

# Politecnico di Torino

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DEPARTMENT of MANAGEMENT and PRODUCTION ENGINEERING  
(DIGEP)

Master Degree  
in  
**Engineering and Management**

**Success factors of IT innovation projects in Central Asia:  
A study of IT innovation development in Uzbekistan**



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# Acknowledgment

*With due respect, I would like to take opportunity of expressing  
my appreciation:*

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## **Abstract**

Interaction of dynamic ecosystems comprising of government, academia, research institutes and increasingly educated populations are turning developing countries into hot beds for innovations. IT innovation is known to significantly to elevate a country's growth and to enhance productivity. Firms across the world want to set their foot in developing regions for profits and inclusion of masses through a plethora of innovative services and products that could be developed in today's opportune times by the information technologies. Riding on the wave of digital revolution and increasing accessibility, with 75 million mobile subscriptions in Central Asia and about 37 million Internet users (in 2019-2020), which are continuously growing, local firms are introducing innovative services, products and applications for the mass inclusion of the underserved in various economic sectors.

Innovative products, services and business models are developed either indigenously in Central Asian nations or developed jointly by developers from developed nations and implemented in Central Asian countries. There are successful innovations that provide pioneering services to underserved areas and are emulated in developing economies with slight content and technology alterations, there are innovations that meet failures due to sustainability and interoperability issues or policy bottlenecks related to country specific regulations in Central Asia. There are several reasons for the failure of an IT innovation. Regional adoption and scalability of the innovative services and products are issues innovators should think about for the success of deployed projects.

It is now well-acknowledged that emerging economies, like in Uzbekistan, are beginning to innovate at a rapid rate despite some of the challenges they face. It is important to understand how these economies innovate, what factors affect innovation in such nations, and what are the impacts. I believe that the absence of studies is primarily due to a lack of understanding of what has been found with respect to IT innovation in Uzbekistan economy, what needs to be studied, and how they should be studied. However, to the best of my

knowledge, little research till date has been conducted on this topic. This research is based on business-level data from 131 Uzbekistan companies collected through a survey. The data gathered identified ten critical success factors affecting IT innovation, adoption and diffusion in Uzbekistan. The results show that in the country factors of success IT innovation are mostly similar with global study. Despite legal institutions fell behind IT development in the country, government, giving legal reliefs for new technologies, tries to support at the beginning. I believe my study makes an important contribution to research on IT innovation in emerging economies, and can be useful resource for future researchers interested in this topic.

# Contents

1	Introduction.....	5
2	Innovation.....	6
2.1	<i>Types of innovation.....</i>	7
2.2	<i>Innovation lifecycles and market adoption.....</i>	10
2.4	<i>Critical factors of innovation in business.....</i>	13
3	Global Innovation Index.....	16
3.1	<i>Central Asian countries in GII.....</i>	18
3.1.1	<i>Institutions.....</i>	21
3.1.2	<i>Human capital and research.....</i>	23
3.1.3	<i>Infrastructure.....</i>	24
3.1.4	<i>Market sophistication.....</i>	26
3.1.5	<i>Business sophistication.....</i>	28
3.1.6	<i>Knowledge and technology outputs.....</i>	30
3.1.7	<i>Creative outputs.....</i>	32
3.3	<i>What should Uzbekistan do in order to strengthen its position in GII ?....</i>	34
4	Digital market in Central Asia.....	39
4.1	<i>Digital market in Uzbekistan.....</i>	41
4.1.1	<i>Internet users and Internet connection speeds.....</i>	42
4.1.2	<i>Social media users in Uzbekistan.....</i>	43
4.1.3	<i>Telegram messenger.....</i>	43
4.1.4	<i>Mobile connections in Uzbekistan.....</i>	44
4.1.5	<i>E-commerce in Uzbekistan.....</i>	45
5	IT innovation development in Uzbekistan.....	46
5.1	<i>Ministry of Innovative development.....</i>	47
5.2	<i>“Mirzo Ulugbek” Innovation center.....</i>	49
5.3	<i>IT Park.....</i>	51
5.4	<i>Universities for IT education in Uzbekistan.....</i>	53
5.5	<i>Platform for teaching IT specialties “One Million Uzbek Coder”.....</i>	55
6	Case studies of successful IT projects in Uzbekistan:	
6.1	<i>Venkon.....</i>	56
6.2	<i>Newmax technologies.....</i>	58
6.3	<i>Interbank payment systems: Uzcard, Humo.....</i>	60
6.4	<i>Card-enabled payment service providers: Click, Payme, Upay.....</i>	62
6.5	<i>Telegram based startups: GoTaxi, GoApteka.....</i>	64

7 Problems of IT projects in Uzbekistan.....	66
7.1 <i>Success Factors of Technological Innovation in Uzbekistan</i> .....	68
7.1.1 <i>Methodology</i> .....	68
7.1.1.1 <i>Research questions</i> .....	68
7.1.1.2 <i>Instruments</i> .....	71
7.1.1.3 <i>Data collection</i> .....	71
7.1.2 <i>Results</i> .....	72
7.1.2.1 <i>Critical Success Factors Identified</i> .....	72
Conclusions.....	76
References.....	77
<i>References from public documentations</i> .....	77
<i>References from websites</i> .....	78

## **Introduction**

IT innovation requires an investment in time, money, infrastructure, and other resources. As IT innovation efforts continue to progress in Central Asia, the investment most businesses devote to these endeavors continues to expand and it becomes increasingly important for governments of the region to encourage efficiency and to use their resources effectively to meet growing demands. The information collected from this study of innovation development in Uzbekistan, provides a better understanding of IT innovation, adoption, and diffusion from the perspectives of government efforts and IT companies and can assist in enhancing planning and governance processes surrounding innovation. Effective use of the information and insight gained from this study may help increase the likelihood of successful innovation efforts on emerging economies, like in Uzbekistan.

Government institutions can use the information from this study to enhance innovation efforts by focusing on and developing initiatives that address the concerns of IT startups and legislation to be considered during initial planning processes. Understanding what is pertinent to each of the constituent institutions of innovation development in Uzbekistan will assist with resource allocation and securing buy-in and support. Identifying factors where government institutions and IT businesses are in agreement regarding technological innovation provides opportunities to gain synergies and create partnerships that allow the two factions to work together toward a mutual goal based on their commonalities while recognizing their differences. Identifying factors where IT companies do not think as critically affords government institutions opportunities to provide avenues for information sharing.

## **Innovation**

Innovation-the creation, development, and commercialization of fundamentally new products, services, or businesses-contributes to the development of new sources of competitive advantage. While there is a general consensus that innovation relies heavily on intangible assets such as creativity or risky behavior, it is only recently that companies have moved from a strategy of hope to a more tightly managed innovation approach. This is followed by an increase in the level of management control in the innovation and applied R&D departments. As a result, new approaches to performance assessment need to be developed that recognize the unique nature of innovation: in these particularly uncertain and new contexts, financial and non-financial results are only significantly delayed, and there is a General need for more detailed indirect measures to evaluate and manage innovation performance. In addition, the general idea of measuring innovation performance has its own pitfalls: a traditional measurement and control approach that uses top-down KPIs for organizational actors can easily undermine the creativity and motivation of innovation employees, or lead to suboptimization and an over-emphasis on short-term goals.

Innovation is necessary not only for the development of new products, services, etc. but also to ensure the survival of any business in a competitive world, since it provides ample opportunities for growth and profitability. Driven by the ever-changing needs of society, innovation can be a continuous activity that includes both incremental and breakthrough improvements. it is the creative transformation of data and concepts into new products, processes or services that meet the needs of the market, culminating in successful innovations.

The compatibility and coexistence of innovative products and services with other technologies is ensured only through standardization. Standardization allows innovation to reach the global platform by providing standard, reliable ground rules for all participating organizations. Standardization and innovation complement each other

and together can provide broad opportunities for growth, as well as ensure the economic development of a country.

Information technology is perceived because the next major utility, after electricity and water. Innovations in information technology can become the engine of economic development in developing countries. Innovation creates companies, mobilizes resources, reduces transaction costs, provides equal access to the underserved, helps create low-cost products and services, creates jobs, and contributes to the socio-economic development of the economy. However, the innovation climate in developing countries is inherently problematic, characterized by poor business and management conditions, low levels of education, and mediocre infrastructure. In this regard, there are particular challenges associated with encouraging innovation.

## **Types of Innovations**

Technological innovation is a complex process consisting of several distinct stages, many of which require different focuses and different management strategies.

Ten types of innovation:

*Revolutionary or radical innovations*, as they are also called, are accompanied by a high degree of change in human behavior and paradigms. In fact, radical innovators have a completely different way of thinking and acting. Radical innovations are responsible for most intermittent product or process changes. Managing radical innovations is often difficult because it is prone to failure. Most organizations feel more comfortable following the less risky path of evolutionary or incremental innovation.

*Evolutionary or incremental innovations* are relatively common and occur in large and small organizations. It is often large firms with a well-developed research base that can benefit most from incremental innovation. By constantly improving, they can stay ahead of their competitors and survive another day. Incremental innovations build

on previous radical innovations. They often focus on introducing new features and capabilities to existing product lines. These innovations can be managed formally by focusing on creative problem solving and integrating customer needs into future projects. Incremental innovation is a typical run of mill innovation needed almost every day. It is most often used to keep up with competitors. Incremental innovation is often the only way that large organizations can innovate. However, the hidden danger is that we only specialize in incremental innovation, because the field of innovation is dynamic and being locked in it can mean giving up many opportunities for more flexible competitors. Impact on the competitiveness of the organization and its final result.

*Architectural or disruptive innovations* occur when the existing knowledge or hardware embodied in a product is arranged differently, creating a completely different product and possibly a different market. The function of a product rarely changes dramatically. Implementing an architectural innovation may require scanning and monitoring a wide range of customer needs and possibly determining where current organizational technologies or competencies are being used. With the holistic approach required to implement architectural innovations, innovators will need a broad knowledge base with information collection and knowledge management systems at hand.

*Modular or sustainable innovations* usually occur in complex products or processes with many divisions and functions. This type of innovation can be a radical innovation of a particular part of the overall product. A new personal computer may have a new CPU, but without the accompanying software, interfaces, memory, and buffer blocks, it cannot be considered a radical new product innovation. In this case, a neural network computer or something completely new will be considered a radical innovation. Modular innovation is associated with radical innovations in the nature of its implementation. A modular innovation is a radical innovation in one part of the system. Linking modular innovations directly to radical innovations, but in a reduced volume.

*Process innovation* can be described as the improvement or modification of existing procedures and methods used in the production of products. Any improvement in current production, delivery, packaging, marketing, project management, etc. can be considered a process innovation. Typically, this type of innovation can be characterized by improved pilot operating procedures, which leads to an improved delivery system. Therefore, it is more a process than a product innovation.

*Product innovation* is often associated with new product development (NPD) and not necessarily with innovation. However, product innovations form the core of an innovative organization and provide an incredible competitive advantage in both new and established markets. Although innovation is related to a process, product innovation is much more of a process than a single implementation or improvement. An innovative product is often a shot in the dark with the hope of hitting the right market with the right product at the right price.

*Procedural innovation (or process innovation)* - an innovation that changes management procedures is a good example of this type of innovation. This innovation does not directly affect the size, shape, or characteristics of the product, but may lead to improvements in the product manufacturing process. Thus, a procedure innovation is a process innovation because it improves the production or production process.

*Service innovations (or product innovations)* - in a service organization, the product provides a service to the customer. In this regard, the service becomes a product of the organization, since it generates revenue. Organizations such as banks and repair stations have many different types of "packages" that they offer, and each of them represents a specific service to the customer.

*Market pull innovation* needs a strong customer base and a mechanism for collecting information to meet their needs. Since the consumer / market is actually asking for a new innovation, little is

required in the form of direct radical creativity. A well-established research and development team, however, must translate customer / market needs into practical product offerings. In this regard, the organization engaged in innovation must constantly maintain good contacts with the consumer/market to ensure that the product meets their expectations. Technological push for innovation occurs in a research-and-development-rich environment.

*Technology push innovation* on the other hand needs a strong technology base. When conducting basic research of "blue sky", new materials, methods and techniques are discovered. When these new ideas are incorporated into products, there is a technological push for innovation. While the need for these new technology-driven products often exists, it may not always exist. When this happens, the customer / market is often unaware of the product's characteristics and benefits, and they need to be trained. Launching such a technology-oriented product usually requires significant market development. Institutions that are based on customers or services mostly use market innovations.

### **Innovation lifecycles and market adoption**

The Lifecycle model suggests that market adoption reflects a bell curve that tracks to customer/consumer adoption of a new technology, product or service.

