

Table 2. Performace indicators

Problem	Description	Source (Problem)	KPIs
Fragmentation	The system is strongly fragmented in a wide number of operators. In particular, paratransit are characterized by a consistent number of individual business.	Sohail et al. (2006), Bruun & Behrens (2016), Klopp et al. (2019)	-
Traffic Congestion	Roads in African countries are heavily congested, especially during peak hours.	Cervero & Golub (2007)	Average PT commute in AM peak (min) Average PT commute in AM peak (km) Peak period speed of PT (km/h) Travel time to relevant points of interests Average commuting time by private and public transport Average commuting distances Average speed Delay Passengers' vehicle speed Bus speed Passengers' speed Ratio of speed of bus to passenger vehicle
Pollution	As a consequence of the traffic congestion, the air in SSA cities is polluted.	Cervero & Golub (2007), Parnell & Walawege (2011)	Level of emission Emission by the vehicle make Fuel consumption per capita Carbon dioxide (CO2) Sulphur dioxide (SO2) Carbon monoxide (CO) Particulates Volatile organic compounds (VOCs) Vehicle fuel consumption Level of noise from urban transport (decibel) Old vehicles still in use
Road Accidents	Many road accidents happen in African cities, mainly due to the unregulated behaviour of drivers and lack of maintenance.	Sietchiping et al. (2012), Ehebrecht et al. (2018)	Number of fatal accidents Number of injury accidents Number of fender bender Number of fatal accidents per capita Number of injury accidents per capita Number of fender bender per capita Number of fatal accidents per vehicle Number of injury accidents per vehicle Number of fender bender per vehicle Number of fatal accidents per vehicle-km Number of injury accidents per vehicle-km Number of fender bender per vehicle-km Number of traffic accidents Number of people killed/seriously injured in traffic accidents
Maintenance of vehicles	Vehicle often breaks during their working time. The lack of maintenance can cause serious accidents as well.	Godard (2013), Behrens et al. (2015)	Mechanically deficient vehicles still in use Old vehicles still in use Distribution age of public transport vehicles
Verbal and physical aggression	Verbal and physical aggression by the personnel and other passengers happen on board. Women are often victims of these situations.	Wa Mungai & Samper (2006), Porter (2008), Porter et al. (2011), Sietchiping et al. (2012), Eagle & Kwele (2019)	Personal Safety at motor parks/stps Personal Safety on board Incidence of commuter being attacked by armed robbers Effective Police Patrols teams
Unregulated behaviour of the drivers	Drivers often do not respect safety and road codes and conduce the vehicle in a dangerous way for its passengers.	Behrens et al. (2015), Sohail et al. (2006)	Incidence of exceeding speed Use of seatbelts Incidence of driving under the influence of alcohol/drugs Incidence of red light running Percentage of tranied/certified drivers Incidence of not stopping or yelding in junctions or at pedestrian crossing
Availability	The transportation system is scarce both in terms of service coverage and service provision, many citizens have difficulties to access it and arrive the specific destination.	Bryceson et al. (2003), Diaz Olvera et al. (2013), Behrens et al. (2015)	% population within 1 km of PT facility % population within 15 min walt to PT facility Average walking distance to PT facility Mobility measure (how many locations can be reached in 60 minutes) Contour measure (how many health facilities can be reached in 60 minutes) Gravity measure (how many health facilities can be reached in 60 minutes multiplied by a time decay function) Bus frequency Average bus system frequency Bus capacity per capita Frequency of public transport Public transport trips (number)
Economic Affordability	The transportation system is unaffordable for part of the population.	Fouracre et al. (2006), Diaz Olvera et al. (2008)	Average fare/trip (Rail) Average fare/trip (Bus) Average fare/trip (Minibus) Annual PT fare/GDP per capita (Rail) Annual PT fare/GDP per capita (Bus) Annual PT fare/GDP per capita (minibus) Average % household income spent on PT
Overcrowding	Collective transport in SSA carry more people than those allowed, leading to strong level of saturation of the vehicle which makes the trip very uncomfortable and dangerous.	Cervero & Golub (2007), Godard (2013)	Average daily load factors PT spaces / 1000 people Crowding during peak hours Ratio of standing passengers to tatal passengers at buses Volume / Capacity Public transportation peak hour load factor Public transportation hour l load factor Percentage of public transportation passengers
Unscheduled time	Transport frequency is strongly variable depending on the time of the day. This results in a lack of reliability	Cervero & Golub (2007), Godard (2013), Behrens et al. (2015), Saddier et al. (2017)	Public transportation headway Entire system average headway Reliability Average waiting time Punctuality
Rude behaviour of personnel	The personnel often behave rudely with its passengers, lack of information provided and rude manners to answer the question.	Behrens et al. (2015), Eagle & Kwele (2019)	Customer service Complaints handling and effective resolution Average time to process claims Percentage of complaints total Behaviour of drivers/conductors