Maraing

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SPOTLIGHT ON THE AFRICAN SMART CITY

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DEAR READER

Dear Marang Readers,

It gives us great pleasure to bring you this latest edition of Marang, which is going to shine the spotlight on Metropolitan Cities in Africa, and their approach to Smart City roll-out, under the theme: “The Spotlight on the African Smart City”.

It’s no secret that megacities across Africa are increasingly home to tech innovation. Like Smart City initiatives across the world, cities in Africa are initiating tech and data-driven solutions to overpopulation issues caused by drastically increasing urbanization. Given the rapid urbanization growth, now is the time for African policymakers to incorporate smart cities into their urbanization strategies. A 2016 report by consulting firm Deloitte noted a set of factors that make African cities ideal candidates for the adoption of smart cities technology.

These solutions often take the form of entire new satellites or “tech cities” being built alongside existing urban areas, from the ground up.

According to Deloitte, Africa in particular is well positioned to lead the way in smart city initiatives for the following reasons:

1. Limited legacy drawbacks:
Many African cities won’t face costs associated with maintenance of legacy infrastructure and systems and can easily implement new technology.

2. The rise of the African middle class:
According to the African Development Bank Chief Economist Mthuli Ncube "it's the middle class that drive demand in an economy," and have the greatest disposable income.

3. Intense urbanization:
Africa is likely to be the fastest urbanizing continent in the world.

4. Entrepreneurial mindset:
African countries are home to citizens known for entrepreneurial thinking and opportunistic approach.

5. Mobile connectivity:
African mobile subscriber growth remains the fastest in the world. Mobile penetration has reached around 72% across the continent.

Jorn Lyseggen has highlighted that "In Africa, there is so little information that sits in traditional databases and sources. Companies therefore go to your behaviour online, as well as your behaviour on the phone, and utilise that to create, for example, as good a credit rating as those you find in other places in the world."

Known for their technological leapfrogging and fast adoption of mobile connectivity, African cities are working to position themselves as the next frontier for smart, data-driven urban optimization, and this will be demonstrated by their ranking in this edition on the Smart City Index.

In addition, mobile operators, as well as public sector organizations, are working together with the private sector to bring these initiatives to life. This Edition has defined what a Smart City is, looked at challenges associated with creating smart cities, evaluated the 2020 Rankings of Smart Cities – and Africa's standing on rankings, and shone the spotlight on some of the fastest upcoming African Smart Cities. The Edition has finally explored some key learnings/test cases on how some African Cities have translated, and implemented the smart city agenda into their service delivery mandate in the quest for creating inclusive space within the Cities.

We trust that you will enjoy the read!
Thusani Mulaudzi – Editorial Board.

01 INTRODUCTION: WHAT IS A SMART CITY?

A Smart City is defined as a municipality that uses information and communication technologies (ICT) to increase operational efficiency, share information with the public and improve both the quality of government services and citizen welfare. While the exact definition varies, the overarching mission of a smart city is to optimize city functions and drive economic growth while improving quality of life for its citizens using smart technology and data analysis. Value is given to the smart city based on what they choose to do with the technology, not just how much technology they may have.

Several major characteristics are used to determine a city's smartness. These characteristics include:

- technology-based infrastructure;
- environmental initiatives;
- a high functioning public transportation system;
- a confident sense of urban planning and
- humans to live and work within the city and utilize its resources.

A smart city's success depends on its ability to form a strong relationship between the government - including its bureaucracy and regulations - and the private sector. This relationship is necessary because most of the work that is done to create and maintain a digital, data-driven environment occurs outside of the government. Surveillance equipment for busy streets could include sensors from one company, cameras from another and a server from yet another.

Additionally, independent contractors may be hired to analyze the data which is then reported back to the city government. This data could then lead to the incorporation of an application development team that is hired to come up with a solution for the problems found in the analyzed data. This company could become part of the system if the solution requires regular updating and management. Therefore, a smart city's success becomes more focused on building positive relationships than on completing a single project.

There's no one-size-fits-all definition for smart cities. However it is not necessarily because they're complex. It's just that the theoretical and practical contexts for smart cities are not always identical. But essentially, smart cities are urban areas that leverage data and digital technology to be more efficient, environmentally friendly and socially inclusive than 'regular' ones.

Smart city technology

Smart cities use a combination of the internet of things (IoT) devices, software solutions, user interfaces (UI) and communication networks. However, they rely first and foremost on the IoT. The IoT is a network of connected devices - such as vehicles, sensors or home appliances - that can communicate and exchange data. Data collected and delivered by the IoT sensors and devices is stored in the cloud or on servers. The connection of these devices and use of data analytics (DA) facilitates the convergence of the physical and digital city elements, thus improving both public and private sector efficiency, enabling economic benefits and improving citizen's lives.

