Supplementary Materials

This part includes five supplementary tables, which are first-hand data table summarized from the five SDGs, these tables totally follow SDGs' original expression and details. These five first-hand tables present guideline's logic. In addition, all the five tables have processed again according to the logic of the paper and put them into the paper finally.

Table S1: The applications of smart technologies in the Beijing SDGs based on guideline's logic

Technical category	Object	Purpose	Description
Traffic assistance	Bus Stop	Optimize route	Build a bus information platform using big data to provide bus arrival information
	Shared Bicycle	Promote low-carbon transport	Smart parking piles with mobile application platform can grasp the situation of the bicycle in real time and standardized the use of bicycles
	Vehicle Lane	Improve driving efficiency	Set up traffic lights to form green-wave belt, dynamically add reversible lanes
	Parking Lot	Optimize parking resources	Build a perfect smart parking and charging system to promote the realization of shared parking resources
Facilities interaction	Light Pole	Collect multiple data	Smart light pole integrates traffic flow detection, pedestrian detection, road emergency detection, traffic guidance, communication base station, Wi-Fi detection, environmental detection, alarm call and LED lighting functions
	Streetlamp	Optimize lighting	Use timed, photoelectric control, automatic flow induction functions
	Public Toilet	Provide health services	Innovate and integrate multi-dimensional smart service models and improve the layout of public toilet
	Urban Furniture	Provide interactive self-service	Encourage public phone booths, newsstand, bus stops, waste bins, manhole covers and other facilities to carry out functional integration and transformation, and set up interactive information systems to provide all kinds of information, self-service retail, recreation, Wi-Fi, charging pile and other services
	Public Art Installations	Enhance inter-actions	The media of sound, image, smell and tactile experiences are expanded through urban furniture and public art equipment
Environmental Monitoring	Comprehensive Platform	Improve efficiency	Carry out data analysis terminal and automatic identification of special cases to realize real-time electronic warning to assist public security prevention
	Smart Device	Share various data	Interaction of apps, roadside electronic alarm, smart parking cloud platform, express delivery and newsstands

Table S2: The applications of smart technologies in the Shanghai SDGs based on guideline's logic

Technical category	Object	Purpose	Description
Space intensification	Municipal Facilities, Urban Furniture	Save street space	Encourage the use of "multi-purpose for one rod and box" and control the occupied proportion of facilities less than 20%, and the interface attachment rate of smart facilities should reach 60%
Efficient transportation	Signal Light	Improve traffic efficiency	Smart traffic lights will be set up to form a green-wave traffic belt and a special bus signal system will be set up to ensure priority for public buses

	Bus Stop	Provide real-time bus information	Create an electronic bus stop board, provide multi-media and passenger complaint information
	Shared Bicycle	Combined with the bus system	Improve the combined transportation of the public transportation system and the bicycle rental point, search the location of the surrounding rental point, the number of available bicycles for loan, and make reservations for borrowing and returning
	Parking Lot	Coordinate parking conflicts	Popularize the city's roadside parking space management, the city's parking guidance and parking space induction system
	Traffic Information Panel	Improve information coverage	Integrate traffic information and query terminal along the street, through the terminal can be used to query for all kinds of traffic information and reduce the dependence on apps
Safety protection	Audio and Video Surveillance Installations	Keep security	Video and audio monitoring installations should be popularized to realize full coverage and warning for natural disasters. It is suggested that relevant departments build a platform to analyze the data provided by terminals and automatically identify special situations, so as to improve the level of security services
	Signal Light	Focus on vulnerable people	Provide sound prompts of signal lights at crossings, set up infrared sensing prompts at pedestrian crossings, and set up emergency call facilities at event-prone locations, which should be combined with street facilities such as signal lights
Information interaction	Advertising Electronic Screen	Provide living information	It is recommended to set up electronic screens in crowd gathering places to promote the real-time release of public security prevention. The information release screen can be used to provide life, service, business, medical and other information, and the screen can be combined with advertising facilities
	Newsstands	Provide life service	Provide self-service retail, charging pile, Wi-Fi, express delivery, mobile payment and other services
	Public Art Installations	Trigger public activities	Important public space can set art installations to expand the sound, image, smell and tactile experiences
Urban environment	Streetlamp Shade	Collect environmental data	Add environmental detection sensors to carry out real-time monitoring of noise, air quality and temperature along the street. The coverage rate of environmental monitors, the monitoring proportion of key pollution sources and the monitoring rate of water quality should all reach 80%
	Light Pole	Save energy	The light pole adopts control functions such as timed, photoelectric control and automatic induction of human flow
	Garbage Can	Reduce pollution	Use solar energy to compress the garbage volume, and notify sanitation personnel to transfer
	Green Irrigator System	Saving water	Through humidity sensing, the irrigation time and water volume are intelligently adjusted to achieve dynamic management

Table S3: The applications of smart technologies in the Shenzhen SDGs based on guideline's logic

