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POSSIBILITIES OF ADAPTATION OF SILICON VALLEY INNOVATION ECOSYSTEM MODELS TO THE INDUSTRY OF BUKHARA REGION

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Abstract. This article analyzes the main components of the Silicon Valley innovation ecosystem model and studies the possibilities of their adaptation to the industrial system of the Bukhara region on a scientific basis. The study reexamines the three main factors of Silicon Valley success - scientific ideas (anchor universities), high-risk venture capital and social capital (networking) - in the context of the Bukhara industry. It also assesses the adaptive potential of the "brain circulation" model, the cluster approach and public-private partnership mechanisms. The analysis revealed that the Silicon Valley model cannot be completely copied, but its individual elements - technoparks, venture funds, cooperation with foreign diasporas - are promising for adapting to the conditions of Bukhara. At the end of the study, practical recommendations were developed for the development of an innovative industrial ecosystem in the Bukhara region.

Keywords: Silicon Valley, innovation ecosystem, Bukhara region, industrial transformation, venture capital, brainstorming, cluster, adaptation.

The development of innovation ecosystems in the global economy has become one of the main factors of regional competitiveness. In particular, Silicon Valley is recognized as a benchmark model of innovative development for the whole world [1; 6]. Many regions of the world are trying to adapt the experience of Silicon Valley to their own conditions, but the limited possibility of fully replicating this model has been noted in a number of studies [2; 7].

Uzbekistan, and Bukhara region in particular, has been implementing a strategy of industrial diversification and transition to an innovative economy in recent years. According to data for 2025, 3,104 industrial enterprises operate in the region [3]. Over the past eight years, more than $8 billion in investments have been attracted to the region, 6,000 new enterprises have been opened in the industrial sector, and the volume of industrial production has increased more than 6 times [5]. However, the share of high-tech industries in the industrial structure is only 0.2 percent [3]. This situation indicates the need to form an innovative development model.

The main goal of this study is to analyze the main components of the Silicon Valley innovation ecosystem model and scientifically assess the possibilities of adapting them to the industrial system of the Bukhara region.

LITERATURE ANALYSIS

2.1. Theoretical foundations of the Silicon Valley innovation ecosystem

The success of the Silicon Valley innovation ecosystem has been studied by many researchers. According to Kasznik and Pierantozzi (2025), the Silicon Valley innovation ecosystem is based on three elements: ideas (anchor universities), high-risk capital investments, and a network of connections between people [1]. These three elements form a mutually reinforcing system.

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Research by Maas and Esther (2020) describes the Silicon Valley innovation ecosystem as a "perpetual innovation machine." The authors argue that Silicon Valley has high levels of trust (openness, sharing) and strong social capital (networks, community), which makes it more receptive to outsiders [6].

The "brain circulation" theory developed by Saxenian (2005) serves to explain the mechanism of the global spread of the Silicon Valley experience. According to this theory, immigrant engineers working in Silicon Valley return to their homeland and transfer knowledge and experience, turning "brain drain" into "brain circulation" [7]. The examples of India (Bangalore) and China (Shenzhen, Taiwan) show that this process has been successfully implemented.

Goldberg (2018), analyzing the possibilities of transferring the Silicon Valley model to other regions, emphasizes that this model cannot be replicated everywhere and that each region needs to develop customized innovation strategies based on its local characteristics [2].

2.2. Current state of industry in Bukhara region

Analysis of the current state of the industry of the Bukhara region is important for assessing the possibilities of adaptation. In January 2025, the enterprises of the region produced industrial products worth 2,102.1 billion soums, and the index of the physical volume of industrial production compared to the previous year was 105.2% [3].

The largest share in the structure of industrial production falls on the manufacturing industry, which amounted to 1,898.5 billion soums (90.3%). However, in terms of technological composition, the share of low-tech industries is 54.0%, the share of medium-low-tech industries is 44.0%, and the share of high-tech industries is only 0.2%. These indicators indicate that the innovative potential of the regional industry is insufficiently developed [3].

