, JRC N° 35841 – DG DEVCO N° ADM-MULTI/2020/418-067
[9] More than 250 individual feedback and change requests from various services have been collected and processed.

Figure 1: Corridors and Urban Systems in Africa (CUSA) studies hierarchy and structure.



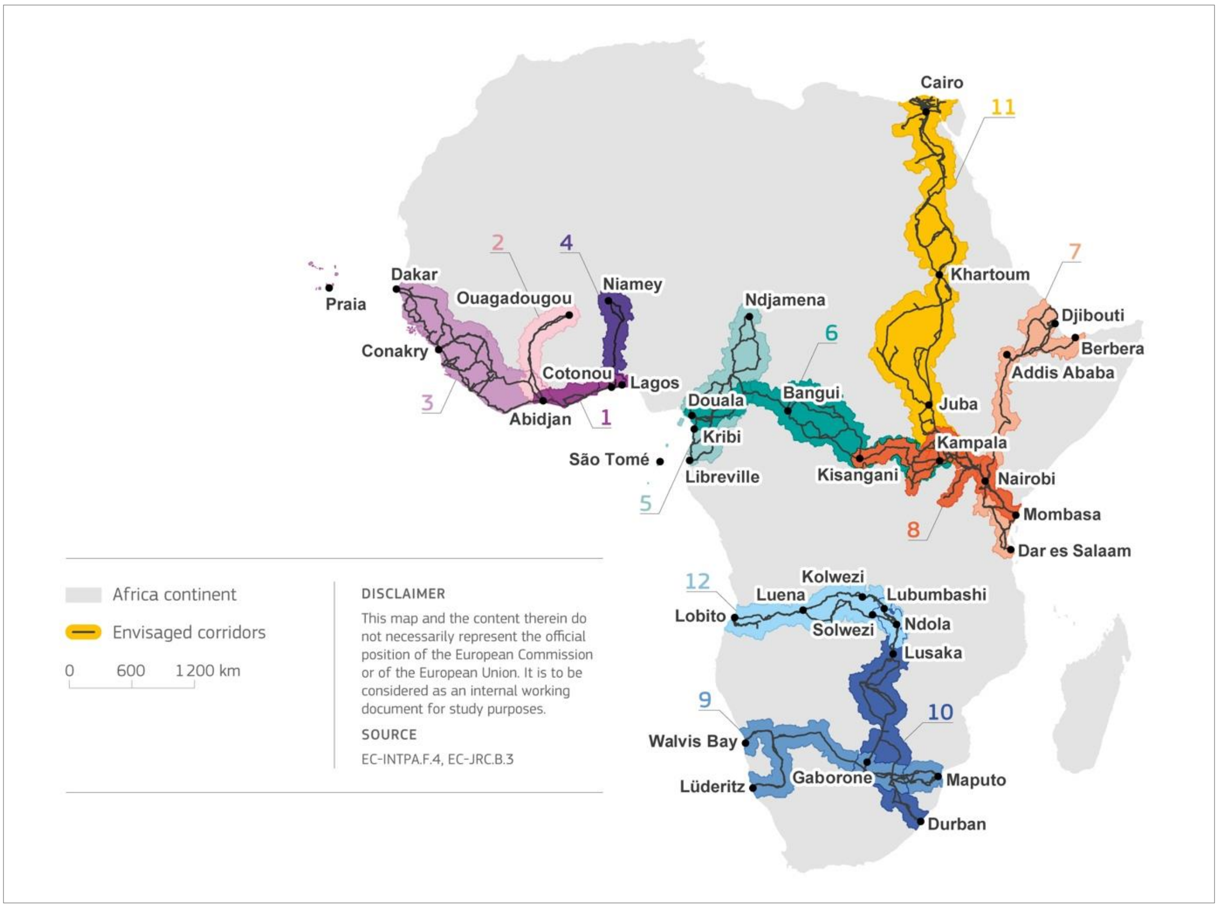
Source: *Authors' own elaboration.*

The buffer of each corridor has been defined by a drive-time service area of 120 minutes in each direction from the core road and railway infrastructure that connected major cities and ports. Based on this extensive analysis, a shortlist of 11 envisaged strategic corrido was announced at the 6th European Union–African Union Summit, February 2022. Following a series of later political evolutions, the delineation of two corridors has been adjusted, while in November 2023 a new, twelfth corridor was added to the priority list. As a result, the list of envisaged corridors (**Figure 2**) comprised:

1. **Corridor 1:** Abidjan-Lagos (Western Africa) – Côte d'Ivoire (CIV), Ghana (GHA), Togo (GHA), Benin (BEN), Nigeria (NGA);
2. **Corridor 2:** Abidjan-Ouagadougou (Western Africa) – Côte d'Ivoire (CIV), Burkina Faso (BFA);
3. **Corridor 3:** Praia-Dakar-Abidjan (Western Africa) – Cabo Verde (CPV), Senegal (SEN), Gambia (GMB), Guinea-Bissau (GNB), Guinea (GIN), Sierra Leone (SLE), Liberia (LBR), Côte d'Ivoire (CIV);
4. **Corridor 4:** Cotonou-Niamey (Western Africa): Benin (BEN), Niger (NER);

5. **Corridor 5:** Libreville-Kribi-Douala-N'Djamena (Central Africa) – São Tomé and Príncipe (STP), Gabon (GAB), Equatorial Guinea (GNQ), Cameroon (CMR), Chad (TCD);
6. **Corridor 6:** Douala-Kribi-Bangui-Kisangani-Kampala (Central Africa) – Cameroon (CMR), Central African Republic (CAF), Democratic Republic of the Congo (COD), Uganda (UGA);
7. **Corridor 7:** Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti (Eastern Africa) – Tanzania (TZA), Kenya (KEN), Ethiopia (ETH), Somalia (SOM), Djibouti (DJI);
8. **Corridor 8:** Mombasa-Kisangani (Eastern Africa) – Kenya (KEN), Uganda (UGA), Rwanda (RWA), Democratic Republic of the Congo (COD);
9. **Corridor 9:** Maputo-Gaborone-Walvis Bay-Lüderitz (Southern Africa) – Mozambique (MOZ), South Africa (ZAF), Eswatini (SWZ), Botswana (BWA), Namibia (NAM);
10. **Corridor 10:** Durban-Lusaka-Lubumbashi (Southern Africa) – South Africa (ZAF), Botswana (BWA), Zimbabwe (ZWE), Zambia (ZMB), Democratic Republic of the Congo (COD);
11. **Corridor 11:** Cairo-Khartoum-Juba-Kampala (Northern & Eastern Africa) – Egypt (EGY), Soudan (SDN), South Sudan (SSD), Uganda (UGA);
12. **Corridor 12:** Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola (Southern Africa) – Angola (AGO), Democratic Republic of the Congo (COD), Zambia (ZMB);

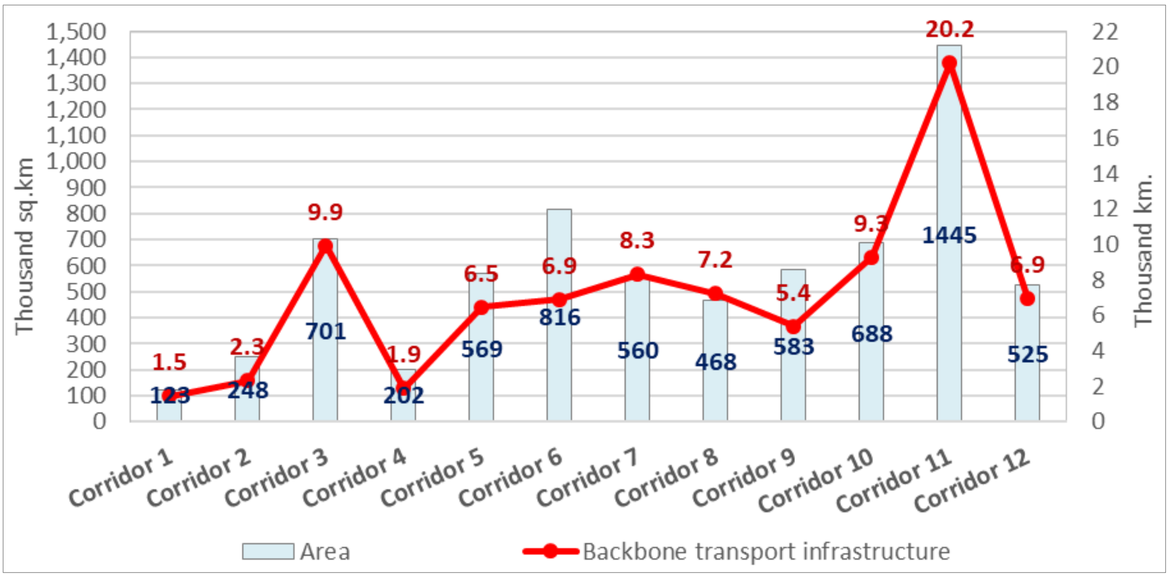
Figure 2: The 12 envisaged corridors.



Source: *Authors' own elaboration.*

Figure 3 shows the core parameters – buffer area and length of backbone transport infrastructure (roads, railways, rivers) – of these 12 envisaged corridors.

Figure 3: Area (thousand square km) and backbone transport infrastructure (thousand km) in the 12 envisaged corridors.



Source: *Authors' own elaboration.*

During the second CUSA phase (2022-2024)[10], specific areas of vulnerability and opportunity at national and regional level (**Figure 1, Level 2**) for the envisaged strategic corridors have been identified, **except for corridor 11** 'Cairo-Khartoum-Juba-Kampala', whose assessment has been postponed. The **overall objective** of the analysis has been to **strengthen transport and trade corridor efficiency,** broken down into **four sub-objectives:**

- **reduce carbon footprint** and **preserve biodiversity;**
- **digitalise the corridors;**
- **improve accessibility:** access to public services in the corridor territory, linking also rural road networks, urban mobility and connectivity in and between cities;
- **unlock productive areas** and support value chains' development, e.g. mining / including raw materials, agriculture / agri-business, industry, etc.

The goal of this second CUSA phase has been to support the decision-making of the EU Delegations, European Investment Bank, EU Member States, International Financial Institutions, etc., in the context of the Team Europe Initiatives and beyond, with regard to specific funding and project decisions.

The main goal of the **third CUSA phase** (2025) was to provide consolidated comparative assessment of the 11 corridors, analysed during the second CUSA phase (2022-2024). This report

[10] CUSA-2A, JRC N° 36126 – DG INTPA N° ADM-MULTI/2021/426-776, CUSA-2B, JRC N° 36329 – DG INTPA N° 434-259, ADM-MULTI/2022/434-259 and CUSA-2C, JRC N° 36588 – DG INTPA N°445-169;

presents the results of this assessment. The **Addendum** to this report contains the results per individual corridors and scenarios.

The analyses and assessments under CUSA have been subject to the following main limitations:

- **Availability, accessibility and affordability of plausible data and information,** especially – geo-localised ones. Sometimes data were available, but not accessible because of various restrictions, or affordable, or because they were beyond the budget of the project. Sometimes data were simply not available. In this context, the trade statistics for 16, out of the totally 52 assessed countries (30%) was mirror (using partner's statistics), but not direct. Trade flows to off-shore zones were another challenge. A number of mathematical mismatches in the macro-economic indicators have been revealed. The optimum effort has been made to acquire, calibrate, refine and use the best available, accessible and affordable data and information.
- **Political and security risks.** The identification of challenges for the overall objective and the four sub-objectives of the study did not take into account the governing political and security situation in the 11 corridors. The political situation and (in)stability in Africa used to be peculiar with high volatility. The so-revealed investment challenges assume the presence of a stable political and security situation.
- **Service sector & tourism not included in the assessment.** The tourism sector, in particular, seems to be an important component of the economies of several, if not many African countries – Cabo Verde, São Tomé and Príncipe, Botswana, Tanzania, Kenya, etc.
- **No field visits.** The CUSA studies did not involve field visits or studies. There was, however, an intensive coordination and collaboration with the EU Delegations in Africa. In this context, the CUSA team would like to thank the colleagues from the EU Delegations, who provided extremely useful local insights.
- **Indicative results.** Any modelling exercise represents an abstraction of real-world situations or trends. The CUSA modelling does not pretend to provide straightforward recommendations or solutions.
- **No specific recommendations for interventions or project assessments.** The mandate of CUSA did not include specific recommendations or impact assessment of particular ongoing projects or potential future interventions at local level – **Figure 1, Level 3.** Such analyses and assessments could be subject of additional studies, in close collaboration with the other EU Services, in particular – the EU Delegations in Africa. The potential follow-up steps could include, amongst others, analysis and assessment of urban specifics, development and mobility (e.g. understand status and future trends of African cities, develop scenarios of urban development, support smart and sustainable urban development and regional connectivity), sustainable territorial development aspects, including critical raw materials, logistics and transport, cross-border issues and bottlenecks, etc. in close collaboration with the other EU Services, in particular the EU Delegations in Africa.

2. Multi-criteria assessment and ranking of corridors

2.1. METHODOLOGICAL NOTES

This chapter summarises the ranking results from the multi-criteria decision analysis of the 11 assessed corridors, in order to identify territorial challenges at fine disaggregation level (5x5 km cells, in total – 219,522 cells) under the four specific sub-objectives:

- reduce carbon footprint and preserve biodiversity;
- digitalise the corridors;
- improve accessibility: access to public services in the corridor territory, linking also rural road networks, urban mobility and connectivity in and between cities;
- unlock productive areas and support value chains' development, e.g. mining / including raw materials, agriculture / agri-business, industry, etc.;

and the fifth overall objective to strengthen transport and trade corridor efficiency.

The multi-criteria decision analysis of the four specific sub-objectives and the resulting ranking has been obtained by employing the **TOPSIS** (**T**echnique for **O**rder of **P**reference by **S**imilarity to **I**deal **S**olution) method[11], supported by a Geographical Information System. The results have been cross-validated with the **SAW** (**S**imple **A**dditive **W**eighting) method[12]. In both cases, the ranking indexes ranged from '0' (no fit with the objective function, i.e. highest investment challenge) to '1' (best fit with the objective function, i.e. lowest investment challenge). The actual breakdown of the 219,522 cells in all scenarios and corridors was between 0.0279 and 0.8141. In order to facilitate the uniform interpretation of the results (index values), a colour-coded legend has been created for both cells and corridors – **Figure 4.** The breakdown of all 219,522 cells per colour coded category is provided in **Annex 1.** The upper two and bottom three categories contain only cells, but not corridors. The extreme cell values at both ends indicate major urban, infrastructure or industrial areas, meaning that additional in-depth analysis of such specific areas appears needed.

The ranking scenarios have been designed consistently for all corridors, but applied individually to each single corridor. This means that the same cell in the same ranking scenario within overlapping corridors could receive different values and hence – get assigned different legend colours from **Figure 4.** As a result, the performance of a specific cell could vary within overlapping parts of corridors (only), depending on the performance of the surrounding cells in those overlapping areas.

[11] Hwang, C.-L., & Yoon, K. (1981). Methods for Multiple Attribute Decision Making. In Multiple Attribute Decision Making: Methods and Applications A State-of-the-Art Survey (pp. 58–191). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-48318-9_3

[12] Wira Trise Putra, D., & Agustian Punggara, A. (2018). Comparison Analysis of Simple Additive Weighting (SAW) and Weighted Product (WP) In Decision Support Systems. MATEC Web of Conferences, 215, 01003. https://doi.org/10.1051/matecconf/201821501003

In practical terms, while a cell could perform better than others within corridor ‘A’, it could perform worse in corridor ‘B’, if the surrounding cells in that corridor ‘B’ perform better than the cell itself.

Figure 4: Breakdown of the TOPSIS index values per cells and corridors.