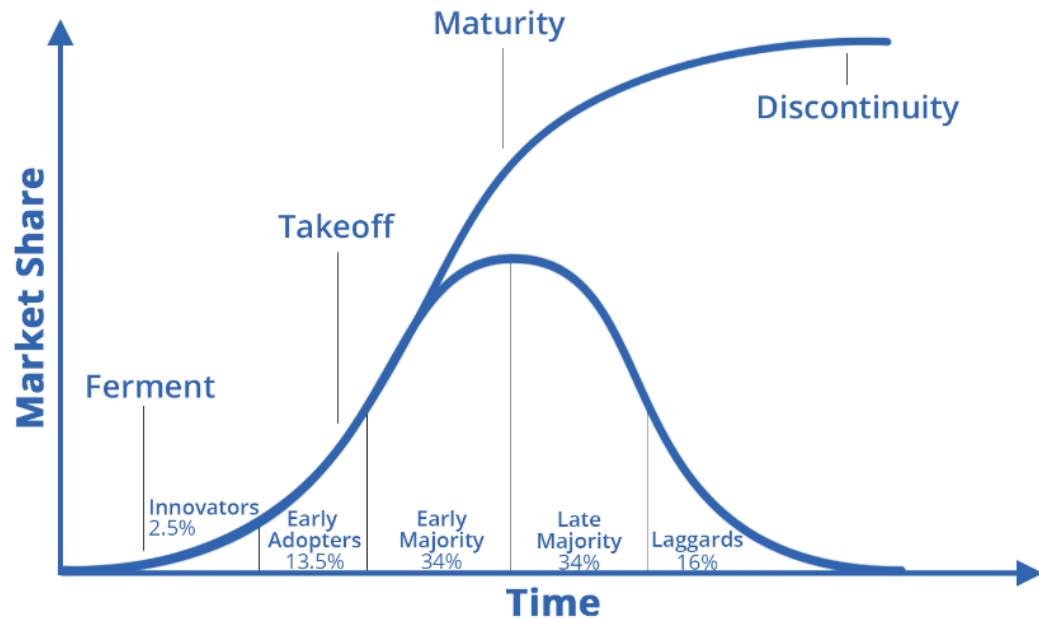


Figure -1- Innovation lifecycles and market adoption

S-curves visually depict how a product, service, technology or business progresses and evolves over time. On a product, service, or technology level, S-curves are usually connected to “market adoption” since the beginning of a curve relates to the birth of a new market opportunity, while the end of the curve represents the death, or obsolescence of the product, service, or technology in the market. Usually the end of one S-curve marks the emergence of a new S-curve – the one that displaces it. There are four phases: ferment, takeoff, maturity and discontinuity.

*Ferment phase:* New system starts with a promising idea and uses many parts that come from the old system. It can provide some new functions though its main performance is worse than the old one. As a result, the new one has to resolve problems in order to work properly and work better than the old one. It often takes a long time due to the lack of resources when people are trying to improve it.

*Takeoff phase:* People would invest and support the improvement of the new system when recognizing its value and market potential. The system comes into the rapid growth stage. The main performance of the system grows rapidly and is becoming better and better than the old one. Meanwhile, the system is trying to enter several market

segmentations where it would gain recognition of customers. The profits that the system makes increase substantially with the improvement of its main performance.

*Maturity phase:* The main performance of the system is reaching its limit. Now, the system steps into its maturity stage. It is very difficult for the parameter to break through the limit because of some objective and subjective factors, such as nature limitation or regulations made by people. Now adding more additional functions to the system is a good way to increase the whole value of the system.

*Discontinuity phase:* The old system is in this stage, the new generation has better main functions than the old one. The old system will be replaced and eliminated or go into some special areas, where it may find new position and new supporters. The main function of the system is changed.

Diffusion of Innovations seeks to explain how innovations are taken up in a population. An innovation is an idea, behavior, or object that is perceived as new by its audience. Diffusion researchers believe that a population can be broken down into five different segments, based on their propensity to adopt a specific innovation: innovators, early adopters, early majorities, late majorities and laggards. Each group has its own “personality”, at least as far as its attitude to a particular innovation goes: 2.5% of innovators (a tiny number of visionaries and imaginative innovators) that can be considered as lead users and can provide important feedback on the performance of a product or a service, 13.5% of early adopters (once the benefits start to become apparent they start buying) that can spread “word of mouth”, 34% of early majority (pragmatists, comfortable with moderately progressive ideas, but won’t act without solid proof of benefits), 34% of late majority (conservative pragmatists who hate risk and are uncomfortable with respect to new idea) and 16% of laggards (people who see a high risk in adopting a particular product, service or behavior). The point, or gap, between the first adopters and also the early majority segments is termed chasm. This can be the foremost important transition that an innovative firm should do because it

allows to succeed in a segment that's quite attractive for its size, thus allowing to the product (or service) to become quite known and diffused within the market.

## Critical factors of innovation in business

There are different elements that could affect innovation and its commercialization in business. Those elements could be organized under a classification that is composed of nine major factors and their constituents:

Individual		This factor is about characteristics of individuals in a firm who have a role in the general scheme and process of technology innovation and its commercialization
	social skills and teamwork	richness in social skills and ability to work in teams
	education	educational background
	diversity	demographic diversity and diversity in professional, personal and cultural background and life experiences
Ideology		It deals with the foundation that a firm is built upon, the values it stands for, its approach toward business, its configuration and constitution and in general, its philosophical approach toward business
	vision and mission	the ideal image that the firm holds and aspires to become and what it wants to fulfil by becoming that
	values	the principles that the firm stands for and conducts itself based on those
	culture	the manner by which the firm's employees comport themselves, handle social transactions among each other and with outsiders
	flexibility	the degree by which the firm's organisation and structure could change to adapt itself to innovations and disruptive changes in the industry
Organization		It involves the structures and arrangements which put the ideology and philosophy of the firm into effect and brings them into practice
	strategy	the business strategy that is formulated based on the firm's long-term and mid-term objectives by considering its resources and the industry's environment and is implemented through the firm's organisation

	learning	the ability of the firm to learn continuously from the environment and its own doings and moving the organisation forward based on what is learnt
	processes	the business processes which are implemented to carry out the firm's activities
	stakeholders	the cooperation between the firm's stakeholders, their relationship, their interaction, and their attitude and behaviour towards the firm and its objectives
	social capital	the formal and informal network of connections among the firm's stakeholders and also their connection with members of other influential external entities and people
Management		It is about how the management of the firm handles different aspects of it and deals with different situations
	style	the management's type of approach toward making decisions and also dealing with people
	knowledge management	capacity of managing knowledge-related activities and processes of the firm, from knowledge production up to capturing and sharing it. Also, taking advantage of external produced knowledge and knowledge spill overs
	IP management	the ability of the management to handle and make proper use of different types of intellectual property such as patents, copyrights, trademarks and trade secrets
	HR (human resource management)	ability to manage the employees and especially the firm's talents and also spotting talented individuals outside the firm and attracting and employing them
	risk management	minimising the impact of uncertainty in the internal and external environment on the firm's assets and resources
	financial management	managing the firm's financial resources to support and foster the firm's activities and also tapping into external financial sources if needed
Technology		It involves the technological sphere in which the firm innovates. Moreover, it includes technological aspects that influence the ability of the firm to innovate
	complexity	the amount of complexity in a technology in different facets of it such as production complexity, components numerousness and usage complexity
	readiness level	the level of maturity of a technology from being still in basic research level up to being ready for launch
	dependency	the reliance of a technology on other technologies and if those technologies are internal or external to the firm
	transfer	the level of facility by which the technology could be transferred from or to the firm
	facilities	the technological facilities and instruments that the firm possess or have access to which could help the firm in

		creation and production of technology from doing research and development up to manufacturing
Knowledge		It incorporates all the aspects regarding the firm's knowledge which is the essence and foundation of technological innovation
	acquisition	the ability of the firm in acquiring knowledge from external sources and benefiting from knowledge spill overs
	production	the capacity of the firm in knowledge creation and production by different processes such as research and development, know-how creation and organisational learning
	HRD (human resource development)	the improvement of human capital's knowledge by providing proper and relevant education
	capture	the capacity of the firm in recording the produced and acquired knowledge in a usable and accessible manner
	transfer	the ability of the firm to spread and share its knowledge capital among its human resources
Support		It deals with the firm's attitude toward technological innovation and how it embraces it and provides for it
	encouragement	promotion of technology innovation in the firm and stimulating the employees participation in its process with permissive policies
	communication	supporting the communication of the firm's technological requirements and obstacles. Also, making an environment in which the employees easily communicate and ideas, problems and solutions are discussed comfortably. Additionally, enhancing the communication among different departments and teams of the firm
	finance	supporting innovative technological initiatives and projects financially
	facilitation	Assisting innovative technological initiatives and projects by facilitating interdisciplinary relationships and enabling technological projects, events and programmes
	reward	implementing a reward system for initiators and participants in commercially successful innovations
	failure	tolerating early failures in innovative projects and programmes and also ensuring that failed projects and programmes do not discourage the employees from further participation in innovation process
Market		It is about keeping the firm's technological innovative course in sync with the market needs and also learning

		from what is happening in the market and incorporating it in the innovation process
	consumers	the firm's understanding of the consumers and their needs
	competitors	the firms' knowledge of its competitors and their strengths and weaknesses
	trends	in which direction the market is moving and what kind of products and services are desired
	position	the firm's desired position in the market and also noticing unoccupied market positions
	demand	the appetite of market for a certain product or service
	size	the total market size for a certain product or service
	growth	the market's potential size and demand for a certain product or service in the future
	substitutes	products and services which could take the market away from a certain technology and shrink the market size and demand
Environment		This factor regards elements of the firm's external environment which could affect the market or how the firm performs
	political	political stability, the government's involvement in the economy in general and, especially the policies toward facilitation of technology innovation such as taxation policies and providing financial support
	economic	the economic factors which affect the market and the firm's decisions, such as interest rate and inflation
	legal	the legal system affecting the firm, such as labour law, consumer law and environmental law
	social	the different aspects of the society in which the firm operates in and targets toward such as cultural aspects, age distribution, educational level and workforce status

Table -1- *Critical factors of innovation in business*

## Global Innovation Index

Recognizing that innovation is a key driver of economic development, the GII aims to provide a rich innovation ranking and analysis referencing around 130 economies. Over the last decade, the GII has established itself as both a leading reference on innovation and a “tool for action” for countries that incorporate the GII into their innovation agendas. For the assessment, 80 parameters are used that provides a

complete picture of innovative development, including a summary of the political situation, the state of education, the amount of development of infrastructure and business. the Global Innovation Index could be a study of the country's innovative climate, which has been conducted by the INSEAD business school since 2007, also because the World IP Organization and Cornell University (USA). Within the 2019 report, Switzerland is the first in the ranking of world leaders in innovation development, followed by Sweden, the United States of America (USA), The Netherlands and also the UK. The report also indicates that the leaders in their regions were India, South Africa, Chile, Israel and Singapore, and China, Vietnam, and Rwanda topped the rankings within the corresponding categories of states, grouped by income.

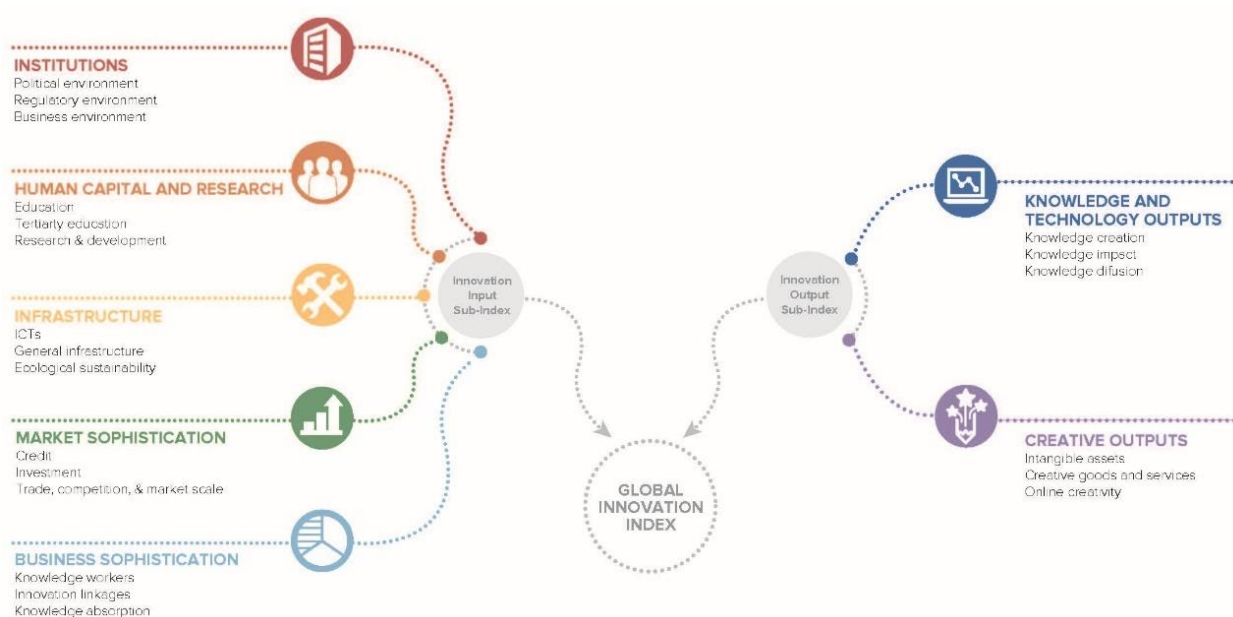


Figure -2- Framework of the Global Innovation Index 2019

The Index is a ranking of the innovation capabilities and results of world economies. It has two sub-indices: The Innovation Input Sub-Index and also the Innovation Output Sub-Index. GII measures innovation based on criteria that has institutions, human capital and research, infrastructure, credit, investment, linkages; the creation, absorption and diffusion of knowledge; and inventive outputs.

