Agency for Strategic Development and Reforms
under the President of the Republic of Uzbekistan

Modern Models of Agglomeration Development and Prospects for Their Adaptation in Uzbekistan



Abstract

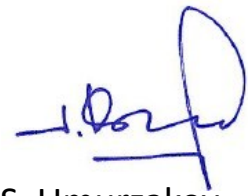
In today's global architecture, **urban agglomerations** act not merely as geographic clusters of settlements, but as key **drivers** of national economic growth and centers of human capital concentration. By forming unified labor markets, integrated transport frameworks and shared resource management systems, they generate powerful economies of scale, which make it possible to effectively **accumulate investment** and stimulate **innovation**.

For **Uzbekistan**, which is rapidly undergoing economic transformation, demographic growth and dynamic **urbanization**, amid mounting infrastructure pressure, water scarcity and climate change, it is particularly important to use **agglomeration models** to ensure sustainable spatial and socio-economic development in the long term.

In this regard, the study examined current **global trends** in agglomeration development, the most **successful foreign models** for managing urbanized clusters, as well as the typical **systemic challenges** that states face in the course of accelerated urbanization.

In addition, the study analyzed the **ongoing reforms** in this area and the current state of emerging agglomerations in **Uzbekistan**, including the **Tashkent agglomeration** and regional growth centers, and identified the key infrastructure, transport, environmental and institutional constraints on their development.

Based on this analysis, **proposals** were developed for introducing more systemic approaches to agglomeration management, aimed at establishing a **balanced polycentric settlement model** capable of striking a balance between economic growth, the quality of the urban environment, infrastructure resilience and the preservation of ecological equilibrium.



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I. Global Trends in Agglomeration Development: Models, Technologies and Systemic Challenges



Today, the global urban landscape is defined by a shift from isolated **megacities** to global **networked agglomerations** that blur the boundaries between the center and the periphery. The key characteristics of such systems are high **building density**, "seamless" **transport connectivity** and unified social and digital **infrastructure** that adapts to the needs of **millions** of residents in real time.

This model can be observed in practice in many countries: **China**, where the **Greater Bay Area** has become a "seamless" economic mega-cluster built around the concept of "one-hour accessibility", **Japan**, whose **Greater Tokyo** has become the ultimate embodiment of the transit-oriented development strategy, or **Germany**, which has merged cities such as **Cologne**, **Düsseldorf**, **Dortmund** and **Essen** into a single network – the **Rhine-Ruhr** region.



Today, **9** of the world's **10** largest agglomerations are located in **Asia**, including **China**, **India**, **Indonesia** and **Vietnam**. Since **2003**, **Asia** has been steadily outpacing **North America** in the number of buildings over **200** m tall, and the gap has now become **fivefold**. **China** is **the absolute leader**, with more than **3,000** skyscrapers – more than **triple** the figure for the **United States**.

Nevertheless, Western agglomerations such as **New York**, **London** and **Paris** retain their **leadership** in GDP per capita and concentration of financial capital. **New York**, for example, with an economy of **$2.6 trillion**, remains the most powerful **global financial hub**.

However, the gap is rapidly narrowing owing to the rise of Asian technology hubs such as **Shenzhen** and **Bangalore**. Thus, in **2025**, the **Greater Bay Area**, which comprises **11** cities including **Shenzhen**, **Hong Kong** and **Guangzhou**, topped the global ranking of innovation clusters, outperforming the "**Tokyo**–**Yokohama**" agglomeration and "**San Jose**–**San Francisco**" ("**Silicon Valley**").

Modern urban studies distinguish **three** dominant types of agglomerations, each of which dictates its own logic of infrastructure development:

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a. **monocentric agglomerations** – develop around a single central **business district** that serves as the main source of employment, while the periphery functions as "**dormitory suburbs**"; examples include cities such as **Moscow**, **Manila** or **Jakarta**.

Despite being widespread, this is the most vulnerable type of structure, as it generates "**pendulum**" migration that in almost **100%** of cases leads to **transport collapse**; therefore, in their pure form, monocentric models are **viable** today only where high-speed transport is available;

b. **polycentric agglomerations** – are a network of several equal-ranking **node cities** linked into a single economic system. In this model, the load is distributed evenly, while each city retains its own **specialization**.

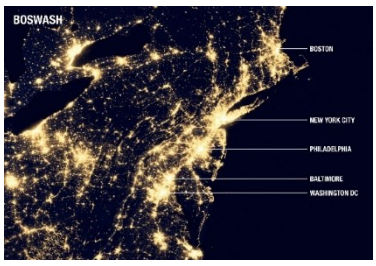


A classic example is the aforementioned **Rhine-Ruhr** region in **Germany**, the country's largest agglomeration and one of the largest in **Europe**, with a population of **10** million, where **Düsseldorf** is the financial center, **Cologne** an important logistics and trade hub, **Essen** the center of energy and heavy industry, and **Dortmund** a major technology park.

c. **linear agglomerations** – form along major transport or natural axes, the so-called "**corridor cities**". The "**gold standard**" of this model is the **Tokaido** corridor – a virtually continuous **urbanized zone** stretching along the Pacific coast of Japan's **Honshu** Island, as if "strung" along the "**Shinkansen**" high-speed rail line.



An equally well-known example is the American "**BosWash**" corridor, a linear urban chain consisting of **Boston**, **New York**, **Philadelphia**, **Baltimore** and **Washington**, which have literally grown together along the federal **I-95** highway and the **Amtrak** rail line, together accounting for about **20%** of **US** GDP.



The transition from classic cities to highly complex agglomerations is driven not only by demographic processes but also by a **fundamental shift**

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in the economy and technology, namely by the effect of **three factors** that make the traditional city model economically and socially inefficient:

1. "**Economics of density**"

The modern post-industrial economy requires a critical mass of talent, capital and ideas in one place. Concentrated at the scale of an agglomeration, this critical mass triggers the mechanism of "**economics of density**": owing to the proximity of participants, knowledge spreads instantly, turning the system into a catalyst for the growth of **total factor productivity** (**TFP**).

***For reference**: total factor productivity (TFP) is an indicator of economic **efficiency** that, in the context of agglomerations, reflects the extent of the "**synergy effect**": it grows through the introduction of new technologies, improved quality of governance and intensive knowledge exchange among market participants. Growth in **TFP** means that the city's economy is becoming "**smarter**" and **more productive**, creating more value with the same available resources.*

Here, value added grows faster than material costs, which transforms the agglomeration into a **self-sufficient ecosystem** whose output often exceeds the GDP of entire countries. Today, the world's **600** largest cities generate about **60%** of global GDP, while the economic center of gravity is rapidly shifting toward **developing countries** – according to experts at the **McKinsey Global Institute**, in the coming years this list will be joined by another **136** cities from the **Global South**.

2. **Crisis of traditional infrastructure**

At the current stage of development, most large monocentric cities have reached the **limit** of their capacity and are unable to cope with the load on power grids, water supply systems and, above all, transport.

Creating **network structures** and "**satellite cities**" appears to be the only viable way to disperse pressure on the environment and on housing and utility services while maintaining **high living standards**.