In recent years, the state has been implementing a number of measures to develop the industry and services sector. By the resolution of the President of Uzbekistan dated December 5, 2024, additional measures were established to develop the industry and services sector in the Bukhara region. As a result, in the first 6 months of this year, industrial production increased by 7.3%, and 198 new industrial enterprises were established [5].

The region has two major oil and gas companies operating, another one under construction, and 10 large solar and wind power plants under construction [5]. This energy and resource base can serve as a basis for the development of high-tech industries.

2.3. Problems of adaptation of innovation ecosystems

The adaptation of innovation ecosystems from one region to another is a complex process that requires taking into account a number of factors. Maas and Esther (2020) argue that innovation regions have historically had a certain history of innovation. The development of Silicon Valley was based on favorable soil, where electronics giants such as Fairchild Semiconductor, Hewlett-Packard and Intel were present [6]. That is, innovation regions do not start from nowhere - they rely on a certain scientific and technological base.

Saxenian (2005) emphasizes the importance of the institutional environment. In the case of India and China, the development of the venture capital industry was carried out precisely through the diasporas in Silicon Valley. According to the author, institutional reforms, the development of capital markets, and a favorable political environment are necessary for the success of the "brain circulation" model [7].

In the case of Uzbekistan, structures such as IT Park and IT Park Ventures are aimed at creating an innovation ecosystem based on the Silicon Valley model. In 2025-2026, these structures signed memorandums with international partners such as Alchemist Accelerator, Draper University, Silkroad

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Innovation Hub [4; 9]. These partnerships serve to integrate the innovation ecosystem of Uzbekistan into global networks.

RESEARCH METHODOLOGY

This study used the methods of systematic analysis, comparative analysis, analysis and synthesis. The main components of the Silicon Valley innovation ecosystem (anchor universities, venture capital, social capital, "brain circulation", cluster mechanisms) were separately identified and each of them was assessed from the point of view of the possibilities of adaptation to the industry of the Bukhara region.

The study used the "brain circulation" theory developed by Saxenian (2005), Porter's (2023) cluster theory, and OECD (2020) regional innovation systems methodology. The empirical basis was data from the Statistical Agency of the Republic of Uzbekistan (2025), IT Park (2025-2026), and the Bukhara Regional Statistics Department (2025).

ANALYSIS AND RESULTS

4.1. Key components of the Silicon Valley model

To assess the possibilities of adapting the Silicon Valley innovation ecosystem to the conditions of Bukhara, it is appropriate to separately analyze its main components.

Table 1.

The main components of the Silicon Valley innovation ecosystem and their potential for adaptation to Bukhara conditions .

Component	Silicon Valley feature	Current situation in Bukhara region	Adaptation capacity
Anchor universities	Stanford, UC Berkeley – source of scientific ideas [1]	Bukhara State University, joint educational institutions exist [8]	It is necessary to increase the research capacity of secondary and higher education institutions.
Venture capital	High-risk investments, risk appetite [1]	IT Park Ventures (2024), partnership with foreign venture funds [4]	High - a state-supported venture system is taking shape
Social capital (networking)	Openness, knowledge sharing, a culture of “failure is appreciated” [1;6]	Traditional industrial culture, innovative thinking are taking shape	Medium – cultural transformation required
Brain circulation	Knowledge transfer through immigrant engineers [7]	Specialists educated abroad, international relations through	High - a state support system for returning specialists is being established

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Component	Silicon Valley feature	Current situation in Bukhara region	Adaptation capacity
		IT Park [4;9]	
Cluster mechanism	Vertical and horizontal integration across industries [10]	BCT Cluster (textile), energy clusters are being formed [5;10]	High – cluster policy is supported at the state level
Attitude to failure	Failure is appreciated, the "fail fast" philosophy [1]	There is a strong tendency to avoid risks in traditional business culture	Low – cultural change takes a long time
The role of the state	Indirect – infrastructure, patent system, defense orders [1]	Active state participation – IT Park, free economic zones, tax incentives [4;5]	Different - the role of the state in Bukhara is much higher, which can also be an advantage

Source: compiled by the author based on [1;3;4;5;6;7;8;9;10].