## Central Asian countries in GII (2018)

The Central Asian countries in the Global innovation index 2018 include Kazakhstan, Kyrgyzstan and Tajikistan. Despite the improvements in data coverage in the region, Uzbekistan and Turkmenistan do not meet the 66% data coverage threshold and is thus excluded from the 2018 GII. Central Asia is a rather heterogeneous region. Most of its economies belong to the lower-middle-income group, although it does include only upper-middle-income economy of Kazakhstan.

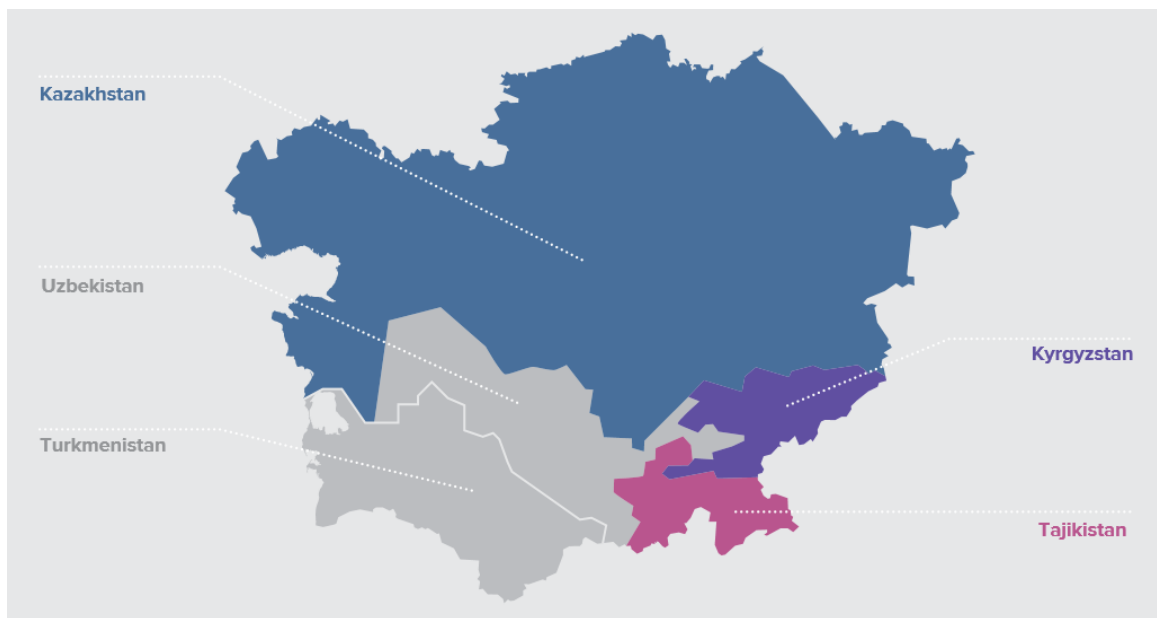


Figure -3- Central Asian countries

Uzbekistan was ranked #122<sup>nd</sup> in the 2015 report last time. In subsequent years, Uzbekistan is not included in this rating. The reason for this is the lack of transparency and completeness of the information provided by the relevant ministries and agencies.

Global Innovation Index								
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Year	2015		2018		2018		2018	
Global Innovation Index	122	25.9	74	31.4	101	26.5	94	27.6
Innovation Input Sub-Index	112	33.88	55	43.56	104	33.04	85	37.99
Innovation Output Sub-Index	127	17.89	91	19.28	88	19.98	101	17.14
Innovation Efficiency Ratio	123	0.53	111	0.44	67	0.6	106	0.45

Table -2- *Global Innovation Index in Central Asia*

Kyrgyzstan has improved its rank considerably in the last few years, and comes in at 94th in 2018. Among lower-middle economies in Central Asia, Kyrgyzstan underperforms than would be expected by their income level.

Tajikistan lost 7 positions in 2018 and became 101th in the GII. But the rank of 48 for Tajikistan in 1.3.1 *Ease of starting a business* is a strength for the country (with a percent rank of 0.62, this is above the cutoff for strengths for Tajikistan, which is 0.52). Tajikistan ranks 10th globally in *Market sophistication and its sub-pillar Investment*. Best-ranked indicators in this pillar include ease of getting credit, microfinance loans, and domestic market scale.

Kazakhstan moves up four positions, ranking 74th that year. In Kazakhstan, the national coders were found to be lenient in marking. Consequently, the human-coded items did not meet PISA standards and were excluded from the international data. Since human-coded items form an important part of the constructs that are tested by PISA, the exclusion of these items resulted in a significantly smaller coverage of the PISA test. As a result, Kazakhstan's results may not be comparable with results for Kazakhstan from previous years.

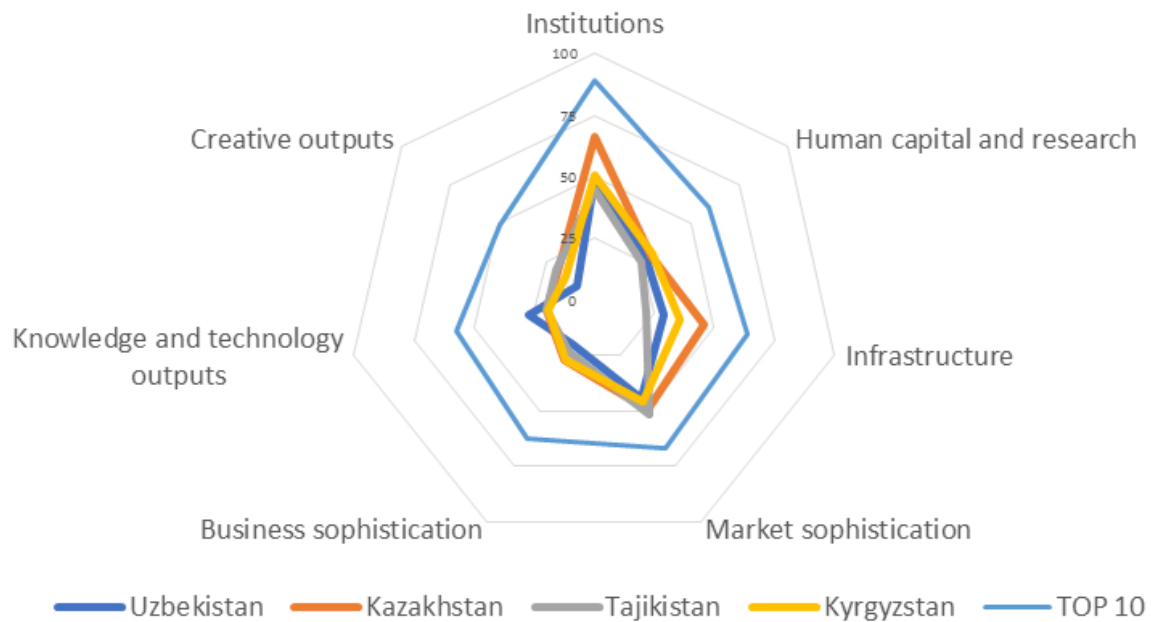
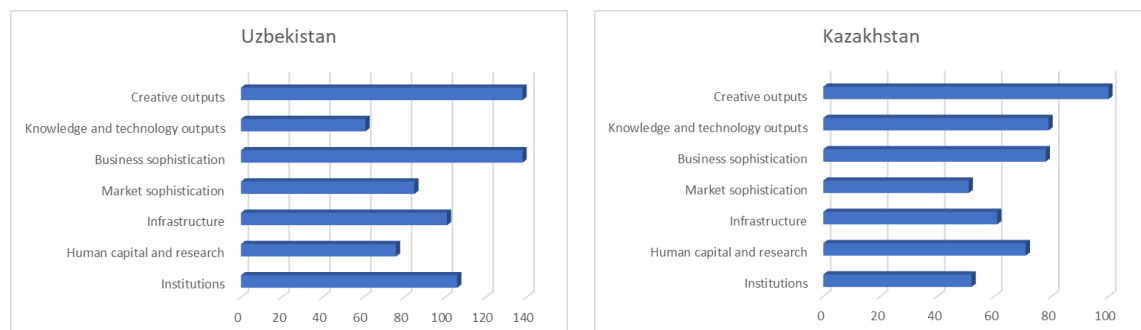


Figure -4- Central Asia in compare with TOP 10 of Global Innovation Index 2018

Kazakhstan ranks 1st among the 5 economies in Central Asia. Compared to other economies in Central Asia, Kazakhstan performs above average in 3 out of the 7 GII pillars: Institutions, Infrastructure and Business sophistication.

In sum, some of the economies in Central and Southern Asia are already occupying key leading positions in the global innovation landscape. By contrast, Institutions and Creative outputs are the areas where, on average, Central and Southern Asia performs less well. Knowledge and technology outputs is another pillar where the region performs relatively well, especially thanks to good rankings in productivity growth.



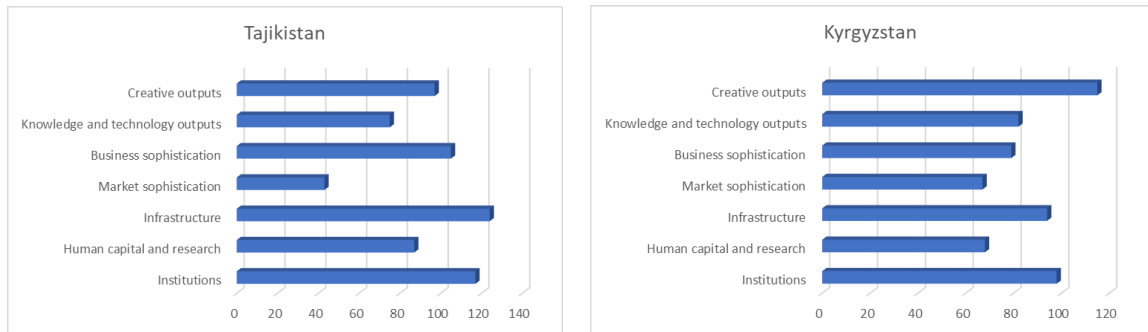


Figure -5- Central Asian countries' strengths and weaknesses in Global Innovation Index framework

## Institutions

The Institutions pillar captures the institutional framework of an economy. It consists of following sub-pillars: Political environment, Regulatory environment and Business environment. There are 7 indicators:

*Political and operational stability:* Index that captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. Scores are standardized.

*Government effectiveness:* Index that captures perceptions of quality of public and civil services and the degree of their independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Scores are standardized.

*Regulatory quality:* Index that captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Scores are standardized.

*Rule of law:* Index that captures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, property rights, the

police, and the courts, as well as the likelihood of crime and violence. Scores are standardized.

*Cost of redundancy dismissal:* Sum of notice period and severance pay for redundancy dismissal (in salary weeks, averages for workers with 1, 5, and 10 years of tenure, with a minimum threshold of 8 weeks)

*Ease of starting a business:* The ranking of economies on the ease of starting a business is determined by sorting their distance to frontier scores for starting a business. These scores are the simple average of the distance to frontier scores for each of the component indicators.

*Ease of resolving insolvency:* The ranking of economies on the ease of resolving insolvency is determined by sorting their distance to frontier scores for resolving insolvency. These scores are the simple average of the distance to frontier scores for the recovery rate and strength of insolvency framework index.

	Institutions							
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015		2018		2018		2018	
Institutions	48.98	106	66.24	52	44.93	117	50.72	98
Political environment	33.34	115	51	65	28.65	120	31.73	114
<i>Political stability</i>	50.58	100	65.67	64	46.31	100	49.47	96
<i>Government effectiveness</i>	16.09	126	43.66	74	19.82	121	22.86	118
Regulatory environment	45.68	121	68	61	46.51	112	55.12	98
<i>Regulatory quality</i>	4.37	139	41.54	75	16.07	122	35.05	93
<i>Rule of law</i>	15.6	133	32.48	90	11.62	122	13.88	119
<i>Cost of redundancy dismissal</i>	81.37	81	98.98	20	79.17	86	85.78	66
Business environment	67.92	76	79.74	34	59.65	99	65.31	78
<i>Ease of starting a business</i>	89	55	91.95	37	90.54	48	92.94	26
<i>Ease of resolving insolvency</i>	46.45	72	67.52	36	28.76	117	37.67	103
<i>Ease of paying taxes</i>	68.3	92	-	-	-	-	-	-

Table -3- Institutions pillar of Global Innovation Index in Central Asia

Ease of paying taxes and ease of resolving insolvency indexes were merged in 2018.

## **Human capital and research**

This pillar gauges the human capital of economies. It consists of following sub-pillars: Education, Tertiary education and Research and development (R&D). There are 12 indicators:

**Expenditure on education** Government operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment, as a percentage of gross domestic product (GDP).