Cell / corridor value range	Colour coding	Observed
0.800-0.899	Dark Water	Cells only
0.700-0.799	Dark Green	Cells only
0.600-0.699	Green	Cell and corridors
0.500-0.599	Light Green	Cell and corridors
0.400-0.499	Olive Green	Cell and corridors
0.300-0.399	Yellow	Cell and corridors
0.200-0.299	Orange	Cells only
0.100-0.199	Red	Cells only
0.000-0.099	Dark Red	Cells only

Source: *Authors’ own elaboration.*

The analysis incorporated a tailored set of 46 indicators at 5x5 km cell level, out of a longer list of 90 indicators. The 46 indicators and their utility functions per sub-objectives are provided in **Annex 2.** The fifth, overall objective has been designed to simultaneously capture the challenge zones from the four sub-objectives. Each objective was described from the point of view of investment fragility. In such a way, five geo-localised sets of outputs have been generated – for the four specific sub-objectives and for the overall objective – for the 11 assessed corridors, in total – 55 maps, provided in the **Addendum to the Consolidated Report.**

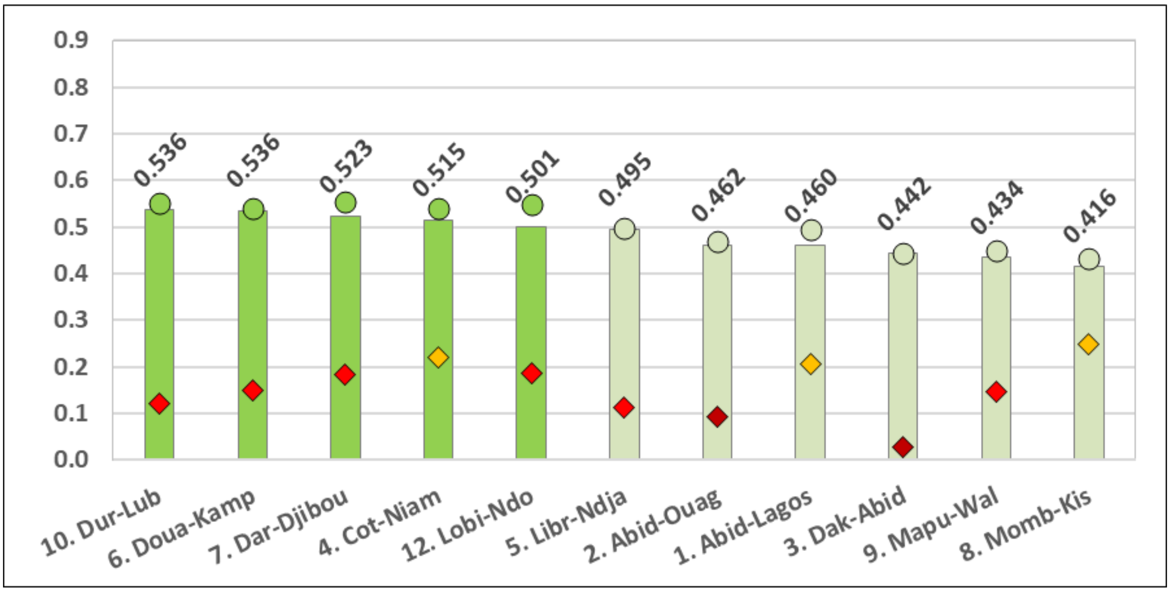
2.2. REDUCING CARBON FOOTPRINT AND PRESERVING BIODIVERSITY

The biggest challenges in carbon footprint reduction are typically identified in the areas where the largest prevalence of carbon dioxide (CO_2) emissions from transport is observed. This means that the most polluted areas come up as highly fragile ones. Conversely, the least polluted areas are the least challenging ones. The largest impact from potential interventions to reduce emissions emerges in the highly fragile areas, i.e. with high CO_2 emissions from transport. Consequently, the smallest impact from potential interventions to reduce emissions occurs in the areas of low challenge, i.e. small CO_2 emissions from transport. The areas, most in need of reducing carbon footprint and preserving biodiversity, have been identified when simultaneously characterised by the:

- highest presence of CO_2 pollution sources, e.g. transport, industry;
- highest total CO_2 emissions coming from road, rail and air transport;
- lowest presence of forest coverage;
- fastest growing population.

The combination of these indicators has allowed to identify vulnerable zones in both urban and rural areas with high levels of transport CO_2 emissions, and where the population growth was the highest. The resulting ranking of the 11 assessed corridors, based on the incremental cost-effective potential to mitigate carbon footprint challenges and preserve biodiversity, is presented in **Figure 5.** Corridors 10 'Durban-Lusaka-Lubumbashi' and 6 'Douala-Kribi-Bangui-Kisangani-Kampala' top the ranking, while corridors 8 'Mombasa-Kisangani' and 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' land at the other extremity. The differences amongst corridor ranking, especially in the upper end, are relatively small. Given the inherent level of uncertainty and approximation of any modelling exercise, **it could be concluded that all corridors generally demonstrate promising potential to improve carbon footprint and biodiversity performance.** This potential is also widespread across corridor areas, given that the average values are close to the highest ones.

Figure 5: Corridor ranking based on the incremental cost-effective potential to mitigate carbon footprint challenges and preserving biodiversity, TOPSIS values.



Legend: *Bar (Π) – Average value; Diamond (◊) – lowest value; Circle (○) – highest value*
Source: *Authors' own elaboration.*

Regardless these positive overall findings, the absolutely lowest scoring cells (falling into the dark red, red and orange categories of **Figure 4,** represented by the diamonds in **Figure 5**) in the whole ranking exercise are encountered in the carbon footprint scenario. These very low scoring cells indicate spots, where reducing carbon footprint and preserving biodiversity result to be extremely challenging and costly. In practical terms, these **poorly performing spots overlap with major urban agglomerations within corridors** – Abidjan (Côte d'Ivoire), Accra (Ghana), Lagos (Nigeria), Ouagadougou (Burkina Faso), Conakry (Guinea), Monrovia (Liberia), Dakar (Senegal), Douala (Cameroon), N'Djamena (Chad), Kampala (Uganda), Kigali (Rwanda), Nairobi, Mombasa (Kenya), Addis Ababa (Ethiopia), Maputo (Mozambique), Durban, Johannesburg, Pretoria (South Africa), etc. Lower ranking cells than the corridor average are **also encountered along core infrastructure lines,** e.g. Abidjan-Bouaké (Côte d'Ivoire), Lagos-Abeokuta (Nigeria), Yaoundé-Bertoua (Cameroon), the whole backbone of corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', etc.

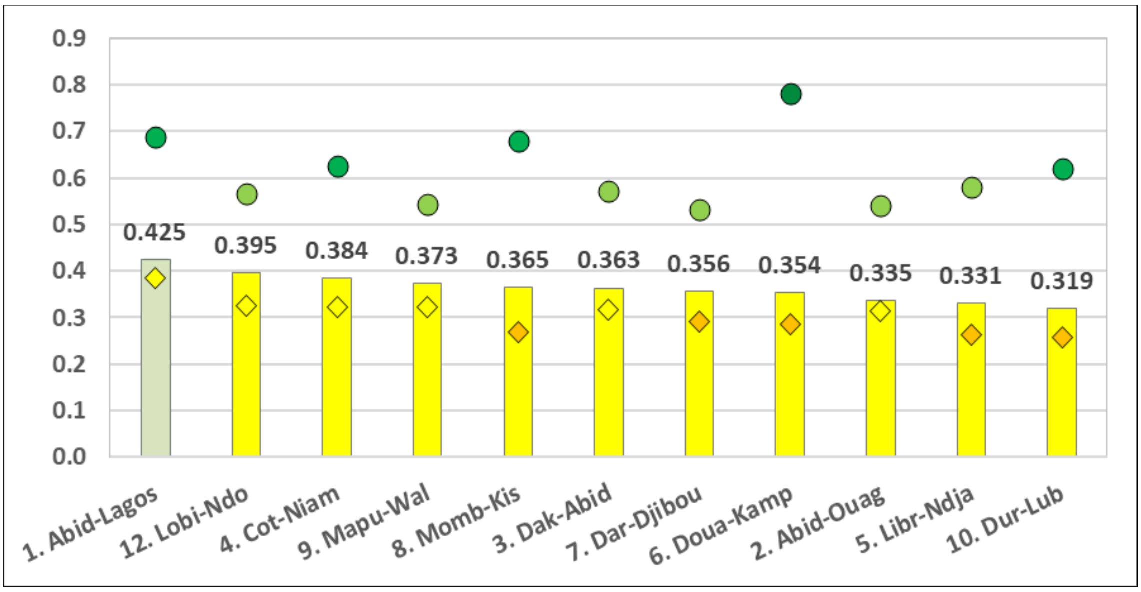
2.3. ENHANCING DIGITALISATION

The lowest challenges for digitalisation from the investment point of view generally occur where the presence of terrestrial transport network is the highest, owing to infrastructure synergies and economies of scale. Conversely, the areas with the highest investment fragility appear to be the ones where the linear transport network is sparse, scattered or missing. In order to identify the areas that face the lowest challenges and respectively – the highest potential to enhance digitalisation, the simultaneous presence of the following characteristics has been sought:

- highest number of past or ongoing investments – EU, Programme for Infrastructure Development in Africa (PIDA), World Bank, etc.;
- highest presence of pre-existing networks – road, rail, fibre, pipelines;
- fastest growing population;
- lowest natural (such as floods) and man-related (such as conflicts) risks;
- lowest mobile and broadband speed.

The combination of these characteristics allows to identify less challenging areas that have been developed in the past, not or rarely exposed to natural and/or man-related risks, where the population was growing, investments were already performed or were still ongoing, and broadband speed was relatively low. Potential new initiatives to improve digitalisation in such areas would bring benefits for both people and businesses at relatively low risk. The resulting ranking of the 11 assessed corridors, based on the incremental cost-effective potential to enhance digitalisation, is displayed in **Figure 6. Corridor 1 'Abidjan-Lagos' is the only one that enters the greenish categories and stands noticeably ahead of all other corridors.** Corridors 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' and 4 'Cotonou-Niamey' follow next. Corridor 10 'Durban-Lusaka-Lubumbashi' clearly ends at the bottom, due to already well-developed digitalisation and hence, more limited incremental potential for further expansion. Unlike corridor 10, the significant under-development and hence – the need of substantial incremental investments in digitalisation, are the

Figure 6: Corridor ranking based on the incremental cost-effective potential to enhance digitalisation, TOPSIS values.



Legend: *Bar (Π) – Average value; Diamond (◊) – lowest value; Circle (○) – highest value*

Source: *Authors' own elaboration.*

reasons for the two lowest ranking corridors – 5 'Libreville-Kribi-Douala-N'Djamena' and 2 'Abidjan-Ouagadougou'. Overall, amongst the four specific sub-objectives, **digitalisation appears to be the most challenging one.**

Compared to carbon footprint and biodiversity, the relative under-performance of digitalisation seems to be more diverse at cell level, as both the lowest values, but especially – the highest values are relatively more remote from the average values for most corridors. The over-performance (the circles, indicating the highest values) is clearly pronounced in corridor 6 'Douala-Kribi-Bangui-Kisangani-Kampala', followed by corridors 8 'Mombasa-Kisangani' and 10 'Durban-Lusaka-Lubumbashi'. These isolated spots and **areas with very high digitalisation typically overlap with large urban agglomerations,** e.g. Abidjan (Côte d'Ivoire), Accra (Ghana), Lomé (Togo), Lagos (Nigeria), Dakar (Senegal), Conakry (Guinea), Cotonou (Benin), Niamey (Niger), Dar es Salaam (Tanzania), Nairobi (Kenya) Addis Ababa (Ethiopia), Kampala (Uganda), Windhoek (Namibia), Huambo (Angola), Lubumbashi (Democratic Republic of the Congo), etc. This observation confirms once again that the large urban areas often tend to have different behaviour than the other areas of the corridors. Further in-depth analysis and assessment of various trends in the major urban centres within the corridors is indispensable to better grasp their socio-economics, transport, accessibility, connectivity and logistics.

Given the so-revealed major challenges in enhancing digitalisation, the potential incremental investments should be carefully optimised. Improving fibre network could earn larger benefits in more densely populated areas, e.g. coastal zones, urban centres, etc., and along already existing major transport infrastructure (roads, railways, to a lesser extent - pipelines), owing to synergies and economies of scale. In less populated remote and/or rural areas, as well as in natural protected areas, the deployment of mobile network (antennas) could be a more viable alternative, as antennas could be installed (at least theoretically) faster and at lower cost. The combination of fixed (fibre) and mobile (antennas) networks could also be considered on a case-by-case basis, especially for sub-urban zones and secondary transport networks. Cross-border fixed network gaps appear to be a major issue for a number of corridors, too.

2.4. IMPROVING ACCESSIBILITY

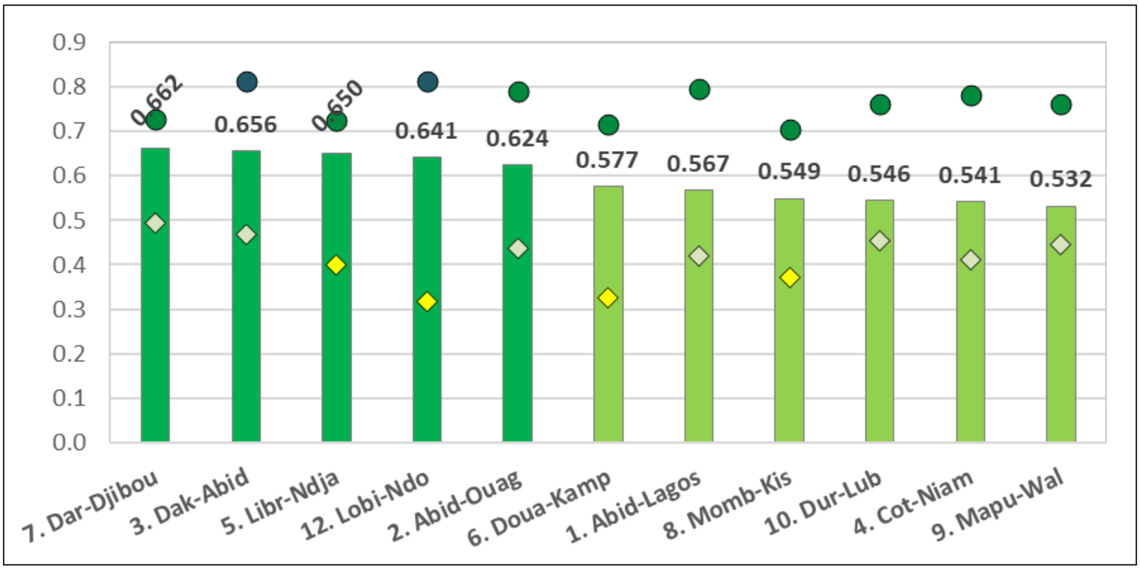
The biggest challenges in improving accessibility are typically identified in areas that are under-connected and/or underserviced. The places with the following characteristics have been therefore selected in order to identify areas where accessibility can be improved:

- fastest growing population;
- highest congestion in and between urban centres, with under-developed access to sanitation and water, education and health services;
- lowest presence of transport networks and transport hubs, e.g. airports, railway stations, where transport accessibility and performance are the lowest and drive times – the highest;
- lowest natural (e.g. floods) and man-related (e.g. conflicts) risks.

The resulting ranking of the 11 assessed corridors, based on the incremental cost-effective potential to improve accessibility, is presented in **Figure 7.** All corridors score very high, meaning that all of them look prospective for investing in transport, connectivity and accessibility. Consequently, amongst the four specific sub-objectives, **transport and accessibility come up as the most promising one for potential investments.** It is also the only sub-objective, where five corridors (No. 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti', 3 'Praia-Dakar-Abidjan', 5

'Libreville-Kribi-Douala-N'Djamena', 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' (see **Figure 4**) and where the highest single TOPSIS values per cell (i.e. the most promising spots for investment) are identified – in corridors 3 (in Abidjan, Côte d'Ivoire) and 12 (near Lubumbashi, Democratic Republic of the Congo). On the other hand, corridor 12 is peculiar with the widest difference between highest and lowest (near Huambo, Angola) ranking cells, **meaning wide difference in accessibility performance and thus – investment challenges, across its territory.** Large variations are also observed in other corridors – 6 'Douala-Kribi-Bangui-Kisangani-Kampala', 1 'Abidjan-Lagos' and 4 'Cotonou-Niamey'. Further in-depth analyses at local level (**Figure 1, Level 3**) appears to be needed, in order to better understand the specifics and challenges in accessibility and connectivity within the 11 corridors and in specific corridor areas, such as urban agglomerations and large infrastructure components.

Figure 7: Corridor ranking based on the incremental cost-effective potential to improve accessibility, TOPSIS values.



Legend: *Bar (Π) – Average value; Diamond (◊) – lowest value; Circle (○) – highest value*
Source: *Authors' own elaboration.*

In general, the **areas in and around big urban agglomerations appear promising for investment in accessibility improvements**, being characterised with the lowest natural and man-related risks and growing population. At the same time, these areas suffer from under-serviced or under-developed transport networks. Upgrading existing transport infrastructure seems to be a promising pathway as well, especially compared to green-field projects, owing to synergies and economies of scale. The positive impacts of such upgrades spread over adjacent areas, too. The non-urban areas, such as rural, sparsely populated or natural protected ones, generally face greater accessibility challenges and hence, more transport and accessibility investments would be needed on equal terms. The same is also valid for the central areas of major cities, where the potential for incremental accessibility improvements appears extremely limited. Many large urban agglomerations, e.g. Abidjan (Côte d'Ivoire), Lomé (Togo), Lagos (Nigeria), Ouagadougou (Burkina Faso), Durban, Johannesburg and Pretoria (South Africa), etc. simultaneously present both challenges and opportunities for accessibility, compared to the remaining non-urban corridor areas. To better understand, mitigate or exploit these comparative challenges and opportunities, further in-depth analyses and assessments are needed.