4.2. Adaptability of the Brain Circulation Model

The "brain circulation" model developed by Saxenian (2005) is important for the transformation of the industry of the Bukhara region. According to the model, specialists who have studied and worked abroad return to their homeland and accelerate innovative development by transferring knowledge, skills, and contacts [7].

The example of Uzbekistan shows that this process has become more active. In 2024, Uzbek startups attracted more than $203 million in venture funding, and IT services were exported to 78 countries. Uzum became the country's first unicorn [4].

International partnerships implemented by IT Park Ventures in 2025-2026 are further strengthening this process. In particular, the memorandum signed with Alchemist Accelerator provides for the entry of Uzbek startups into Silicon Valley accelerators, participation in the Hero Training Program with Draper University, and cooperation in the gaming industry with SkyStone Games [4].

The importance of this model for the Bukhara region is reflected in the following aspects:

1. **Harnessing the potential of the diaspora** : Students from Bukhara are studying at foreign universities. It is important to encourage them to return to their homeland and contribute their knowledge to the development of local industries.
2. **Remote collaboration mechanisms** : As Saxenian (2005) noted, digital technologies have made it possible to develop local projects without having to physically return. The collaboration between IT Park and Silkroad Innovation Hub is working in this direction [7;9].

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3. **Venture capital transfer** : Investors from Bukhara in Silicon Valley may be encouraged to invest in their homeland. As Saxenian (2005) shows, the venture capital industries in Taiwan and Israel have developed through this mechanism [7].

4.3. Cluster model and industrial transformation

One of the foundations of Silicon Valley's success is the cluster mechanism. Porter (2023) defines clusters as "geographically close, interconnected groups of companies, specialized suppliers, service providers, and firms in related industries" [reference to Porter 2023 in Chapter 2].

The cluster approach is already being implemented in Bukhara region. The "BCT Cluster" project is a vivid example of this. Within the framework of this cluster, textile, oil and fat industries, animal husbandry, biogas technologies and education are combined. The project has been invested in the amount of 123.1 million US dollars [10].

The difference between this model and Silicon Valley clusters is that BCT Cluster is based on vertical integration (unification along a single technological chain), while Silicon Valley clusters are characterized by horizontal branching (exchange between companies in different industries). It is important to combine both approaches in the adaptation process.

Clusters are also being formed in the energy sector in the region. The construction of 10 large solar and wind power plants has been accelerated. By locating small and medium-sized businesses around this energy base, a "green cluster" model can be developed [5].

4.4. Institutional foundations of the innovation ecosystem

The institutional environment is of particular importance in adapting the Silicon Valley model. Uzbekistan is implementing a number of reforms in this regard:

1. **IT Park and IT Park Ventures** : Established in 2024, IT Park Ventures is a state-backed venture capital platform that has been actively engaged in international collaborations since 2025-2026 [4].
2. **Zero Risk Program** : A program that includes office space, payroll, and tax breaks for startups [4].
3. **Enterprise Uzbekistan** : A legal and financial framework aimed at attracting startups and venture capital, developed based on international experience [4].
4. **SCALE2US program** : A program that supports IT outsourcing companies' entry into the US market [9].

However, there are also a number of factors that limit adaptation. As shown in Table 1, the most important limiting factor is the culture of failure. While Silicon Valley is dominated by the philosophy of "fail fast, learn fast, restart fast," Bukhara's traditional industrial culture is characterized by a strong tendency to avoid risks. This cultural transformation will take a long time.

4.5. Comparative analysis in the context of Silicon Valley - Bukhara

To fully assess the adaptability of the Silicon Valley model to the conditions of Bukhara, we will conduct a comparative analysis of them according to the following key parameters.

Table 2.

Comparative analysis of the innovation ecosystems of Silicon Valley and Bukhara .

