

# Modern features of urban development: a case study from Uzbekistan

*Rajabboy Madrimov*<sup>1\*</sup>, *Saida Tashtaeva*<sup>2</sup>, *Khasanboy Kasimov*<sup>3</sup> and *Hasanboy Yusupov*<sup>1,3</sup>

<sup>1</sup>Research Institute of Environment and Nature Conservation Technologies, Tashkent, 100043, Uzbekistan

<sup>2</sup>Tashkent State University of Oriental Studies, Tashkent, 100060, Uzbekistan

<sup>3</sup>National University of Uzbekistan, Tashkent, 100174, Uzbekistan

**Abstract.** This article describes the development features of Tashkent agglomeration in conditions of independence of Uzbekistan and market relations. The urban agglomeration was approached as a unique social environment, economic space, innovation, and infrastructure and investment space. Territorial composition of the capital agglomeration was analyzed and ways of regulating it in accordance with market relations were recommended. This paper develops the theory of agglomeration support carcass which provides its formation, existence and spatial compounds with using the geostructural and regional analyses and here have been identified their importance in the future development of the urban territories. In this article population were divided into two zones according to the purpose of attracting residents to the center and it based on research and questionnaires which provided in the satellite cities: zone 1, which dominates daily traffic, with population commutes for work and study and in the second zone prevails weekly and monthly traffic. And some ways to regulate the territorial composition of the capital agglomeration in accordance with market relations are recommended.

## 1. Introduction

Urban agglomerations are the next higher stage of the development of cities, and from their historical formation until now, they have always played a decisive role in the development of countries, and in the future, global development will be related to them. Because the main strength of the states – demographic, economic-social, scientific-technical, cultural and innovative potential is concentrated in large cities and urban agglomerations [1].

Urban agglomerations are complex territorial systems of cities, characterized by a large economic and social efficiency. Urban agglomerations are a compact territorial group of population settlements united into a single, dynamic system with various intensive connections [2]. The types of activities characteristic of cities that extend beyond the administrative boundaries of the city and spread to neighboring settlements called as "agglomeration" [3].

Everything that serves the main "core", including the land in this area [4]. But, it is considered only as a sum of places where people live and work [5].

The territorial process of urbanization, calling such territorial systems "conurbation" and referring to the merging of large cities [6].

It could be argued that, urban agglomerations are, in general, a complex system of cities and villages located in a small densely populated area and interconnected with each other by various connections. It should be noted here that the concept of "urban agglomeration" has a conditional character in a certain sense. The reason is that such territorial systems in Uzbekistan include not only urban areas, but also many villages among them, and their residents also participate in the process of agglomeration [7]. However, taking into account the leading role of the city, especially large cities, in the formation of such complex systems, as well as the dominance of urban residents and the spread of urban lifestyle, such structures are called urban agglomerations [8].

Urban agglomerations in Uzbekistan began to emerge during the Soviet era in the 1960s and 1970s, in densely populated areas, on the basis of the exploitation and natural resources processing. In the conditions of Uzbekistan's

---

\*Corresponding author: [r.madrimov1001@umail.uz](mailto:r.madrimov1001@umail.uz)

independence and modernization of the economy, such integrated regional systems of large cities and population settlements that are emerging within their influence are distinguished by the fact that they have great potential. Most cities were characterized by single-industry, mainly industrial specialization, even in the Tashkent (capital), in terms of the share of employees (39%), industry sector is ranked first [9].

It has changed in the conditions of stable economic development after the independence of Uzbekistan. Now country's large cities and urban agglomerations are a unique space for innovation, investment and infrastructure, social environment. Yet, this status plays a key role in the social-economic, political-cultural development strategy and determining its priority directions [10].

In this regard, the metropolitan agglomeration of Tashkent, which has achieved a high level of territorial urban integration, has demographic and production potential, has a leading position in the Central Asian region with its full formation [11, 12].