The IoT devices sometimes have processing capabilities called edge computing. Edge computing ensures that only the most important and relevant information is communicated over the communication network.

A firewall security system is also necessary for the protection, monitoring and control of network traffic within a computing system. Firewalls ensure that the

data constantly being transmitted within a smart city network is secure by preventing any unauthorized access to the IoT network or city data.

Other smart city technologies include:

- application programming interfaces (APIs)
- artificial intelligence (AI)
- cloud computing
- dashboards
- machine learning (ML)
- machine to machine (M2M)
- mesh network

Features of a smart city

Emerging trends such as automation, machine learning and the IoT are driving smart city adoption.

Theoretically, any area of city management can be incorporated into a smart city initiative. A classic example is the smart parking meter that uses an application to help drivers find available parking spaces without prolonged circling of crowded city blocks. The smart meter also enables digital payment, so there's no risk of coming up short of coins for the meter.

Also in the transportation arena, smart traffic management is used to monitor and analyze traffic flows in order to optimize street-lights and prevent roadways from becoming too congested based on time of day or rush-hour schedules. Smart public transit is another facet of smart cities. Smart transit companies are able to coordinate services and fulfil riders' needs in real time, improving efficiency and rider satisfaction. Ride-sharing and bike-sharing are also common services in a smart city.

Energy conservation and efficiency are major focuses of smart cities. Using smart sensors, smart street-lights dim when there aren't cars or pedestrians on the roadways. Smart grid technology can be used to improve operations, maintenance and planning, and to supply power on demand and monitor energy outages.

Smart city initiatives also aim to monitor and address environmental concerns such as climate change and air pollution. Waste management and sanitation can also be improved with smart technology, be it using internet-connected trash cans and IoT-enabled fleet management systems for waste collection

and removal, or using sensors to measure water parameters and guarantee the quality of drinking water at the front end of the system, with proper waste water removal and drainage at the back end.

Smart buildings are also often part of a smart city project. Legacy infrastructure can be retrofitted and new buildings constructed with sensors to not only provide real time space management and ensure public safety, but also to monitor the structural health of buildings. Sensors can detect wear and tear, and notify officials when repairs are needed. Citizens can help in this matter, notifying officials through a smart city application when repairs are needed in buildings and other public infrastructure, such as potholes. Sensors can also be used to detect leaks in water mains and other pipe systems, helping reduce costs and improve the efficiency of public workers.

Smart city technologies also bring efficiencies to urban manufacturing and urban farming, including job creation, energy efficiency, space management and fresher goods for consumers.

02 HOW DOES A SMART CITY WORK?

Smart cities utilize their web of connected IoT devices and other technologies to achieve their goals of improving the quality of life and achieving economic growth. Successful smart cities follow four steps:

1. Collection - Smart sensors throughout the city gather data in real time.

2. Analysis - Data collected by the smart sensors is assessed in order to draw meaningful insights.

3. Communication - The insights that have been found in the analysis phase are communicated with decision makers through strong communication networks.

4. Action - Cities use the insights pulled from the data to create solutions, optimize operations and asset management and improve the quality of life for residents.

Fostering sustainability with smart cities

Sustainability is another major facet of smart cities. Urbanization is expected to increase even more in the coming years. The United Nations reports that around 55% of the world's population currently resides in an urban area or city; this figure is set to rise 68% throughout the coming decades. Smart technology will help

cities sustain growth and improve efficiency for citizen welfare and government efficiency in urban areas in the years to come.

While cities already present environmental advantages, such as smaller geographic footprints that impact fewer ecological systems, they also negatively impact the environment with emissions, such as their extreme usage of fossil fuels. The network of smart city technologies could alleviate these detrimental effects.

Making the switch to an electric public transportation system would not only decrease fuel emissions, but could also pose the advantage of working closely with the city's electric power infrastructure in order to minimize the impact of charging batteries during peak hours of electric use. Furthermore, with proper coordination, electric vehicles could also be used to regulate the frequency of the city's electric grid when they're not in service.

The number of cars used in cities is also expected to decrease as municipalities become smarter. Autonomous vehicles, or self-driving cars, could potentially change a population's perspective on the necessity of owning cars. It is suspected that the adoption of autonomous vehicles will reduce the amount of vehicles owned by civilians, thus decreasing the number of cars on the street and further lowering the emission of detrimental gases.

Smart city challenges and concerns

Smart city initiatives must include the people they aim to help: residents, business people and visitors. City leaders must not only raise awareness of the benefits of the smart city technologies being implemented, but also promote the use of open, democratized data to its citizens. If people know what they are participating in and the benefits it can bring, they are more likely to engage.