Parameter	Silicon Valley	Bukhara region (current situation)	Adaptation strategy
Research base	Stanford, UC Berkeley –	Bukhara State University - of	Joint programs with international universities;

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Parameter	Silicon Valley	Bukhara region (current situation)	Adaptation strategy
	world-class universities	regional importance	development of research infrastructure
Industry structure	IT, biotechnology, green energy – high-tech	Oil and gas (28.2%), textiles (29.2%), food (21.7%) – medium and low-tech [3]	Digitizing existing industries; encouraging high-tech startups
Talent database	Graduates from the world's best universities, immigrant professionals	Limited number of local staff, those educated abroad	Expanding study abroad programs; benefits for returning professionals
Capital market	Developed venture capital market, angel investor network	IT Park Ventures (2024), venture market in the formation stage [4]	IT Park Ventures expansion; creating a network of local angel investors
Infrastructure	Developed transport, communication, energy systems	Developing; energy (10 solar and wind farms) – an advantage [5]	Utilizing energy infrastructure through the "green cluster" model
Public policy	Indirect support (patent system, defense orders)	Active state participation (IT Park, technoparks, tax incentives) - a differentiating factor	Encouraging private initiatives while maintaining an active role for the state
Social capital	High trust, open networks, “valuing failure”	Traditional ties are strong, innovative thinking is taking shape	Creating new social capital through incubators and accelerators
Global connections	Integrated with all the innovation	In development – collaboration with Alchemist, Draper	Expand existing partnerships and create new ones

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Parameter	Silicon Valley	Bukhara region (current situation)	Adaptation strategy
	centers of the world	University, Silkroad Innovation Hub [4;9]	

Source: compiled by the author based on [1;3;4;5;6;7;9].

PROSPECTS OF ADAPTATION OF THE SILICON VALLEY MODEL FOR BUKHARA

5.1. Main directions of adaptation

As a result of the analysis, the following main areas of adaptation of the Silicon Valley model to the industry of the Bukhara region were identified:

1. Developing the venture capital ecosystem

Expanding the work initiated by IT Park Ventures, forming a network of local angel investors, and deepening cooperation with foreign venture funds are among the most promising areas of adaptation [4;9]. The establishment of a business angel school and club (based on the experience of the Silkroad Innovation Hub) is recommended for Bukhara [9].

2. Activation of the "Brain circulation" mechanism

To return Bukhara specialists who have studied and worked abroad to their homeland and use their experience to modernize local industry. To do this:

- Soft loans and grants for returning professionals
- Internship programs at companies in Silicon Valley
- Creating remote working opportunities

In this direction, the collaboration between IT Park Ventures and Silkroad Innovation Hub can play an important role [4;9].

3. Improving cluster mechanisms

Expand the BCT Cluster experience to other sectors (energy, building materials, food). Combine the horizontal cluster model of Silicon Valley with vertically integrated clusters.

4. Development of the scientific research base

Formation of an "anchor university" model based on Bukhara State University: integration of the university with industrial enterprises, organization of research laboratories, opening a startup incubator.

5. Development of digital infrastructure

Supporting IT companies' entry into global markets through programs such as SCALE2US. Establishing an IT park branch in Bukhara.

5.2. Factors limiting adaptation and ways to overcome them

Table 3.

Factors limiting adaptation and measures to overcome them .

Limiting factor	Description	Elimination measures
Cultural barriers	Negative attitude towards failure, risk avoidance	Programs that promote startup failures as "steps to success"; incubators that implement the "fail fast" philosophy

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Limiting factor	Description	Elimination measures
Institutional gap	Underdeveloped venture capital market	Provision of initial venture capital by the state through IT Park Ventures; improvement of the legislative framework
Human resources	Shortage of specialists in high-tech sectors	Expanding study abroad programs; Remote training from Silicon Valley experts
Research base	Lack of modern laboratories and science schools	Establishing joint laboratories with international universities; increasing funding for research and development
Integration into global networks	Limited international relations	Expand existing partnerships (Alchemist, Draper University, Silkroad); participate in international conferences

Source: Developed by the author.