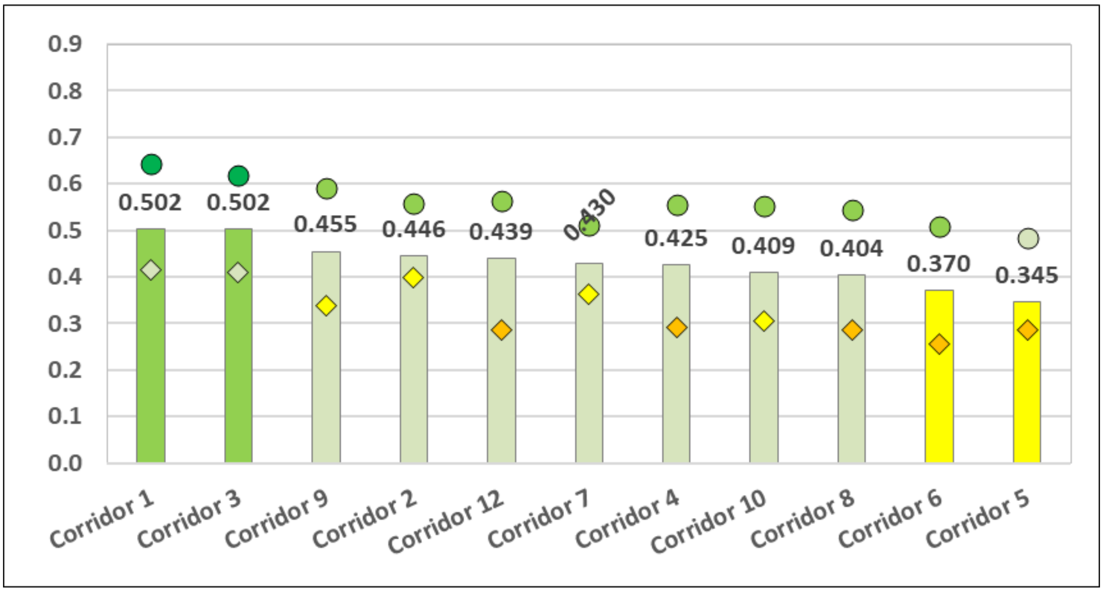
2.5. UNLOCKING PRODUCTIVE AREAS

The highest need for investment interventions is generally assumed in potentially productive areas, while the lowest need for investment interventions is attributed to areas of low productivity. The productive areas that are under-connected or lack accessibility, could be considered as having the largest potential for improvement, i.e. most attractive for investments. Such areas have been identified by simultaneously looking for the:

- highest number of investments – EU, Programme for Infrastructure Development in Africa (PIDA), World Bank, etc.;
- highest prevalence of productive areas, e.g. mineral extraction sites, cropland, that were under-connected in terms of under-developed network accessibility;
- fastest growing population;
- lowest number of transport networks and network entry points of all types (road, rail, air), where transport accessibility and performance were the lowest and drive times – the highest;
- lowest natural (e.g. floods) and man-related (e.g. conflicts) risks;
- highest greenhouse gas emissions – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) – from all sectors.

The resulting ranking of the 11 assessed corridors, based on the incremental cost-effective potential to boost productivity, is shown in **Figure 8.** Compared to the other three sub-objectives, productivity demonstrates the largest performance variation – corridors rank within three multi-criteria decision categories (**Figure 4**). This large variation implies that additional in-depth analyses at finer disaggregation level (**Figure 1, Level 3**) seem to be necessary to better understand the specific opportunities in productivity.

Figure 8: Corridor ranking based on the incremental cost-effective potential to boost productivity, TOPSIS values.



Legend: *Bar (Π) – Average value; Diamond (◊) – lowest value; Circle (○) – highest value*
Source: *Authors' own elaboration.*

As regards the individual corridor performance, **two West African corridors – 1 'Abidjan-Lagos' and 3 'Praia-Dakar-Abidjan' are the top performers.** Together with the intersecting corridor 2 'Abidjan-Ouagadougou' that ranks fourth, these three corridors form a potentially highly productive West African cluster. At the other end, the two Central African corridors – 6 'Douala-Kribi-Bangui-Kisangani-Kampala' and 5 'Libreville-Kribi-Douala-N'Djamena' – demonstrate the lowest incremental potential to boost productivity, forming thereby a low productive Central African productivity cluster.

The productivity potential tends to be rather limited in the central areas of urban agglomerations, next to: Porto Novo (Benin) in corridor 4 'Cotonou-Niamey', Mombasa (Kenya) in corridors 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' and 8 'Mombasa-Kisangani', Pretoria and Johannesburg (South Africa) in corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi', Lubumbashi (Democratic Republic of the Congo) in corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', etc. **as well as in rural and/or natural protected areas**. **Some productivity opportunities are discovered in the sub-urban areas, owing to the proximity to the services and amenities of the adjacent urban agglomerations**, next to: Accra (Ghana) and Cotonou (Benin) in corridor 1 'Abidjan-Lagos', Dakar (Senegal) in corridor 3 'Praia-Dakar-Abidjan', Dar es Salaam (Tanzania) in corridor 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti', Kampala (Uganda) in corridor 8 'Mombasa-Kisangani', Windhoek (Namibia) and Gaborone (Botswana) in corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz', Lusaka (Zambia) in corridor 10 'Durban-Lusaka-Lubumbashi', Huambo (Angola) and Kabwe (Zambia) in corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', etc.

2.6. STREGHTENING TRANSPORT AND TRADE EFFICIENCY

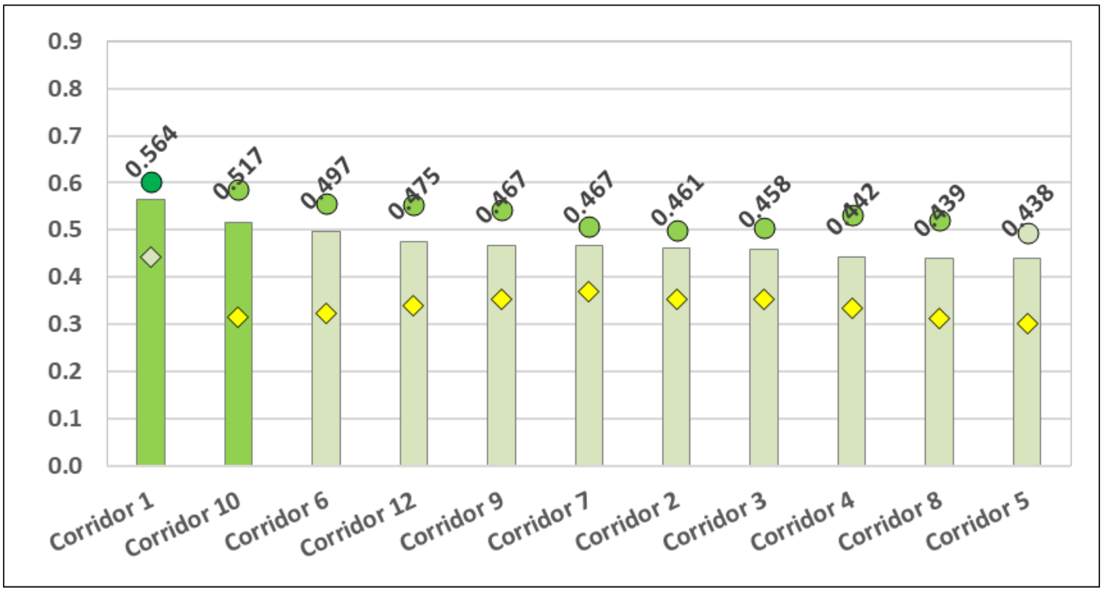
The overall objective of the study has been to strengthen the overall transport and trade efficiency of the 11 corridors with environmentally-friendly investment options. The analysis included identifying and characterising the under-developed, under-connected and under-serviced areas in each corridor that were potentially productive, where investments have been made in the past, but additional initiatives might be needed. It also highlighted the places with the lowest natural and man-related risks for investments that were characterised by expanding population and a growing number of businesses, where also the highest demand for education and governmental utility services would be needed. Consequently, the areas in question were those, which were simultaneously characterised by the:

- highest number of productive areas – raw materials, crops areas, etc.;
- highest number of investments in the past – EU, Programme for Infrastructure Development in Africa (PIDA), World Bank, etc.;
- highest number of activities – businesses, Points of Interest;
- highest presence of cropland;
- highest presence of artificial surfaces – built-up, urban;
- highest presence of greenhouse gas emissions – carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O) – from all sectors;
- highest presence of carbon dioxide (CO_2) emissions from road, rail and air transport;
- lowest presence of basic services – broadband, sanitation, water supply, etc.;
- lowest natural (e.g. floods) and man-related (e.g. conflicts) risks;

- lowest number of connections – airports, railways, railroads, train stations, pipelines and fibre network;
- lowest forest coverage;
- lowest presence of protected areas;
- smallest population in the past and the largest population in the future;
- lowest transport accessibility and performance;
- lowest accessibility to health and education services, airports and train stations.

The corridor ranking based on this aggregated analysis is displayed in **Figure 9.** The overarching conclusion is that all 11 corridors result promising for incremental improvement of transport and trade performance. The **largest potential is estimated for corridor 1 'Abidjan-Lagos', followed by corridor 10 'Durban-Lusaka- Lubumbashi' and corridor 6 'Douala-Kribi-Bangui-Kisangani-Kampala'.** Corridor 1 is peculiar also with the highest minimum performance value (the olive green rhombus within corridor's average performance value bar in **Figure 9**), meaning top overall performance amongst all corridors at grid level, too. At the other end clearly lands corridors 5 'Libreville-Kribi-Douala-N'Djamena', followed by corridor 8 'Mombasa-Kisangani' and corridor 4 'Cotonou-Niamey'. The difference amongst corridor's ranking, especially of the five ones in the middle range (corridors 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', 9 'Maputo-Gaborone-Walvis Bay-Lüderitz', 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti', 2 'Abidjan-Ouagadougou' and 3 'Praia-Dakar-Abidjan') is rather small. Given the inherent level of uncertainty and approximation of each modelling exercise, all these 5 corridors could be considered as similarly performing.

Figure 9: Corridor ranking based on the incremental cost-effective potential to strengthen the overall transport and trade efficiency, TOPSIS values.



Legend: *Bar (Π) – Average value; Diamond (◊) – lowest value; Circle (○) – highest value*
Source: *Authors' own elaboration.*

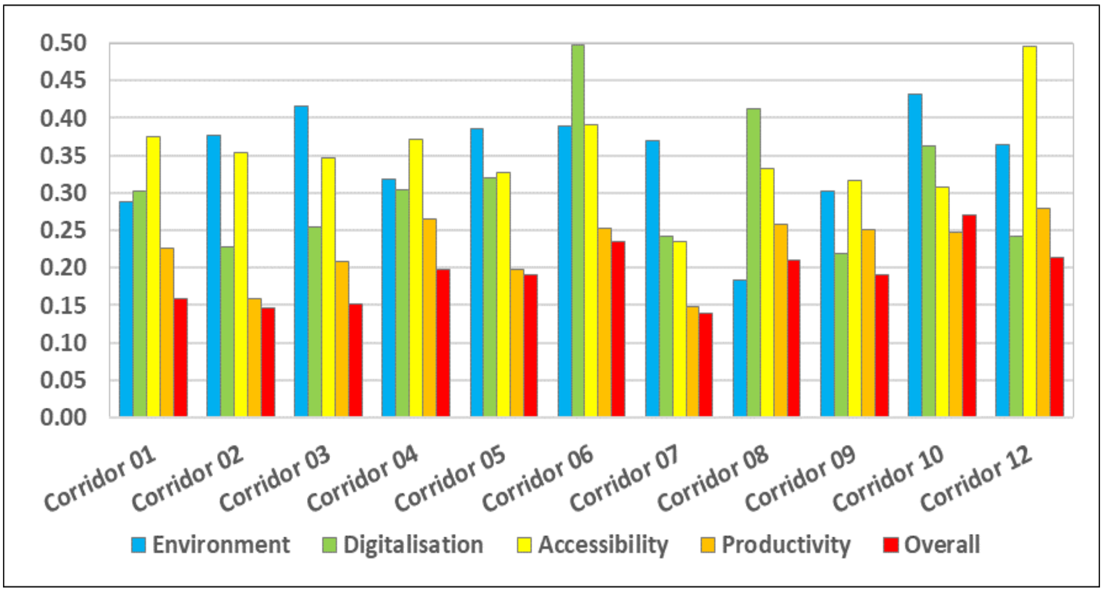
The average TOPSIS ranking values, the dominant colour coding, based on the classification from **Figure 4,** and the standing values (ranking) per corridor and scenario is summarised in **Annex 3.**

At sub-corridor level, **urban agglomerations and their adjacent areas often demonstrate different behaviour (i.e. potential) than the remaining wide corridor area.** The urban and sub-urban zones with superior performance include: Abidjan (Côte d'Ivoire) in corridors 1 'Abidjan-Lagos' and 2 'Abidjan-Ouagadougou', large spaces around Douala, Edéa (Cameroon), Kampala and Iganga (Uganda) in corridor 6 'Douala-Kribi-Bangui-Kisangani-Kampala', Pretoria and Johannesburg (South Africa) in corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz', Lubumbashi (Democratic Republic of the Congo) in corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'. The urban and sub-urban areas with inferior performance include: Accra (Ghana) and Lagos (Nigeria) in corridor 1 'Abidjan-Lagos', Ouagadougou in corridor 2 'Abidjan-Ouagadougou', Dakar (Senegal) in corridor 3 'Praia-Dakar-Abidjan', Niamey (Niger) in corridor 4 'Cotonou-Niamey', Libreville (Gabon) and N'Djamena (Chad) in corridor 5 'Libreville-Kribi-Douala-N'Djamena', Dar es Salaam (Tanzania) and Nairobi (Kenya) in corridor 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti', Nairobi and Kampala (Uganda) in corridor 8 'Mombasa-Kisangani', Windhoek (Namibia) and Gaborone (Botswana) in corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz', Durban (South Africa) and Ndola (Zambia) in corridor 10 'Durban-Lusaka-Lubumbashi', Huambo (Angola) and Kabwe (Zambia) in corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'.

2.7. VARIATIONS IN CORRIDOR'S RANKING

Figure 10 presents the variation between cell's performance (minimum and maximum TOPSIS values) for all corridors and scenarios. This variation measures the level of performance (in)homogeneity of corridor sectors in different scenarios. The smaller the variation, the more homogeneous performance (no matter good or bad) across the corridor and vice-versa. A larger or large variation implies greater heterogeneity and the need for a more detailed spatial analysis of specific challenges and opportunities in different corridor cells that demonstrate these variations.

Figure 10: Variation in cell's TOPSIS performance for all corridors and scenarios.



Source: *Authors' own elaboration.*

The absolute difference is the widest in corridor 6 'Douala-Kribi-Bangui-Kisangani-Kampala' (for digitalisation) and in corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' (for accessibility). The largest variation in the environmental scenario is observed in corridors 10 'Durban-Lusaka-

Lubumbashi' and 3 'Praia-Dakar Abidjan', while for productivity – in corridors 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' and 4 'Cotonou-Niamey'. Corridor 8 'Mombasa-Kisangani' is peculiar with wide difference in digitalisation. Corridor 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' tends to demonstrate the smallest variation per scenarios, followed by corridor 2 'Abidjan-Ouagadougou'. With the exception of corridor 10 'Durban-Lusaka-Lubumbashi' that shows the widest difference in the overall strengthening of transport and trade efficiency, the variation in this overarching transport and trade scenario is smaller compared to the variations in the other four individual scenarios.