**Government funding per secondary student** Initial government funding per secondary student, as a percentage of GDP per capita.

**School life expectancy** Total number of years of schooling that a child of a certain age can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular age is equal to the current enrolment ratio for that age.

**Assessment in reading, mathematics, and science** PISA average scales in reading, mathematics, and science

**Pupil-teacher ratio, secondary** The number of pupils enrolled in secondary school divided by the number of secondary school teachers (regardless of their teaching assignment).

**Tertiary enrolment** The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education.

**Graduates in science and engineering** The share of all tertiary graduates in science, manufacturing, engineering, and construction over all tertiary graduates.

**Tertiary level inbound mobility** The number of students from abroad studying in a given country, as a percentage of the total tertiary enrolment in that country.

**Researchers per million population, full-time equivalence.** Researchers in R&D are professionals engaged in the conception or

creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned.

Gross expenditure on R&D (GERD) Total domestic intramural expenditure on R&D during a given period as a percentage of GDP.

Global R&D companies, average expenditure top 3: Average expenditure on R&D of the top three global companies.

Human capital and research								
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015		2018		2018		2018	
Human capital and research	26.99	76	29.06	71	24.33	87	29.93	68
Education	55.19	29	43.44	77	47.53	65	58.66	23
Expenditure on education	n/a	n/a	22.01	101	48.43	42	57.26	22
Government expenditure on education per pupil, secondary	n/a	n/a	27.08	49	n/a	n/a	n/a	n/a
School life expectancy	41.15	97	56.01	46	33.76	94	46.11	73
Assessment in reading, mathematics, and science	n/a	n/a	37.29	53	n/a	n/a	n/a	n/a
Pupil-teacher ratio, secondary	83.26	47	100	1	73.27	70	86.57	35
Tertiary education	22.61	95	31.97	63	24.75	82	30.33	69
Tertiary enrolment	6.96	117	40.3	53	24.86	78	37.26	60
Graduates in science and engineering	41.48	47	38.27	39	35.02	47	26.96	65
Tertiary inbound mobility	0.51	107	11.02	68	4.12	84	30.12	34
Research and development (R&D)	3.17	92	11.76	55	0.72	108	0.79	107
Researchers	6.34	58	8.2	56	n/a	n/a	n/a	n/a
Gross expenditure on R&D (GERD)	n/a	n/a	2.99	96	2.17	103	2.38	102
Global R&D companies, average expenditure top 3	n/a	n/a	n/a	40	n/a	40	n/a	40
QS university ranking average score top 3 universities	n/a	73	35.87	36	n/a	78	n/a	78

Table -4- Human capital and research pillar of Global Innovation Index in Central Asia

QS university ranking average score top 3 universities. This index was started to indicate in the list in 2017.

## Infrastructure

The third pillar measures Information and communication technologies (ICTs), General infrastructure, and Ecological sustainability. Information and communication technologies (ICTs), General infrastructure and Ecological sustainability are sub-pillars. Final result of the pillar takes into account 10 indexes:

*ICT access* The ICT access index is a composite index that weights five ICT indicators (20% each). It is the first sub-index in ITU's ICT Development Index (IDI).

*ICT use* The ICT use index is a composite index that weights three ICT indicators (33% each). It is the second sub-index in ITU's ICT Development Index (IDI).

*Government's online service* Research teams assessed each country's national website, including the national central portal, e-services portal, and e-participation portal as well as the websites of the related ministries of education, labour, social services, health, finance, and environment, as applicable.

*Online e-participation* The United Nations E-Participation Index is based on the survey used for the UN Online Service Index. The survey was expanded with questions emphasizing quality in the connected presence stage of e-government.

*Electricity output* Electricity production, measured at the terminals of all alternator sets in a station.

*Logistics performance* A multidimensional assessment of logistics performance, the Logistics Performance Index (LPI) compares the trade logistics profiles of 160 countries and rates them on a scale of 1 (worst) to 5 (best).

*Gross capital formation* Ratio of total gross capital formation in current local currency to GDP in current local currency.

*GDP per unit of energy use* Purchasing power parity gross domestic product (PPP\$ GDP) per kilogram of oil equivalent of energy use.

*Environment performance* This index ranks countries on 20 performance indicators tracked across policy categories that cover both environmental public health and ecosystem vitality. These indicators gauge how close countries are to established environmental policy goals.

*ISO 14001 environment certificates* ISO 14001:2015 sets out the criteria for an environmental management system and can be certified.

	Infrastructure							
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015		2018		2018		2018	
Infrastructure	28.97	101	45.38	61	21.34	124	35.95	94
Information and communication technologies (ICTs)	35.58	93	67.13	43	16.33	122	44.14	90
ICT access	29.5	119	75.5	38	n/a	n/a	45.4	93
ICT use	20.9	90	56.9	52	n/a	n/a	29.1	96
Government's online service	44.88	72	76.81	31	12.32	120	42.75	96
Online e-participation	47.06	70	59.32	65	20.34	113	59.32	65
General infrastructure	29.83	73	41.55	51	18.93	121	37.61	64
Electricity output	9.07	79	21.32	34	7.08	77	7.65	75
Logistics performance	11.92	116	31.86	77	n/a	126	4.31	122
Gross capital formation	49.16	19	56.52	25	34.31	102	69.23	13
Ecological sustainability	21.51	132	27.47	107	28.76	101	26.11	112
GDP per unit of energy use	10.19	117	13.02	102	23.87	72	10.34	107
Environmental performance	43.23	101	54.56	84	47.85	101	54.86	82
ISO14001 environmental certificates	0.7	129	2.18	100	0.35	121	0.16	124

Table -5- Infrastructure pillar of Global Innovation Index in Central Asia

## Market sophistication

The Market sophistication pillar has three sub-pillars structured around market conditions and the total level of transactions. It consists of 3 sub-pillars: Credit, Investment and Trade, competition, & market scale. There are 9 indicators in this pillar:

*Ease of getting credit* The ranking of economies on the ease of getting credit is determined by sorting their distance to frontier scores for getting credit.

*Domestic credit to private sector* Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.

*Microfinance institution's gross loan portfolio* Combined gross loan balances per microfinance institution (current US\$), divided by GDP (current US\$) and multiplied by 100.

*Ease of protecting minority investors* the ranking is the simple average of the distance to frontier scores for the extent of conflict of

interest regulation index and the extent of shareholder governance index.

*Market capitalization* Market capitalization (also known as ‘market value’) is the share price times the number of shares outstanding.

*Venture capitals deals* Thomson Reuters data on private equity deals, per deal, with information on the location of investment, investment company, investor firms, and funds, among other details.

*Applied tariff rate, weighted mean* Weighted mean applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country.

*Intensity of local competition* Average answer to the survey question: In your country, how intense is competition in the local markets? [1 = not intense at all; 7 = extremely intense]

*Domestic market scale* The domestic market size is measured by gross domestic product (GDP) based on the purchasing-power-parity (PPP) valuation of country GDP, in current international dollar (billions).

Market sophistication								
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015		2018		2018		2018	
Market sophistication	44.44	85	49.66	51	51.39	43	46.1	67
Credit	25.2	87	23.23	108	42	49	50.5	28
<i>Ease of getting credit</i>	40	93	55	70	40	101	75	26
<i>Domestic credit to private sector</i>	n/a	n/a	12.51	93	6.12	113	7.03	110
<i>Microfinance institutions' gross loan portfolio</i>	10.4	39	2.19	53	79.87	8	69.47	10
Investment	26.05	115	59.54	18	66.67	10	41.43	59
<i>Ease of protecting investors</i>	50.83	88	85	1	66.67	32	61.67	50
<i>Market capitalization</i>	2.38	103	8.62	64	n/a	n/a	0.95	85
<i>Total value of stocks traded</i>	0.15	92	-	-	-	-	-	-
<i>Venture capital deals</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trade and competition	82.09	42	66.2	47	45.51	109	46.36	107
<i>Applied tariff rate, weighted mean</i>	82.09	83	83.52	56	62.57	93	79.32	65
<i>Intensity of local competition</i>	n/a	n/a	59.04	106	62.16	94	55.42	115
<i>Domestic market scale</i>	-	-	61.12	39	28.66	111	25.36	119

Table -6- Market sophistication pillar of Global Innovation Index in Central Asia

## **Business sophistication**

The fifth enabler pillar tries to capture the level of business sophistication to assess how conducive firms are to innovation activity. Knowledge workers, Innovation linkages and Knowledge absorption are sub-pillars here. 15 indicators build final result:

*Employment in knowledge-intensive services* Employment in knowledge-intensive services (% of workforce)

*Firms offering formal training* The percentage of firms offering formal training programs for their permanent, full-time employees.

*GERD performed by business enterprise* Gross expenditure on R&D performed by business enterprise as a percentage of GDP.

*GERD financed by business enterprise* Gross expenditure on R&D financed by business enterprise as a percentage of total gross expenditure on R&D.

*Females employed with advanced degrees* The percentage of females employed with advanced degrees out of total employed.

*University/industry research collaboration* Average answer to the survey question: In your country, to what extent do people collaborate and share ideas in between companies and universities/research institutions? [1 = not at all; 7 = to a great extent]

*State of cluster development* Average answer to survey question on role of clusters in the economy: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)?

*GERD financed by abroad* Percentage of gross expenditure on R&D financed by abroad—i.e., with foreign financing.

*Joint venture/strategic alliance deals* Thomson Reuters data on joint ventures/strategic alliances deals, per deal, with details on the country of origin of partner firms, among others.

*Patent families filed in at least two offices* Number of patent families filed by residents in at least two offices.

*Intellectual property payments* Charges for the use of intellectual property not included elsewhere payments (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010.

*High-tech imports* High-technology imports minus re-imports (% of total trade).

*ICT services imports* Telecommunications, computer and information services (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010.

*Foreign direct investment, net inflows* This data series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.

*Research talent in business enterprise* Professionals engaged in the conception or creation of new knowledge, products, processes, methods, and systems, as well as in the management of these projects, broken down by the sectors in which they are employed.

Business sophistication								
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015		2018		2018		2018	
Business sophistication	20.04	138	27.45	78	23.2	105	27.26	79
Knowledge workers	9.89	135	40.34	53	23.22	96	36.26	60
Employment in knowledge-intensive services	n/a	n/a	56.02	39	23.8	87	29.5	76
Firms offering formal training	9.89	105	32.85	53	39.18	44	78.23	6
GERD performed by business enterprise	n/a	n/a	1.68	69	n/a	n/a	0.39	80
GERD financed by business enterprise	n/a	n/a	50.69	41	2.01	86	5.97	79
Females employed with advanced degrees	n/a	n/a	52.28	30	11.37	85	31.99	61
Innovation linkages	5.28	138	16.94	116	24.62	81	14.91	120
University/industry research collaboration	n/a	n/a	39.13	72	55.19	30	25.46	117
State of cluster development	n/a	n/a	32.51	111	33.55	108	29.96	116
GERD financed by abroad	n/a	n/a	2.92	86	0.4	97	3.72	75
Joint venture/strategic alliance deals	8.29	60	5.94	79	n/a	n/a	10.81	58
Patent families filed in at least three offices	2.28	89	2.63	43	n/a	n/a	0.77	74
Knowledge absorption	44.93	27	25.08	85	21.77	95	30.6	65
Intellectual property payments	n/a	n/a	7.55	76	0.08	114	3.66	92
High-tech imports	n/a	n/a	20.29	80	n/a	n/a	25.07	61
ICT services imports	n/a	n/a	12.22	88	8.04	104	18.99	70
Foreign direct investment net inflows	44.93	90	51.48	22	46.34	35	61.2	14
Research talent in business enterprise	-	-	n/a	n/a	n/a	n/a	n/a	n/a

Table -7- Business sophistication pillar of Global Innovation Index in Central Asia

## Knowledge and technology outputs

This pillar is one of two pillars of “Innovation Output Sub-Index”, which covers all those variables that are traditionally thought to be the fruits of inventions and or innovations. It consists of 3 sub-pillars: Knowledge creation, Knowledge impact and Knowledge diffusion. 14 indexes are concluded in the pillar:

*Patent applications by origin*      Number of resident patent applications filed at a given national or regional patent office (per billion PPP\$ GDP)

*PCT international applications by origin*      Number of international patent applications filed by residents at the Patent Cooperation Treaty (per billion PPP\$ GDP)

*Utility model applications by origin*      Number of utility model applications filed by residents at the national patent office (per billion PPP\$ GDP)

*Scientific and technical publications*      Number of scientific and technical journal articles (per billion PPP\$ GDP)

*Citable documents H index*      The H index is an economy’s number of published articles (H) that have received at least H citations in the period 1996–2014

*Growth rate of GDP per person engaged*      Growth of gross domestic product (GDP) per person engaged provides a measure of labor productivity (defined as output per unit of labor input).

*New business density*      Number of new firms, defined as firms registered in the current year of reporting, per thousand population aged 15–64 years old.

*Total computer software spending*      Computer software spending includes the total value of purchased or leased packaged software such as operating systems, database systems, programming tools, utilities, and applications. Data are reported as a percentage of GDP.