Fostering collaboration between the public and private sector and city residents is key to creating a smart citizen who will be engaged and empowered to positively contribute to the city and community. Smart city projects should include plans to make the data transparent and available to citizens, often through an open data portal or mobile application. This enables residents to engage with the data and understand what it is used for. Through a smart city application, residents may also be able to complete personal chores, such as viewing their home's energy consumption, paying bills and finding efficient public transportation.

Smart city opponents worry that city managers will not keep data privacy and security top of mind, fearing the exposure of the data that citizens produce on a daily basis to the risk of hacking or misuse. Additionally, the presence of sensors and cameras may be perceived as an invasion of privacy or government surveillance. To address this, smart city data collected should be anonymized and not be personally identifiable information.
However, perhaps the biggest challenge smart cities face is the problem of connectivity. The thousands or millions of IoT devices scattered across the city would be defunct without a solid connection and the smart city itself would be dead.

Furthermore, public transit, traffic management, public safety, water and waste management, electricity and natural gas supply can be unreliable, especially as a system ages and grows. However, the importance of these operations will only increase as the city expands and the demands on its infrastructure increase. These systems must be constantly maintained and tested to ensure their proper functioning.
Smart cities are also challenged by finding ways to attract and keep residents without a cultural fabric. The cultural essence of an area is often-times what attracts residents the most; this is something that cannot be programmed or controlled with a sensor. Therefore, smart cities may falter because they cannot provide a sense of authenticity, distinctiveness or place.

Additionally, smart cities that are being created from the ground up - like Saudi Arabia's Neom and Arizona's Buckeye which are being built in the desert - lack an established population and are therefore presented with the obstacle of having to recruit residents. These future smart cities also have no past success to provide confidence. As Neom and Buckeye have been built, concerns have risen over whether or not there is even a sustainable water source available.

The challenges associated with the design, development and maintenance of digital urban infrastructure are substantial and have to balance the needs and incentives of both public and private stakeholders.
While proofs of concepts and test-beds have been tried and are often successful, scaling these to city scale has been challenging for a number of reasons:

Scope. There is too often a focus on solutions that address narrow aspects of the city's needs.

Capital requirements. Many cities do not have adequate capital for deploying solutions at scale and might struggle to attract investment from the private sector.

Procurement. Procurement models favour vendor-buyer relationships as opposed to multi-year, multi-enterprise, complex partnerships.

Time scales. Some of the most pressing challenges that cities face will need multiple years to address. These complex journeys need partnerships that can withstand the pressures of time, budgets and expectations.

Data. A nuanced understanding of public concern over data sourcing and use can be critical for a successful public-private collaboration. These dynamics contribute to the unique challenges and opportunities for smart city public-private collaborations that range from intelligent street lighting to broadband access.

In recognition of these challenges, the World Economic Forum's G20 Global Smart Cities Alliance assembled a taskforce to look for best practices and model policies in the area of public-private collaborations in 2021. That taskforce, comprised of experts and officers from cities, companies and institutions deeply involved in smart city projects, compiled case studies, insights and feedback from across the sector. As members of that taskforce, we are happy to provide a distillation of these resources in the form of our new Primer for Smart City Public Private Collaborations.

Source: https://www.techtarget.com/iotagenda/definition/smart-city

A rationale for the need for smart African cities

The primary goal of a smart city is to create an urban environment that yields a high quality of life to its residents while also generating overall economic growth. Therefore, a major advantage of smart cities is their ability to facilitate an increased delivery of services to citizens with less infrastructure and cost.
As the population within cities continues to grow, it becomes necessary for these urban areas to accommodate the increasing population by making more efficient use of their infrastructure and assets. Smart city applications can enable these improvements, advance city operations and improve the quality of life among residents.

The attempts at creating new cities in Africa stem from two theories. The first is that a growing population needs more space. The second is that most existing cities aren't functioning as they should. These two problems ought to make a healthy case for new cities. But it's missing out on one vital truth: cities often reflect the lives of citizens.

Whether it's Lagos, Dar es Salaam, Dakar, Mogadishu, Windhoek or Asmara, Africa's cities have the same challenges: poor sanitation, disorganized and unsafe public transport, insufficient water, pollution, dirty energy sources, insecurity, unemployment, poor drainage and expensive housing. According to the African Development Bank (AfDB), Africa needs $170 billion per annum to meet its infrastructure needs but has a deficit of about $110 billion. Solving these problems doesn't require that you build new cities. Instead, the figures show that fixing the existing ones is becoming an emergency.

Smart city applications enable cities to find and create new value from their existing infrastructure. The improvements facilitate new revenue streams and operational efficiencies, helping governments and citizens save money, and this smart city applications can be embedded in the existing African Cities.