Application Scenario	Object	Purpose	Description
Urban Activities perception	Refined transportation system	Record human and vehicle data	Radar, geomagnetic, thermal sensing, satellite positioning, IoT and other technologies are used to record the types and quantities of vehicles and the spatial-temporal characteristics of human flow
	Underpass	Reduce crime rates	Use "Sound tunnels" to provide a responsive space in the city's underground, and increases the safety and

			vitality through interactive experiences with light and sound
	Urban Furniture	Provide life services	Trash can have automatic compression, collecting data with IOT and classification; newsstand are equipped with charging, Wi-Fi, self-service shopping and other functions
Management of Infrastructure	Street infrastructure	Improve work efficiency	Use the IoT to build a full range of street infrastructure monitoring, to achieve infrastructure operation, monitoring, early warning, management and other life cycle management
Environmental Monitoring	Streetlamp Shade	Collect environmental data	Popularize environmental monitoring sensors to monitor air pollutant, street noise, temperature and humidity, wind speed, and key pollution sources
Travel Assistance	Information Panel	Provide traffic information	Establish a comprehensive information panel through smart street lights and public green traffic ways to provide information about the transportation system of buses, subways, buses, trains, planes and ferries information
	Composite Transportation System	Establish a barrier-free travel system	The establishment of personalized travel demand customization for the elderly, the weak, the disabled, pregnant and other groups, combined with barrier-free facilities for customized decision-making before travel
	Smart Life Micro-Hub	Improve work efficiency	The smart micro hub is used to customize the "shift level" connection of transportation services according to needs, and coordinate the connection between leasing, purchasing, office and other activities
Transportation Control	Safety Devices	Improve safety at street crossings	Infrared thermal imaging facilities are used to monitor pedestrian tracks. Ground signal lights, pedestrian induction flash lights and smart spikes are installed to ensure pedestrian safety
	Signal lamp sounding device	Protect the visually impaired	Visually impaired people can identify signal lights by sound, and the volume is automatically adjusted according to ambient noise
	Shared Bicycle	Optimize parking resources	The bicycle parking area, business district, office area, residential area and public transportation station are jointly planned, and the bicycle information is obtained through mobile phone terminal

Table S4: The applications of smart technologies in the Nanjing SDGs based on guideline's logic

Technical category	Object	Purpose	Description
Smart Transportation	Bus Corridor	Improve the efficiency of public transportation	The main traffic road is equipped with special bus corridor, and establish the special bus signal system
	Signal Light	Improve urban efficiency	Combined with the monitoring of traffic flow to form "green wave traffic". Considering the travel demand of vulnerable groups, the signal light sound prompt device, infrared induction prompt device and distress calling facility are added
	Traffic Monitoring System	Improve traffic efficiency	All kinds of smart traffic monitoring facilities are set up near road intersections to realize intelligent management of traffic flow
	Parking Lot	Optimize parking resources	Encourage parking space sharing in cities, improve coverage of parking guidance systems and provide automatic hourly payment systems

	Bus Stop	Provide information	Equipped with GPS positioning system, combined with weather data to provide travel guidance
	Shared Bicycle	Combined with the bus system	The bicycle rental point should be set up in combination with bus stations and public areas with dense flow of people, and connected with the app terminal
Space intensification	Light Pole	Save space	On the premise of the standards, the street light pole and the traffic facility pole should be integrated, and the signal lamp, traffic monitoring, environmental monitoring and other sensors should be integrated
	Streetlamp	Save energy	Encourage the use of inductive sidewalk street lamps to provide targeted lighting
Convenient Living	Newsstand	Provide life services	Furniture such as public phone booths and newsstands can be centralized and integrated through renovation, introducing multimedia data terminals to provide street and surrounding information inquiry, and equipped with WIFI hotspot function to transition to media information terminals
	Trash Can	Reduce pollution and emission	With automatic garbage compression and full capacity reminder function

Table S5: The applications of smart technologies in the Qingdao SDGs based on guideline's logic

Technical category	Object	Purpose	Description
Information Technology for Acquiring City Data	Oblique Photography Technology	Collect information on the physical spaces of streets	The oblique photography technology is used to collect the data information of street form, color and texture, and analyze the sight corridor, landscape corridor and city skyline
	Portrait Technology	Improve business vitality	Based on the POI data, the advantages and patterns of street business forms were analyzed, and the characteristics of the crowd were analyzed to make portraits, so as to match the business forms and stimulate the vitality of the streets
	Emergency callbox	Optimize information dissemination channels	It is equipped with high-density networked urban data sensors to realize the perception of urban micro-environment changes and the prediction of future spatial-temporal development trends. An early warning information system shall be established to monitor, predict and warn all kinds of emergencies such as natural disasters, accidents and public health
Transportation Assistance	Vehicle Lane	Improve driving efficiency	According to the passenger flow data of lines and stations, passenger-vehicle flow data of different periods and big data of people's travel, the intelligent cloud computing platform is used to conduct intelligent scheduling for buses, taxis, online ride-hailing, rail transit and static parking
	Signal light	Improve urban efficiency	The smart signal light at the intersection collects real-time traffic flow, and form the green wave traffic belt at the intersection intelligently optimize. When an emergency occurs, the traffic flow data automatically allocates the signal light time, and the green life belt is customized for ambulances and fire trucks immediately
	Bus Corridor	Improve the efficiency of public transportation	Combined with the important bus corridor to establish a special bus signal system, to ensure the priority of public transport, improve efficiency
Convenient Living	Street lamp	Collect environmental data	The "smart street lamp" with photoelectric control and self-movement mode of human flow will be adopted, and the multi-sensor intensive rod mode such as 5G base

		station, Wi-Fi coverage, electric vehicle charging, air quality monitoring and monitoring networking will be promoted
Electronic information screen	Provide handy information	The electronic information screen is set up in the crowd gathering place, and all kinds of travel related information can be queried through the terminal
Mobile baby care room	Provide health services	The mobile baby care room can be set up in combination with the store, or can be set up independently in the street facilities. It is suggested to combine solar energy facilities, power supply by itself, and realize the intelligence of internal facilities
Newsstand	Provide life services	To stimulate the memory and vitality of the city, more self-service retail, leisure and entertainment, charging piles, Wi-Fi and express collection services will be added