3. **Technological transformation**

Today, participation in economic and social life depends less and less on living directly in the central core of a megacity, thanks to the development of **transport** and **digitalization**. The key technological drivers of the transition to agglomeration development models are:

a. "**Digital twins**" – for example, **Japan** is actively implementing the **PLATEAU** project, creating detailed 3D city models to simulate disaster protection, optimize energy consumption and manage traffic. Unlike simple maps, this is a **semantic model**: it "knows" what **material** a building's roof is

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made of, what its **seismic resistance** is and how many people are inside, enabling city authorities to make decisions in real time;

b. **Seamless multimodal mobility** based on the "Mobility as a Service" model (**MaaS**), which integrates various modes of transport into a single "**seamless**" chain to combat excessive car dependence. In **Columbus** (**USA**), for example, introducing this model reduced emergency service response times by **15%** and their total travel time by **17%**.



c. **Internet of Things** – in the urban context, this refers to an extensive network of sensors embedded in engineering and social infrastructure. As the experience of **Amsterdam**, **Portland** and **Barcelona** has shown, their use makes it possible to radically reduce the operating costs of maintaining the urban environment – the so-called "**scale tax**", which in traditional megacities grows in proportion to population.

However, despite their enormous economic potential, the development of modern agglomerations faces **serious challenges**:



a. **Climate vulnerability** – many large agglomerations, such as **New York** or **Abidjan** (**Côte d'Ivoire**), are located in low-lying coastal areas, so sea-level rise and extreme storms pose a **direct threat** to their existence.

In extremely dense agglomerations such as **Delhi**, air temperatures can be **5-10°C** higher than in the surrounding suburbs, as concrete and asphalt accumulate **solar heat**, and the lack of "**green corridors**" prevents natural cooling.

b. **Social inequality** – the high cost of living in innovation centers and the "**gentrification**" of prestigious neighborhoods push low-skilled workers out to the distant periphery, increasing their transport costs and heightening social tension. In **Africa** and a number of **South Asian** countries, this process is exacerbated by the explosive growth of **informal settlements** (slums), home to a significant share of megacity populations and cut off from basic infrastructure and the formal labor market.

c. **Erosion of privacy** — the "smart city" model, based on extensive data collection for AI-driven management, inevitably leads to the creation of systems of total surveillance over citizens. In such megastructures, **every step a**

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resident takes is recorded by sensors, facial recognition cameras and digital financial footprints. Under these conditions, the central theme of political and public debate becomes the **balance** between urban governance and people's right to privacy.

d. **Threat of fragmentation** – as studies in **China** show (in particular, analysis of the productivity of coastal clusters), unlimited sprawl of subcenters can lead to the loss of the "**agglomeration effect**". When linkages become too extended, the phenomenon of "**negative polycentricity**" emerges, in which "**satellite cities**" do not complement each other but compete for the same investment and human capital.

Summarizing the analysis of global trends, it can be concluded that in **2025-2026** competition between states is definitively shifting to the level of **competition between agglomerations**, which are becoming centers of attraction for financial and intellectual capital and the main generators of economic growth and innovation. The "**ideal agglomeration of the future**" is a flexible, polycentric ecosystem that maximizes **total factor productivity** (TFP) while maintaining high standards of inclusiveness and environmental sustainability.

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II. Current State of Agglomeration Development in Uzbekistan

Uzbekistan is currently the most **populous** country in **Central Asia**, accounting for about **45%** of the region's total population. With a population that already exceeds **38 million** people and annual **growth** of **700-800 thousand** people, the country faces unprecedented pressure on its existing infrastructure, especially in **urban areas**.

The situation is made particularly acute by the **uneven** distribution of the population: in the **Fergana Valley**, density already reaches **700-800** people per **1** km^2, comparable to the most densely populated provinces of **China** or **India**. According to forecasts by the **UN** and experts from the **Institute for Macroeconomic and Regional Studies** (**IMRS**), by **2050** the urbanization rate in **Uzbekistan** will exceed **54%** (compared with the current **51%**), which means an influx of an additional **7-9 million** people into cities over the next **two decades**.

This "**demographic tsunami**" turns urbanization from a socio-economic process into a matter of **national security** and renders the traditional model of infill development in **Uzbekistan** insufficiently effective.

The only way out is a transition to **organized agglomerations** capable of absorbing such an influx of population without infrastructure collapse. It is their sustainable and planned development that will determine whether this growth becomes a "**demographic dividend**" or a "**demographic burden**".

Within the current settlement structure of **Uzbekistan**, **three types of agglomerations** can be clearly distinguished, each playing its own unique role in the country's socio-economic landscape:

1. Tashkent agglomeration – the only fully formed international-level agglomeration in the country, uniting the capital and the dynamically developing adjacent districts of **Tashkent Region** and concentrating the bulk of financial, administrative and intellectual resources. As a result, it generates the region's strongest "**economics of density**", enabling **Tashkent** to compete for the status of the main agglomeration hub of **Central Asia**.

This extensive agglomeration includes the largest **satellite cities**: **Gazalkent**, **Keles**, **Nurafshan**, **Chinaz**, **Chirchik** and **Yangiyul**.



These satellite centers are not classic "**dormitory suburbs**" – on the contrary, they perform **specific functions** within the regional

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division of labor. For example, **Chirchik** historically developed as a major center of the chemical industry and mechanical engineering, **Almalyk** was built as a single-industry town around the backbone **Almalyk Mining and Metallurgical Combine**, and **Angren** is one of the largest regional centers of the coal industry.

A specific and extremely important feature of the **Tashkent agglomeration** is the high share of settlements that retain a pronounced **semi-agrarian character**. Unlike classic Western metropolises, where suburbs are zones of continuous **low-rise development**, the periphery of **Tashkent** represents a large-scale phenomenon of "**rural urbanization**" – a deep fusion of rural and urban forms of life, architecture, employment and mentality.

On the one hand, this symbiosis acts as a kind of **shock absorber** for social tension: in periods of economic turbulence or inflationary spikes, the agricultural component of households ensures **food security**, while urban employment guarantees the necessary **cash inflow** to pay for utilities and purchase goods.

On the other hand, such blurring of the boundaries between city and countryside creates **certain challenges** for planning the engineering development of territories and raises the issue of a "**triple balance**" between preserving **highly productive land** for agricultural employment, providing the population with **affordable housing** and maintaining the resilience of the **local ecosystem**.

2. Large regional centers – the cities of **Samarkand** and **Namangan**, which serve as powerful regional growth poles. For example, **Samarkand** has in recent years been steadily transforming from a compact historic city with a strong **tourism focus** into a large regional agglomeration aspiring to become the country's **second** macroeconomic pole.



A distinctive feature of the **Samarkand agglomeration** is its historically rooted high degree of ethnocultural diversity: for centuries this territory saw the **interpenetration** of Uzbek, Tajik, Iranian and other cultures, which ultimately shaped a unique environment that has traditionally stimulated entrepreneurial activity, trade, crafts and services, making the city's economy **highly adaptive** to external changes.