03 WHAT IS AN AFRICAN SMART CITY?

Many cities around the world are becoming smarter thanks to the constant advancements of technology. Africa may be developing at a slow pace compared to other continents around the world. Still, it is home to some of the smartest cities, where technological innovations drive urbanisation solutions.

These include cities like Cape Town in South Africa, Nairobi in Kenya, Port Louis in Mauritius, Abidjan in Ivory Coast, Lagos in Nigeria and more.
Smart cities use digital technologies to make the lives of residents easy. Mckinsey aptly explains that smartphones have become the primary keys to the city – “Smartphones have become the keys to the city, putting instant information about transit, traffic, health services, safety alerts, and community news into millions of hands.”

What makes a city a smart city?

TWI Global describes a smart city as one that “uses information and communication technology (ICT) to improve operational efficiency, share information with the public and provide a better quality of government service and citizen welfare.”

“The main goal of a smart city is to optimise city functions and promote economic growth while also improving the quality of life for citizens by using smart technologies and data analysis. The value lies in how this technology is used rather than simply how much technology is available.”

A city is smart if it has these following features:
- An infrastructure built around technology
- Environmental initiative drives
- Effective and highly functional public transportation
- Strategically progressive city plans
- People able to live and work within the city, using its resources without challenges.

What technoligical lessons can be learned from smart cities?

Transforming a city to a smart city isn’t easy; it requires specific and specialised strategies to achieve. But if the above-mentioned cities can do it and thrive, other African countries can follow suit and consider the lessons from the already established cities.
These lessons include the following.

Digital transformation
Digital transformation is no longer a luxury but a need, smart cities use digital transformation to drive the necessary changes required to make a city liveable, inclusive and sustainable for its inhabitants. This is because digital transformation makes operation processes more efficient and profitable.

Leverage digital technologies
Leveraging digital technologies has several benefits, such as addressing digital inequalities. Digital technologies include electronic tools, systems, devices and resources that generate, store and process data. Digital technologies used by smart cities, according to Tomorrow City, include:
- Big data – refers to a collection of data that is complex and huge in volumes. This information is analysed to get insights for decision making. For example, a transport big data system will be used to understand and estimate users’ needs on different routes and multiple modes of transportation and then utilise route planning to reduce their wait time.

- Artificial Intelligence (AI) – in the context of smart cities, AI can be used to bridge the gap and collect data from traffic cameras. This data is used to help with solutions to make city living easy for those who live and commute to the city.
- Internet of Things (IoT) – refers to a system of interrelated, internet-connected objects that can collect and transfer data over a wireless network such as the cloud. An example of an IoT in a smart city would be smart parking.
- Connectivity – telecommunication that allows users to connect, such as free public wi-fi accessible in public transportation.
- Smart public transportation – a clean and efficient transportation system that makes commuting easier for users.

The challenge, however, is that for these lessons to be replicated and implemented, the infrastructure must be available. Investment is a critical resource that can facilitate infrastructure development. The DBSA makes this a possibility through its fund management solution.

This solution allows potential users to engage with development financial institutions and the market to develop financial instruments that will enable investments for infrastructure development in the Information and Communications Technology (ICT) sector.

Final thoughts
Building smart cities is an innovative strategy that assists in making city life easier for its residents and growing the national economy. If cities that haven't yet tapped into the abilities of digital technologies are looking to learn how to build a smart city, the above information is a sufficient guide to help them get started.

Source:
https://www.dbsa.org/article/important-technological-development-lessons-

Ranking of smart cities

"Only 6 African Cities are present in the 2020 Edition of Smart City Index"

The International Institute for the Development of Management (IMD) and the Singapore University of Technology and Design (SUTD) have published the Smart City Index 2020. The Index is the ranking of the 109 smartest cities in the world. In 2020, six African cities appeared in the list.