3. Core corridor indicators

3.1. SOCIO-ECONOMICS, TRADE AND DEMOGRAPHICS

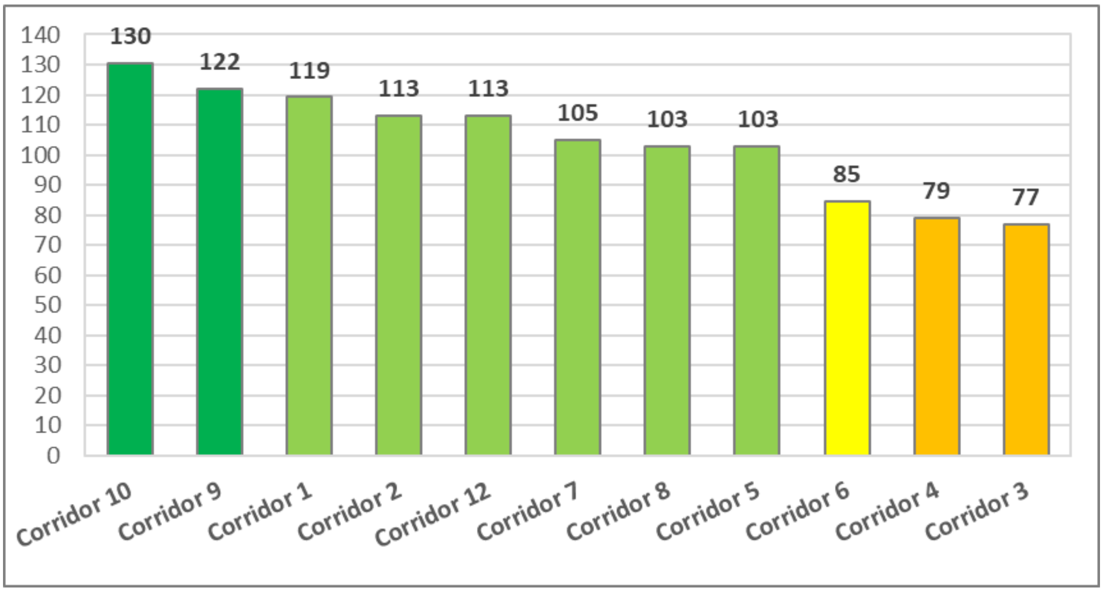
Most macro-economic, socio-economic and trade data have been available at national level only. It was therefore necessary to somehow recalibrate and recalculate the national data at corridor level. For the macro-economic and trade corridor performance, two corridor-level indexes have been derived from the national level data – Aggregated Macro-Economic Index (AMEI) and Aggregated Foreign Trade Index (AFTI). In both cases, four individual indicators at country level for 2023 (the latest year, which data were available for by the time of performing this study – the first quarter of 2025) have been taken into account as follows:

- Aggregated Macro-Economic Index: Gross National Product (GDP) and Gross National Income (GNI) – total and per capita (in current U.S. Dollars), from World Bank Open Data, https://data.worldbank.org/;
- Aggregated Foreign Trade Index: Export to and import from the EU – absolute and as share of total export and import, from International Trade Centre, https://www.intracen.org/.

The trade computation included all 52 countries assessed in the first phase of CUSA (CUSA-1), i.e. including countries that later on did not enter corridors, in particular – the North African ones. The macro-economic computation included 49 countries, because the data for Eritrea and South Sudan were heavily outdated (from 2011 and 2015 respectively), while no data were available for Western Sahara. This has been done for consistency reasons, as during CUSA-1 similar ranking has been performed for trade, as well as to allow for potential extension of the geographical scope of the analysis. The country with the highest value in each indicator got 52 trade points or 49 macro-economic points, the country with the second highest value – 51/48 and so on, ending up with the country with the lowest value that got assigned 1 point. Then, the aggregated country index has been calculated, by summing up the 4 individual indexes for both macro-economics and trade. Finally, the corridor aggregated index has been derived as an average of the aggregated country indexes for the countries from the respective corridors. For example, if a corridor contained 4 countries, whose aggregated country indexes were 20, 40, 60 and 80, the corridor index was 50 [(20+40+60+80)/4=50].

Figure 11 displays the ranking of the 11 assessed corridors, based on the **Aggregated Macro-Economic Index**. **Two Southern African corridors – 10 ‘Durban-Lusaka-Lubumbashi’ and 9 ‘Maputo-Gaborone-Walvis Bay-Lüderitz’ – show the best performance, closely followed by the top-ranking corridor in the overall multi-criteria transport and trade performance scenario – 1 ‘Abidjan-Lagos’ (Western Africa).** The third Southern African corridor 12 ‘Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola’ and the Western African corridor 2 ‘Abidjan-Ouagadougou’ follow this leading threesome. Eastern Africa (corridors 7 ‘Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti’ and 8 ‘Mombasa-Kisangani’) ranks slightly better than Central Africa (corridors 5 ‘Libreville-Kribi-Douala-N’Djamena’ and 6 ‘Douala-Kribi-Bangui-Kisangani-Kampala’). The two remaining Western African corridors – 3 ‘Praia-Dakar-Abidjan’ and 4 ‘Cotonou-Niamey’ – land on the bottom, implying that the macro-economic performance in Western Africa is very diverse.

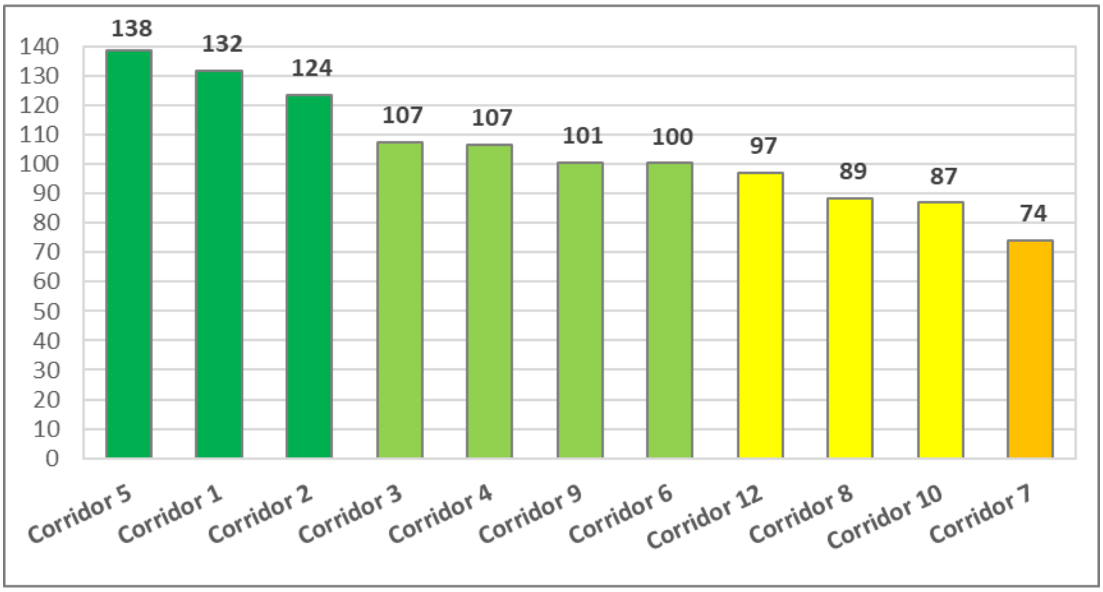
Figure 11: Aggregated Macro-Economic Index, 2022 – descending corridor ranking.



Legend: *Very High (120+ points), High (100-119 points), Moderate (80-99 points), Minor (Below 80 points)*
Source: *Authors' own elaboration.*

Figure 12 presents the ranking of the 11 corridors, **based on the Aggregated Foreign Trade Index. Corridor 5 'Libreville-Kribi-Douala-N'Djamena' tops the ranking,** followed by the four Western African corridors – 1 'Abidjan-Lagos' (the top ranking one in the overall multi-criteria transport and trade performance scenario), 2 'Abidjan-Ouagadougou', 3 'Praia-Dakar-Abidjan' and 4 'Cotonou-Niamey' – that form a kind of **Western African high performing trade cluster.** The corridor ranking is based on retrospective 2023 data and hence, does not capture later or forthcoming developments. This is particularly relevant for corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', where in October 2023 the EU concluded Memorandums of Understanding for the development of the corridor itself, as well as with Zambia on sustainable raw materials value chains and with Democratic Republic of the Congo on critical and strategic raw materials value chains.

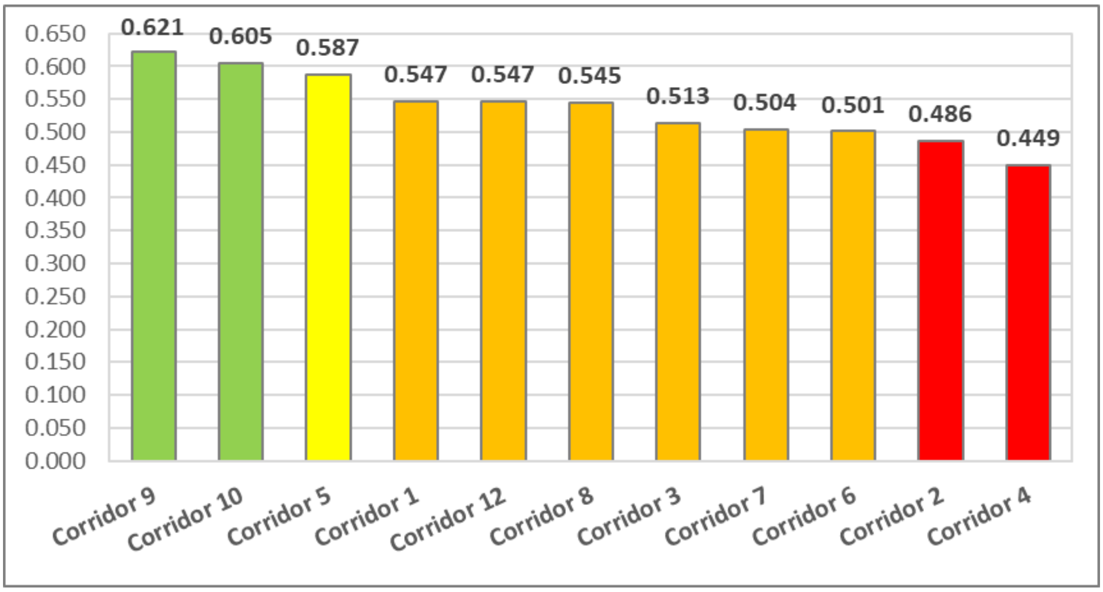
Figure 12: Aggregated Foreign Trade Index, 2023 – descending corridor ranking.



Legend: *Very High (120+ points), High (100-119 points), Moderate (80-99 points), Minor (Below 80 points)*
Source: *Authors' own elaboration.*

The national **Human Development Index (HDI)** from the UN Development Programme, https://hdr.undp.org, has been re-calculated at corridor level in the same way like the Aggregated Macro-Economic Index and the Aggregated Foreign Trade Index, i.e. as an average of the individual indexes for the latest available year (2022) for the countries from the respective corridors. **Figure 13** displays this recalculated corridor HDI. **Two Southern African corridors – 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi' – stand on top of the classification,** adopted for the purposes of his analysis, with high HDI, followed by the Central African corridor 5 'Libreville-Kribi-Douala-N'Djamena', with medium HDI. All other corridors score with low HDI and two Western African corridors at the bottom of the ranking – 4 'Cotonou-Niamey' and 2 'Abidjan-Ouagadougou' – rank in the very low HDI category. Altogether, these findings suggest that Human Development is a widespread challenge in most of the 11 assessed corridors.

Figure 13: Human Development Index (HDI), recalculated from country to corridor level in 2022.



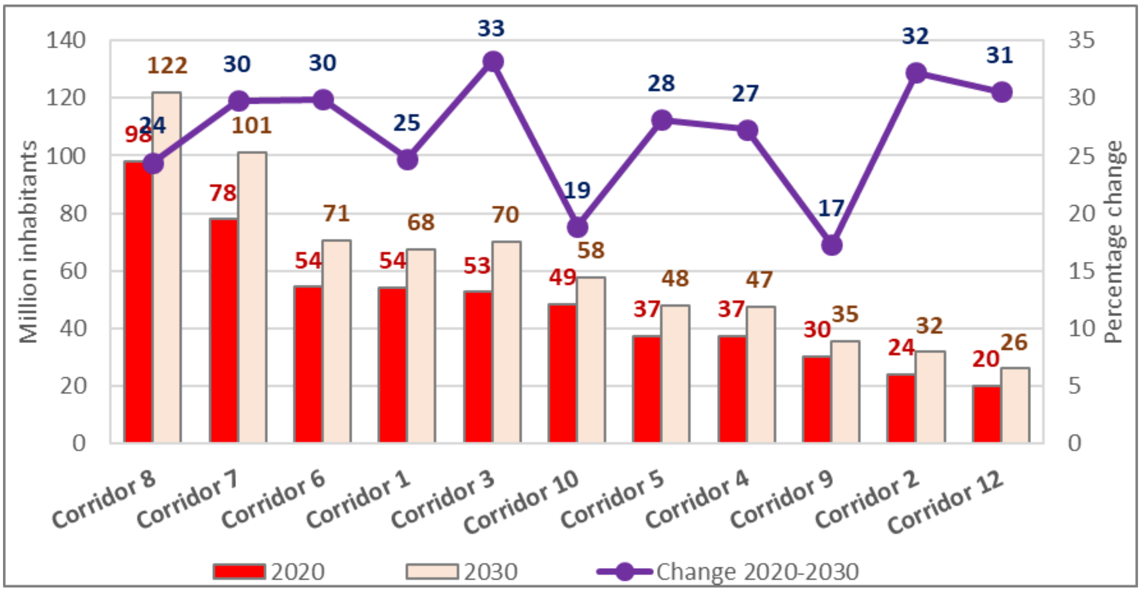
Legend: *High (0.600+), Medium (0.550-0.599 points), Low (0.500-0.549) Very low (Below 0.500)*[13]
Source: *UNDP Human Development Index, https://hdr.undp.org/data-center/human-development-index#/indicies/HDI*

The **Global Human Settlement Layer (GHSL),** https://human-settlement.emergency.copernicus.eu, evaluates the spatial distribution of world population for both 2020 and 2030 at high disaggregation level. **Figure 14** shows the estimated by 2020 and projected by 2030 population in the 11 assessed corridors, along with the respective population change 2020-2030. **The two Eastern African corridors – 8 'Mombasa-Kisangani' and 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' – clearly come up as the most populated ones** in both 2020 and 2030. They are followed by a cluster of three corridors with similar population size – the Central African 6 'Douala-Kribi-Bangui-Kisangani-Kampala', and two Western African 1 'Abidjan-Lagos' and 3 'Praia- Dakar-Abidjan'. At the other end, the Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' has the smallest population in both 2020 and 2030. As regards

[13] The UNDP categorisation (cutoff-points) is different: HDI of less than 0.550 – low human development, 0.550–0.699 – medium human development, 0.700–0.799 – high human development; 0.800 or greater – very high human development.

population change (increase), however, corridor 12 is projected to experience the third highest population growth, only behind two Western African corridors – 3 'Praia-Dakar-Abidjan' and 2 'Abidjan-Ouagadougou'.

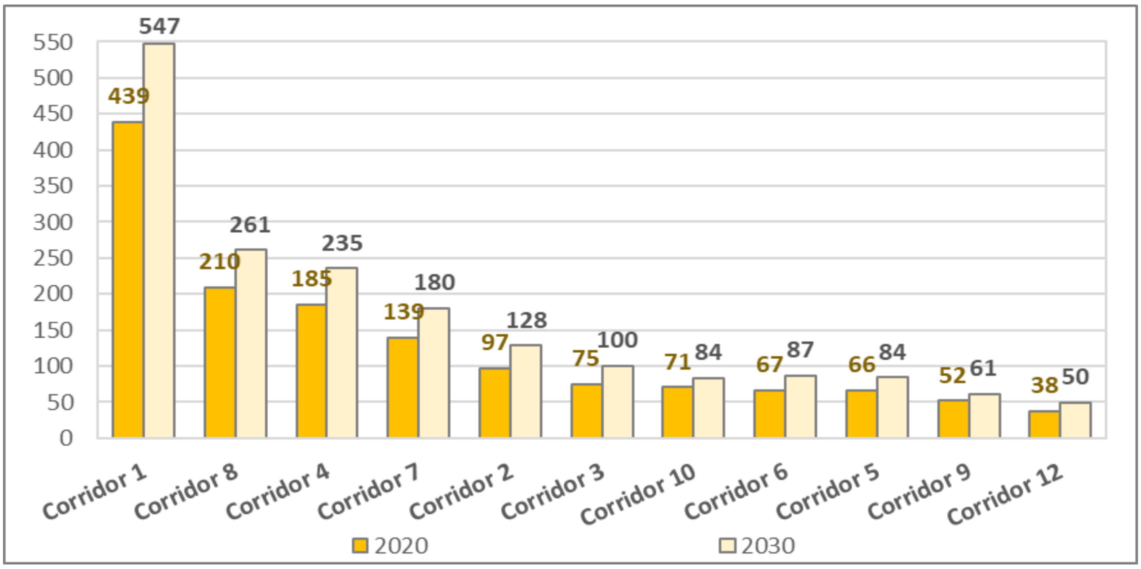
Figure 14: Estimated corridor population in 2020 and 2030, million inhabitants, and change 2020-2030, %.



Source: *Global Human Settlement Layer (GHSL) estimates and projections at grid level & corridor buffer delineation*

The **estimated population** density in terms of inhabitants per square kilometre in the 11 corridors presents different patterns – **Figure 15**. **Corridor 1 'Abidjan-Lagos' has by far the highest population density,** more than two times larger than the one of the second most densely populated corridor – 8 'Mombasa-Kisangani'. The next two corridors - 4 'Cotonou-Niamey' and 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' – also have relatively high population densities. All other corridors are much less populated, corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' is sitting again at the bottom, like for total population.