Notably, development within the agglomeration does not follow a purely **centripetal vector**. Some nodes have their own gravity. For example, **Urgut**, while formally a satellite within the **Samarkand agglomeration**, is itself a major

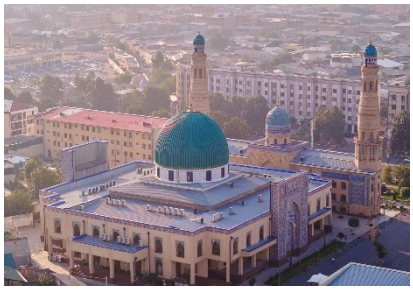
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trade and industrial cluster; consequently, commuting in the region is not two-way but multidirectional and **inter-district** in nature.



Against this backdrop, **Namangan** is increasingly positioning itself as an industrial and logistics center. In particular, according to expert estimates, in the medium term the population of **Namangan** will officially reach **1 million** and the city will officially attain the status of a **million-plus city**, which will require new, more effective urban governance tools to ensure its economic efficiency and infrastructure resilience.

3. Subregional nodes – a category that includes the unique emerging polycentric "**Fergana–Margilan**" agglomeration, as well as the rapidly growing regional centers of **Bukhara**, **Andijan** and **Karshi**. Their growth contributes to a relative stabilization of the country's settlement pattern and slows the process of **hypercentralization** around **Tashkent**.



Particularly noteworthy is the integration of **Fergana** and **Margilan**, a classic example of the **polycentric model**, where **two** cities have effectively grown together into a single production and social system. These centers are separated by relatively short distances filled with a continuous zone of **high-intensity agriculture** and an unbroken chain of small settlements, making the physical boundaries of the cities virtually indistinguishable from space.



Andijan, the administrative center of the region of the same name, is a key eastern industrial and logistics outpost of **Uzbekistan**, especially in the context of the construction of the **China–Kyrgyzstan–Uzbekistan** railway.

Its uniqueness lies in the fact that, on the one hand, given the high population density in the **Fergana Valley**, over time it will naturally "merge" with **Namangan** and the "**Fergana–Margilan**" agglomeration. On the other hand, thanks to its geographic proximity and strong economic and transport ties with **Osh** in Kyrgyzstan, **Andijan** has every chance of becoming the "**core**" of the **first** cross-border agglomeration in **Central Asia**.

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The **key trends** and agglomeration development projects in **Uzbekistan** include the following:

a. The "**New Tashkent**" project – an initiative to move from the capital's traditional radial-ring development structure to a "**twin city**" model. The new district, covering about **20,000 ha**, will be developed to the east of the city's current boundaries.



Its key goal is to relieve the historic center of **Tashkent** and to address dense development, traffic congestion and deteriorating utility networks. The concept of the new district is based on the "**15-minute city**" principle: all necessary social infrastructure will be within **walking distance**.

At least **30%** of the territory will be allocated to parks and public gardens. The main "**green lungs**" of the new city will be the **Central Park** covering **420 ha**, where about **200,000** trees are to be planted. Plans also include the construction of a **21**-kilometer light rail line (LRT) and a new metro line that will be seamlessly connected to the **Tashkent** Metro. The closest international analogues of this project are **Putrajaya** (**Malaysia**), **New Cairo** (**Egypt**), **Sejong** (**Korea**) and **Navi Mumbai** (**India**).

b. **A paradigm shift in urban infrastructure development** – the period of spontaneous urbanization is giving way to a stage of strict regulation and a transition to a "**responsible development**" model: since **2026**, the focus in **Uzbekistan** has definitively shifted from the "**race**" for square meters to compliance with environmental and engineering life-support standards.

In particular, from this year, **stricter rules** for building development are coming into force, including:

– a **complete moratorium** has been introduced on adding floors and attics to existing apartment buildings (especially those built in the **1960s**–**1990s**). This is reinforced by the introduction of a system of **electronic passports** for buildings that records the actual condition of structures. Any reconstruction now requires a **digital assessment** of seismic resistance that takes into account the increased soil density in the center of the capital;

– **introduction of digital general plans** (master plans) that limit building density in favor of "**green zones**" through a system of requirements for developers; as a result, by **2030** green space in **Tashkent** is planned to be increased to **8 m²** per person;

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– **an automated monitoring system** now blocks the issuance of a cadastral passport for a property if **deviations** from the GIS-approved design were made during construction (for example, additional floors or fewer parking spaces). This rules out legalizing unauthorized buildings through court decisions, as was the practice during the period of "**spontaneous urbanization**".

c. Decentralization through "secondary" agglomerations – under the balanced settlement strategy, the state is actively encouraging the **delegation** of key functions from the center to the regions. This is reflected not only in the development of regional centers as places of residence, but also in the **transfer** to them of certain economic, educational, logistics and service functions previously concentrated mainly in the capital.

d. Greening of agglomerations – the environmental agenda is gradually becoming one of the **key** drivers of agglomeration development in **Uzbekistan**, especially against the backdrop of deteriorating air quality, water scarcity, rising **car ownership** and high building density. In these conditions, the state is paying increasing attention to greening, the introduction of energy-saving technologies, public transport development and curbing chaotic urbanization.



For example, in recent years the **Tashkent agglomeration** has shifted to a more active policy of reducing **PM2.5** concentrations and overall air pollution levels. To this end, in line with new environmental requirements, by September **2026** all combined heat and power plants in the capital and the surrounding region were to be equipped with modern filtration systems with an efficiency of **95-99%**.

In addition, a system of **color-coded environmental labeling** for vehicles ("**red**", "**yellow**", "**green**") based on emission levels is being introduced, and in new developments it is legally prohibited to block natural aeration corridors that provide **ventilation** of the urban environment.

Under the "**Yashil Makon**" program, **Tashkent** and other major agglomeration hubs are being surrounded by **forest plantations** and "**green**" belts designed to mitigate the impact of dust storms, reduce the **overheating effect** in the urban environment and enhance the environmental sustainability of territories. At the same time, requirements for **urban planning policy** are being tightened: for buildings over **12 meters** high, at least **30%** of the adjacent area must be allocated to greenery and public spaces.

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In parallel, the country is introducing **water recycling** systems and digital metering of resource consumption, which should eventually save at least **7 billion m^3** of water. Along with this, measures are being taken to improve the **energy efficiency** of buildings, modernize **utility infrastructure** and expand **resource-saving** construction practices.

In waste management, the target is to raise the **waste recycling** rate in major agglomeration hubs to **65%**, including through the construction of **6 new plants** generating electricity from municipal solid waste, gradually moving from the extensive model of primitive landfilling to **circular economy** mechanisms.

Internationally, **Uzbekistan** is actively promoting the concept of "**balanced urbanization**", aimed at overcoming the excessive concentration of resources in the capital agglomeration through accelerated development of **medium-sized and small cities**, which are to become fully fledged alternative centers of employment, education and business. Thus, urbanization in **Uzbekistan** is ceasing to be a **spontaneous process** and is gradually becoming one of the key instruments of the state's spatial, economic and social policy.

The key challenge for agglomeration development in **Uzbekistan** is the need to **simultaneously address** several tasks that most developed countries tackled **sequentially** over **decades** – a problem faced today, to varying degrees, by virtually all countries of the **Global South**.