*ISO 9001 quality certificates* ISO 9001:2015 sets out the criteria for a quality management system and is the only standard in the family that can be certified to (although this is not a requirement)

*High-tech and medium high-tech output* High-tech and medium-high-tech output as a percentage of total manufactures output, on the basis of the Organization for Economic Co-operation and Development (OECD) classification of Technology Intensity Definition.

*Intellectual property receipts* Charges for the use of intellectual property not included elsewhere receipts (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010.

*High-tech exports* High-technology exports minus re-exports (% of total trade).

*ICT services exports* Telecommunications, computer and information services (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010.

*Foreign direct investment, net outflows* This data series shows net outflows of investment from the reporting economy to the rest of the world and is divided by GDP.

Knowledge and technology outputs								
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015		2018		2018		2018	
Knowledge and technology outputs	27.23	61	19.88	79	20.07	75	19.48	82
Knowledge creation	9.45	75	12.17	61	28.24	36	10.53	67
National office patent applications	14.42	48	12.66	43	0.41	112	22.71	29
Patent Cooperation Treaty resident applications	0.38	83	0.73	79	n/a	n/a	0.71	81
National office resident utility model application	17.28	24	26.09	17	67.8	6	14.96	31
Scientific and technical publications	2.43	129	3.95	113	5.17	110	8.43	94
Citable documents Hindex	4.89	109	3.48	108	n/a	126	1.44	121
Knowledge impact	45	38	27.3	96	29.48	90	27.36	95
Growth rate of GDP per person engaged	87.48	6	71.04	38	84.24	9	74.63	22
New business density	4.25	83	8.19	47	0.66	94	4.65	65
Total computer software spending	n/a	n/a	0.92	118	6.31	95	7.52	90
ISO 9001 quality certificates	0.81	130	2.53	104	0.02	125	0.1	124
High-tech and medium-high-tech output	n/a	n/a	10.06	80	1.39	98	2.63	94
Knowledge diffusion	n/a	n/a	20.18	64	2.51	126	20.54	61
Royalties and license fees receipts	n/a	n/a	0.11	96	0.95	74	1	73
High-tech exports	n/a	n/a	20.48	34	n/a	n/a	7.86	54
Communications, computer and information services	n/a	n/a	2.27	111	4.07	98	24	35
Foreign direct investment net outflows	n/a	n/a	39.01	35	n/a	n/a	34.91	44

Table -8- Knowledge and technology outputs pillar of Global Innovation Index in Central Asia

## Creative outputs

The last pillar on creative outputs measures the role of creativity for innovation. It consists of 3 sub-pillars: Intangible assets, Creative goods and services and Online creativity. Furthermore, they have 13 indicators:

*Trademark application class count by origin* Number of trademark applications issued to residents at a given national or regional office (per billion PPP\$ GDP)

*Industrial designs by origin* Number of designs contained in industrial design applications filed at a given national or regional office (per billion PPP\$ GDP)

*ICTs and business model creation* Average answer to the question: In your country, to what extent do ICTs enable new business models? [1 = not at all; 7 = to a great extent]

*ICTs and organizational model creation* Average answer to the question: In your country, to what extent do ICTs enable new

organizational models (e.g., virtual teams, remote working, telecommuting) within companies? [1 = not at all; 7 = to a great extent]

*Cultural and creative services produced* Creative services exports (% of total exports) according to the Extended Balance of Payments Services Classification EBOPS 2010.

*National feature films produced* Number of national feature films produced (per million population 15–69 years old).

*Entertainment and media market* The Global entertainment and media outlook (the Outlook) provides a single comparable source of five-year forecast and five-year historic consumer and advertiser spending data and commentary, for 13 entertainment and media segments, across 61 countries.

*Printing, publications & other media output* Publishing, printing, and reproduction of recorded media output as a percentage of total manufacturing output.

*Creative goods exports* Total value of creative goods exports, net of re-exports (current US\$) over total trade.

*Generic top-level domains (gTLDs)* Generic top-level domains (gTLDs) (per thousand population 15–69 years old).

*Country-code top-level domains (ccTLDs)* Country-code top-level domains (ccTLDs) (per thousand population 15–69 years old).

*Wikipedia yearly edits* Wikipedia yearly page edits (per million population 15–69 years old).

*Mobile app creation* Global downloads of mobile apps, by origin of the HQ firm, scaled by PPP\$ DGP (billions)

Creative outputs								
	Uzbekistan		Kazakhstan		Tajikistan		Kyrgyzstan	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Year	2015	2018	2018	2018	2018	2018	2018	2018
Creative outputs	8.55	138	18.68	100	19.88	97	14.8	115
Intangible assets	10.97	136	31.22	101	26.06	116	23	118
<i>National office resident trademark applications</i>	16.32	69	7.99	90	1.77	110	4.89	99
<i>Madrid system trademark applications by country of origin</i>	0.28	67	0.76	106	n/a	116	3.77	75
<i>ICTs and business model creation</i>	n/a	n/a	54.05	90	47.29	110	38.95	118
<i>ICTs and organizational model creation</i>	n/a	n/a	46.84	94	42.14	105	34.77	116
Creative goods and services	12	93	8.21	100	26.71	51	10.94	89
<i>Cultural and creative services exports</i>	n/a	n/a	0.22	77	n/a	n/a	n/a	n/a
<i>National feature films produced</i>	12	49	4.87	73	6.51	64	1.93	91
<i>Global entertainment and media output</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<i>Printing and publishing output</i>	n/a	n/a	16.88	75	36.81	29	19.72	67
<i>Creative goods exports</i>	n/a	n/a	5.22	89	n/a	n/a	6.67	78
Online creativity	0.24	126	4.08	74	0.69	107	2.25	87
<i>Generic top-level domains (gTLDs)</i>	n/a	141	0.29	113	0.01	125	0.14	116
<i>Country-code top-level domains (ccTLDs)</i>	0.4	105	3.14	58	0.33	98	0.37	94
<i>Wikipedia monthly edits</i>	0.33	120	11.63	52	1.74	96	4.94	69
<i>Video uploads on YouTube</i>	n/a	n/a	1.24	77	n/a	n/a	3.53	67

Table -9- Creative outputs pillar of Global Innovation Index in Central Asia

## What should Uzbekistan do in order to strengthen its position in GII ?

Uzbekistan, like many other countries, is actively working to enter and improve its positions in international rankings such as the Global Innovation Index (GII) and also the Global Competitiveness Index (GIC), and others. Despite the actual fact that Uzbekistan is showing significant progress in such indices as Doing Business, it's fell out of the GII and GIC ratings, due to not having enough country necessary statistics. Nevertheless, the country's leadership has set an ambitious task not only to return to these indicators, but also to strengthen the position of Uzbekistan in international ratings.

Each of these indices evaluates the standard and effectiveness of institutions, the state of innovation or improvements in the business environment. Entrance and improvement in such indices are necessary for any developing country, since independent indicators are barometers of the country's socio-economic development, and are often taken into consideration by large international investors when deciding to invest in the economy of a specific developing country. International studies have shown that improvements in such ratings

are often co-occur with an increase in FDI inflows and increased satisfaction with the life among the population. Often, most of these indices are calculated and consist of many sub-indicators that display various areas of a country's social or institutional development. For instance, the GII is composed of 80 indicators that measure the legal system, human capital, development of information and communication technologies and the quality of education. The Global innovation index has a close positive relationship with the level of economic development of countries and the rate of economic growth. On the one hand, more developed countries have more economic leverage to stimulate innovation, but any other way, macroeconomic studies show that innovation is a fundamental factor in economic development.

Uzbekistan has set an ambitious goal of entering the best-ranked 50 countries on this indicator by 2030, as a part of the Innovation Development Strategy implementation. The implementation of this task would force the active and coordinated work of ministries and departments, since most of the GII indicators relate to different areas of the country's socio-economic system. For instance, GII includes such indicators as education spending (in% of GDP), capital market development, reduction in energy intensity of GDP or improvement of logistics infrastructure – have a positive effect on the dynamics of GII.

As a conclusion, an analysis of the gap between the Republic of Uzbekistan and the countries that are within the top 50 of the GII index showed that the biggest gaps are noted in such areas as: Higher education (the share of foreign citizens in universities, admission to universities); Science (number of scientific publications, citation of scientists, number of scientists per 1 million people); Capital market development and FDI inflows; ICT sector (coverage of the population with LTE networks, access to the net and ICT, etc.)

### *Financial infrastructure development*

A comparison of international data shows that the increase of the capital market can become one among the important factors of the country's innovative growth. Thus, the capitalization of states is closely and positively correlated with the country's place within the GI rating.

Capital market development can be an alternative and important tool to stimulate innovation in the private sector by: Market liquidity growth; The emergence of new financial instruments for financing innovative projects where, by their nature, the traditional banking sector is less active; Attracting institutional investors to the private sector.

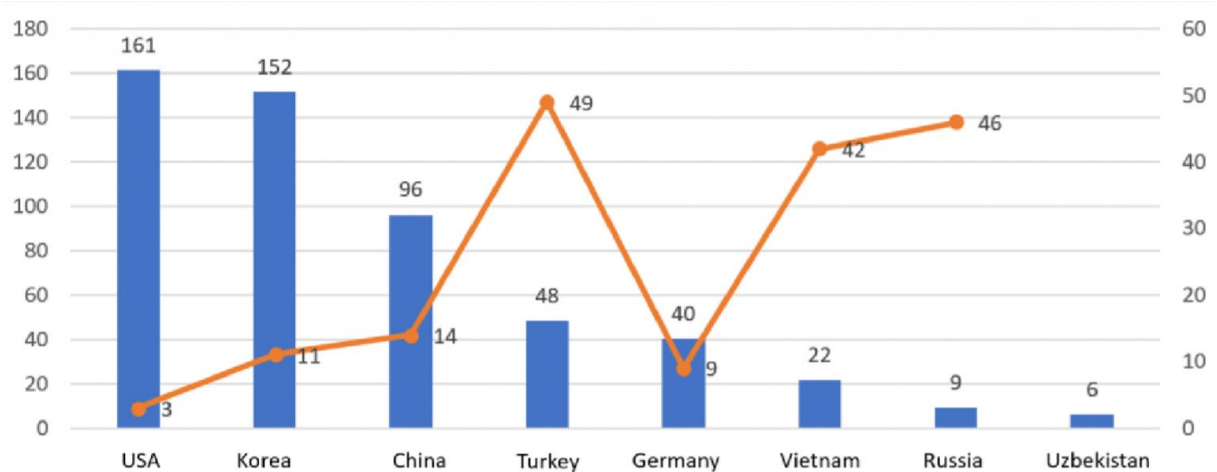


Figure -6- Stock market capitalization of GDP in compare with GII rating

### *Human capital as a factor in the innovative development*

It should be noted that Uzbekistan, being the most densely populated country in Central Asia, has a significant reserve in innovative development due to investments in human capital: increasing enrollment in education, entry and improvement in global educational ratings (PISA, TIMMS), stimulating scientific and technical activities. For example, according to the World Bank in Uzbekistan in 2017 there were 496 researchers in R&D compared to 672 in Vietnam, 833 in Montenegro or 3,900 in Slovenia (countries that are in the top 50 GII).

However, there is a direct and close relationship between the number of scientists in the country per 1 million people and the rating in GII.

Consequently, within the next few years, the country are faced with the task of attracting more youth to science and research. The Ministry of Innovative Development of the Republic is taking certain steps during this direction.

So, as an example, under the Ministry, by decree of the President, the Youth Academy is being created without legal entity status. On a competitive basis, teams will be accepted into the academy, consisting of gifted youth and students, as well as scientists and entrepreneurs under the age of 40 who have their own innovative projects and ideas. The leadership of the Youth Academy is entrusted to the primary Deputy Minister of Innovation Development. Similarly, the Gifted Youth Support Fund is organized at the Academy of Youth. Legal entities with a state share in the authorized fund (capital) of 50% or more, as well as legal entities in whose authorized fund (capital) of 50% or more belong to enterprises with a predominant share of the state, will annually transfer 10% per annum of all funds to the fund support innovation. The fund will also be replenished through charitable donations from members of the Board of Trustees of the Academy of Youth, grants and loans of international financial institutions and donors, and other sources. The priority areas in which the Youth Academy will carry out projects include artificial intelligence, renewable energy, robotics, mechatronics, pharmaceuticals, biotechnology, programming, industrial design, 3D modeling and other promising areas.

At the same time, it should be noted that while implementing this initiative, it is necessary not to forget about such disciplines as economics, sociology, psychology and others (social sciences). So, according to the statistics of “Scopus” (a tool for tracking the citation of articles published in scientific journals – ed.) out of 1813 articles published for 2016-2018, only about 100 articles were in social sciences.