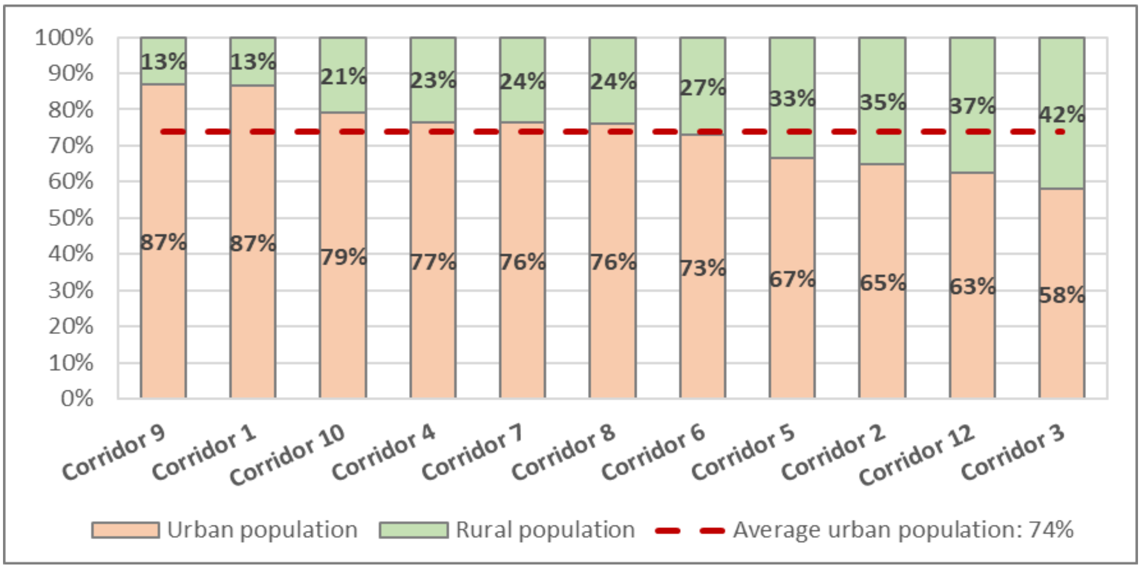
Figure 15: Estimated corridor population density in 2020 and 2030, inhabitants per square kilometre.



Source: *Global Human Settlement Layer (GHSL) estimates and projections at grid level & corridor buffer delineation*

Finally, **Figure 16** reveals the estimated **breakdown between urban and rural population** in the 11 assessed corridors by 2020. The extent of **urbanisation is the highest in the two Southern African corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi'**, and in the Western African corridor 1 'Abidjan-Lagos'. **At the other end stand two Western African corridors – 3 'Praia-Dakar-Abidjan' and 2 'Abidjan-Ouagadougou'** – and the third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'. Altogether, these observations imply large intra-regional differences in Southern and Western Africa with regard to the level of urbanisation.

Figure 16: Estimated breakdown between urban and rural population by 2020, %.



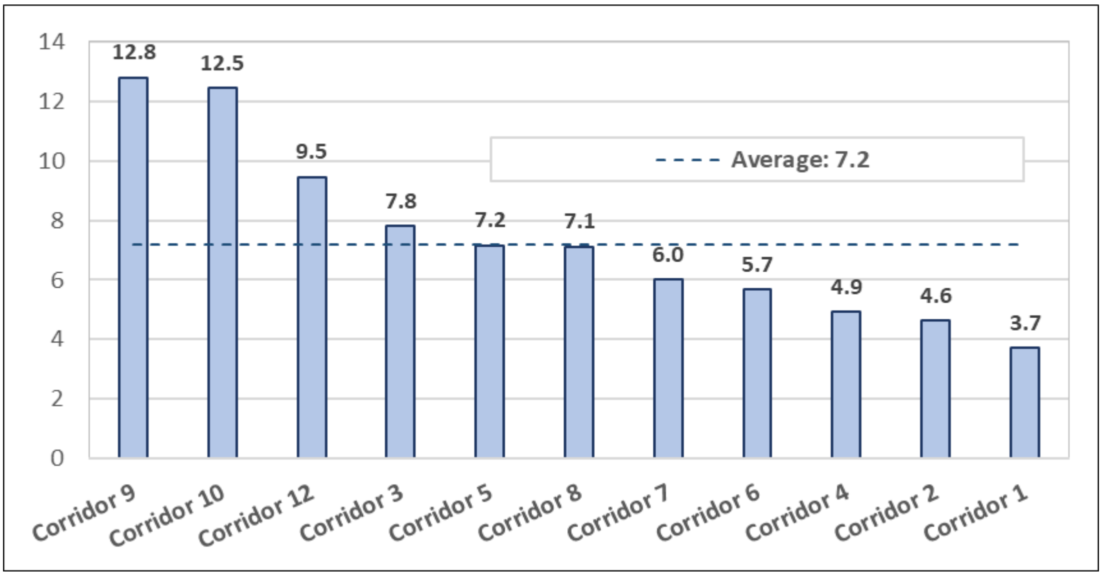
Source: *Global Human Settlement Layer (GHSL) estimates and projections at grid level & corridor buffer delineation*

3.2. TRANSPORT AND ACCESSIBILITY

The **road network data** have been extracted from OpenStreetMap, https://www.openstreetmap.org. **Figure 17** displays the road length in the 11 assessed corridors in kilometres per thousand people of corridor population. **Two Southern African corridors – 9 'Maputo-Gaborone-Walvis Bay-Lüderitz', 10 'Durban-Lusaka-Lubumbashi' – come up much ahead of all other corridors,** followed by the third Southern African corridor – 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'. In the bottom of the rank end up three of the four Western African corridors – 1 'Abidjan-Lagos', 2 'Abidjan-Ouagadougou' and 4 'Cotonou-Niamey'.

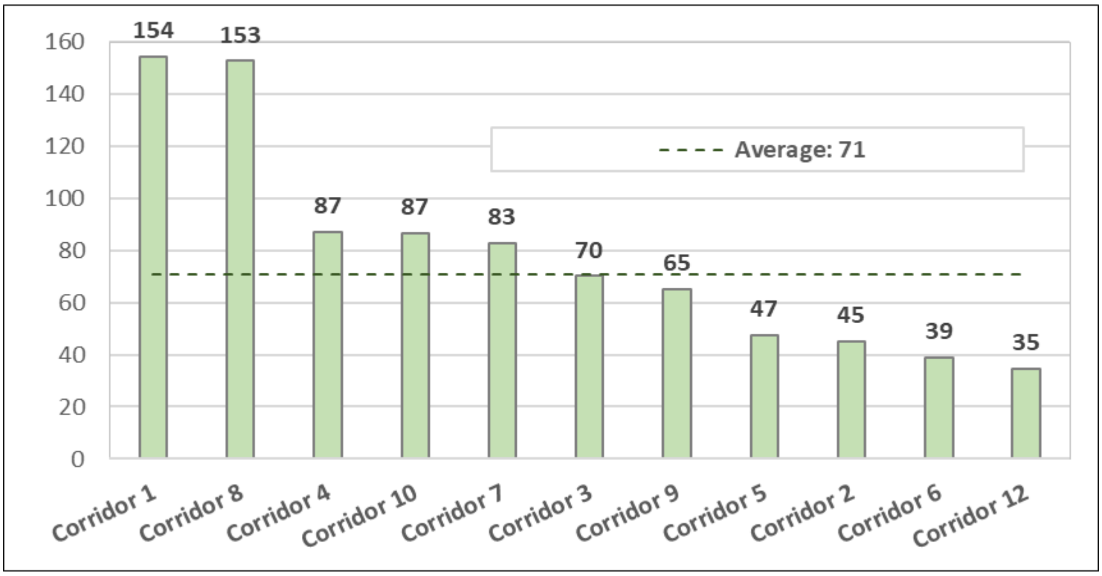
Figure 18 presents the **road density** in kilometres per 100 square kilometres of corridor land. These results are largely opposite to the ones on road length from **Figure 17**. The corridor with the shortest road length per thousand people – **1 'Abidjan-Lagos' – has the highest road density, together with corridor 8 'Mombasa-Kisangani'.** These two corridors stand much ahead of all other corridors. Corridor 4 'Cotonou-Niamey', 10 'Durban-Lusaka-Lubumbashi' and 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' also rank well, above the average of 71 km^2 for all 11 corridors. At the other end, **corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', third in road length per thousand people, lands on the bottom of the road density ranking.**

Figure 17: Road length, kilometres per thousand people.



Source: *Authors' own elaboration.*

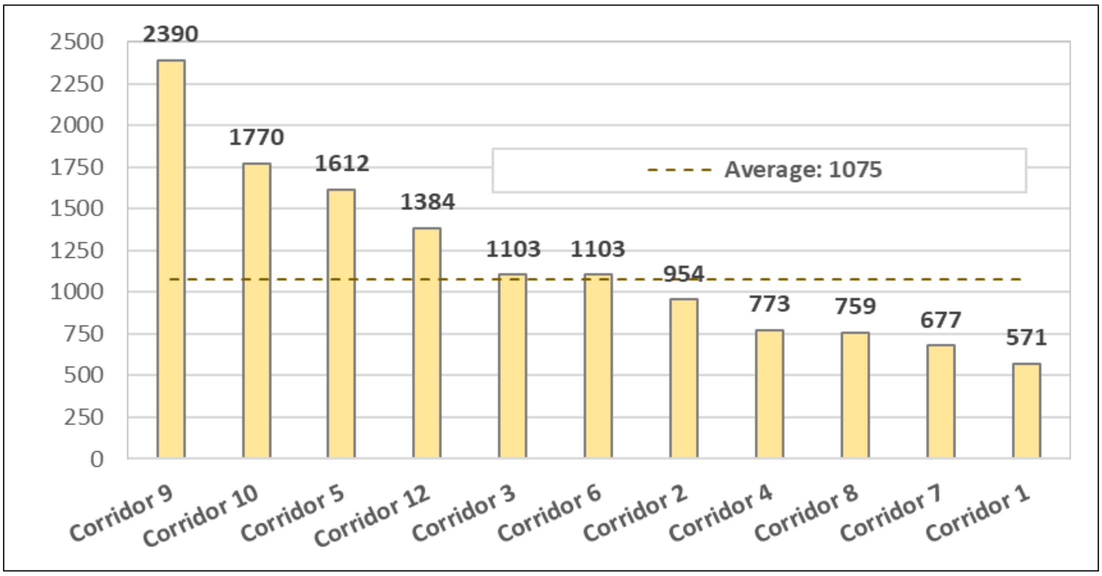
Figure 18: Road density, kilometres per 100 square kilometres of land.



Source: *Authors' own elaboration.*

Figure 19 shows the **length of main roads only** (with speed of 50 km/h or more) in metres per thousand people of corridor population. Similarly to road length (**Figure 17**), **the two Southern African corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi' are the top performers,** but here the difference between the two is noticeable (2,390 versus 1,770 metres). The central African corridor 5 'Libreville-Kribi-Douala-N'Djamena', together with the third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola', are characterised with clearly higher than the average length of main roads, too. In the bottom of the ranking are corridor 1 'Abidjan-Lagos' (like for total length), and the two Eastern African corridors – 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' and 8 'Mombasa-Kisangani'.

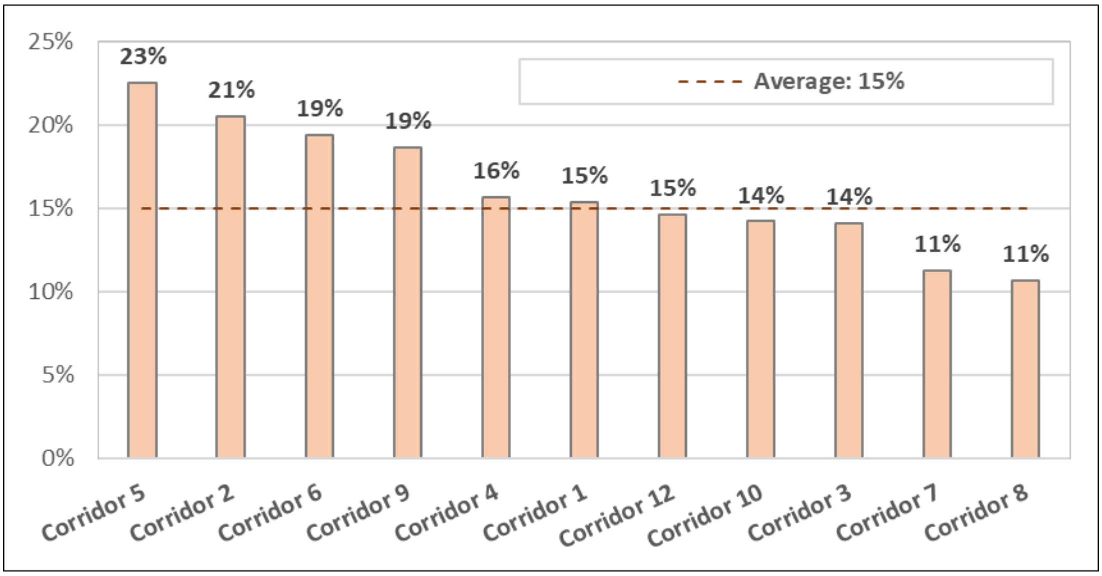
Figure 19: Length of main roads (with speed of 50 km/h or more), metres per thousand people.



Source: *Authors' own elaboration.*

Figure 20 displays the **share of main roads** (with speed of 50 km/h or more), in percentage, in the total road network of the 11 corridors. **The two Central African corridors – 5 'Libreville-Kribi-Douala-N'Djamena' and 6 'Douala-Kribi-Bangui-Kisangani-Kampala', together with the Western African corridor 2 'Abidjan-Ouagadougou' and the Southern African corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz', come up much ahead of the others** and well above all corridors' average of 15%. The two Eastern African corridors – 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' and 8 'Mombasa-Kisangani' – have the lowest share of main roads amongst the 11 assessed corridors.

Figure 20: Share of main roads (roads with 50km/h or more above), %.

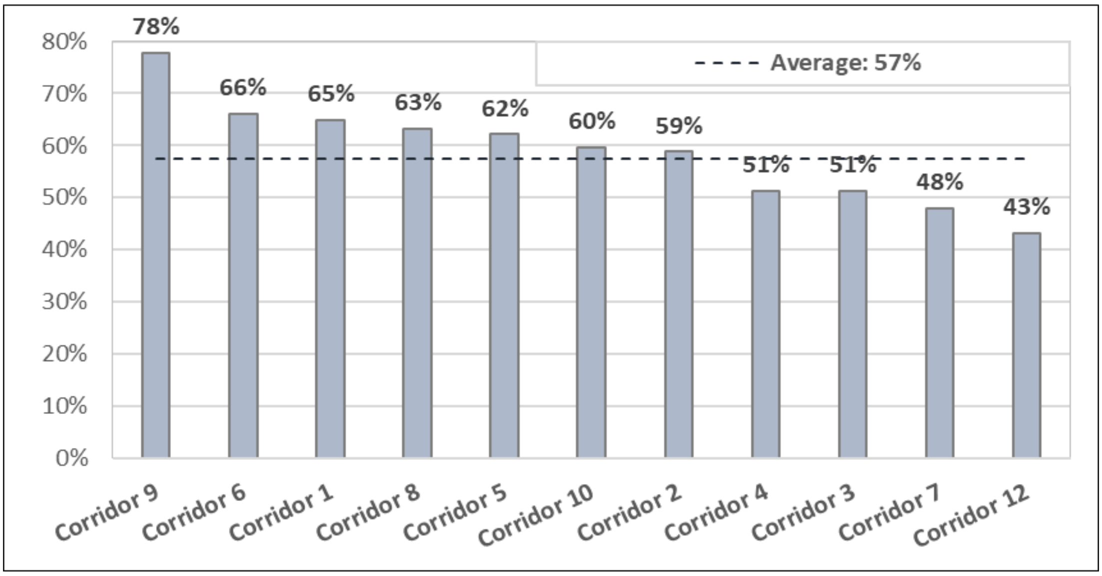


Source: *Authors' own elaboration.*

Figure 21 presents the **rural access index,** in percentage, indicating the share of rural population, living within 2 km from a main road (with speed of 50 km/h or more). **The rural accessibility is**

by far the highest in the Southern African corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz'. Six other corridors – the two Central African ones 6 'Douala-Kribi-Bangui-Kisangani-Kampala' and 5 'Libreville-Kribi-Douala-N'Djamena', two Western African ones 1 'Abidjan-Lagos' 2 'Abidjan-Ouagadougou', the Eastern African 8 'Mombasa-Kisangani' and the Southern African 10 'Durban-Lusaka-Lubumbashi' – also demonstrate elevated rural accessibility, above the average of 57%. **The Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' is peculiar with the lowest rural accessibility.**

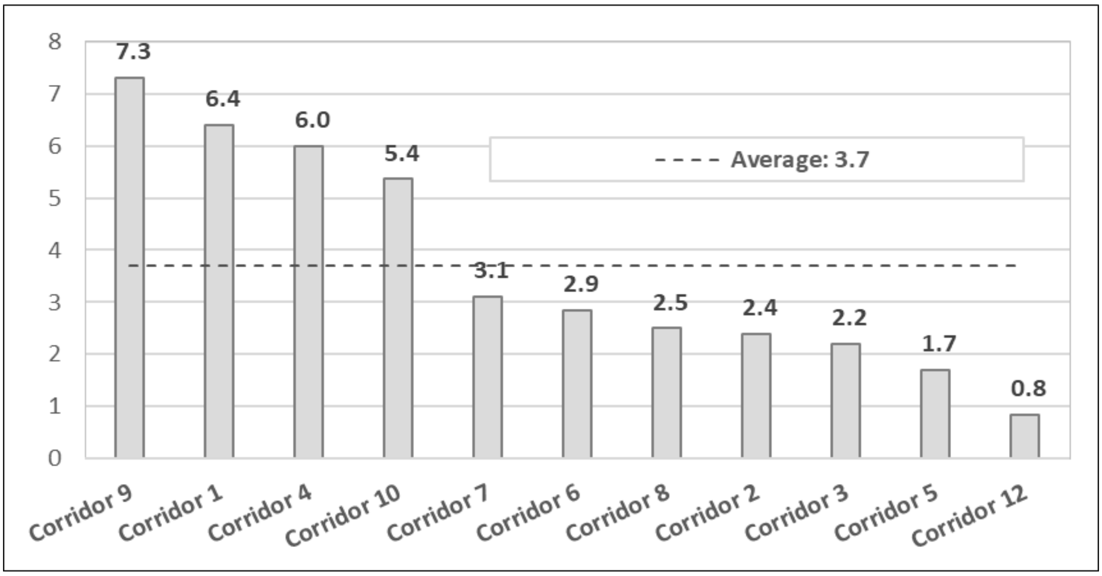
Figure 21: Rural access index, %.