This involves, at the same time, the **modernization** of worn-out engineering and utility **infrastructure** dating from the Soviet period, the **expansion** of cities to accommodate strong **demographic growth**, the **digitalization** of management systems and urban services, and the gradual **greening** of the urban environment amid deteriorating air quality, water scarcity and rising car ownership, while maintaining the **affordability** of housing and social amenities.

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III. Systemic Challenges to Sustainable Development of Agglomerations in Uzbekistan

An analysis of the prospects for further sustainable development of agglomerations in **Uzbekistan**, based on expert assessments and, in particular, a **World Bank** study conducted in April of this year on the **Tashkent agglomeration**, identified the following systemic challenges and barriers.

1. Rapid urbanization and motorization



Tashkent city and **Tashkent Region** are home to about **five** million people. According to forecasts, over the next **ten** years the population of satellite cities will grow by more than **40-46%**, significantly exceeding the expected growth of **Tashkent** itself (**14%**). Every day, more than **a million** people make "**pendulum**" trips between the suburbs and the capital, placing an enormous burden on the road network and city entry points.

At the same time, suburban **commuter trains** are practically not used for regular trips. Public transport infrastructure cannot keep pace with the "**explosive**" growth in private car ownership: in **2020-2025** alone, the number of privately owned vehicles increased by **83%** to **4.7 million**, of which **92.9%** are passenger cars. In **2025** alone, the private vehicle fleet grew by more than **415,000** vehicles.

The growing popularity of **electric vehicles**, **70%** of which are likewise sold in **Tashkent**, on the one hand reduces harmful emissions, but on the other hand encourages further **motorization** of the population. Ultimately, these factors have led to a **drop** in commercial bus speeds to below **15 km/h** on a number of routes and a **90%** increase in road traffic accidents over the period under review.

2. Insufficient accessibility and efficiency of public transport



The existing transport system often fails to cope with the load, which reduces its **attractiveness** to the public. About **40%** of passengers still report that buses often do not keep to their schedules, and that their speed drops so much that some locations are quicker to reach **on foot**. Because of the

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morning, lunchtime and evening "**rush hours**", buses are overcrowded for roughly **40%** of their route operating time.

While in central **Tashkent** more than **75%** of residents have bus stops within standard walking distance (**400-500** meters), in the region's districts this figure drops below **30%**. In the largest satellite cities, such as **Chirchik** and **Nurafshan**, only **32%** and **44%** of the population, respectively, live within the transport accessibility zone.

To illustrate the scale of the problem, it suffices to consider as an example the **typical daily route** of a resident of **Parkent District** commuting to the capital for study or work.

Bus No. **221** "**Parkent–Tashkent**" runs from **05:00** to **19:30** at a stated interval of **15-20** minutes. During the morning rush hour (from **06:30** to **09:00**), the number of buses that can depart for **Tashkent** is about **8-10**, each carrying up to **60** people, which together amounts to a carrying capacity of up to **500-600** people.

The population of **Parkent District** in **2026** exceeds **170,000** people. Typically, **15%** to **20%** of the economically active population of such nearby suburbs (at least **10,000–15,000** people) commute daily to the capital for work or study. Accordingly, the bus route covers less than **5%** of actual transport demand.



In fact, the main mode of transport in the **Tashkent agglomeration** is **passenger cars** operating as informal shared taxis: the driver picks up **4** passengers (instead of the permitted **3**) and drives to the "**Mashinasozlar**" metro station or the **Rohat** intersection. This is faster than the bus, but **3-4** times more expensive and completely unregulated in terms of safety.

In addition, **minibuses** run between the center and the periphery; they also have no timetable and depart only once full.

3. Lack of integration of transport systems

The route networks of **Tashkent** and **Tashkent Region** currently do not form a single whole: although these two entities have long functioned economically and socially as a **single organism**, they in fact exist as **separate jurisdictions**. Strategic planning stops at the administrative boundary between

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the city and the periphery, creating a kind of "**blind spots**" at the junctions of key transport hubs, which is precisely where congestion most often occurs.

Moreover, there is a **budget asymmetry**: **Tashkent**, which concentrates the "**economics of density**", can objectively afford significantly higher spending on modernizing transport and road infrastructure than the districts of **Tashkent Region**, which is precisely where the objective need for investment is greater owing to longer road networks and more active **demographic growth**.

Due to the absence of a single governing body, the urban and peripheral transport system lacks an **integrated fare structure** – almost **half** of suburban trips require **2-3** transfers using different payment systems. This creates an artificial financial and time barrier, undermining the very idea of "**seamless**" mobility (**MaaS**) and making daily trips too **expensive** and **inconvenient** for residents of "**satellite cities**".

While **Tashkent** has begun moving to a system of **gross-cost contracts**, under which the state pays the operator for adherence to schedules and kilometers driven, transport in the region still operates under an **outdated self-financing model** based on gross revenue. As a result, up to **50%** of regional operators' costs are not covered, leading to fleet deterioration, the growing popularity of shared taxis (marshrutkas) and a shortage of transport during "unprofitable" evening hours.



Until recently, the state operator "**Toshshahartransxizmat**", thanks to the state support it received, held a dominant market position, while many private companies were forced to take out commercial loans at extremely high interest rates (up to **27%** per annum), making their business **unprofitable**.

As a result, according to the **World Bank**, the number of private bus operators in **Tashkent** fell from **7** in **2019** to **one** in **2024**, while the number of shared-taxi operators fell by **half**. The situation has since improved, but the **state operator** still holds the lead.

Despite an extensive **railway network** linking **Tashkent** with cities such as **Angren**, **Khojikent** or **Bekabad**, suburban trains are not connected to metro lines and bus stops, and service intervals are not adapted to "pendulum" commuting, so the use of the existing potential of rail transport to relieve the roads remains **low.**

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The situation is particularly evident on weekends during the warm seasons, when the highways linking **Tashkent** with **Bostanlyk District** become clogged with traffic jams many kilometers long as residents drive out to the mountain recreation areas, to the shores of the **Charvak Reservoir** and to the resorts of **Chimgan** or **Amirsoy**.

Taken together, this state of affairs creates a vicious circle: the poor quality of public transport encourages **car ownership**, which in turn paralyzes the road network and further reduces the speed and reliability of public transport. For the **Tashkent agglomeration**, this means **direct losses** in total factor productivity (**TFP**) due to the **billions** of hours the population loses in traffic jams every year.

4. Environmental and social risks

Rising car ownership has ultimately made transport the **second** largest source of air pollution, accounting for about **25%** of all emissions of harmful fine particulate matter **(PM2.5)** in **Tashkent**. In the winter of **2025**-**2026**, pollution levels regularly exceeded **WHO** standards by a factor of **10**-**15**, which was directly linked to the growing vehicle fleet and the low capacity of roads, which forces engines to **idle** in traffic jams.

Moreover, according to survey results, women are **five** times more likely to travel with children and more likely to use **buses** for shopping, visits to medical facilities and social activities – needs that the existing route network, geared to peak-hour travel, meets only to a **limited extent**.