The purpose of the work is to determine the features of development of Tashkent agglomeration in the conditions of the market economy and to develop recommendations for improving its territorial structure. For this, the following tasks were performed: 1) the concept of urban agglomeration was clarified; 2) the development processes of the Tashkent agglomeration under the conditions of the market economy were analyzed and researched as a unique "social environment", economic space, innovation and investment environment; 3) here determined the main carcass sector which provides the zone as a agglomeration; 4) ways to improve the territorial structure of the capital agglomeration are recommended.

## 2. Materials and Methods

Urban agglomerations began to emerge at the end of the 19th century and at the beginning of the 20th century and are studied by many scientists. However, because they are a rapidly changing, dynamic entity, there is increasing interest in studying them. Theoretical and practical issues of the formation and development of urban agglomerations were studied in foreign countries [13, 14]. They considered urban agglomerations as an important form of regional organization of population and production and studied them mainly from the point of view of economic efficiency. In addition, the features of the transformation and development of urban agglomerations during the period of adaptation to the conditions of a market economy are reflected in the studies [3, 5, 6]. In Uzbekistan, the development of the Fergana-Margilan agglomeration based on industrial production and cooperative processes, besides the formation and development features of the Samarkand agglomeration located in the central part of the republic was studied [5, 9].

In this research paper, Tashkent agglomeration in the conditions of market relations, which consistently solves problems such as free competition in various fields, correct and rational use of land resources, strengthening the competitiveness of small cities and towns, and the organization of a single labor market, which satisfies the material and spiritual needs of the population at a high level considered as a "social environment", the concentration of innovation and investment with advanced technology.

## 3. Results and Discussion

The capital agglomeration is the largest in the republic and includes 10 cities, 17 towns and more than 600 villages as a whole territorial system of fully formed cities and villages. An important factor in its formation is the fact that Ugom, which is a part of the Tianshan Mountains, is located on the western flanks of the Pskom Mountains, at their junction with the plain, along the Chirchik River and it determines the territorial composition of the agglomeration. The Chirchik River serves as the historical-geographic basis and "axis" of the Tashkent oasis.

The Chirchik River irrigates fields, provides water to the population and industrial enterprises of the agglomeration, 19 hydroelectric power stations operate here. For the efficient use of water here was created the Tuyabuguz reservoir (Tashkent Sea) and the Charvak reservoir with a capacity of 2 billion cubic meters. Dozens of canals were drawn from Chirchik, such as Bozsu, Zakh, Karasu, Ankhov, Northern Tashkent, Parkent and others, which are the *hydrographic framework of the agglomeration, concentrating* cities and villages.

In addition, they act an *ecological and recreational frame* for a multi-million population in arid climatic conditions, with the favorable foothill climate and environmental conditions in the eastern mountainous regions, especially in the summer season, shifting the borders of the agglomeration to the east. *The transport frame of the agglomeration* is represented by a railway and a road running parallel to the main hydrographic axis from the northeast to the southwest, linking the settlements into one. The agglomeration has a strip-like structure in the center with the capital city as the main hub. Seven radial "urban axis" of the capital expand the circle of agglomeration.

In 1930, the city of Tashkent became the capital city, making it an important transport hub in the region. Due to its convenient economic geographical position, the city has grown rapidly functionally, territorially and demographically, its area has increased by 4.4 times and its population by 11.1 times in the last 100 years (Table 1). The borders of the city are expanded in the south, north-east, north-west, and east directions and are entering the rural districts of Qibray, Zangiota, Tashkent, Ortachirchik. The area of the city has been expanding from year to year and is currently equal to

441 sq. km. The population has increased dramatically and reached 2 million 909 thousand 500 people in 2022. According to forecasts, it is expected to increase to 5 million by 2040. In 2021, 7,853.3 hectares of land from the Tashkent region were added to Tashkent city [10, 11].