Source: *Authors' own elaboration.*

Figure 22 shows **road accessibility,** expressed in population (million people), reachable within 90 minutes- drive by car from populated cells within corridor boundaries. Road accessibility is clearly the **highest in the Southern African corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz'.**

Figure 22: Road accessibility – million people, reachable within 90 minutes-drive by car.

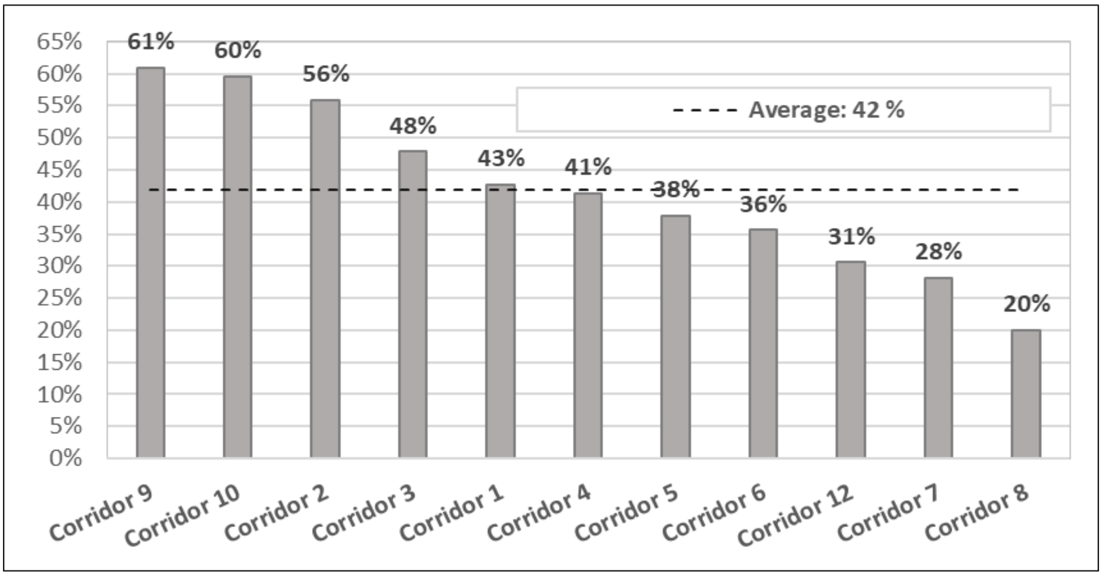


Source: *Authors' own elaboration.*

Then follow two Western African corridors – 1 'Abidjan-Lagos' and 4 'Cotonou-Niamey'. Above the average of 3.7 million people is also another Southern African corridor – 10 'Durban-Lusaka-Lubumbashi'. By far the **lowest accessibility is observed in the third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'.**

Figure 23 displays **road transport performance** – the ratio, in percentage, between the population, accessible by road (**Figure 22**) and the population, living nearby. The road transport performance is effectively a measure of road infrastructure quality and connectivity. The results from **Figure 23** suggest a quite apparent regional clustering of the 11 corridors. **Two Southern African corridors – 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi' – remonstrate the top performance.** The four Western African corridors come afterwards – 2 'Abidjan-Ouagadougou', 3 'Praia-Dakar-Abidjan', 1 'Abidjan-Lagos' and 4 'Cotonou-Niamey' – the first three ranking above the average of 42%. Then follows Central Africa, with corridors 5 'Libreville-Kribi-Douala-N'Djamena' and 6 'Douala-Kribi-Bangui-Kisangani-Kampala', while Eastern Africa lands on the bottom, with corridors 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' and 8 'Mombasa-Kisangani'. **The third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola' ranks low**, unlike the other two regional corridors that top the list.

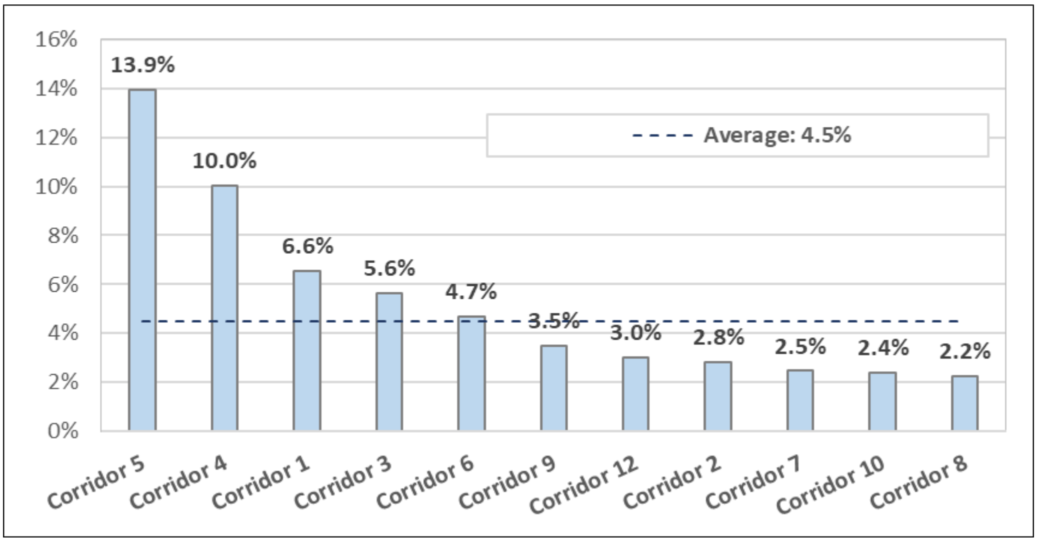
Figure 23: Road transport performance, %.



Source: *Authors' own elaboration.*

Figure 24 presents the **vulnerability of road network** from flooding, expressed by the share (in percentage) of road network in flood-prone areas, based on 100 years retrospective flood measurements. The road network in the Central African **corridor 5 'Libreville-Kribi-Douala-N'Djamena' appears to be the most vulnerable to floods,** followed by the Western African corridor 4 'Cotonou-Niamey'. Other two Western African corridors – 1 'Abidjan-Lagos' and 3 'Praia-Dakar-Abidjan', as well as the second Central African corridor 6 'Douala-Kribi-Bangui-Kisangani-Kampala', are also peculiar with elevated flood risk vice-versa road network, above the average for the 11 assessed corridors. At the other end of the ranking are the two Eastern African corridors 8 'Mombasa-Kisangani' and 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti', and the Southern African corridor 10 'Durban-Lusaka-Lubumbashi'. Altogether, these observations imply that the risk of flooding for the road infrastructure in Central and Western Africa tends to be higher than in the rest of the African continent.

Figure 24: Share of road network in flood-prone areas, %.

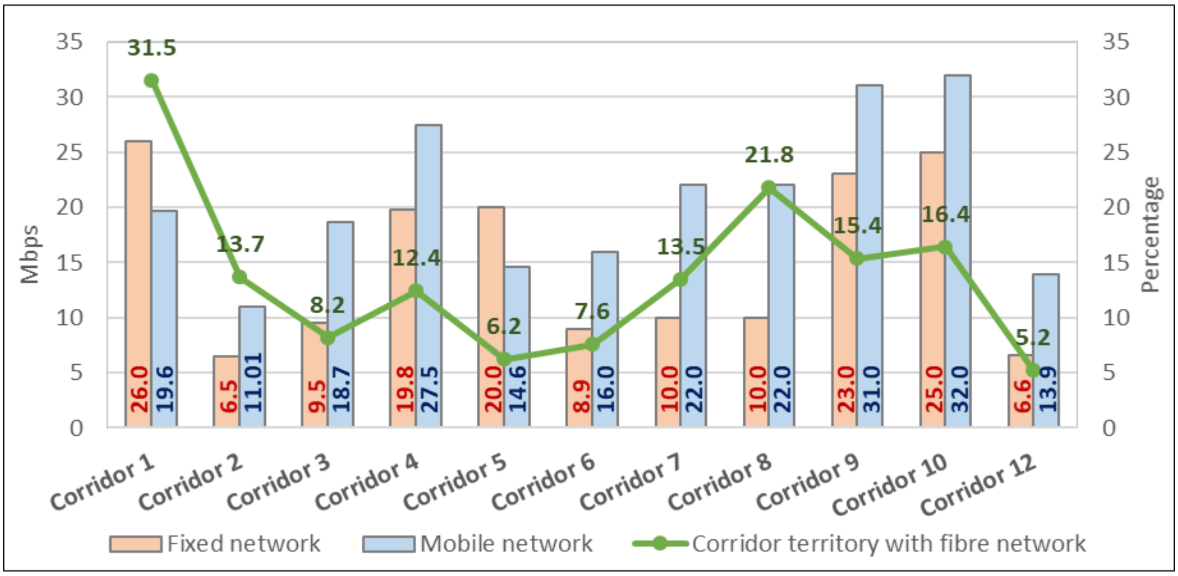


Source: *Authors' own elaboration.*

3.3. DIGITALISATION

The source data for digitalisation have been extracted from OOKLA database, https://www.ookla.com[14]. **Figure 25** shows the mean download speed for the fixed and mobile network (in megabits per second, Mbps) and the share of corridor territory, in percentage, covered by fibre network in the 11 assessed corridors. The download speed for the fixed network is the **highest in the Western**

Figure 25: Mean download speed for the fixed and mobile networks (megabits per second, Mbps) and share of corridor territory with fibre network (%).



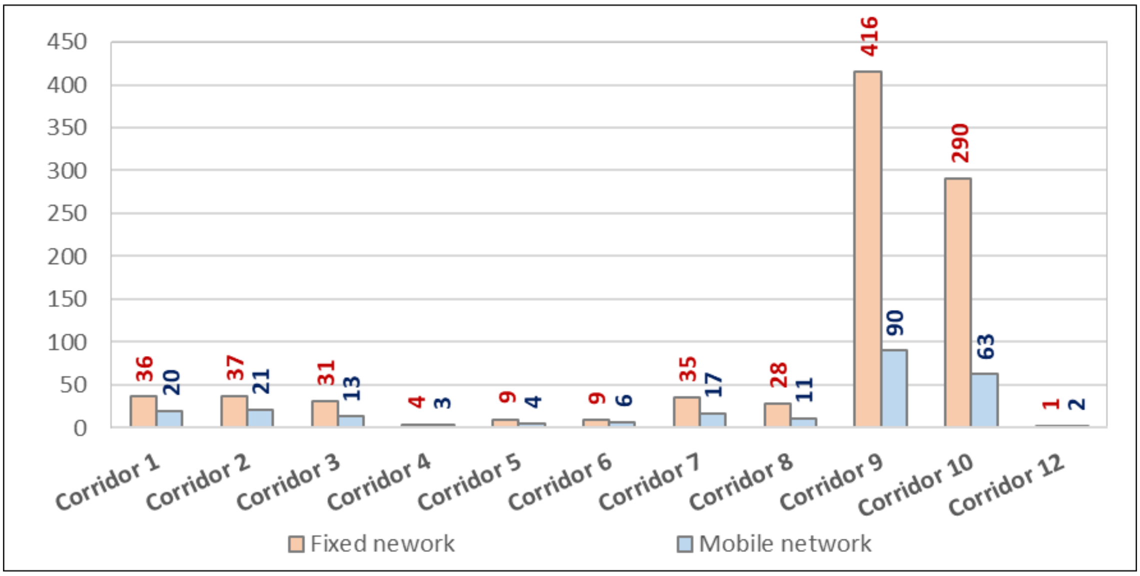
Source: *Authors' own elaboration.*

[14] The data for six corridors (numbers 1, 4, 5, 7, 8 and 12) are from 2023. The data for the remaining five corridors (numbers 2, 3, 6, 9 and 10) are from 2022.

African corridor 1 'Abidjan-Lagos', followed by two Southern African corridors – 10 'Durban-Lusaka-Lubumbashi' and 9 'Maputo-Gaborone-Walvis Bay-Lüderitz'. The highest download speeds for mobile network are found in the same two Southern African corridors 9 and 10, followed by the Western African corridor 4 'Cotonou-Niamey'. The **lowest download speeds for both fixed and mobile networks are detected in the Western African corridor 2 'Abidjan-Ouagadougou' and in the third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'.** Altogether, these observations suggest the presence of large differences at regional level in Western and Southern Africa, besides those at continental level. Except in corridors 1 'Abidjan-Lagos' and 5 'Libreville-Kribi-Douala-N'Djamena', the download speed of the mobile network is higher than the one of the fixed network.

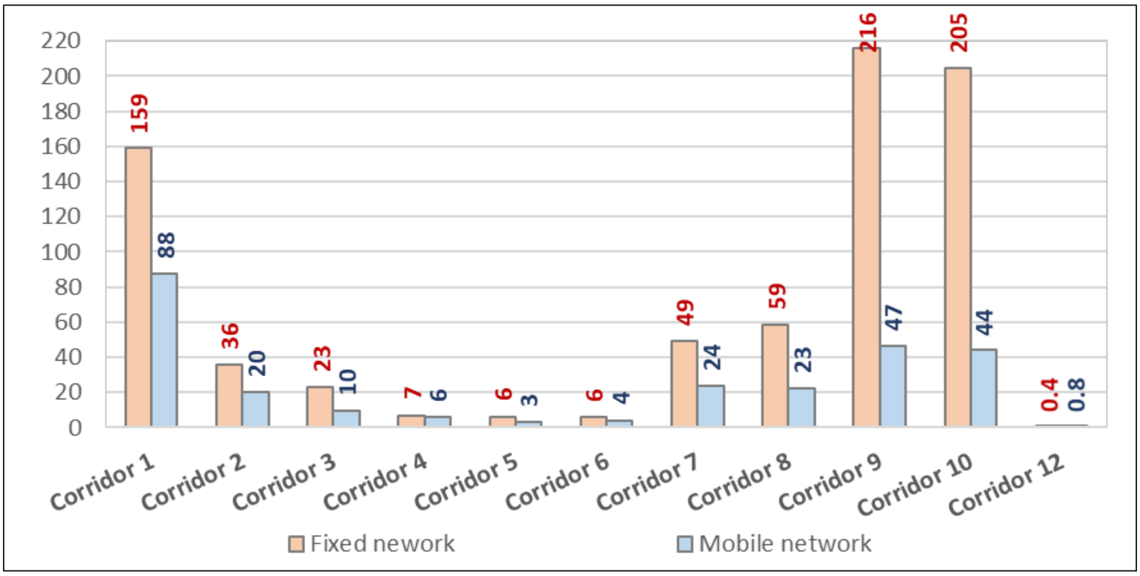
Figure 26 and **Figure 27** display the number of access points of the fixed and mobile networks, weighted by corridor population (per 100,000 people) and area (per 1,000 square kilometres) respectively. In both cases, the **Southern African corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi' stand up much ahead of all other corridors as regards fixed network access points.** They are approached only by the Western African corridor 1 'Abidjan-Lagos' concerning the number of access points per 1,000 square kilometres (**Figure 27**). With regard to the **access points of the mobile network, once again corridors 9 and 10 are the leaders,** surpassed only by corridor 1 for the number of access points per 1,000 square kilometres. All other corridors are characterised with relatively low or very low number of access points for both fixed and mobile network per 100,000 people of corridor population and per 1,000 square kilometres of corridor area. **The two indicators are particularly low in the third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola',** meaning huge intra-regional differences in Southern Africa. As regards the proportion between the access points in the fixed and the mobile network, weighted by population and area, the fixed network access points are higher, sometimes – much higher (in the case of corridors 9 and 10), with the exception of the most poorly performing corridor 12.