An equally important factor pushing people to use private cars is the inadequacy of **pedestrian infrastructure**. The main challenges here are the **fragmentation** of footpaths (and often their complete **absence**), the use of sidewalks for **parking** cars, particularly in “old” neighborhoods and near markets, “**heat islands**”, especially on new roads where newly planted young trees have not yet had time to provide shade, as well as **pedestrian overpasses** that create serious **barriers** for people with disabilities.

5. Urban planning shortcomings

The shortcomings of the city’s pedestrian infrastructure are largely what **Uzbekistan inherited**: the historically established layout of **Tashkent**, based on

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Soviet urban planning standards of the **second** half of the **20th** century, was designed for low levels of car ownership and did not take into account modern challenges such as global warming and population growth.



Streets were designed as wide traffic arteries: for example, in **Mirzo-Ulugbek District** on **Parkent** Street, which is currently being reorganized at the initiative of the **Traffic Management Center** (**TMC**) of **Tashkent**, the number of lanes on some sections reaches **16**, a figure comparable to the world's **largest high-speed highways** such as **Highway 401** in **Ontario** (**Canada**).

As a result, pedestrians are often unable to cross the road in **one** traffic light cycle and are forced to stop on the median strip ("**refuge island**"), squeezed between two streams of cars.

In addition, according to the **Lewis-Mogridge** law, wide roads paradoxically generate **new congestion** – since the more **interchanges** are built, the more people decide to drive a **private car**. Excessive asphalt surfaces also create huge **overheating zones** on the "**frying pan**" principle – on average **5-7** degrees above the background temperature – as well as powerful flows of **hot air**.

Furthermore, the wider the road, the more funds are needed for its landscaping and greening. For example, on the same **Parkent** Street or on **Makhtumkuli** Street, where **new urban development** is concentrated, the number of **trees** planted along many kilometers of fragmented sidewalks is in the **single digits**, contrary to **approved standards**.



It should also be borne in mind that **massive asphalting** sharply reduces the area of natural soil cover. This reduces the absorption of stormwater, leading to **soil desiccation** and preventing the natural replenishment of groundwater. In **Tashkent**'s arid climate, this leads to **degradation** of the urban microclimate and an increased load on the **storm sewer system**, which every spring demonstrates its **inability** to cope with instant runoff during heavy rainfall.

Similarly, wide sections have a negative impact on road **safety**, provoking drivers, whose driving culture in **Uzbekistan** is still taking shape, to "**speed up**". In addition, long distances between crossings (sometimes up to **800-1,000**

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meters) force people to run across the road at undesignated places, which with **10**-lane traffic often leads to **accidents**.

It should also be noted that streets with **10** or more lanes are in themselves an **unattractive location** for small and medium-sized businesses: pedestrians feel unsafe and uncomfortable there, so flows of potential customers are **weak**, while drivers moving at **70**-**80** **km/h** simply have no time to look at shop signs. As a result, the street turns into a "**transit pipe**", residents lose **earning** opportunities, and the city loses **tax revenues** that could be used to improve infrastructure.

Another persistent problem is the **poor quality of pedestrian infrastructure**. In many cases, sidewalks laid as part of improvement works begin, after just **1**-**2** winter seasons, to crumble: the surface cracks, subsides or deforms, which indicates **weak quality control** of construction materials and violations of laying techniques. As a result, the state is effectively forced to finance repairs of the same sections again, increasing the burden on local budgets and raising public suspicions of **corruption** among officials of the responsible government agencies.

6. Irresponsible construction

As analysis and site visits have shown, in a number of the capital's neighborhoods, despite ongoing reforms in the urban planning sector, the practice of **unscrupulous construction** persists, whereby developers seeking to maximize profit from every square meter disregard the city's need for social and transport infrastructure – a classic example of privatizing profits while **shifting costs** onto the state.



One example is a residential area in **Yakkasaray District** along **Kichik Beshagach** Street: satellite imagery clearly shows at the very least **increased density** of development resting on a narrow network of access roads. Moreover, as the study showed, many buildings in this block lack greenery and underground parking, despite their **considerable height** (more than **10** floors) and the fact that they were built relatively **recently**, just **2**-**3** years ago.

This simultaneously leads to a **spillover** of residents' vehicles onto adjacent streets, creating **informal parking** (an additional source of **congestion**), creates a barrier for **emergency services**, significantly worsens **insolation**, since, due to the height of the buildings, sunlight often does not reach the lower floors

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in sufficient quantity, and also leads to **air stagnation** and, in the absence of greenery, to the formation of so-called "**heat islands**".

The most serious problem is that such urban planning errors are virtually **irreversible**. Even if violations are identified and those responsible are held accountable, the state will no longer be able to change the built environment without major consequences for residents. As a result, instead of setting rules and standards, the city is forced to "reshape" infrastructure around **developers' mistakes** and spend resources on **dealing with the consequences** of unbalanced urbanization.

This year, these issues have repeatedly been considered at meetings chaired by the **Head of State**, following which **specific instructions** were issued aimed at strengthening developers' accountability and systematically transforming the transport framework of the capital and the agglomeration, including through expansion of the existing **metro** network, fare integration, renewal of the bus fleet and the use of **AI** to manage passenger flows.

In view of these priorities, it appears advisable to consider **further steps** to ensure the sustainable development of agglomerations, drawing on best international practice, so that mobility turns from a barrier into a **catalyst** for socio-economic development.

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IV. The PRC's Experience in Sustainable Agglomeration Development

China's experience in managing agglomerations represents a shift from developing individual cities and settlements to a paradigm of **network planning**. Under this model, an agglomeration is no longer viewed as the extended periphery of a megacity, but as an integrated economic ecosystem acting as an **independent center** for generating industrial growth, innovation, human capital and national GDP.

The key elements of this model are:

a. functional decomposition of territories – within megasystems such as the **Jing-Jin-Ji** region or the **Greater Bay Area**, a multi-tier structure is formed that includes an innovation and financial core, production belts, logistics hubs, technology parks and residential "**satellite cities**". This architecture makes it possible to reduce the "**overheating effect**" of central megacities, redistribute demographic and infrastructure pressure, and avoid excessive concentration of capital in one place;



b. synchronization of governance – the creation of supra-regional coordination mechanisms (interregional committees and joint governing bodies) that ensure end-to-end planning of agglomeration development and the consolidation of their resources and enable the state to implement **long-term infrastructure projects** that are critical for the entire agglomeration system rather than for an individual city;

c. digital ecosystem "**City Brain**" – the introduction of management platforms based on **Big Data**, the Internet of Things (**IoT**) and **AI** is gradually transforming urban administration from a **reactive model** of responding to problems that have already arisen into a **predictive system** for forecasting and managing flows in real time. Building a **unified digital framework** for managing transport, energy, utility infrastructure and the environment makes it possible to operate very large urbanized clusters with populations of **tens of millions** at significantly lower administrative transaction costs;

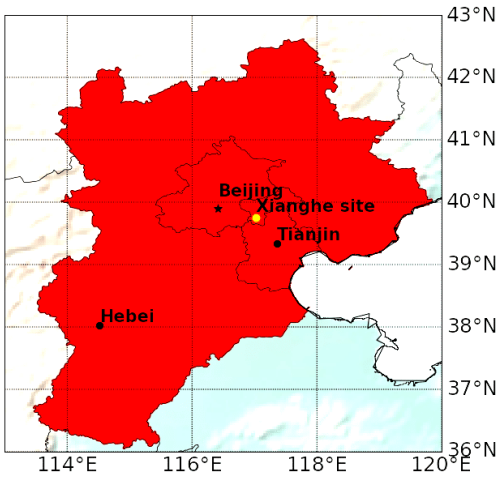
d. transport connectivity as part of the economy – the implementation of the "**one-hour accessibility**" concept is viewed by **Beijing** not simply as advance infrastructure development, but as a mechanism for **spatial scaling of the economy** that, by uniting scattered settlements into a single space of production and consumption, significantly increases the **mobility** of human

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capital, the depth of interregional **cooperation** and total **factor productivity** (**TFP**).