**Table 1.** Change in the area of the city of Tashkent and the number of inhabitants for 100 years

Years	Area, km <sup>2</sup>	Increase (compared to 1922)	Population, '000 people	Increase (compared to 1922)
1922	100	1.0	260	1.0
1951	117	1.2	626.2	2.4
1961	160	1.6	1037.1	3.9
1970	225	2.3	1384.5	5.3
1977	252	2.5	1688.6	6.4
1985	256	2.6	2035.9	7.8
2010	367	3.7	2220.7	8.1
2022	441	4.4	2909.5	11.1

The table was compiled by the authors based on the data of the Statistics Department of the city of Tashkent. Especially since 2020 was allowed to register the population in the capital, there was a sharp increase in the population. People are moving to the city not only from the regions, but also from Kazakhstan, Tajikistan, and Russia. Relatively cheap housing in Bektemir, Sergeli, Yangiheyat, which are the suburbs of the city, as well as houses with private courtyards around the city, are increasingly attracting them, and suburbanization processes are accelerating. Luxury buildings are rising inside and outside the city, and new features such as the emergence of unique "elite" districts are taking place.

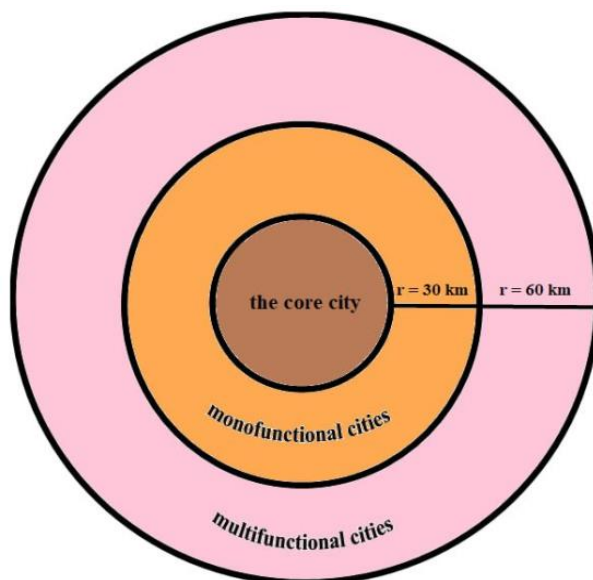
**Table 2.** Analysis and estimation of economic development of the Tashkent agglomeration

Historical phases	Features of economic development of the Tashkent agglomeration
before 1917 (ancient period)	The core of the agglomeration was a trading city that served as a fortress (qal'a). It became the main transport hub of Central Asia as the part of the Russian Empire, after the construction of the Trans-Caspian and Turksib railways.
From 1917 to 1940 (Early years of Soviet Union)	Hydroelectric power stations were built according to the GOELRO plan (State Commission for Electrification of Russia), and here appeared the first cotton ginning factories, oil mills and confectionery enterprises. Here developed metallurgical and chemical plants in Chirchik, food plants in Yangiyul, many villages were transformed into cities, Tashkent city was reconstructed and became an industrial and transport center. Organized first universities and cultural institutions. It was connected to the cities of the suburban zone by railways and roads.
1941-1945 (the period of World War II)	More than a hundred military enterprises were evacuated to Tashkent. 80 percent of the industry was made up of light industries' branches in 1941. But these facts changed to 60 percent in 1943, mainly for military purposes. Here arrived many specialists and highly qualified labor resources. The basis of heavy industry has been formed.
From 1945 to 1990 (Post-war Soviet phases)	The city became the economic, transport, cultural, political, scientific and technical center of Central Asia; it was the "gate" at the entrance to Central Asia which export-import operations took place from here. The place of military enterprises was occupied by mechanical engineering, electronics, metallurgy and metalworking, chemical, light and food industries. Parent enterprises branches appeared, established close economic ties for cooperation and combination of industrial and agricultural enterprises with satellite cities – interconnected settlement, which led to constantly recurring daily or weekly labor pendulum migrations between cities.
From 1991 to present (Independence period)	There have been radical changes in sectors of the economy; small and medium-sized enterprises have taken the place of large enterprises. First, the agglomeration bonds were broken. There was modernization and diversification of economic sectors. Tashkent began to perform purely metropolitan functions, the share of industry decreased, for account of other more modern spheres, such as political, organizational, economic, trade, scientific, cultural, educational activities, construction, polygraphy, furniture, electrical industries, etc. Tashkent has currently become an arena for information and investment, business and financial, scientific and educational, transport and logistics spheres, services, and human capital.