5.3. Adaptation potential across networks

The adaptive potential of the elements of the Silicon Valley model for different sectors of the Bukhara region's industry varies. The following analysis presents an assessment by key sectors.

Table 4.

Adaptation potential across industrial sectors in the Bukhara region.

Network	Current share [3]	Innovative potential	Adaptation priority	Recommended mechanisms
Oil, gas and chemicals	28.2%	Medium	High	Chemical cluster, digital monitoring, joint scientific laboratories
Textiles and sewing	29.2%	Medium	High	Expansion of the BCT Cluster model, smart manufacturing (Industry 4.0), export-oriented design

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Network	Current share [3]	Innovative potential	Adaptation priority	Recommended mechanisms
Food and drinks	21.7%	Medium-low	Medium	Agricultural startups, organic products cluster
Energy (renewable)	In development [5]	High	Highest	"Green cluster", venture capital, international technology transfer
Building materials	Developing	Medium-low	Medium	Innovative materials startups, industrial design
IT and outsourcing	Small	High	Highest	IT Park branch, accelerator programs, entry into foreign markets (SCALE2US)

Source: compiled by the author based on [3;4;5;10].

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The results of the study show that it is not possible to fully transfer the Silicon Valley innovation ecosystem model to the industry of the Bukhara region. The reasons are as follows:

1. Historically, Silicon Valley has a unique institutional and cultural environment that has been shaped over a long period of time [6];
2. The current technological composition of Bukhara's industry consists mainly of medium and low-tech sectors [3];
3. The "anchor university" and developed venture capital market necessary to form an innovative ecosystem have not yet been fully formed.

However, the study shows that some elements of the Silicon Valley model can be successfully adapted to the conditions of Bukhara. In particular:

1. **The venture capital ecosystem** – the experience of IT Park Ventures and cooperation with international accelerators (Alchemist, Draper University) is an important step in this direction [4;9];
2. **The "brain circulation" model** has a high potential for attracting and utilizing internationally educated professionals [7];
3. **Cluster mechanisms** – The BCT Cluster experience can also be applied to other networks [10].

6.2. Recommendations

The following measures are recommended to develop an innovative industrial ecosystem based on elements of the Silicon Valley model in the Bukhara region:

1. Establishment of the Bukhara branch of IT Park

- Opening an IT Park branch in Bukhara;
- Establishing incubator and accelerator programs for startups;

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- Active involvement of Bukhara companies in the SCALE2US program.

2. Expanding venture capital mechanisms

- Directing IT Park Ventures resources to Bukhara startups;
- Establishing a local business angel club (based on the Silkroad Innovation Hub experience) [9];
- Developing joint investment mechanisms with venture funds in Silicon Valley.

3. Development of the "Brain Circulation" program

- Formation of a database of Bukhara students and specialists who have studied abroad;
- "Startup Grant" and "Knowledge Transfer" programs for returning professionals;
- Allocating quotas for internships at Silicon Valley companies.

4. Improving cluster policy

- Expanding the existing BCT Cluster experience beyond textiles to the energy and food sectors;
- "Green energy cluster" - locating small businesses around solar and wind farms;
- Introduction of horizontal branching mechanisms (inter-sectoral cooperation).

5. Development of the scientific research base

- Establishing an "Industrial Innovation Center" on the basis of Bukhara State University;
- Establishing joint laboratories with international universities (e.g. Inha University, MDIS);
- Funding of joint research projects between universities and industry.

6. Cultural transformation

- Training that promotes a philosophy of "learning from failure" rather than "fighting against failure";
- Media coverage of successful startup stories (including those that succeeded after failure);
- Organizing events like "Fail Fest" (a platform for discussing failures in the Silicon Valley experience).

7. Deepening international integration

- Expand existing partnerships with Alchemist Accelerator and Draper University on favorable terms for Bukhara startups [4];
- Ensuring the participation of the Bukhara delegation at the TechCrunch Disrupt conference every year;
- Facilitating the access of Bukhara startups to Silicon Valley through joint programs with the Silkroad Innovation Hub.

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