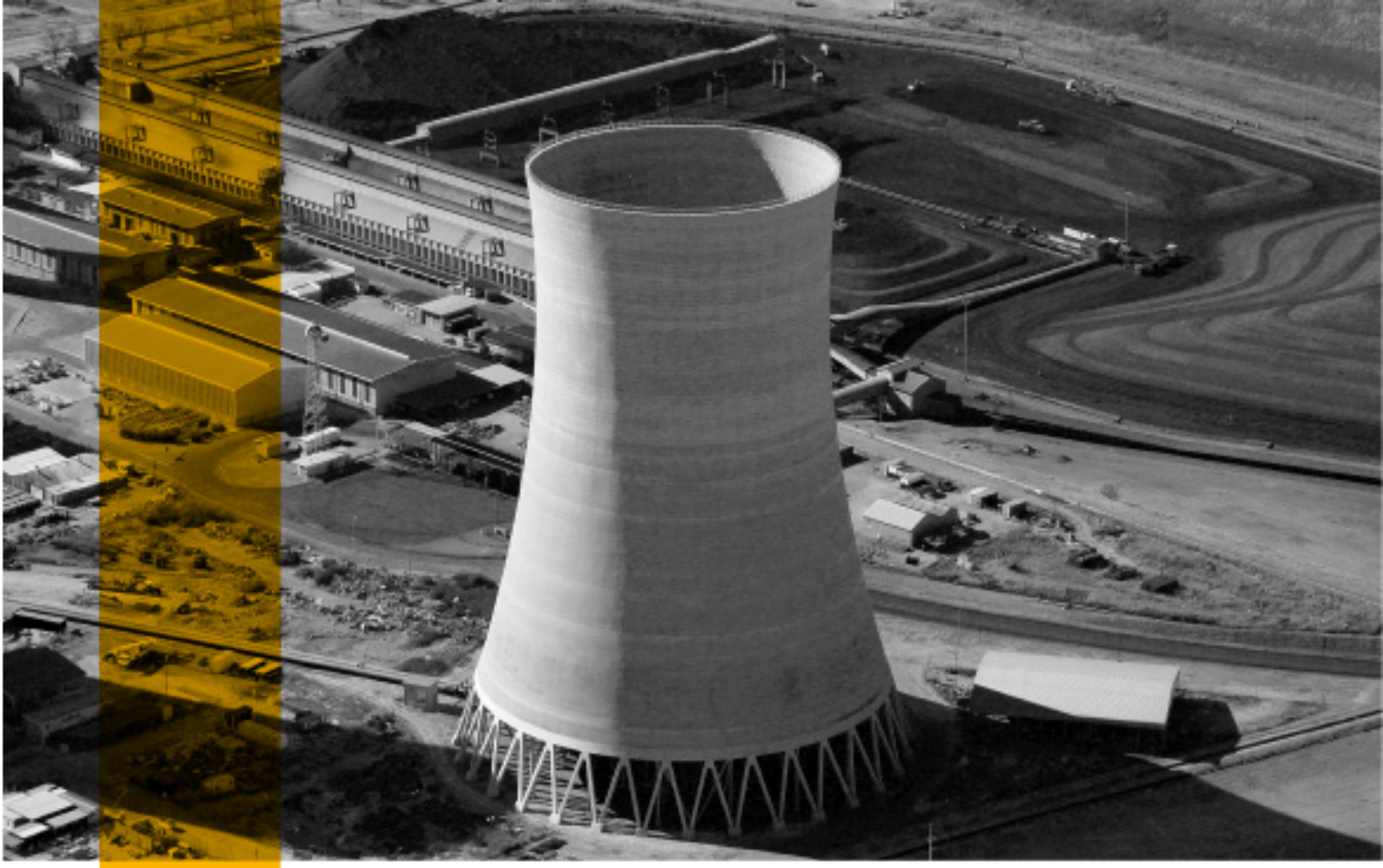
“It is of course too early to draw the lessons from COVID. However, it is clear that we are at a critical juncture, where the sanitary crisis is still very much with us, while the economic and social crisis that it will entail has hardly started. This year’s Smart City Index suggests that the cities that have been able to combine technologies, leadership and a strong culture of ‘living and acting together’ should be able to better withstand the most damaging effects of such crises.” Said Bruno Lanvin, President of the IMD Smart City Observatory.

The African Cities that have been featured on the Smart City 2020 Index Rating are Cape Town (103), Rabat (105), Cairo (106), Abuja (107), Nairobi (108) and Lagos (109). It is impressive to see that there are African Cities that are punching above their weight and fighting to create smart principles that will benefit their citizens in service delivery, even though they are still trailing at the bottom of the list.