Economic activity and production connections determine the formation and development of an agglomeration, because the concept of “agglomeration” initially arose in the process of territorial organization of productive forces. The *economic framework of the agglomeration* is represented by the large industrial potential of the capital, the agro-industrial potential of the suburban area and the particular-industrial specialization of satellite cities such as Chirchik, Yangiyul, Salar, Gazalkent, Keles and others, which are increasingly attracting the population from outside (Table 2). Tashkent agglomeration has high economic, investment, scientific and technical potential. Here operate 6,225 (28% of the republic) industrial enterprises and 15% of the country's industrial products are produced by it.

In the “Center-periphery” direction, population and production relationships are increasing. Neighboring cities and villages continue or serve some of the functions of the city of Tashkent: Chirchik-heavy industry, Yangiyol-food industry, Salor, Iskandar-transport nodes, Chorbog-resort-recreation, Ulugbek-science, Yangibazar, Ortaovul, Ghazalkent-agro industry, etc. Some industrial enterprises, educational institutions, institutions are being moved to the outskirts of the city. Settlements such as Eshonguzar, Keles, Hasanboy, Khanabad, Dormon, Salor are directly joining the capital due to construction. Tashkent is interconnected with its surroundings through water, energy and gas networks (90 percent), sewage system (up to 30 percent in villages, up to 60 percent in cities), and connections of the population for various purposes. The results of surveys conducted in some neighboring cities (Yangiyol, Parkent, Ortasaroy, Toytepa, Chinoz) show that 65.8% of respondents go to Tashkent city. 47.4% of them go to work, 31.7% to study, 14.4% for cultural and household purposes, and the rest for medical treatment, kinship and other purposes. 60% of those who participate in oscillating migration are year-round, and the rest are weekly, monthly and seasonal in nature. The majority of commuters to the center are young people, and the elderly prefer small towns and villages.

As a result of the research and survey, 2 zones were divided around the center: zone 1, where the relations of work and study prevail, with a radius of up to 30 km, small monofunctional cities are located here (Figure 1).

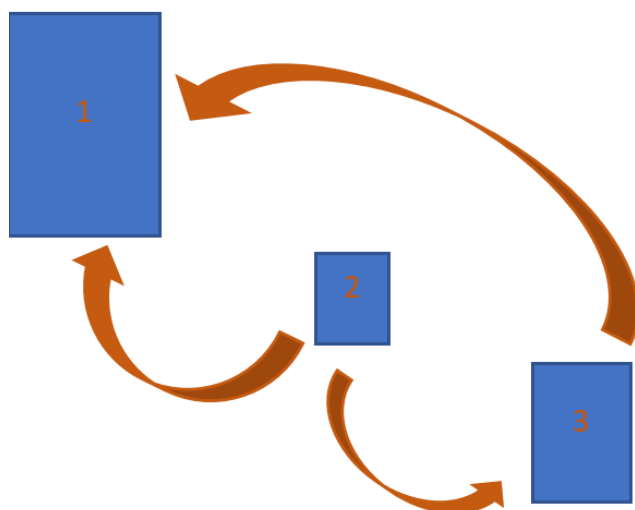


**Fig. 1.** Location scheme of cities in agglomerations

The main part of their population goes to the center of agglomeration, and a smaller part goes to polyfunctional medium-sized cities in zone 2 (Figure 2). The radius of zone 2 is from 30 km to 60 km, daily connections to the center decrease, and weekly, seasonal cultural-household, organizational-economic, business connections prevail. In this zone, medium-sized cities are located and perform 3-4 types of functions. A large part of the population in the agglomeration attends them for work and study, as a result here has emerged a single labor market in the agglomeration. Under the influence of the Agglomeration Core (1) and medium-sized cities in Zone 2 (3), monofunctional cities (2) can not grow well, their functions do not improve, and the population moves out in both directions. This pattern is also observed in other agglomerations of the republic – Samarkand, Fergana-Margilan, etc., and it can be expressed in the following scheme (Figure 2).