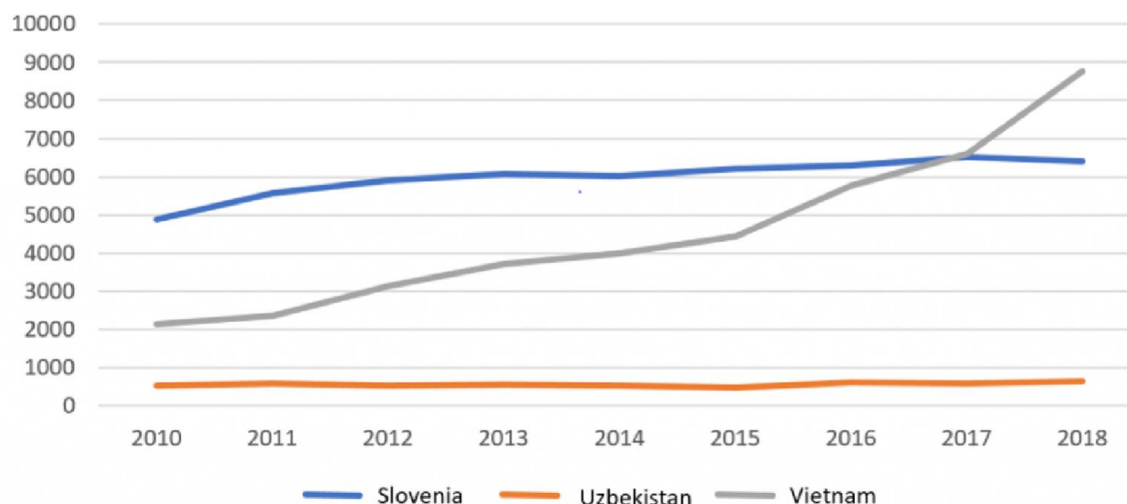


Figure -7- Number of articles published in SCOPUS

Consequently, without more ambitious measures, it'll be extremely difficult to cut back the scientific lag from other developing countries. For example, in terms of the number of scientific articles published, there is a significant gap between Uzbekistan and other developing countries that are in the top 50 of the GII index.

Measures to attract young people to science and improve the quality of scientific activity include: modification of the traditional centralized model of financing research activities towards decentralization creation of scientific thematic startup incubators; creation of tools for financing independent scientists and research groups on various topics popularization of science among young people through trainings and seminars with the participation of leading local and foreign scientists, as well as in the media (for example, one of the first modern popular science magazines QVANT has already appeared in Uzbekistan in this regard); grant funding for mini research laboratories that study a specific topic (for example, human capital, sustainable development) closely with the private sector and other sectors (ICT), thereby increasing the commercialization of science and attracting investments and grants for further development creating new solutions for the country, business and society.

The implementation of these measures can allow Uzbekistan to make a qualitative scientific breakthrough, which will positively affect the positions in the ranking of State Institutions, allow local universities to enter the list of top 500 QS, increase the prestige of scientific activity, and therefore, will contribute to the innovative economic development of the country.

Summarizing the above mentioned, it can be said that the active attention of the Government of the Republic of Uzbekistan to international ratings and indicators is an important signal of the desire to transfer the economy from resource-oriented economic development to the tracks of innovative economic growth, driven by institutions and human capital. Since the pillars of most international ratings are indicators of the quality of state institutions, indicators of the effectiveness of financial and market institutions, as well as the rate of accumulation of human capital.

At the identical time, the implementation of those ambitious tasks would require the active and coordinated work of ministries and departments, since most of the indications like GII or GCI are composite indicators consisting of an oversized number of sub-indicators. However, the achievement of the target parameters for 2030, which are noted within the Strategy for Innovative Development, will significantly increase GDP per capita, create a competitive private sector, and usually shift the flow of foreign investment from the raw materials sector to the important sector of the economy.

## **Digital market in Central Asia**

The role of digital technology in our lives has reached new heights, and more people are spending more time doing more things online than ever before:

The number of people in Central Asia using the internet has grown to 36.2 million, an increase of 5.1 percent (0.5 million new users)

compared to January 2018. Worldwide, there are 11.6 million social media users in January 2019, with this number increasing by more than 37.4 percent (3.4 million new users) since this time last year. More than 74.4 million people now use mobile phones, with user numbers up by 2.3 million (2.6 percent) over the past year.

Digital around the world			Uzbekistan		Kazakhstan		Kyrgyzstan		Tajikistan		Turkmenistan	
	Urbanization/ (bln)	Penetration	Urbanization/ (mln)	Penetration	Urbanization/ (mln)	Penetration	Urbanization/ (mln)	Penetration	Urbanization/ (mln)	Penetration	Urbanization/ (mln)	Penetration
Total population	7.676	56%	32.59	50.0%	18.5	57%	6.18	37.0%	9.20	27.0%	5.90	52.0%
Unique Mobile users	5.112	67%	24.84	76.0%	25.69	139%	9.38	152.0%	9.90	108.0%	4.48	76.0%
Internet users	4.388	57%	15.45	47.0%	14.14	76%	2.49	40.0%	3.01	33.0%	1.06	18.0%
active social media users	3.484	45%	2.00	6.1%	7.3	39%	1.80	29.0%	0.44	4.8%	0.04	0.7%
Mobile social media users	3.256	42%	1.00	3.1%	3.6	19%	0.9	16.0%	0.24	2.6%	0.02	0.4%
Growth (mln)			Growth (thousand)		Growth (thousand)		Growth (thousand)		Growth (thousand)		Growth (thousand)	
Total population	84	1.1%	455	1.4%	196	1.1%	88	1.4%	189	2.1%	94	1.6%
Unique Mobile users	100	2.0%	2000	6.7%	-647	-2.5%	568	6.4%	422	4.5%	-120	-2.6%
Internet users	367	9.1%	0	0.0%	80	0.6%	380	18.0%	13	0.4%	16	1.5%
active social media users	288	9.0%	700	54.0%	2000	26.0%	500	38.0%	130	42.0%	9	27.0%
Mobile social media users	297	10.0%	200	25.0%	1000	44.0%	310	48.0%	70	41.0%	5	31.0%

Table -10- Digital market 2019 in Central Asia

Central Asia is located in the heart of the Eurasian landmass, on the traditional silk road trade route, halfway between Europe and the developing economies of East, South and Southeast Asia. Despite this strategic location, the Central Asian countries are poorly connected to each other and to the rest of the world. Some factors help explain the poor connectivity: *Geography*: all five countries are landlocked (Uzbekistan is even doubly landlocked, since all its neighbors also do not have access to the sea). The region is characterized by a harsh climate, and settlements are separated from each other by huge distances. High mountains in the East and political instability in the South (Afghanistan) are barriers to movement. Central Asia is remote from both European and far Eastern markets. *History*: during the Soviet period, Central Asia was isolated from the rest of the world by a sealed border. The legacy transport and energy infrastructure reflect Soviet rather than modern needs (links between the peripheral republics and Moscow, rather than from one Republic to another or to neighboring countries). *Politics*: although the region is gradually opening up, isolationist authoritarian regimes tend to view the rest of the world with suspicion. Protectionist economic policies have created high barriers to foreign trade and investment. Political repression prevented travel and Internet access.

Currently, the average Internet user spends 6 hours and 43 minutes online every day. This is 3 minutes less than last year, but still amounts to more than 100 days of connected time per Internet user per year. If we allow ourselves to sleep about 8 hours a day, this means that we currently spend more than 40 percent of our waking life using the Internet. Just over 50 percent of the Central Asian population – about 36.2 million people – are still not connected to the Internet.

GlobalWebIndex estimates that mobile phones currently account for more than half of all the time we spend online, with the company's latest data showing that the share of mobile devices in Internet time is 50.1 percent. Since 92% of the world's Internet users now connect to the Internet via mobile devices, this figure may be lower than one would expect, but various data show that computers continue to play an important role in our Internet-related lives. Despite the ubiquity of mobile devices, three-quarters of Internet users between the ages of 16 and 64 still access the Internet using laptops and desktop computers. In addition, the latest Statcounter data shows that approximately 53 percent of all web page requests now come from mobile phones, but computers still account for 44 percent of the total. About half of the 3.7 hours people spend on mobile phones every day are spent on social and communication apps, which means that these platforms make up the same proportion of our mobile time as all our other mobile activities combined. GlobalWebIndex reports that on mobile devices and computers, we spend an average of 2 hours and 24 minutes per person per day using social networks, which is 2 minutes more than last year.

## **Digital market in Uzbekistan**

Under former President Islam Karimov, Uzbekistan had a closed economy and difficult relations with most of its neighbors. Given that Uzbekistan is the most populous country in the region, strategically located between the other four States, efforts to establish intraregional ties without its participation made little sense, which was hampered by Tashkent's isolationist policy. This picture is now changing, thanks to

the ambitious reforms launched since 2016 by Karimov's successor, Shavkat Mirziyoyev. Among other things, they made Uzbek currency convertible, opened border checkpoints, lifted travel restrictions on Uzbek citizens, and lowered customs duties on imports. Two regional summits of Central Asian leaders in 2018 – the first in almost a decade – and an intensive program of international visits by Mirziyoyev symbolize the country's new readiness to interact with the world. Breaking the isolation of the most populous country in Central Asia is an important incentive for the development of regional ties. There are many new bus routes, trains and flights (for example, direct flights between Tashkent and Dushanbe resumed in 2017 after a 25-year break).

According to Freedom House, Uzbekistan has one of the most tightly controlled online environments in the world. However, the government has been taking an interest on e-commerce, particularly with a "social web solution" that seeks to expand the scale of e-commerce and make it more convenient for social services to be provided online. The most popular browsers in the country by market share were Chrome (53.69%), followed by UC Browser (19.99%), Opera (5.62%), Samsung Internet (4.61%), Firefox (4.52%), and Safari (3.88%). As for search engines, Google was the most popular one in Uzbekistan, with a market share of 71.87%, followed by Yandex RU (24.02%) and Mail.ru (2.64%).

### *Internet users and Internet connection speeds*

There were 15.5 million internet users in Uzbekistan in January 2019. The number of internet users in Uzbekistan increased by 1.2 million (+7.1%) between 2019 and 2020 and reached 16.7 million users. Internet penetration in Uzbekistan stood at 47% in January 2019.

	Uzbekistan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan
<b>Internet users</b>					
Total number of active internet users	15.45	14.14	2.49	3.01	1.06
Internet user as a percentage of Total population	47.0%	76.0%	40.0%	33.0%	18.0%
Total number of active mobile internet users (mln)	7.73	6.97	1.33	1.64	0.53
Mobile internet users as a percentage of total population	24.0%	38.0%	22.0%	18.0%	9.0%
<b>Internet connection speeds</b>					
Average speed of mobile internet connections	9.97 mbps	18.9 mbps	12.9 mbps	5.12 mbps	-
Annual change in average speed of mobile internet connections	50.0%	0.3%	9.7%	-8.2%	-
Average speed of fixed internet connections	10.11 mbps	29.7 mbps	19.7 mbps	n/a	-
Annual change in average speed of fixed internet connections	65.0%	14.0%	40.0%	n/a	-

Table -11- *Internet users and Internet connection speeds in Uzbekistan*

## *Social media users in Uzbekistan*

There were 2.0 million social media users in Uzbekistan in January 2019. The number of social media users in Uzbekistan increased by 1.2 million (+37.5%) between April 2019 and January 2020 and now the number is 3.2 million users. Social media penetration in Uzbekistan stood at 6.1% in January 2019.

	Uzbekistan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan
<b>Social media overview</b>					
Total number of active social media users (mln)	2.0	7.3	1.8	0.44	0.042
Active Social media users as a percentage of total population	6.1%	39.0%	29.0%	4.8%	0.7%
Total number of active social users accessing via mobile device (mln)	1.0	3.6	0.96	0.24	0.021
Active mobile social users as a percentage of the total population	3.1%	19.0%	16.0%	2.6%	0.4%
<b>Facebook audience overview</b>					
Number of people that Facebook reports can be reached with adverts on Facebook (mln)	0.85	2.4	0.69	0.21	0.021
Percentage of adults aged 13+ that can be reached with adverts on Facebook	3.3%	17.0%	15.0%	3.2%	0.5%
Quarterly growth in Facebook advertising reach	-13.0%	9.1%	11.0%	11.0%	-8.7%
Percentage of its ad audience that Facebook reports is female	33.0%	54.0%	49.0%	27.0%	46.0%
Percentage of its ad audience that Facebook reports is male	67.0%	46.0%	51.0%	73.0%	54.0%
<b>Instagram audience overview</b>					
Number of people that Instagram reports can be reached with adverts on Instagram (mln)	1.7	6.8	1.6	0.36	0.032
Percentage of adults aged 13+ that can be reached with adverts on Instagram	6.6%	48.0%	35.0%	5.4%	0.7%
Quarterly growth in Instagram advertising reach	42.0%	11.0%	14.0%	38.0%	3.2%
Percentage of its ad audience that Instagram reports is female	28.0%	57.0%	48.0%	22.0%	45.0%
Percentage of its ad audience that Instagram reports is male	72.0%	43.0%	52.0%	78.0%	55.0%

Table -12- *Social media users in Uzbekistan*

## **Telegram messenger**

Central Asian governments, unlike their counterparts in Russia and Iran, see no need to crack down on a convenient and trusted app like Telegram.