Examples of the practical implementation of these principles include the following agglomerations:

1. The "**Beijing–Tianjin–Hebei**" agglomeration is one of the most extensive examples in world practice of the managed decompression of an over-concentrated capital city.



Launched in **2014**, the initiative has over time evolved from a regional urban development project into an instrument for the **deep restructuring** of the economic and spatial architecture of all of **Northern China**.

The model was based on a strict **functional division of roles**: **Beijing** gradually shed its "non-capital" functions – industrial production, part of its logistics infrastructure and wholesale markets – to focus on public administration, diplomacy, culture, research, finance and high-tech innovation.

Meanwhile, **Tianjin** became the main **technology hub** and "**export gateway**" of the agglomeration, focusing on industries such as aircraft manufacturing and robotics, as well as world-class maritime logistics. **Hebei** Province became the **main production base** and **logistics hinterland of the region**, taking on upgraded industrial capacity, distribution centers and "**cloud**" data storage facilities and creating **millions** of jobs outside the capital.

A special role was assigned to the **Xiong'an** New Area, which became the "**strategic backup**" of **Beijing**. Serving as a testing ground for digital management systems (**City Brain**) and green urban planning, **Xiong'an** took on the role of an **administrative and innovation cluster** to which the headquarters of major state-owned corporations, leading universities and research centers were relocated, finally relieving the critical load on the capital's historic "**core**".



To ensure transport connectivity, a high-speed rail network with a total length of about **2,600 km** was built. An additional factor in the agglomeration's resilience was the synchronization of **social** and **administrative systems**, from

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healthcare and transport services to investment administration and digital public services.

As a result, by **2026** the region's gross product had effectively **doubled**, reaching approximately **$1.6 trillion**. Meanwhile, a qualitative shift toward a service-based model, whose share approached **70%**, marked the agglomeration's transition to a "**knowledge economy**".

2. **The model** of the **Greater Bay Area** takes the idea of specialization even further, distributing roles among cities with different legal and economic systems. As of **2026**, the functional division is as follows:



a. **Shenzhen** – a global center of technological innovation and the "**Silicon Valley** of **China**", home to the headquarters of the largest technology giants such as **Huawei** and **Tencent**, research centers and production facilities for electronics and "**green**" energy equipment;



b. **Macao** – a global center of tourism, leisure and cultural exchange, specializing in the entertainment industry, hospitality and international forums. In addition, **Macao**, as a former Portuguese **colony**, officially serves as a **strategic platform** for trade and economic cooperation between **China** and **9** Portuguese-speaking countries, such as **Brazil**, **Angola**, **Portugal** itself and others;



c. **Hong Kong** – a leading **international financial, transport and logistics, and arbitration hub** that connects the agglomeration to global capital markets, serves as a management center for maritime and air transport, and provides international law and dispute resolution services – a kind of "**financial gateway**" through which global investment flows into the technology sector of the **Greater Bay** Area.



The other **8** cities of **Guangdong** Province that are part of the **Greater Bay Area** form a powerful **industrial and logistics belt** that gives material form to the innovations of **Shenzhen** and the financial resources of **Hong Kong**. In particular, **Guangzhou** is

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the largest transport and logistics hub, **Dongguan** is a powerful **manufacturing node**, and the remaining cities are **sectoral industrial clusters**.

The unique advantage of the **Greater Bay Area** lies in the **unprecedented speed** of its production cycles, achieved through close integration of research institutes, startups, financial institutions, industrial sites, logistics centers and ports.

As of **2026**, the region's total GDP exceeded **$2.1 trillion**, making the agglomeration the world's **10**th largest economy, comparable to **Canada** or **Italy**. This concentration of resources makes it possible to complete the **full cycle** – from the inception of an idea to the release of a serial batch of a high-tech product – in record time (the so-called "**Shenzhen** speed"), which is **3-5** times faster than comparable benchmarks in the **US** or **Europe**.



A key link in the agglomeration's infrastructure is the **Hong Kong–Zhuhai–Macao sea bridge**, **55 km** long, which has cut travel time between the eastern and western banks of the **Pearl River** Delta from **3** hours to **30** minutes. Connectivity received an additional boost with the opening in **2024-2025** of the **Shenzhen–Zhongshan** undersea tunnel, which directly linked the production chains of the "**technology core**" (**Shenzhen**) and the "**industrial belt**" on the western bank of the river.

The network of high-speed rail lines and intercity express trains has exceeded **2,500 km**, creating the conditions for "**one-hour accessibility**" between key cities and "**two-hour**" accessibility to any point in the region. Ridership on the **Guangzhou–Shenzhen–Hong Kong** line alone exceeds **100 million** passengers a year. The region has the highest density of port infrastructure in the world. The combined container throughput of the ports of **Shenzhen**, **Hong Kong** and **Guangzhou** exceeds **75 million TEU**, almost **2** times greater than the throughput of all of **North America**.

Thus, the experience of **China** demonstrates that modern agglomeration policy is no longer simply the expansion of urban territory but a complex **system of strategic management** of spatial development, in which transport connectivity, functional specialization, digital administration and institutional coordination become elements of a single **national model of economic growth**.

Otherwise, agglomerations, which have a natural tendency to grow, begin to turn from drivers of development into **sources of systemic imbalances**.

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For example, in addressing housing affordability, countries undergoing accelerated urbanization, including **Uzbekistan**, are already beginning to face **infrastructure overload**; in providing employment through industrialization – **environmental degradation** and growing pressure on water and energy systems; and in stimulating economic activity – distortions along the "center–periphery" axis.

As a result, a **vicious cycle** emerges in which eliminating some consequences of urbanization inevitably gives rise to new problems, forcing the state to constantly spend resources on ad hoc "firefighting" measures instead of focusing on **long-term development**.

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V. Proposals for Adapting Advanced Foreign Models of Agglomeration Development to the Context of Uzbekistan

In order to **improve** state policy on the long-term development of urban agglomerations, in particular the **Tashkent agglomeration**, and taking into account the identified barriers, potential future risks and advanced foreign practices, it is proposed to systematize the existing **infrastructure** and **ongoing projects** in urban and transport development and, to this end, to consider the following conceptual proposals for implementation:

1. Establishing a **Project Office for the Development** of the **Tashkent Agglomeration** – a coordination center vested with the mandate of a supra-departmental regulator and powers for end-to-end planning, coordination and audit of the spatial, infrastructure and economic development of the agglomeration, which comprises **Tashkent** city and **Tashkent Region**. It will include representatives of the relevant ministries and agencies (including the **Directorate for the Construction** of the "**New Tashkent**" City), as well as the khokimiyats of the capital and the adjacent region.