Tashkent agglomeration has a **high innovation potential**, in particular, scientific-inspection, construction-design organizations, market infrastructure centers, higher educational institutions, personnel training, transport infrastructure and trade institutions are embodied. In the last 3-4 years (9-36 percent), admission to higher education has increased dramatically in the republic, and many state and non-state higher education institutions have been opened. More than

half of them and the most prestigious are located in Tashkent agglomeration. This attracts many young people. As a result, there has been a growing desire among young people to move to cities, especially the capital.



**Fig. 2.** Interconnection of agglomerated cities

A number of changes in the city’s economy - economic liberalization and modernization, development of small business and entrepreneurship, the establishment of an effective commodity market continues. 17% of the republic’s GDP, 19 % of industrial production, 20 % of investments, 27 % of trade turnover, 30% of services, and almost 37 % of foreign trade are accounted for by the capital. Meanwhile, the city's political-administrative and scientific-cultural functions of the capital are rapidly developing, and a *pure capital environment* is emerging.

Industry is one of the factors that create agglomeration. In the 1990s, the number of people employed in industry in the capital was 39 %, and in 2020 it was 20.8 %. In the structure of industrial sectors, the role of such industries as electronics, precise machine engineering, electrical engineering, equipment manufacturing, light and food, polygraphs, construction, furniture manufacturing, which are based on modern scientific and technical development and meet the high level of demands and needs of the population, are increasing and a unique *economic space* is being formed. In this area, the emergence of new industries requiring science, providing scientific and technical development, based on advanced technology, or modernization of old ones continues. More than 2,330 different industrial enterprises are located in Tashkent, 700 in Chirchik and about 500 in Yangiyol now.

The increasing activity of investment processes in the Tashkent agglomeration, in particular in the city of Tashkent, creates the basis for creating a unique investment environment. 20% of the total investments in the republic are accounted for by the capital.

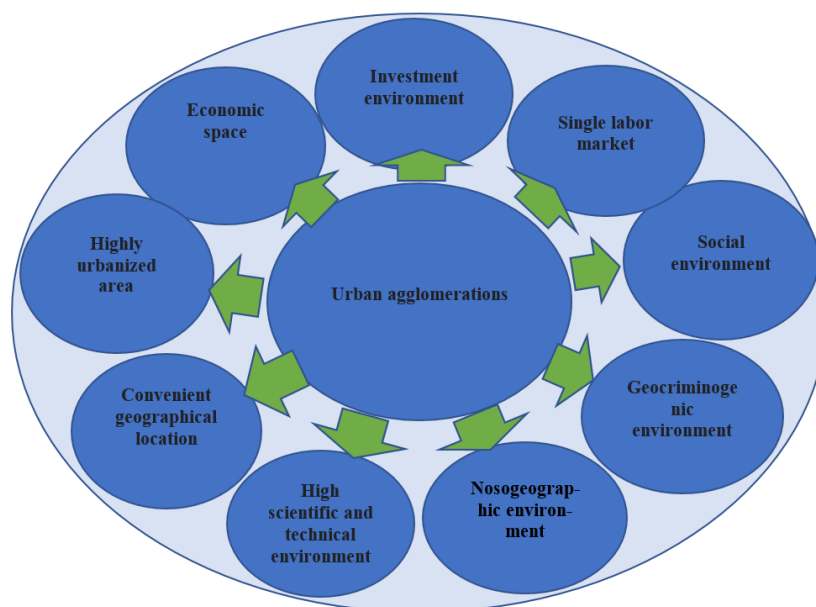
The system of republican cities has a “unipolar” structure, and the difference between the capital and the cities that follow it is getting bigger. The pressure on the city caused many problems. In particular, a unique *criminogenic situation* related with territory has formed in Tashkent city and region. The region has the highest rates of crime in the republic. Criminal activity per 10,000 inhabitants is 3 times higher than the national average.