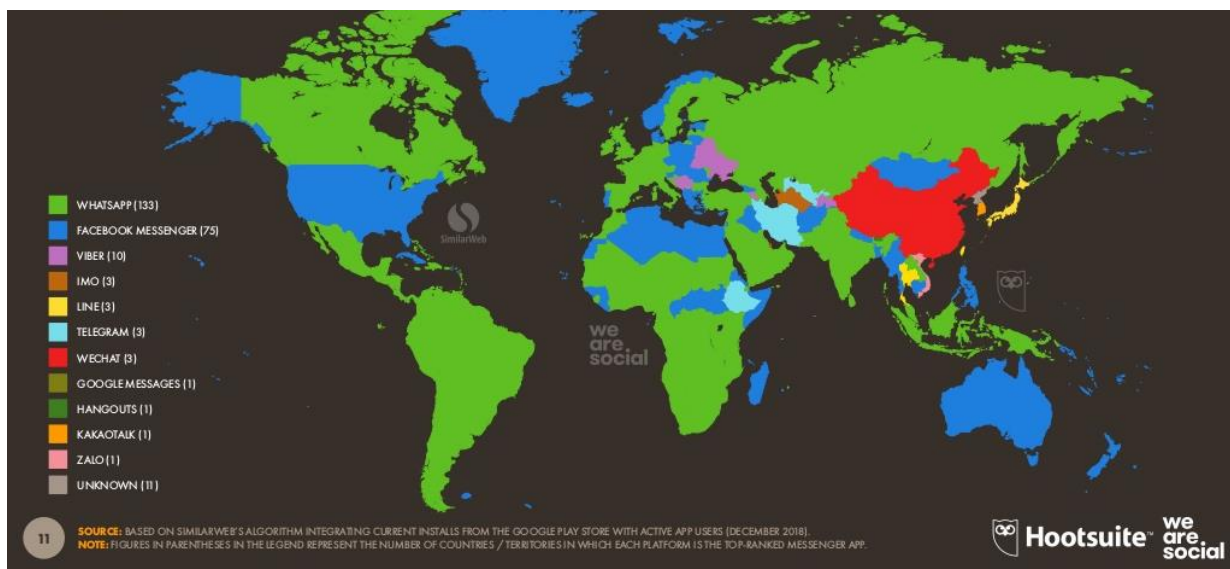


Figure -8- Top Social Messengers around the World in 2018

In Uzbekistan, the app is embraced nationwide and the government has expressed no intention of curtailing messaging apps.

**TELEGRAM IS MORE POPULAR IN UZBEKISTAN  
THAN ANYWHERE ELSE IN THE WORLD.**

The entire country communicates with this messenger in Uzbekistan. The president has a page, as do almost all the cabinet ministers. The traffic police collect fines using Telegram. You can order a pizza or call a cab. All Central Asian countries have a similar policy towards the app. However, these governments announced it lacked the ability to block messaging apps like Viber, Telegram and WhatsApp.

### *Mobile connections in Uzbekistan*

There were 24.84 million mobile connections in Uzbekistan in January 2019. The number of mobile connections in Uzbekistan increased by 301 thousand (+1.2%) between January 2019 and January 2020 and current number is 25.14 million. The number of mobile connections in

Uzbekistan in January 2019 was equivalent to 76% of the total population.

	Uzbekistan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan
<b>Mobile use</b>					
Total number of mobile connections (not unique individuals) (mln)	24.84	25.69	9.38	9.9	4.48
Mobile connections as a percentage of total population	76.0%	139.0%	152.0%	108.0%	76.0%
Percentage of mobile connections that are pre-paid	96.0%	91.0%	89.0%	92.0%	90.0%
Percentage of mobile connections that are post-paid	4.0%	9.0%	11.0%	8.0%	10.0%
Percentage of mobile connections that are broadband (3G&4G)	59.0%	68.0%	44.0%	40.0%	42.0%
<b>(Max 100)</b>					
Overall country index score	46.31	63.58	51.03	43.77	-
Mobile network infrastructure	41.77	51.39	46.74	42.44	-
Affordability of devices & services	60.39	90.59	69.01	50.52	-
Consumer readiness	73.49	83.31	78.57	70.34	-
Availability of relevant content & services	24.81	42.13	26.75	24.33	-

Table -13- Mobile connections in Uzbekistan

### *E-commerce in Uzbekistan*

E-Commerce in Uzbekistan is still underdeveloped, and only now it is beginning to become a priority. In 2018, the President of Uzbekistan signed a decree "on measures to accelerate the development of e-Commerce", and approved the "program for the development of e-Commerce in Uzbekistan for 2018-2021". As a result, the market is expected to grow significantly in the next few years. However, given that e-Commerce in Uzbekistan is still fairly unexplored, there are no official figures for market value or revenue. The main obstacles to the development of e-Commerce in the country are the insufficient number of e-banking services, conversion restrictions, and underdeveloped trade and customs regulations. The capital, Tashkent, is currently the only viable e-Commerce market in the country, as 90% of Uzbek Internet users live here. On the other hand, the growing number of mobile Internet users is contributing to the growth of e-Commerce potential, and mobile broadband usage is expected to grow moderately or strongly over the next five years. However, at present, mobile e-Commerce in Uzbekistan is not widespread and continues to develop.

	Uzbekistan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan
E-commerce use					
Financial inclusion factors					
Has an account with financial institution	37.0%	59.0%	40.0%	47.0%	41.0%
Has a credit card	0.6%	20.0%	3.6%	5.7%	n/a
Has a mobile money account	n/a	n/a	3.1%	n/a	n/a
Makes online purchases and/or pays bills online	7.1%	24.0%	5.0%	13.0%	2.0%
Percentage of women with a credit card	0.6%	18.0%	3.7%	4.8%	n/a
Percentage of men with a credit card	0.5%	22.0%	3.5%	6.6%	n/a
Percentage of women making online transactions	4.0%	25.0%	5.2%	10.0%	1.5%
Percentage of men making online transactions	10.0%	24.0%	4.8%	15.0%	2.6%

Table -14- E-commerce in Uzbekistan

## IT innovation development in Uzbekistan

The innovation market in Uzbekistan is just beginning to take shape. However, despite the problems facing the industry, local experts are confident that in the next two years the country will become a leader in the IT sector among the countries of Central Asia.

Uzbekistan is the largest country in Central Asia. More than 30.2 million people live there. Over 51 percent of them, or 15.5 million as of 2018, are mobile subscribers, which means they are active or potential Internet users. The government of Uzbekistan has taken a number of measures to improve Internet access. In the same year 2018, the bandwidth of the international data network increased 10 times-from 110 to 1200 gigabits per second. The corresponding order was given by President Shavkat Mirziyoyev personally earlier this year. Experts are sure that all this serves as a fertile ground for creating IT startups in the country, which have been actively developing since 2017. In addition to private players, government agencies are also involved in this process.

The state helps in the development of IT innovations for instance in 2019, the Ministry of innovative development of the country allocated 15 billion UZS (about \$ 160 thousand) in the form of grants for these purposes. In addition, this year, the first scientific accelerator, C. A. T. science, was opened, which has already released 17 startups.

Hackathons (a forum for software developers), contests (a competition for IT startups), both jointly implemented with state agencies of

Uzbekistan, and interstate, including with the participation of private corporations can derive innovation market of the country.

*Ministry of innovative development of the Republic of Uzbekistan*



The Ministry of innovative development of the Republic of Uzbekistan was established by presidential Decrees in 2017, in order to ensure accelerated innovative growth of all sectors of the economy and social sphere based on advanced foreign experience, modern achievements of world science, innovative ideas, developments and technologies and in accordance with the goals set out in the action strategy for the five priority areas of development of the Republic of Uzbekistan for 2017 – 2021. Ministry implements a unified state policy in the field of innovation and scientific and technical development of the Republic of Uzbekistan, aimed at the comprehensive development of public and public life, increasing the intellectual and technological potential of the country. Moreover, they assess innovative development based on its performance indicators, determines the main directions of development in the relevant industries and areas that require the rapid introduction of advanced technologies and coordinates the activities of public administration institutions, research and analytical institutions and other organizations in the implementation of innovative ideas, developments and technologies. The Ministry of innovative development is a single customer of state scientific and technical programs and projects implemented by research, educational and other institutions, which examines the state of Affairs in state bodies and other organizations, collects and summarizes proposals for improving innovation activities; Financed from the state budget and other funds not restricted by law.

The main functions of the Ministry are:

- Development and implementation of innovations in state and public construction taking into account long-term scenarios of the country's development, as well as determining the development strategy of priority and promising areas of scientific research and advanced technologies that ensure the progress of society and the state;
- Strategic and preventive planning to ensure accelerated economic growth, taking into account rapidly changing global conditions;
- Comprehensive analysis and forecast of the activities of state bodies and organizations to improve the quality of life of the population, ensure the growth of welfare and the formation of modern infrastructure for scientific and innovative development, providing the necessary conditions for sustainable growth of the country's socio-economic potential;
- Introduction of innovations aimed at modernization and intensive growth of agriculture;
- Introduction of innovations in social development, including health and education systems;
- Introduction of innovations in environmental protection and environmental management systems;
- Determination of priority directions of the state scientific, technical and innovation policy and approval of state scientific and technical programs of fundamental, applied and innovative research based on grants;
- Introduction of modern technologies based on long-term scenarios of the country's development, aimed at designing know-how, expanding innovation activities and forming a competitive market for scientific and technical products;
- Development of international cooperation and improvement of the legal framework for the implementation of innovative ideas, developments and technologies.

## *Mirzo Ulugbek Innovation center*



Mirzo Ulugbek Innovation center was created by the decree of President Shavkat Mirziyoyev on June 30, 2017 in order to improve the conditions for the development of the information technology industry in the country. In recent years, Uzbekistan has been implementing gradual reforms to introduce ICT in all areas, including public administration and the provision of public services. This contributed to significant progress in the implementation of the e-government concept in the country, in particular, the creation of an effective system of dialogue with the population based on ICT.

The rapid development of ICT, which opens up new opportunities, nevertheless requires expanding the scope of state support aimed at strengthening the country's position in the global ICT market. In order to further develop production of software for information and communication technologies in the Republic in accordance with international standards, in support of domestic developers to expand production of high-quality, competitive software products, as well as other tasks stipulated by the State program on the implementation of the strategy five priority directions of development of the Republic of Uzbekistan for the years 2017-2021 and Informed dialogue with the people and human interests, expanding exports of ICT goods, to stimulate the attraction of domestic and foreign investments in the sphere, it was decided to create an innovation center named after him. Mirzo Ulugbek.

The main activities of the innovation center are: Creating the necessary organizational, technical, financial and economic conditions for expanding the interaction of business entities and higher education institutions in the production and sale of information technology products in the domestic and foreign markets; Assistance to residents

of the innovation center in attracting foreign investment to implement competitive ICT projects in the domestic and foreign markets; Participation in providing employment for graduates of higher education institutions and professional colleges with a specialization in information technology, including by supporting gifted young people in the implementation of startup projects; Organization of professional development and retraining in the field of ICT through short - and medium-term specialized courses, including the invitation of foreign specialists; Support for start-up entrepreneurs in implementing innovative projects in the field of developing ICT products in promising areas.

Since December 3, 2019, the Innovation Center for supporting the development and implementation of information technologies - Mirzo Ulugbek is being abolished, and its residents are moving to the Technopark of software products and information technologies. The main reasons are: further improvement of the IT sector, creation of competitive and promising software products, expansion of outsourcing IT services for foreign countries and improvement of the quality of its products in general. This step will allow us to combine joint efforts to further develop the IT culture and startup ecosystem in the Republic of Uzbekistan, as well as raise the quality of domestic IT products to a new level. Only Technopark launches a full cycle of the startup ecosystem of the information technology industry: starting with the birth of programming skills (IT Academy) and the development of an IT idea (incubation program), continuing with the development of a product prototype and testing it on the real market (acceleration program), ending with receiving benefits for improving IT business in Uzbekistan (residency).

## *IT Park*



Measures for the organization of the it Park are defined by the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated January 10, 2019, and its Directorate was created. In July of this year, the first complex was put into operation in the designated area.

The innovation city has incubation and acceleration programs to support promising start-up projects, and all conditions have been created for specialists. Currently, the first projects are being implemented in such areas as information technology, financial technology, e-Commerce, E-education, and biotechnology.

For example, outsourcing provides technology services to transportation companies, cafes, and pizzerias operating in the United States. It Park services attract the attention of foreign customers due to their availability and high quality.

Enterprises registered as residents of the it Park are exempt from taxes and customs duties until January 1, 2028. This, being a great help for specialists in this field, increases the interest in the Technopark. In a short time, the number of its inhabitants exceeded 300 people. In the future, it is planned to expand the conditions for participants by building it offices, a business center, a hotel and other facilities on seven lots in the territory of the it Park. It is planned that the annual volume of products produced here will exceed 10 million US dollars in 2020 and reach 100 million US dollars in 2025. The total cost of the project is \$ 150 million.