Figure 26: Access points of the fixed and mobile networks per 100,000 people of corridor population.



Source: *Authors' own elaboration.*

Figure 27: Access points of the fixed and mobile networks per 1,000 square kilometres of corridor area.

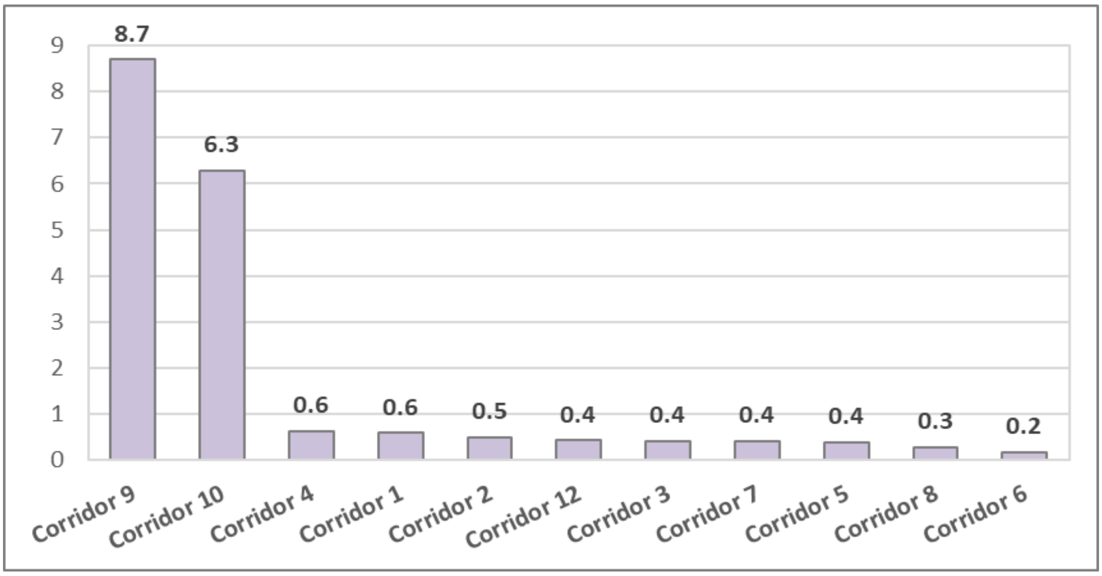


Source: *Authors' own elaboration.*

3.4. ENVIRONMENTAL PERFORMANCE

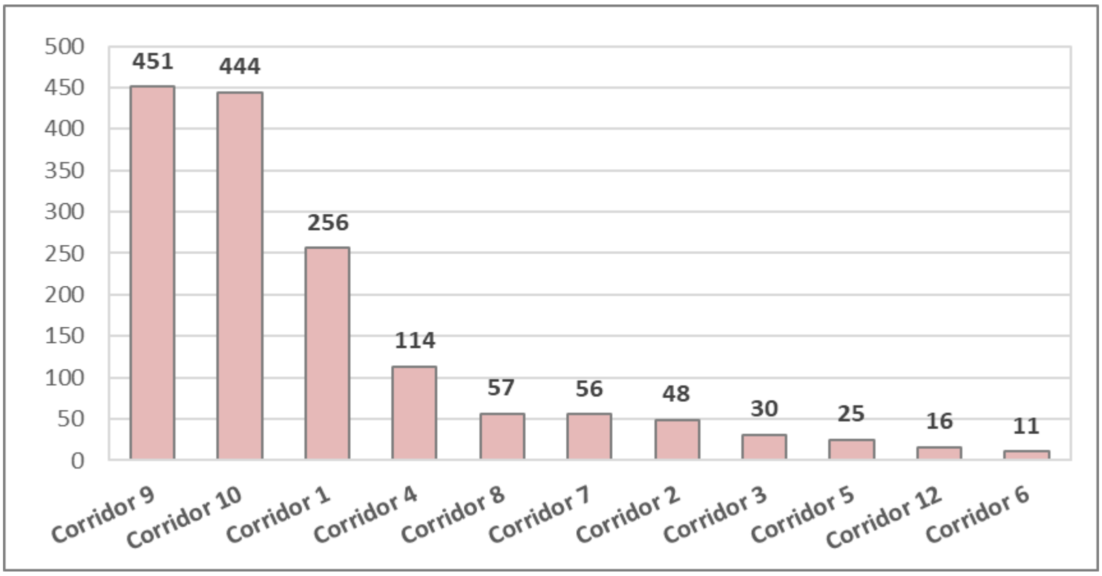
The source data for carbon dioxide (CO_2) emissions have been extracted from the Emissions Database for Global Atmospheric Research (EDGAR), https://edgar.jrc.ec.europa.eu/. **Figure 28** and **Figure 29** present the estimated total CO_2 emissions in tonnes from all sectors for the 11 corridors per capita and per square kilometre respectively. In both cases, the **Southern African corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi' come up much ahead of all other corridors** in terms of CO_2 emissions per square kilometre. Only the Western African corridors 1 'Abidjan-Lagos' and 4 'Cotonou- Niamey' are also characterised with relatively elevated CO_2 emissions. **In all other cases and for all other corridors, the CO_2 emissions both per capita and per square kilometre appear low or very low.**

Figure 28: Carbon dioxide emissions per capita from all sectors in 2023, tonnes.



Source: *Authors' own elaboration.*

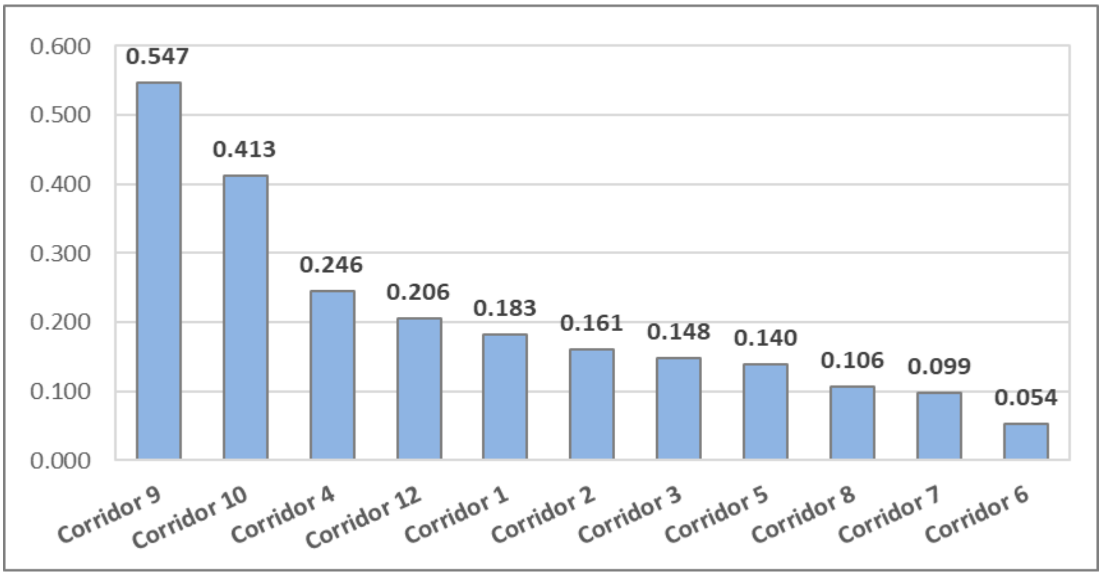
Figure 29: Carbon dioxide emissions per corridor's square kilometre in 2023, tonnes.



Source: *Authors' own elaboration.*

Figure 30 and **Figure 31** display the estimated CO_2 emissions in tonnes from road transport for the 11 corridors per capita and per square kilometre respectively. Similarly to total CO_2 emissions (**Figure 28**), the **Southern African corridors 9, 10 and the Western African corridor 4 'Cotonou-Niamey' register the highest road transport CO_2 emissions per capita.** The difference between the two most CO_2 intensive corridors and the remaining corridors is, however, narrower. In absolute terms, the CO_2 emissions per capita from road transport appear to be low or very low.

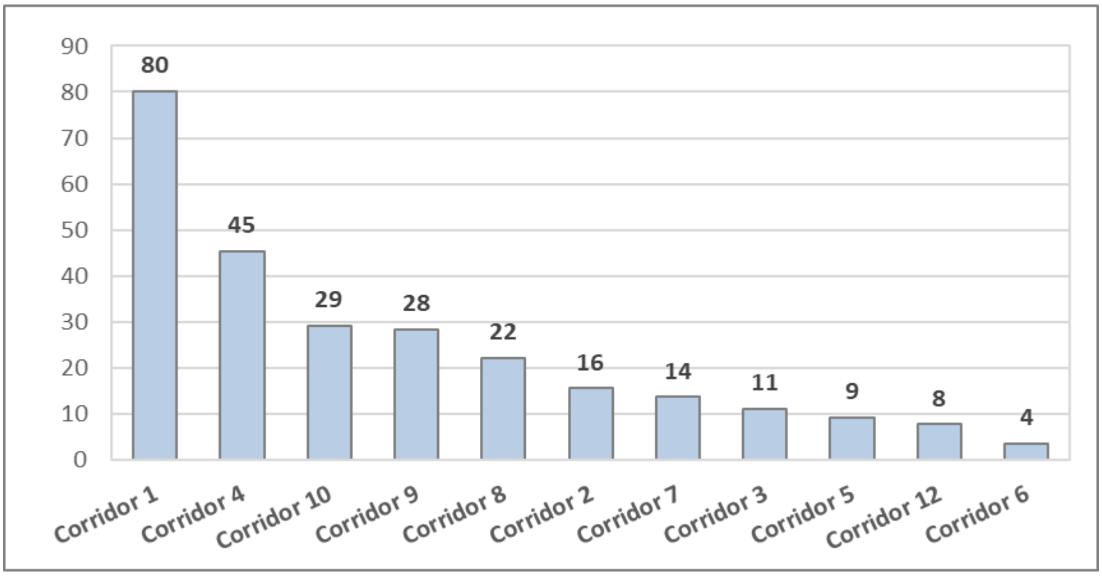
Figure 30: Carbon dioxide emissions of road transport per capita in 2023, tonnes.



Source: *Authors' own elaboration.*

Concerning road transport CO_2 emissions per square kilometre (**Figure 31**), the Western African corridor 1 'Abidjan-Lagos' clearly emerges as the one with the highest emissions, followed by another Western African corridor – 4 'Cotonou-Niamey'.

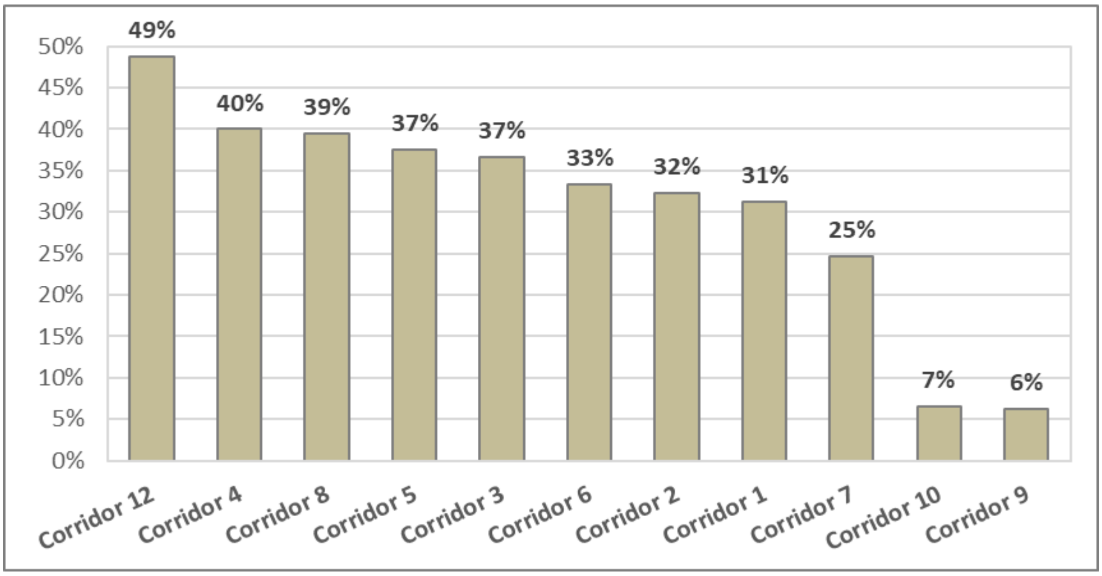
Figure 31: Carbon dioxide emissions of road transport per corridor's square kilometre in 2023, tonnes.



Source: *Authors' own elaboration.*

In relative terms, as share in total CO_2 emissions (**Figure 32**), the road transport CO_2 emissions are the lowest in two Southern African corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi' – around 6-7%. This means that **the bulk of CO_2 emissions in these two corridors comes from other sectors. The share of road transport CO_2 emissions in total CO_2 emissions is the highest, almost 50%, in the third Southern African corridor 12 'Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola'. All remaining corridors are peculiar with elevated share (25-40%) of CO_2 emissions from road transport.**

Figure 32: Share of road transport carbon dioxide emissions in total carbon dioxide emissions in 2023, %.

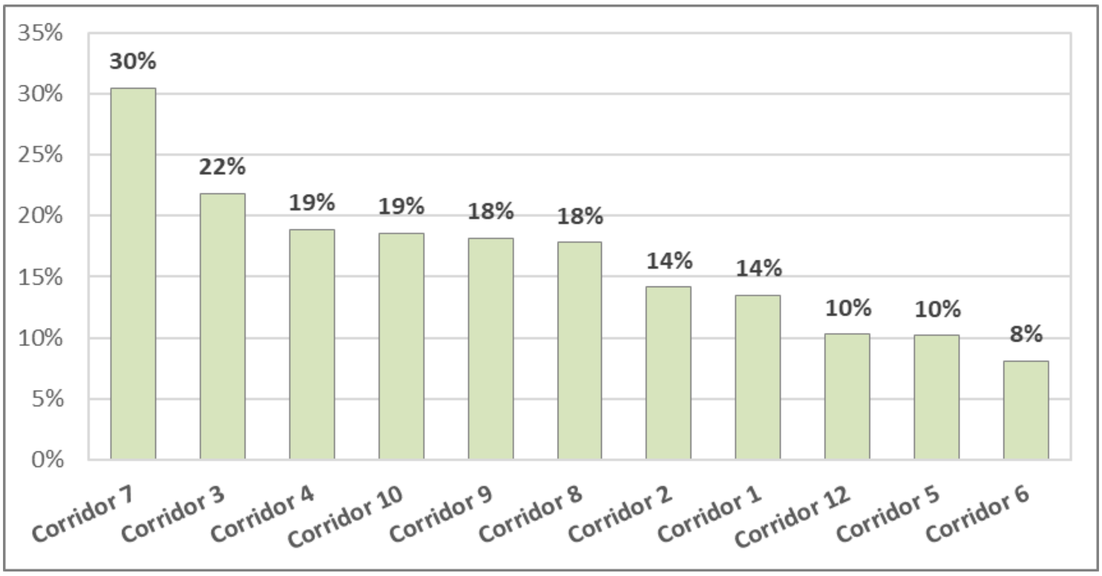


Source: *Authors' own elaboration.*

The source data for calculating the share of protected areas from corridor's territory (**Figure 33**) have been extracted from the World Database on Protected Areas (WDPA), https://www.protectedplanet.net. **Figure 33** reveals a very **high share of protected areas (almost 1/3 of corridor buffer) in**

corridor 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti'. Such a large share translates into a substantially restricted spatial potential for infrastructure, economic, etc. development. On top of that, these protected areas are concentrated in the more economically-advanced and larger countries of corridor 7 – Tanzania, Kenya and Ethiopia. Protected areas occupy on average 35% of corridor area in each of these three countries. On the other hand, protected areas offer economic opportunities, associated with tourism, but the analysis and assessment of tourism, and in general – of the service sector – has been excluded from the scope of this study. Further research is needed to better understand the impact of tourism in the 11 envisaged corridors.