A critical ecological situation has arisen in the agglomeration. Cities such as Almalyk, Fergana, Tashkent, Navoi, Chirchik, and Bekobod have become among the most polluted cities in the country with the development of transport, energy, metallurgy, gas, and chemical industries. With the boom of constructions, frequent “dust storms” began to be observed in the city of Tashkent, and at this time the city even took the 2nd place in the world. There are more than 2,330 different industrial enterprises in Tashkent, 700 in Chirchik, and more than 500 in Yangiyol. The dirty air generated over the industrial city of Chirchik comes to Tashkent through the valley through the mountain-valley wind and increases it further (10-15%). It was found that 40-60 percent of drinking water in the agglomeration does not meet the requirements.

The incidence of disease among the population is 766 people per thousand people in Tashkent, taking the second place in the republic after the industrialized Navoi region. The highest rate of death is in this agglomeration, which is 7-8 per thousand.

The results of the analysis show that the capital agglomeration and its nucleus - the city of Tashkent is a separate, unique region. Here, in the republic, there is a *social environment* that satisfies the material and spiritual needs of the population at a high level. It is based on the fact that the region is the most favorable *geographical location*, an

*economic space* with a high level of integration of production, high *infrastructure*, *innovation* and investment environment, a single *labor market*, and great social and economic benefits can be obtained. At the same time, they are developing as a specific environment where the problems are the most acute, the *geoecological*, *nosogeographic* and *geocriminogenic* situation is formed (Figure 3).



**Fig. 3.** Features of modern development of urban agglomerations

In the future, the main task of Tashkent city is to improve the social infrastructure, provide the population with housing, and develop it as a "megapolis" of world demand. In the implementation of such huge tasks of the city, it is necessary to take into account the above features, to improve the city and agglomeration in accordance with the market conditions in the development of the capital in a limited area, water, harsh ecological and non-geographical conditions.

#### 4. Conclusions

Based on the above analysis, the following recommendations for improving agglomeration were developed.

On a *city scale*:

1. Limiting or curtailing the activities of old, non-modern, non-necessary branches of industry, ecologically dangerous enterprises, moving large hospitals, universities to the outskirts of the city, chemical plants to the southwest sector, closing cotton mills, the activities of some oil bases control is required. New industrial enterprises should not be built in the city and existed ones should be kept running at full capacity. The city center should be organized for cultural recreation, tourism, solving the problem of traffic congestion, increasing green spaces and water bodies.
2. In the future, it is desirable to develop purely capitalistic, social, political, financial, and cultural functions in the city. In this case, the use of the experiences of highly urbanized regions, in particular, the areas and sectors that are based on high science and technology and require highly qualified specialists, which are not possible in other regions: management, banking and finance, scientific research, construction, culture, in industry - precise mechanical engineering, electronics, ATM, it is advisable to leave industries such as electrical engineering, automotive, light, food, furniture, and printing.
3. It is necessary to bring the city of Tashkent to the ranks of post-industrial cities, to develop it in the style of a "green city" with modern characteristics. It is necessary to limit the extensive expansion of the city, to increase the density.

*In the agglomeration:*

1. Construction of a "green field" lane along the third ring road around Tashkent city.
2. Effective use of the unique social, innovative and economic infrastructure environment created in the city. Placement of certain parts, departments or branches of certain large enterprises, organizations or educational institutions located in the core of the agglomeration, industrial enterprises necessary for the center in satellite cities.
3. To improve the functions of multifunctional medium cities in the 2nd zone, taking into account the long travel time and the high consumption costs of the population, develop Chirchik, Parkent, Nurafshon, Yangiyol as "alternative

centers", form "second-level" agglomerations based on them, and in this way to Tashkent city reduce pressure and develop traffic in the opposite direction.