To this end, it is proposed to redistribute some functions among existing government bodies by transferring to the **Project Office** responsibility for interregional transport planning, mutual alignment of the master plans of "**satellite cities**" and coordination of the development of infrastructure zones along the city–region boundary within the agglomeration.

To build a sustainable legal framework, it is proposed to draft a **Law** of the **Republic** of **Uzbekistan** "**On Agglomerations**", defining the procedure for establishing and managing agglomerations, mechanisms for interregional coordination, the distribution of powers and joint financing of infrastructure, as well as unified principles of spatial, transport and environmental planning.

2. Developing a long-term **Strategy for the Comprehensive Development** of the **Tashkent Agglomeration** (for a period of at least **5** years) – a single macro-regional strategic planning document aimed at overcoming spontaneous urbanization, the managed decompression of the capital and the formation of a sustainable **polycentric settlement model** with clear functional zoning of territories.

It is envisaged that the **Strategy** will provide for:

a. **deep synchronization** of the master plans of **Tashkent**, the "**New Tashkent**" project under construction and adjacent "**satellite cities**" (such as

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Chirchik, **Yangiyul**, **Angren** and others) within an integrated urban planning framework;

b. introduction of the principles of **transit-oriented development** (TOD), which requires the transport and engineering framework to be built in advance, before residential areas and social infrastructure facilities are commissioned;

c. **assignment** to individual agglomeration nodes of **specialized functions** – administrative, industrial, logistics, research and education, residential and service – to form a mutually complementary economic system and reduce the overload of the central core;

d. phased **redistribution** of part of the economic, industrial and logistics load from the capital to "**satellite cities**" and peripheral industrial zones in order to prevent hyper-concentration of population and infrastructure overload;

e. creating a system of managed **environmental sustainability** that provides for the preservation of regional aeration (air) corridors, the development of "**green**" belts, reduced pressure on water and energy infrastructure and the introduction of unified **environmental standards** for development.

3. Designing a **Unified Transport System** for the **Tashkent Agglomeration** – an integrated multimodal framework providing for the synchronized development of transport connectivity between **Tashkent**, "**New Tashkent**" and the other settlements of **Tashkent Region**.

It appears that the system design will need to include:

a. a plan for the **phased expansion** and "**seamless**" **integration** of rapid rail transit, trunk bus routes (including bus rapid transit lines under construction and planned), as well as taxi, car-sharing and **micromobility** systems (bicycles, e-scooters, etc.) based on **unified** electronic ticketing, digital navigation and coordinated timetables to implement the concept of "**one-hour accessibility**";

b. a scheme for building a **network of transport interchange hubs** (TIHs) with **intercept parking** (**Park&Ride**) to capture private vehicle flows at the entrances to **Tashkent** and "**New Tashkent**", where passengers will be able to transfer to rapid public transport, reducing the load on central arterial roads and preventing chronic traffic congestion;

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c. introduction of a "**City Brain**"-level digital platform using **AI** and "**big data**" technologies to manage traffic light infrastructure, monitor transit flows, predictively regulate commuter flows and create "**green corridors**" for emergency services and public transport.

To deploy this system and ensure its uninterrupted operation, it is proposed to eventually scale up the **TMC** of **Tashkent** into a **Mobility Management Center** for the **Tashkent Agglomeration** with its powers extended to "satellite cities" and suburban areas.

4. Establishing an **Interregional Agglomeration Fund** – a consolidated financial mechanism aimed at overcoming the budget asymmetry between the "**core**" of the **Tashkent agglomeration** and its periphery, with functions for pooling and targeted allocation of resources to implement cross-cutting infrastructure projects, build transport interchange hubs (TIHs) and subsidize a **unified route network** for passenger transport.

To this end, it is proposed to introduce a co-financing model providing for the redistribution of part of the tax revenues generated by **Tashkent** and their subsequent allocation – together with state transfers and concessional external financing – to the development of infrastructure in "**satellite cities**" and suburban areas, where rapid demographic growth and high levels of commuting create the **greatest need** for capital investment.

5. Implementing **additional measures to decompress Tashkent** and enhance transport and socio-economic **interconnectedness** within the **Tashkent agglomeration**, including:

a. development of a **Master Plan** for the sectoral specialization of **Tashkent**, "**New Tashkent**", "satellite cities" and districts of **Tashkent Region**, which in particular will provide for the relocation outside the capital of all "**non-capital**" facilities – large environmentally harmful enterprises, warehouses and wholesale markets (for example, "**Abu-Sahiy**", "**Malika**" or "**Bek-Baraka**") – to special zones in adjacent districts with direct access to highways or railways (following the example of **Moscow**).

In addition to relieving urban infrastructure, this step will also help to "formalize" **wholesale and retail trade flows**, which, lacking direct contact with retail customers, will be forced to switch to transparent digital **B2C** and **B2B platforms** and automated warehouse accounting (as happened in its time with the **Cherkizovsky Market** in **Moscow**);

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b. relocation of branches of a number of capital-based universities from **Tashkent** to the **Tashkent agglomeration** or other regions in line with their specialization (for example, the **Tashkent Institute of Textile and Light Industry** – to **Namangan** or **Fergana**, **Tashkent State Agrarian University** – to **Karshi**, etc.), creating fully fledged regional educational clusters with enhanced **support measures** for students and teachers in the regions.

Only the **head offices** of universities, **research institutes**, **master's programs** and **doctoral programs** (PhD) would remain in the capital, which would simultaneously reduce migration pressure on the capital and preserve its "**economics of density**".

c. launch of a preferential "**Agglomeration Mortgage**" program with reduced rates for those who buy housing in "satellite cities" or districts of **Tashkent Region** and are officially employed there;

– introduction of an **incentive tax regime** for enterprises relocating production capacity and logistics facilities from the capital to satellite cities and peripheral districts of the agglomeration, including reduced property and land tax rates;

– granting satellite cities the status of **Special Economic Zones** (**SEZs**) with simplified administrative procedures, accelerated connection to utility infrastructure and special urban planning regimes, modeled on Chinese agglomeration clusters such as the **Xiong'an** zone in the **PRC**;

– **phased relocation** of the head offices of certain state-owned companies, agencies and service centers to "**New Tashkent**" and "satellite cities" to generate sustained demand there for housing, services, and transport and commercial infrastructure, and to create new centers of economic activity outside the capital's central core.