Discover the Smart City 2020 index ranking

City	Smart City Rank 2020	Change	Smart City Rating 2020	Smart City Rank 2019	Smart City Rating 2019
Singapore	1	— (0)	AAA	1	AAA
Helsinki	2	▲ (+6)	AA	8	A
Zurich	3	▼ (-1)	AA	2	AAA
Auckland	4	▲ (+2)	AA	6	A
Oslo	5	▼ (-2)	AA	3	AA
Copenhagen	6	▼ (-1)	AA	5	AA
Geneva	7	▼ (-3)	AA	4	AA
Taipei City	8	▼ (-1)	A	7	A
Amsterdam	9	▲ (+2)	A	11	A
New York	10	▲ (+28)	A	38	BBB
Munich	11	new	A		
Washington D.C.	12	▲ (+19)	A	31	BBB
Dusseldorf	13	▼ (-3)	A	10	A
Brisbane	14	▲ (+13)	A	27	BBB
London	15	▲ (+5)	A	20	BBB
Stockholm	16	▲ (+9)	A	25	BBB
Manchester	17	new	A		
Sydney	18	▼ (-4)	A	14	A
Vancouver	19	▼ (-6)	A	13	A
Melbourne	20	▲ (+4)	A	24	BBB
Montreal	21	▼ (-5)	A	16	A
Hamburg	22	new	A		
Newcastle	23	new	A		
Bilbao	24	▼ (-15)	BBB	9	A
Vienna	25	▼ (-8)	BBB	17	BBB
Los Angeles	26	▲ (+9)	BBB	35	BBB
San Francisco	27	▼ (-15)	BBB	12	A
The Hague	28	▲ (+1)	BBB	29	BBB
Rotterdam	29	▲ (+7)	BBB	36	BBB
Toronto	30	▼ (-15)	BBB	15	A
Gothenburg	31	▼ (-3)	BBB	28	BBB
Hong Kong	32	▲ (+5)	BBB	37	BBB
Hanover	33	▼ (-7)	BBB	26	BBB
Dublin	34	▼ (-4)	BBB	30	BBB
Denver	35	▼ (-2)	BBB	33	BBB
Boston	36	▼ (-4)	BBB	32	BBB
Seattle	37	▼ (-3)	BBB	34	BBB
Berlin	38	▲ (+1)	BBB	39	BBB
Phoenix	39	new	BBB		
Birmingham	40	▲ (+12)	BBB	52	BB
Chicago	41	▲ (+12)	BBB	53	BB
Abu Dhabi	42	▲ (+14)	BB	56	B
Dubai	43	▲ (+2)	BB	45	BB
Prague	44	▼ (-25)	BB	19	BBB
Madrid	45	▼ (-24)	BB	21	BBB
Busan	46	▲ (+4)	BB	50	BB
Seoul	47	— (0)	BB	47	BB
Zaragoza	48	▲ (+1)	BB	49	BB
Barcelona	49	▼ (-1)	BB	48	BB
Tel Aviv	50	▼ (-4)	BB	46	BB
Lyon	51	▼ (-28)	BB	23	BBB
Philadelphia	52	▲ (+2)	BB	54	BB
Riyadh	53	▲ (+18)	B	71	CCC
Kuala Lumpur	54	▲ (+16)	B	70	CCC
Warsaw	55	▲ (+6)	B	61	B
Moscow	56	▲ (+16)	B	72	CCC
Ankara	57	▲ (+17)	B	74	CCC
Krakow	58	▲ (+11)	B	69	CCC
Tallinn	59	new	B		
Brussels	60	▲ (+4)	B	64	B

City	Smart City Rank 2020	Change	Smart City Rating 2020	Smart City Rank 2019	Smart City Rating 2019
Paris	61	▼ (-10)	B	51	BB
Zhuhai	62	▼ (-22)	CCC	40	BB
Tianjin	63	▼ (-22)	CCC	41	BB
Chongqing	64	▼ (-22)	CCC	42	BB
Hangzhou	65	▼ (-21)	CCC	44	BB
Nanjing	66	▼ (-11)	CCC	55	B
Shenzhen	67	▼ (-24)	CCC	43	BB
Guangzhou	68	▼ (-11)	CCC	57	B
Chengdu	69	▼ (-11)	CCC	58	B
Bologna	70	▼ (-52)	CCC	18	BBB
Bangkok	71	▲ (+4)	CCC	75	CCC
Medellin	72	▲ (+19)	CCC	91	C
St. Petersburg	73	— (0)	CCC	73	CCC
Milan	74	▼ (-52)	CCC	22	BBB
Lisbon	75	▲ (+1)	CCC	76	CCC
Bratislava	76	▲ (+8)	CCC	84	CC
Budapest	77	▲ (+6)	CCC	83	CC
Marseille	78	new	CCC		
Tokyo	79	▼ (-17)	CCC	62	B
Osaka	80	▼ (-17)	CCC	63	B
Shanghai	81	▼ (-22)	CC	59	B
Beijing	82	▼ (-22)	CC	60	B
Ho Chi Minh City	83	▼ (-18)	CC	65	CCC
Hanoi	84	▼ (-18)	CC	66	CCC
Hyderabad	85	▼ (-18)	CC	67	CCC
New Delhi	86	▼ (-18)	CC	68	CCC
Bucharest	87	▼ (-2)	CC	85	CC
Buenos Aires	88	▼ (-1)	CC	87	CC
Sofia	89	— (0)	CC	89	CC
Mexico City	90	▼ (-2)	CC	88	CC
Santiago	91	▼ (-5)	CC	86	CC
Bogota	92	▲ (+6)	CC	98	D
Mumbai	93	▼ (-15)	C	78	CC
Jakarta	94	▼ (-13)	C	81	CC
Bengaluru	95	▼ (-16)	C	79	CC
Makassar	96	▼ (-16)	C	80	CC
Medan	97	▼ (-15)	C	82	CC
Kiev	98	▼ (-6)	C	92	C
Athens	99	▼ (-4)	C	95	C
Sao Paulo	100	▼ (-10)	C	90	CC
Rome	101	▼ (-24)	C	77	CCC
Rio de Janeiro	102	▼ (-6)	C	96	C
Cape Town	103	▼ (-10)	D	93	C
Manila	104	▼ (-10)	D	94	C
Rabat	105	▼ (-4)	D	101	D
Cairo	106	▼ (-7)	D	99	D
Abuja	107	▼ (-10)	D	97	D
Nairobi	108	▼ (-8)	D	100	D
Lagos	109	▼ (-7)	D	102	D