4. Creating convenience for the population in the 1st zone of the suburbs, improving the transport system for it, deepening the monofunctional development of neighboring towns and villages, and continuing the functions of the capital; here it is appropriate to regionalize economic and social facilities (markets and shopping centers, household services, medical services).

*Regionally:*

1. To connect with the neighboring Bekobod system, to connect with Boka, Gulistan and Jizzakh systems, to connect with Chinoz, Angren-Almalik agglomeration, to connect the city of Pskent, it is necessary to expand the sphere of influence as specific growth points based on "link" cities.

2. It is desirable to develop Jizzakh agglomeration, which is the second largest city after Tashkent city in the urban planning region of Tashkent, and the industrially developing Angren-Almaliq agglomeration as an "alternative" to the capital agglomeration.

*Nationally:*

The development of Fergana as the center of Fergana region, Samarkand as the center of Zarafshan region, and Urganch as the center of Lower Amudarya region in the form of "regional centers" will regulate the Tashkent metropolitan agglomeration.

Tashkent city, its agglomeration and region are an integral part of the republic's national economy and population settlement framework (supporting frame of settlement), and its problems should be comprehensively studied and organized on a nationwide scale, and determined in a reciprocal and proportional manner with the capabilities of other agglomerations and cities in the territory of the republic.

## References

1. E.B. Alayev, Socio-economic geography Conceptual and terminological dictionary. *Mysl Moscow* 350 (2003)
2. O.B. Ata-Mirzaev, Economic and geographical research of the Ferghana - Margilan agglomeration. *Reports of the departments and commissions of the Geographical Society* **11**, 118 – 127 (2009)
3. E. Bose, Urban agglomeration: old name of new content *Russian expert review* **4-5**, 13-16 (2007)
4. A.P. Buryan, V.N. Lakhtin, Problems and ways of regulating the development of the Chelyabinsk agglomeration: territorial systems of production and settlement. *Perm State University Perm* 53-63 (2013)
5. P. Geddes, Cities in evolution: An introduction to the town-planning movement and the study of cities. *Williams and Norgate London (New edition)* 447 (2015)
6. G.M. Lappo, Urban geography. *Vladost Moscow* 480 (1997)
7. N. Mamatkulov, Economic and geographical features of the formation of the Samarkand agglomeration. *Abstract of thesis of PhD – Moscow* 164 (2018)
8. M. Nazarov, B. Rakhmanov, S. Yanchuk, S. Kurbanov, S. Tashtayeva, Z. Abdalova, Natural resource potential of industrial development of the Tashkent economic district. *International Journal of Agricultural Extension* **8(2)**, 121-134 (2021)
9. B. Larkina, Problems of studying urban agglomerations. *Institute of Geography of the Academy of Sciences of Russia* **211** (2020)
10. S. Tashtaeva, Sh. Batirova, Urbanization in Uzbekistan: modern features problems prospects: geography as study issue in Uzbekistan and Russia: common problems opportunities and prospects for cooperation. *Materials of the international scientific-practical conference Tashkent* 349-352 (2019)
11. S. Tashtaeva, S. Bakhramova, Urban agglomerations. *Study paper- Innovatsiya-ziyo Tashkent* **135** (2021)
12. S. Bakhramova, K. Kosimov, Urbanization and Geo-Urban Situation in Uzbekistan. *Indiana Journal of Humanities and Social Sciences* **3(6)**, 410-419 (2022)
13. C. Fang, D. Yu, Urban agglomeration: An evolving concept of an emerging phenomenon. *Landscape and Urban Planning* **162**, 126–136 (2017)
14. Y. He, Y. Lin, G. Zhou, Y. Zhu, K. Tang, Spatial pattern and drivers of urbanization in China's mid-level developing urban agglomeration: A case study of Chang-Zhu-Tan. *Regional Sustainability* **2(1)**, 83-97 (2021)