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The 2019 Deloitte City Mobility Index

Methodology

We chose more than 60 unique data parameters based on a review of existing literature, their correlations with economic growth, and our research team's analysis. Data was gathered from a variety of sources, including government statistical databases, third-party reports, private vendors, and nongovernmental organizations. We then brought in the qualitative judgments of a variety of experts both inside and outside Deloitte on urban mobility or particular cities.[1]

We assigned each metric a score between 1 and 5 based on the data parameters within it. Depending on the metric, score assignment involved converting a qualitative assessment into a number, indexing data to create a relative score, or both. We applied some data parameters and metrics to more than one theme.

To look specifically at a city's readiness for the future of mobility,[2] we focused more closely on the parameters that dealt with "smart" or "digital" elements of transportation. In particular, the DCMI looks at *integrated and shared mobility*, *vision and strategy*, *innovation*, *regulatory readiness* for the *future of mobility*, and *ease of use*. The metric scores were then averaged. "Five" indicates being closest to full future of mobility readiness. (Figure 3.)

The data was collected for the years 2016 and 2017 (or earlier where newer data did not exist). Unless specified otherwise, this information is no more than five years old. In some instances, trend data was collected, but predominately the data was cross-sectional for the latest year.

In all, we examined more than 50 cities. (Profiles of 18 cities were published in January 2018 and additional cities were added in the following months.) Cities were selected to achieve geographic distribution, a variety of sizes (population and area), and various levels of economic development.

Of course, any effort to create a composite measure such as this is a product of choices and assumptions made along the way. Ours were guided by a view of how seamless urban mobility that is faster, cheaper, safer, and cleaner than today could look, and the important contribution such a system can make to prosperity and productivity. Places that had multiple modes of easily accessible transportation; that had placed an emphasis on walking, biking, and public transit relative to personally owned automobiles; and that had taken steps toward digitally enabling their mobility network received high marks. Different choices and assumptions, guided by a different vision, would necessarily yield different results. In addition, the DCMI currently presents a snapshot, not a trajectory. It does not capture how cities have trended over time, nor can it evaluate how past investments have affected mobility. As we update the data every year, a more robust picture will emerge.

To read the full report, visit: www.deloitte.com/insights/mobility-index

FIGURE 1

Deloitte City Mobility Index themes, metrics, and data sources

THEME ▼	METRIC ▼	EXAMPLE DATA ▼	
Performance and resilience	**Congestion**	• Peak hours spent in congestion • Congestion level	• Driving time to city center (10 km drive from each cardinal direction, peak hours) • Dedicated bus lane in km
	Public transport reliability	• Percentage of metro/tram delays • Percentage of bus delays	• Average waiting time for public transportation (in minutes)
	Transit safety	• Road quality • Walkability score	• Number of traffic-related fatalities • Number of traffic-related serious injuries
	Integration and shared mobility	• Existence of open data or APIs for transport • Existence of integrated ticketing option across transport modes • Carsharing system in the city	• Bikesharing system in the city • Existence of MaaS-based application • Private car dependency
	Air quality	• Annual mean of PM2.5 concentration • Annual mean of PM10 concentration	• Carbon dioxide per capita emissions • Air quality index
Vision and leadership	**Vision and strategy**	• City innovation and Future of Mobility strategy	• Regulatory collaborations and joint initiatives with the private sector and academia
	Investment	• Transport budget as a percentage of the total local authority/city budget	• Investment levels in transport
	Innovation	• Electric vehicles (EVs) adoption • Existence of open data or APIs for transport • Smart transportation/FoM-focused accelerators/venture capitals/startups	• City rank in IESE Smart Cities index • City innovation and Future of Mobility strategy • Existence of MaaS-based application
	Regulatory environment	• Operation of ridesharing companies • Number of regulatory bodies • City innovation and Future of Mobility strategy	• Regulatory collaborations and joint initiatives with the private sector and academia • Autonomous vehicles (AVs)–city support
	Environmental sustainability initiatives	• Transport sustainability score • Sustainability plan score • Length of bicycle lanes (in km) • EV incentives	• Cars sold/registered in given year that are low carbon dioxide (BEV or PHEV) • Dedicated bus lane (in km) • "Environmentally friendly" modal share (includes public transport, walking, and cycling)
Service and inclusion	**Public transit supply**	• Rail system length (in km) • Number of light rail stops • Length of bicycle lanes (in km)	• Metro/subway average peak frequency (in minutes) • Dedicated bus lane (in km) • Average waiting time for public transportation (in minutes)
	Transport affordability	• Monthly public transport cost (in US$) • Fuel price per liter (in US$) • Average parking price (in US$) • Average cost of taxi (in US$)	• Minimum daily wage (in US$) • Modal share divided into percentage of trips by cars, public transport, cycling, walking, and other modes such as taxi, ferries, etc.
	Versatility	• Presence of tube or commuter rail system • Presence of tram system • Operation of ridesharing companies • Carsharing system in the city	• Presence of dedicated rapid bus transport • Presence of other modes of transport: rickshaw, taxis, ferries, etc. • Bikesharing system in the city • Private car dependency
	Customer satisfaction	• Customer satisfaction with public transport I • Customer satisfaction with public transport II • Road quality	• Congestion level • Average waiting time for public transportation (in minutes)
	Accessibility	• Transport accessibility score • Accessibility of bus fleet (in percentage)	• Accessibility of train or metro fleet (in percentage) • Walkability score

Source: Deloitte analysis.

Endnotes

1. The sources of data included:

   - **2thinknow data**: Data sources purchased from 2thinknow, a research company based in Australia that focuses on analysis of cities. Data points include metro/subway average peak frequency, taxi rate per km, traffic-related injuries and casualties, and others (14 data points in total).
   - **Government statistical databases**: Including census reports, economic statistics, and geographical information.
   - **City and state/province websites**: Including US Department of Transportation, city transport authority websites.
   - **External reports and indexes**: Including Movmi Shared City Mobility Index, INRIX Global Traffic Scorecard, TomTom Traffic Index, Waze Driver Satisfaction Index, IESE Smart Cities Index, Arcadis Sustainability Index, Easy Park Smart Cities Index, Moovit average waiting time for public transportation survey.
   - **NGO reports**: These include the road quality rating provided by World Economic Forum, Particulate Matter (PM2.5 and PM10) reports by World Health Organization, European Alternative Fuels Observatory, OECD, CDP, and American Public Transportation Association.
   - **Qualitative analysis**: Done mostly by the Deloitte USI team. For example, evaluation of EV and AV regulation, operation of ridesharing companies.

2. See Scott Corwin, Joe Vitale, Eamonn Kelly, and Elizabeth Cathles, *The future of mobility: How transportation technology and social trends are creating a new business ecosystem*, Deloitte University Press, September 24, 2015; and Scott Corwin, Nick Jameson, Derek M. Pankratz, and Philipp Willigmann, *The future of mobility: What's next?,* Deloitte University Press, September 14, 2016.

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