04 THE BEST SMART CITIES IN AFRICA

Kate Pelikh has critically highlighted that smart cities contribute to societal performance - and infrastructural growth in evolving markets. According to isaafrica research, Africa is on the road of urbanisation with more than half the population to become urban by the end of 2035. While urbanization and technology adoption is predicted to occur in different capitals around Africa at first, in some cities it has already begun. These are two of the most attractive smart cities on the African continent.

The silicone valley of Africa: Kigali, Rwanda

Smart cities contribute to societal performance - and infrastructural growth in evolving markets. According to isaafrica research, Africa is on the road of urbanisation with more than half the population to become urban by the end of 2035. While urbanisation and technology adoption is predicted to occur in different capitals around Africa at first, in some cities it has already begun.

Kigali is one of the most attractive smart cities on the African continent.

- Smart infrastructure: sensors around the city measure air quality, monitor

the power grid's safety and detect water leaks.
- Education: collaborating with renowned universities and offering talent from the whole continent a place to meet, learn, and develop.

Creating new jobs and driving the economy by technological advancement. Situated between rolling hills, in a series of valleys, you find Kigali. It might not come as a surprise that the area of the smart city Kigali pretty soon got nicknamed ***'The Silicon Valley of Africa'***.

Kigali is Rwanda's capital, and the country's economic heart focused on leapfrogging economic and social challenges. Everything in the smart city of Kigali is about improving the lives of the people in the town by providing knowledge and education. The effects of this strategy reach much further than just the town or country borders; talent from all over the African continent will be educated in Kigali.

Rwanda is already leading in technological advancement, which is one reason it is now one of the world's fastest-growing economies. The city is hosting well-known international universities and tech companies. An immense operation has been started to provide a good living- and work environment for the people driving the smart city initiatives in Kigali. The construction project alone will create 50,000 jobs annually.

The main goal for Kigali is to attract the brightest tech talents in Africa. Bringing together tech organisations and talent has already been a crucial success factor in the American Silicon Valley, and Kigali chooses to follow this example. To speed up their smart city ambitions, Kigali reached out to an investment fund in infrastructure projects: Africa50. Although the pandemic might have caused some delay, Kigali is maintaining its strategic direction towards an even smarter city.

Rwanda's capital is ambitious and not just in it for economic gain. This smart city also wants to find solutions for the challenges that public sector organisations and educational institutions face. Kigali is a great example of how the many possibilities of the Internet of Things (IoT) offer solutions to

Building a smart city from scratch: Konza, Kenya

- A smart city that is built from scratch with a National Data Center that provides anything digital a city requires.
- WiFi points all over the city and basic internet provision inside homes make sure that people are connected with each other and the Internet of Things.
- Collecting and sharing data is a big driver for overall inclusiveness and a smarter city.

The amazing story of Konza Technopolis in Kenya is an example to many cities around the world. Konza is a smart city built from scratch, meaning that the city doesn't have to deal with 'inherited' infrastructural or social challenges.

The vision of the Konza Technopolis organisation is clear: "[to be] a world-class city, powered by a thriving information, communications and technology (ICT) sector, superior, reliable infrastructure and business-friendly governance systems."

In 2009 the development of Konza started the urban design that is tech-powered and plans to house over 185,000 residents. If everything goes as planned, in 2030, Konza will have provided for 100,000 jobs. It stands

to reason that not every smart city can be built from scratch, but the learnings from Konza and its blank-canvas approach can be used by cities anywhere. Creating a new infrastructure focused on mobility can inspire infrastructural projects in crowded cities all over the world.