Figure 33: Share of protected areas in total corridor territory in 2023, %.

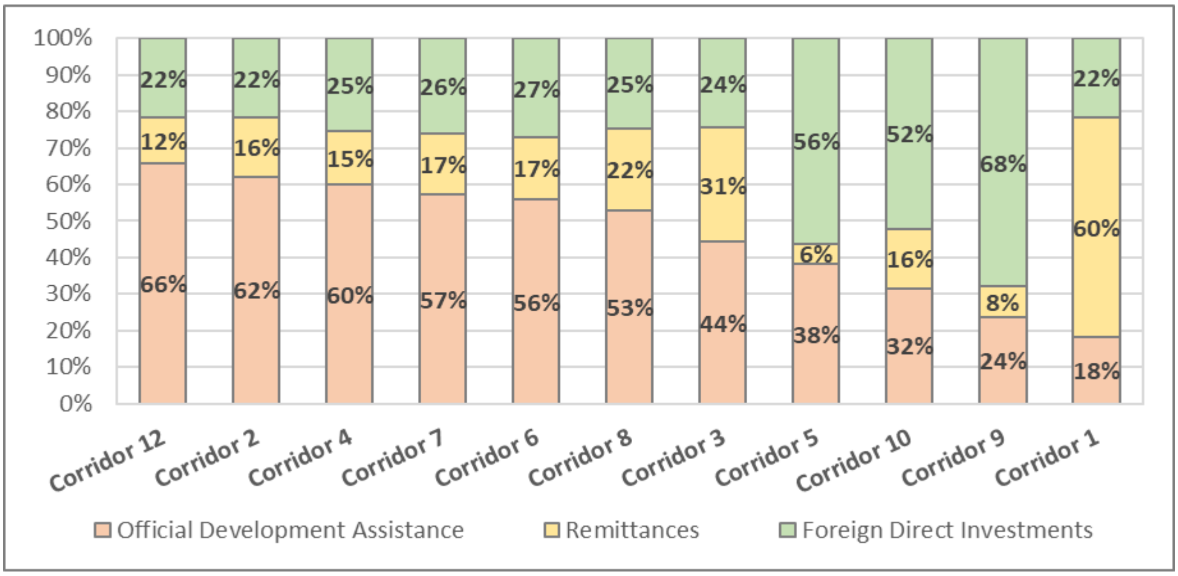


Source: *Authors' own elaboration.*

3.5. FINANCIAL INFLOWS

The source data on the financial inflows have been extracted from the Organisation for Economic Cooperation and Development, OECD – https://data-explorer.oecd.org/ and 'Africa's Development Dynamics 2024'. **Figure 34** shows the breakdown of the three main external financial inflows – Official Development Assistance (ODA), Remittances, and Foreign Direct Investment (FDI) in the 11 corridors within 2000-2022. **In most corridors, ODA prevails, meaning significant dependence on external aid**. **FDI are the dominant financial inflow for the Southern African corridors 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' and 10 'Durban-Lusaka-Lubumbashi', as well as for the Central African corridor 5 'Libreville-Kribi-Douala-N'Djamena'. Remittances are by far the largest source of financial inflow for the Western African corridor 1 'Abidjan-Lagos', suggesting a large emigration-driven income.** The Western African corridor 3 'Praia-Dakar-Abidjan' presents a more balanced mix of the three components, implying diversified financial inflows.

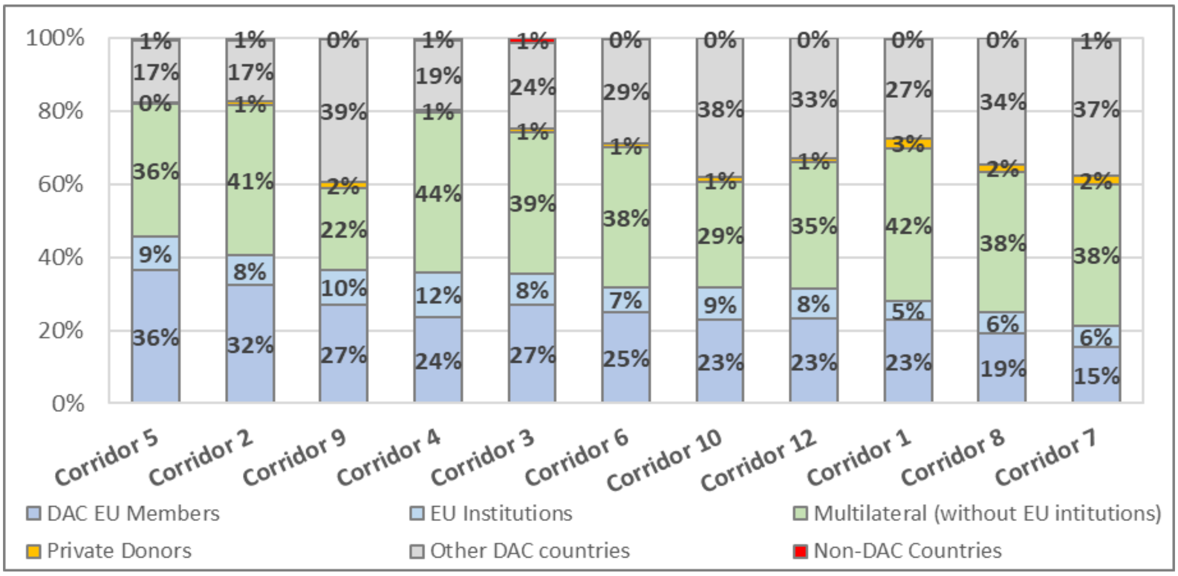
Figure 34: Breakdown of the external financial inflows by type within 2000-2022, %.



***Source:** Authors' own elaboration.*

Figure 35 displays the breakdown of the Official Development Assistance by donors in the 11 corridors. The **largest combined EU contribution (EU Member States and EU Institutions – European Commission, European Development Fund, European Investment Bank, etc.), of 45% is registered in the Central African corridor 5 'Libreville-Kribi-Douala-N'Djamena',** followed by two Western African corridors – 2 'Abidjan-Ouagadougou' (40%) and 4 'Cotonou-Niamey' (36%) – and the Southern African corridor 9 'Maputo-Gaborone-Walvis Bay-Lüderitz' (37%). **The two Eastern African corridors 7 'Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti' and 8 'Mombasa-Kisangani' register the lowest EU presence in terms of ODA – 21% and 25% respectively.**

Figure 35: Breakdown of the Official Development Assistance by donors within 2000-2022, %.



***Source:** Authors' own elaboration.*

List of figures

Annexes

ANNEX 1. BREAKDOWN OF CELL TOPSIS VALUES PER CATEGORIES

Scenario Id	Corridor id	Dark aqua	Dark green	Green	Light green	Olive green	Yellow	Orange	Red	Dark red	Total Cells
1.Carbon	Corridor 1					4928	38	1			4967
1.Carbon	Corridor 2					9916	14	4	3	1	9938
1.Carbon	Corridor 3					28037	176	14	3	1	28231
1.Carbon	Corridor 4				7952	90	8	2			8052
1.Carbon	Corridor 5					22712	52	17	3		22784
1.Carbon	Corridor 6				32323	269	19	6	2		32619
1.Carbon	Corridor 7				22273	87	13	4	1		22378
1.Carbon	Corridor 8					18560	157	8			18725
1.Carbon	Corridor 9					23147	131	9	7		23294
1.Carbon	Corridor 10				27358	155	13	4	1		27531
1.Carbon	Corridor 12				20124	854	21	3	1		21003
1.Carbon	**Total cells**	**0**	**0**	**0**	**110030**	**108755**	**642**	**72**	**21**	**2**	**219522**
2. Digitalisation	Corridor 1			1	6	4958	2				4967
2. Digitalisation	Corridor 2				2	2	9934				9938
2. Digitalisation	Corridor 3				4	15	28212				28231
2. Digitalisation	Corridor 4			1	1	14	8036				8052
2. Digitalisation	Corridor 5				2	2	22772	8			22784
2. Digitalisation	Corridor 6		1		1	3	32613	1			32619
2. Digitalisation	Corridor 7				6	8	22363	1			22378
2. Digitalisation	Corridor 8			1	2	6	18715	1			18725
2. Digitalisation	Corridor 9				2	8	23284				23294
2. Digitalisation	Corridor 10			1		2	27519	9			27531
2. Digitalisation	Corridor 12				2	40	20961				21003
2. Digitalisation	**Total cells**	**0**	**1**	**4**	**28**	**5058**	**214411**	**20**	**0**	**0**	**219522**
3. Accessibility	Corridor 1		2	3	4952	10					4967
3. Accessibility	Corridor 2		2	9909	25	2					9938
3. Accessibility	Corridor 3	1	4	28213	10	3					28231
3. Accessibility	Corridor 4		1	3	8024	24					8052
3. Accessibility	Corridor 5		2	22771	11						22784
3. Accessibility	Corridor 6		1	9	32606	2	1				32619
3. Accessibility	Corridor 7		3	22370	4	1					22378
3. Accessibility	Corridor 8		1	1	18715	7	1				18725
3. Accessibility	Corridor 9		1	4	23242	47					23294
3. Accessibility	Corridor 10		1	4	27496	30					27531
3. Accessibility	Corridor 12	1		20999	2		1				21003
3. Accessibility	**Total cells**	**2**	**18**	**104286**	**115087**	**126**	**3**	**0**	**0**	**0**	**219522**
4. Productivity	Corridor 1			2	4727	238					4967
4. Productivity	Corridor 2				2	9936					9938
4. Productivity	Corridor 3			2	28088	141					28231
4. Productivity	Corridor 4				2	8042	7	1			8052
4. Productivity	Corridor 5					6	22776	2			22784
4. Productivity	Corridor 6				1	9	32608	1			32619
4. Productivity	Corridor 7				2	22373	3				22378
4. Productivity	Corridor 8				2	18627	95	1			18725
4. Productivity	Corridor 9				3	23289	2				23294
4. Productivity	Corridor 10				2	27490	39				27531
4. Productivity	Corridor 12				3	20999		1			21003
4. Productivity	**Total cells**	**0**	**0**	**4**	**32832**	**131150**	**55530**	**6**	**0**	**0**	**219522**
5. Overall	Corridor 1			1	4960	6					4967
5. Overall	Corridor 2				1	9934	3				9938
5. Overall	Corridor 3				1	28226	4				28231
5. Overall	Corridor 4				1	8044	7				8052
5. Overall	Corridor 5					22776	8				22784
5. Overall	Corridor 6				302	32315	2				32619
5. Overall	Corridor 7				1	22372	5				22378
5. Overall	Corridor 8				1	18715	9				18725
5. Overall	Corridor 9				4	23286	4				23294
5. Overall	Corridor 10				27518	12	1				27531
5. Overall	Corridor 12				3	20998	2				21003
5. Overall	**Total cells**	**0**	**0**	**1**	**32792**	**186684**	**45**	**0**	**0**	**0**	**219522**

ANNEX 2. INPUT INDICATORS AND UTILITY FUNCTIONS FOR THE FOUR SUB-OBJECTIVES

	Indicator / Utility	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
1	GHSL average build up	MAX	MAX	MAX	MAX	MAX
2	World Bank financing		MAX			MAX
3	Critical raw materials				MAX	MAX
4	Conflict-prone areas		MIN	MIN	MIN	MIN
5	Major mineral deposits				MAX	MAX
6	Airports	MAX		MIN	MIN	MIN
7	Marine ports	MAX		MIN	MIN	MIN
8	Drive time from closest airport				MAX	
9	Drive time from closest marine port				MAX	
10	Pipelines, gas, oil, processed products		MAX			MIN
11	PIDA projects		MAX			MAX
12	Railway stations	MAX		MIN	MIN	MIN
13	Points of Interest		MAX	MAX		MAX
14	Railways	MAX	MAX	MIN	MIN	MIN
15	Roads	MAX	MAX	MIN	MIN	MIN
16	Waterbodies		MIN	MIN	MIN	MIN
17	Flooding event area		MIN	MIN	MIN	MIN
18	Protected area share		MIN	MIN	MIN	MIN
19	Electrical grid		MAX			MIN
20	Terrestrial fibres		MAX			MIN
21	Urban centres			MAX		MAX
22	China financing		MAX		MAX	MAX
23	European Commission financing		MAX		MAX	MAX
24	Broadband speed mobile		MIN			MIN
25	Broadband speed fixed		MIN			MIN
26	Carbon Dioxide (CO_2) emissions – total				MAX	MAX
27	CO_2 emissions, excluding fossil ones				MAX	MAX
28	Methane (CH_4) emissions				MAX	MAX
29	Nitrous Oxide (N_2O) emissions				MAX	MAX
30	Tree cover	MIN				MIN
31	Cropland				MAX	MAX
32	GHSL Population historical	MIN	MIN	MIN	MIN	MIN
33	GHSL Population projection	MAX	MAX	MAX	MAX	MAX
34	Access to sanitation facilities			MIN		MIN
35	Access to water facilities			MIN		MIN
36	CO_2 emissions transport roads	MAX				MAX
37	CO_2 emissions railways and pipelines	MAX				MAX
38	CO_2 emissions air transport take-off & landing	MAX				MAX
39	CO_2 emissions air transport cruising	MAX				MAX
40	Proximity		MAX			MIN
41	Accessibility		MAX	MIN	MIN	MIN
42	Transport performance			MIN	MIN	MIN
43	Accessibility to health services			MAX		MAX
44	Accessibility to education services			MAX		MAX
45	Accessibility to airports			MAX	MAX	MAX
46	Accessibility to train stations			MAX	MAX	MAX

Remark: The machine-based indicators weights are corridor/sub-corridor specific and thus – not provided in this report.

ANNEX 3. AVERAGE TOPSIS RANKING VALUES, DOMINANT COLOUR CODING STANDING VALUES PER CORRIDOR AND SCENARIO

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Corridor 1	0.460 (8)	0.425 (1)	0.567 (7)	0.502 (1)	0.564 (1)
Corridor 2	0.462 (7)	0.335 (9)	0.624 (5)	0.446 (4)	0.461 (7)
Corridor 3	0.442 (9)	0.363 (6)	0.656 (2)	0.502 (2)	0.458 (8)
Corridor 4	0.515 (4)	0.384 (3)	0.541 (10)	0.425 (7)	0.442 (9)
Corridor 5	0.495 (6)	0.331 (10)	0.650 (3)	0.345 (11)	0.438 (11)
Corridor 6	0.536 (2)	0.354 (8)	0.577 (6)	0.370 (10)	0.497 (3)
Corridor 7	0.523 (3)	0.356 (7)	0.662 (1)	0.430 (6)	0.467 (6)
Corridor 8	0.416 (11)	0.365 (5)	0.549 (8)	0.404 (9)	0.439 (10)
Corridor 9	0.434 (10)	0.373 (4)	0.532 (11)	0.455 (3)	0.467 (5)
Corridor 10	0.536 (1)	0.319 (11)	0.546 (9)	0.409 (8)	0.517 (2)
Corridor 12	0.501 (5)	0.395 (2)	0.641 (4)	0.439 (5)	0.475 (4)

The dominant colour allocation is based on the colour coding scheme from **Figure 4.** The standing values per scenario (in brackets) indicate the relative ranking (1 – best, 11 – poorest), the top three rankings being highlighted in **bold reddish colours,** of the 11 corridors:

- **Corridor 1:** Abidjan-Lagos (Western Africa);
- **Corridor 2:** Abidjan-Ouagadougou (Western Africa);
- **Corridor 3:** Praia-Dakar-Abidjan (Western Africa);
- **Corridor 4:** Cotonou-Niamey (Western Africa);
- **Corridor 5:** Libreville-Kribi-Douala-N'Djamena (Central Africa);
- **Corridor 6:** Douala-Kribi-Bangui-Kisangani-Kampala (Central Africa);
- **Corridor 7:** Dar es Salaam-Nairobi-Addis Ababa-Berbera-Djibouti (Eastern Africa);
- **Corridor 8:** Mombasa-Kisangani (Eastern Africa);
- **Corridor 9:** Maputo-Gaborone-Walvis Bay-Lüderitz (Southern Africa);
- **Corridor 10:** Durban-Lusaka-Lubumbashi (Southern Africa);
- **Corridor 12:** Lobito-Kolwezi-Lubumbashi-Solwezi-Ndola (Southern Africa).

In each of the 5 scenarios:

1. reduce carbon footprint and preserve biodiversity;
2. digitalise the corridors;
3. improve accessibility: access to public services in the corrido territory, linking also rural road networks, urban mobility and connectivity in and between cities;
4. unlock productive areas and support value chains' development, e.g. mining / including raw materials, agriculture / agri-business, industry, etc.;
5. strengthen transport and trade corridor efficiency.

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