6. Implementing measures to ensure **sustainable environmental development of the Tashkent agglomeration**, including:

a. Integrating into the infrastructure of **Tashkent** elements of the Chinese urban development model "**Sponge City**", namely:

– implementing pilot projects to replace or supplement concrete roadside aryks (irrigation ditches) with zones of multi-layer **filtering soil** and **moisture-loving plants**, which will make it possible to retain up to **70%** of precipitation in the soil, preventing road flooding and replenishing groundwater;

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– paving sidewalks, squares and parking lots with **porous concrete** or **wide-joint pavers**, which allows water to soak into the ground, replenishing groundwater reserves and preventing the formation of puddles that would otherwise simply evaporate;

– creating **sunken landscape areas** in parks and mahallas that act as temporary reservoirs during downpours, preventing overload of the city sewer system.

Overall, technologies for retaining and naturally evaporating rainwater, which is **extremely valuable** in **Central Asia**, appear to be a promising solution for **Tashkent**, since water accumulated in the soil and plants of a "**sponge city**" evaporates on hot days and lowers the temperature of the near-surface air layer by **3-5°C**, effectively countering the previously mentioned "**heat island**" effect.

Moreover, as practice has shown, implementing "**green**" solutions based on the "**sponge city**" model (as in **Wuhan** (**PRC**), **Copenhagen** (**Denmark**) and **Singapore**) costs on average **20-30%** less than building and maintaining concrete collectors of equivalent capacity.

b. Launching the "**Green Corridors** of **Tashkent**" initiative – the creation of a **continuous network** of ecological corridors uniting isolated parks, canal banks and highway verges into a single cooling system (based on the successful experience of **Medellín**, the **second** largest city in **Colombia** and its former "**industrial capital**").

To this end, the following is proposed:

– **revitalization of canals** such as the **Ankhor**, **Bozsu** or **Salar**, including landscaping of embankments with the planting of **greenery** and the development of **pedestrian infrastructure**. The canals should function as "**natural ventilation channels**", channeling flows of cool air from the water deep into dense residential areas;



– **creation of roadside eco-filters:** forming dense "**green walls**" – **three-tier plantings** (dense shrubs + low hedges + large trees) along the city's key highways to effectively **capture** exhaust fumes and noise and filter dust;

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– **introduction of vertical greening of infrastructure:** using the supports of the elevated metro, overpasses and "**blank**" facades of administrative buildings to grow climbing plants. This will lower the temperature of concrete surfaces in summer by **10-15**°C and reduce the overall heat load on the city.



In **Medellín**, more than **880,000 trees** and **2.5 million shrubs** were planted in this way, making it possible to unite isolated "**green**" areas into **30 continuous corridors**.

As part of this initiative, it is also proposed to use the Colombian experience to modernize the **Tashkent Botanical Garden** as the capital's main **research, production and educational eco-hub** by transforming it into a center of "**green**" technologies and expertise that will supply the city with advanced research and high-quality planting material.

c. Implementing pilot projects to introduce **modernized badgir ventilation shafts** into urban architecture (based on the experience of **Masdar City** in the **UAE**) – one of the oldest and most effective passive cooling and ventilation technologies, which emerged in **Ancient Egypt** as early as the **2nd** millennium BC.



Air passing through such systems and coming into contact with canal water is cooled and humidified by the pressure difference (**Venturi** effect), eliminating the need for energy-intensive air conditioners. Today, such structures – "**wind towers**" – are successfully used in cities in the **Middle East**, **Europe** and **Asia**, both in street structures and in buildings themselves.

7. Strengthening **oversight of the quality of the urban environment and compliance with urban planning standards** – to this end, it is proposed to form a dedicated commission involving representatives of the **Prosecutor General's Office** to conduct selective audits of districts of **Tashkent**.

The commission's work will focus on:

a. identifying cases of **critical deviation** from urban planning standards, including shortages of parking space, insufficient greenery, and overloading of the street and road network and social infrastructure;

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b. conducting a **comprehensive assessment of the pedestrian environment** in areas with a high concentration of population and public activity, including the accessibility and connectivity of sidewalks, the safety of crossings, conditions for people with limited mobility and the level of protection against urban overheating;

c. introducing a system of **digital monitoring** of construction projects based on GIS and satellite data to prevent unauthorized increases in the number of floors, reductions in greenery and other deviations from approved parameters;

d. preparing proposals for the introduction of unified standards for "**human-centered**" urban design that prioritize pedestrian accessibility, greenery, insolation, aeration and the availability of public spaces, as well as **mechanisms to strengthen accountability** for violations of urban planning and infrastructure standards by developers, design organizations, expert review bodies and the authorized bodies that approve construction projects.

8. Developing a **Master Plan for the Accelerated Development of the Fergana Valley Agglomeration** (for the period up to **2035**) – a comprehensive macro-regional strategic planning document aimed at transforming the **Fergana Valley** from a collection of disparate cities and industrial nodes into a single integrated **polycentric agglomeration** serving as a major industrial, logistics, transport and demographic center of **Uzbekistan** and, in the long term, as one of the key transit and production hubs of **Central Asia** on the "**East**–**West**" axis.

Taking into account the launch of the **China**–**Kyrgyzstan**–**Uzbekistan** railway in **2030**, which is expected to radically change the geo-economic landscape of **Central Asia**, the growing population density, limited land and water resources, and the increasing interconnectedness of the cities of the **three** regions, it appears advisable for the **Master Plan** to include the following areas:

a. forming a **unified transport and logistics framework** for the **Fergana Valley** that provides for the synchronization of rail, road and border infrastructure, the development of multimodal logistics centers and the creation of conditions for launching accelerated container routes;

b. introducing a system of sectoral specialization within the **Fergana Valley** to build intra-regional value chains and ensure even employment across the population of the three regions, avoiding "**pendulum**" migration;

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c. developing energy infrastructure ahead of demand and forming a "**green**" energy balance system that provides for the construction of small and medium-sized solar and wind generation facilities, the development of small hydropower cascades based on the hydropower potential of local rivers, and the introduction of a single digital energy consumption management system for the **three** regions (**Smart Grid**);

d. introducing mechanisms for **coordinating the spatial development** of the **three** regions, including the **synchronization** of master plans, joint management of water, transport and environmental systems, and the prevention of chaotic urbanization and degradation of highly productive agricultural land.

9. Similarly, it appears advisable to develop a **Master Plan for the Development** of the **Samarkand Agglomeration** – a comprehensive strategic planning document aimed at forming a sustainable, polycentric model of spatial development based on **Samarkand**, **Urgut** and other large settlements of the region, taking into account growing **tourist flows**, demographic dynamics and the specifics of the region's socio-economic development.

It is envisaged that the **Master Plan** will provide for:

– development of an **integrated transport system** for the agglomeration, including the expansion of tram, bus and suburban services, the creation of transport interchange hubs and greater connectivity between tourist, industrial and residential zones;

– establishing the **functional specialization** of individual agglomeration nodes, including the development of **Samarkand** as an international tourism, education and service center and **Urgut** as an industrial, trade and crafts cluster, as well as strengthening the role of other cities and districts in agro-processing, logistics and services;

– aligning **urban planning policy** with the objectives of preserving historical and cultural heritage and preventing chaotic development of areas adjacent to sites of cultural and tourist significance;

– development of modern engineering, environmental and digital infrastructure, taking into account the need to maintain a comfortable urban environment and the agglomeration's resilience to growing tourist and transport loads.

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