Konza is not only about building a smart physical infrastructure; it is also building a digital infrastructure that contributes to solving social challenges. One of the significant drivers in the Konza project is overall inclusiveness. The population of Konza will have direct access to all the data collected in the smart city. From traffic maps to detailed information on energy and water consumption. By sharing the data and letting people use them, the people of Konza are not only passive inhabitants of the city; they can participate directly in the operations of their smart city and practice more sustainable living patterns.

Already deemed the Silicon Savannah, Kenya's Smart City efforts are well underway. Konza Techno City, 60km from the centre of Nairobi, is currently in planning stages. The proposed satellite city will gather data from smart devices and sensors embedded in roadways and buildings, enabling optimization of traffic and infrastructure, smart communication services and improved citizen participation.

Cape Town leads with smart sensors and real time data

IoT and real time data analysis has taken a particular stronghold in South Africa, where the country struggles to meet demand for electricity, water and waste management. Through sensors implemented across the major cities, municipalities can gather real-time data from millions of objects, including water meters, electricity meters, waste bins, traffic lights and street lights.

Network providers like Sqwidnet help enable data collection and sharing from these networks of IoT devices. According to Financial Mail, Sqwidnet now covers all eight metros in South Africa, and will roll out to all national roads and additional cities and towns. Network coverage aimed to exceed 85% of the South African population by the end of 2017.

Benefits of this real time data can extend across farming optimization, to traffic management by informing travellers of congestion, crime management by using sensors that detect gunshots in crime zones, and waste management, in which metros are automatically informed by sensor-equipped bins when refuse needs to be collected.
Specifically, Cape Town's government has launched a four-pillar project in an effort to establish itself as a Smart City.

Cape Town smart pillars

Cape Town has been hailed as one of Africa's smartest cities, from its open data portal through which all data Cape Town registers from its citizens is made publicly available, to digital inclusion via free wifi enabled on city buses. Access to city data is just one small step in the external data revolution.

The city is already leveraging real time data efforts to improve emergency response, including fire and rescue, law enforcement and disaster risk management. The Cape Town Emergency Dispatch Centre was created to form one integrated public safety solution that facilitates operations and data sharing.

In line with this, IBM has launched a Fire Management Portal, taking fire incident data from the Cape Town open data platform and overlaying it with historical weather maps from IBM's own weather portal. The system can predict fire incidents of high and extreme risk incredibly well, allowing officials to prepare for emergency responses.

"South Africa is a tremendous growth and transformation story, yet its increasing population and healthcare delivery shortfalls continue to pose challenges in the country," said Solomon Assefa, director, IBM Research – Africa. "With the ability to detect patterns and discover new correlations, cognitive and cloud computing and the Internet of Things can provide potential solutions."

Conclusion: What will it take for African cities to truly become smart?

For smart cities to succeed, they won't only get people to live in them but also deliver their proposed potential. Theoretically, they're supposed to be socially inclusive for different earning classes. Cities will become decongested, and there'll be a new crop of opportunities for citizens to harvest. The problem with this pattern is that the city governments these firms partner with don't own the strategies. The firms, on the other hand, are not part of the execution. They only provide the paperwork. So, the cost falls back to the governments who agree to take on these projects. That's why smart cities are likely to succeed in super-rich countries like South Korea and the United Arab Emirates, which can afford to keep throwing money at projects until completion.

What will it take for this to happen in Africa?
It will take more than big budgets to make smart cities succeed in Africa. There's an obvious hindrance: cost. Land in these new cities is too expensive for the middle class. That narrows the market to a few wealthy people. For context, Singapore has an adult population of 4.9 million and a little under 270,000

millionaires in US dollars, while the whole of Africa has only 136,000 millionaires. So, it's either that people become rich enough to afford to live in these cities, or the cities become affordable.

Pricing, however, comes with a dilemma. Creating "utopic" cities is not cheap. You have to provide both infrastructure and security to residents. However, this also means that the narrative of social inclusion dies, as smart cities will become urban bubbles.

Moreover, the dream of smart cities is to house many multinational companies. But that'll mean these companies have to look beyond the way snags in Africa's cities give them low scores in the global index of ease of doing business.

Today, most cities don't even do an Environment, Social and Governance (ESG) audit to control pollution and carbon emissions. Yet they are quick to construct skyscrapers and expressways that only raise city temperatures as they use high-carbon cement in their construction. Only Kigali seems to take the issue of ESG seriously.

Finally, city life needs to improve generally. Existing cities can become 'smart' when taken seriously. ***"It's far more realistic to rebrand cities than to build new ones".*** As is the case of Johannesburg, it is key for the city to rather rebrand itself incorporating smart principles.