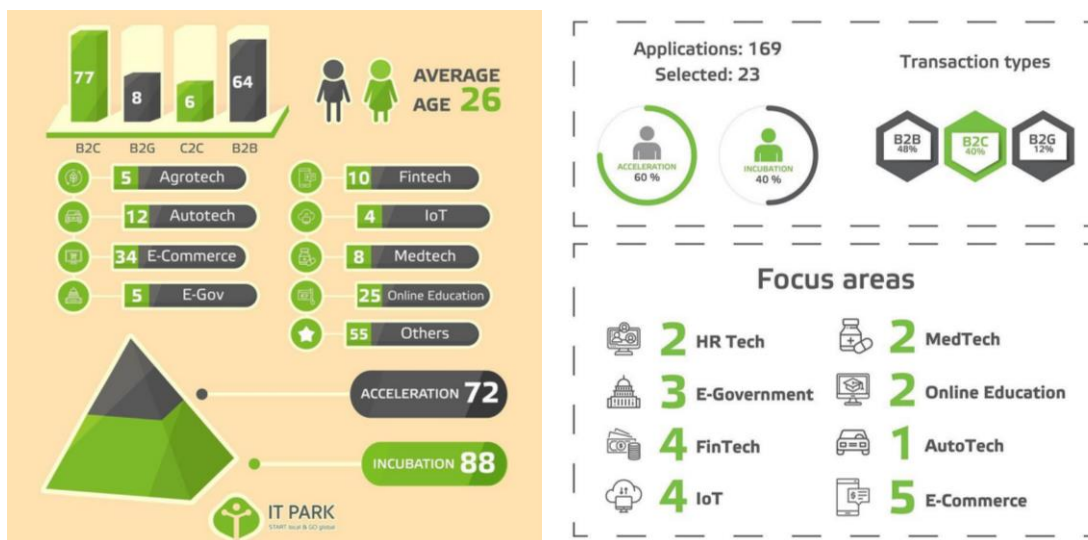


Figure -9- IT Park overview in 2019

Currently, IT-Park has launched free incubation and acceleration programs. In the first selection, we received 103 applications, of which 15 startups were chosen.

The IT Park creates a modern world-class environment for the development of innovative and competitive products and services in the field of information technology, their promotion on both domestic and global markets. It provides an innovative culture and entrepreneurial atmosphere for the youth of Uzbekistan. The vision of the it Park is to provide an enabling environment with the necessary support and tools needed to promote nurturing and growing innovative technology startups from the idea stage to successful commercial entrepreneurs. The mission is to create an eco-system to support it innovation and technology entrepreneurship throughout Uzbekistan, which will lead to the creation of wealth and employment through successful projects. It Park specializes in: incubation and acceleration programs, public and private venture funds, it Academy of international standards, modern and comfortable coworking spaces and it offices, coworking spaces and it zones, legal accounting and marketing support.

## Universities for IT education in Uzbekistan



### *Tashkent University of information technologies named after Muhammad al- Khwarizmi*

Tashkent University of information technology (often abbreviated TUIT), located in Tashkent, Uzbekistan, is one of the largest universities in Uzbekistan. Tashkent University of information technology was founded as the Tashkent electrotechnical Institute of communications in 1955 and was the largest and only manufacturer of communications engineers for the Central Asian region. Today it is one of the largest universities in nurturing talent in the field of ICT in Uzbekistan. The University was named after al-Khwarizmi in accordance with a presidential resolution to further enhance its role at home and abroad.



### *Amity University in Tashkent*

Located in the green surroundings of the capital of Uzbekistan, Tashkent, the rich educational experience at the Amity University Tashkent is based on research, holistic development, international corporate impact, and academic excellence. The people friendship University of Tashkent offers career guidance programs at the Foundation, undergraduate, and postgraduate levels in various higher education disciplines, including information technology, management, Economics, and tourism. The Amity University in Tashkent strives to ensure that a world-class education with commendable research meets the strategic vision of Uzbekistan. It is based on Amity group's commitment to research, which has allowed it to obtain the largest number of patents in India. Amity's highly practical and industry-oriented curriculum has been conceptualized to meet the region's talent needs, opening up a world of opportunities for students. Its focus on industry education has led to the creation of a curriculum that is developed in close collaboration with industry.

Amity also has the largest scholarship program in India, which awards more than 25,000 scholarships. Merit scholarships at Amity Tashkent were established to encourage the talents of such students, thereby

strengthening the roots of our future generation. Another distinctive feature of Amity is its desire to create a modern high-tech learning environment using tools and infrastructure that are globally reference and modern.



### *Yeoju Technical Institute in Tashkent*

The main task of the Technical Institute of Yeoju in Tashkent is to train highly qualified personnel and specialists with modern professional skills that are in demand in the labor market. In this regard, curricula are formed taking into account current requirements and trends in economic development, as well as agreed with basic and potential employers.

The Institute has modern equipment and a constantly updated information and resource database. In general, the Institute has created all conditions for students to receive quality education and leisure activities. International professors from UK, USA, Belgium, South Korea, Saudi Arabia and others in the educational process involved and the national teams of the teaching staff, mostly formed by graduates of leading foreign institutions of UK, USA, Italy, Germany, Japan, South Korea etc. Students have the opportunity to participate in exchange programs, as well as in joint or double degree programs. Thus, students can participate in 2+2 exchange programs and continue their education at Hanyang University, Chungbuk National University, Hanken University, Joseon University, Busan University of foreign studies, Jeonju University, Chungcheong University (Republic of Korea), United business institutes (Belgium), and Yeoju Institute of technology.



### *Inha University in Tashkent (IUT)*

One of the leading universities in Uzbekistan in the field of IT technologies and logistics, which has more than 1,500 students.

Inha University in Tashkent (IUT) was founded in 2014. The University was established in cooperation with Inha University in the Republic of Korea. Currently, our University has more

than 1,500 students. The University was established in order to further improve the training of highly qualified specialists in the field of information and communication technologies and logistics at the level of international standards, as well as to expand cooperation with leading foreign higher education institutions.



### *Turin Polytechnic University in Tashkent*

The University was officially established in April 2009, after the adoption of the decree of the President of the Republic of Uzbekistan “on organizing the activities of the Turin Polytechnic University in Tashkent”.

In accordance with the Strategic development plan, the University should become the main source of human resources not only for the automotive industry, but also for construction and architecture, energy and information technology. Admission is held annually in the following five undergraduate courses: "mechanical engineering", "energy", "aerospace engineering", "civil engineering and architecture", "Information technology and automatic control systems in industry", as well as in two master's degrees: "mechanical engineering" and "mechatronics".

### Platform for teaching IT specialties “One Million Uzbek Coder”

A free online platform for training IT specialists in the project “One million Uzbek programmers” has been launched at Inha University in Tashkent in 2019. This project is implemented by the Ministry of information technologies and communications of the Republic of Uzbekistan in cooperation with the Dubai Future Foundation, Inha University in Tashkent, the IT Academy at the IT Park and the IT school. Muhammad al-Khorazmi.

This is a free distance learning platform for the public through a specialized Internet portal. Everyone can already apply. The goal of the program is to train a generation of specialists in the field of digital technologies, equipping them with all the tools-programming skills.

At the initial stage, it covers the four most popular specialties in the global labor market: data Analytics, Android development, Front End Development, and Full Stack Development. The course is designed for 120 hours of training. The result of each level will be the preparation of laboratory work and obtaining the appropriate certificates.

Successful course graduates will be able to compete for grants and continue their studies in one of the more than 100 programs of the Nanodegree Udacity platform. To do this, you must successfully pass the final exam and enter the top 150 students with the highest scores. Note that Nanodegree diplomas are recognized by such its industry giants as Google, AT&T, Autodesk, Salesforce, and many others.

For the first time in the UAE, a platform for distance learning of programmers called “One million Arab programmers” was launched. During the official visit of President of Uzbekistan Shavkat Mirziyoyev to the United Arab Emirates in March 2019, agreements were reached on a number of areas, including in the field of information technology. The government of the United Arab Emirates, having studied the possibilities of exporting the project to Uzbekistan, developed a plan to adapt the concept to the country's conditions and launched an initiative at the local level called "one Million Uzbek programmers".

## **Successful IT projects in Uzbekistan**

*Venkon company*



**VENKON**

Company profile-consulting business. It appeared within the market of Uzbekistan in 2014 as new startup that created functional sites, designed to assist business. They began speaking about «Venkon»

brand in 2015. At that time, the corporate grew to 40 people. Today within the Office about 100 professionals are employed, 26 years old in average.

There are ten industrial business areas within the firm. Among them, there are consulting and accounting services, development, information and technological support of "1C" users, express implementations and project implementations (realization of large-scale projects on complex business automation), software distribution, operator of electronic legally significant document flow - DIDOX.UZ, training centre. Recently additional direction has opened -digital marketing. This team doesn't only prepare content and place customers advertising within the Internet, but also provides full sales cycle.



Basic direction of «Venkon» activity is implementation and maintenance of "1C" products, consulting and customer support. Work here is organized in such method that none of the users of software remains alone with the service. Within three months, they're given free advice. At the identical time on the multi-channel line, seven consultants operate. Daily centre receives and processes up to 100 calls.

One of the topical issues was related to the personnel gap. In «Venkon» it was solved in a very simple way- training center was opened and started to teach specialists for themselves. The second step was co-operation with universities: Inha University, TUIT, National University of Uzbekistan, Tashkent financial Institute. The firm participated and initiated career days in higher educational institutions. as an example, last year, after conducting Career day at the University of Inha, 160 students became participants of free internship program in «Venkon».

Cooperation with financial institute relies on individual work with each student of "Accounting and audit" faculty. Recently, eight people have undertaken internship, and that they all are recruited.

At present, the question of inclusion of variety of disciplines on use and programming in "1 C" in educational programs of the above universities is within the works.

The outcome of the work wiped out the realm of coaching is impressive-99.9% of employees of «Venkon» have grown within the company walls.

Recently, within the training centre the course "Basics of JAVA programming for school-children" has appeared. it's designed for kids from 11 to 16 years old, it's held in groups of 5-10 people. Training on specially developed technique lasts a year, it's divided into four stages and is completed with the exam-students write own games just like the classic "Snake".

### *Newmax Technologies*



LLC "Newmax Technologies" appeared on the business map of Uzbekistan in 2006. Now it's a company, on account of which four working projects: GPS-monitoring system of MaxTrack transport, system of accounting of working hours of Workly staff, application for ordering a taxi MyTaxi and food delivery service Express 24. The two are focused on the b2b segment and are in demand within the foreign market. Support to existing projects and work on a new projects, Newmax has 105 employees.



*MaxTrack* is a GPS vehicle monitoring system that was developed 12 years ago. Today it's employed by quite 700 corporate clients. the overall number of vehicles with installed GPS-trackers is 7000. There

are 30 staff in this project, and this is a third of the whole company. Interesting fact: most of the developers have been working in the company for 8-10 years. This is the first successful project of Newmax.



Workly system is personnel working time accounting. The software has evolved from a biometric card reader to a tablet-based software solution. it's employed by small businesses and huge companies with a staff of several thousand employees (for example, factory "UZTEX", supermarket chain "Korzinka.uz" and low shop "Safia"). The office operating within the USA is liable for promotion within the international market. Among the most competitors - Czech TMetric, American TopTracker, Russian Crocotime and "Tendo".



*MyTaxi* is aggregator of taxi app that was launched in January 2015. a motivating fact is connected with it within the Newmax portfolio - private company became the first-runner in Uzbekistan to get a license for cartographic activities. For the appliance, the team has created its own navigation maps, likewise as software that permits you to digitize signs and road labels. The experience of Newmax within the development of navigation system in Baku was later implemented by SINAM.

*Express 24* (Monsters of delivery) is the leading food delivery service. It appeared in early 2017. The company intends to bring the project to the regional market. Scaling will provide it with the necessary growth and profitability – according to the forecast, the volume of the delivery market in Central Asia by 2020 will reach 720 million dollars (90 million orders).

## *Uzcard*



Uzcard is a brand of a Single National Processing Center. The company employs more than 200 specialists. Today, the uzcard interbank payment system unites the Association of banks of Uzbekistan, the Central Bank, the Unified National Processing Center (UOPC), 29 banks of the Republic of Uzbekistan and 40 payment aggregators. The security of the system is ensured by full confidentiality and is guaranteed by the agreement, as well as by the legislation of the Republic of Uzbekistan.

In 2019, the Unified National Processing Center serves more than 17 million Uzcard cards in Uzbekistan. The Uzcard user can pay for goods and services through more than 285,000 terminals. The service is carried out in more than 1,500 ATMs and 3,000 information kiosks, through mobile applications and Internet sites throughout the country. In 2018, the Center's specialists introduced a new software called "international payment system" for conducting transactions through existing POS terminals, ATMs using uzcard plastic cards and international cards. This provided an opportunity to cooperate with international payment systems.

The payment system performs the functions of a provider and corresponds to the organizational and technical infrastructure, as well as is based on a set of legal norms, regulatory documents, and software and technical solutions. The basic element of the uzcard MPs is microprocessor and dual plastic cards that meet the requirements of the EMV standard.

Key dates of the company:

2004-A Single National Processing Center Was Founded.

2006-launch of DUET cards.

2011 - launch of Online maps.

2012 - activation of the "SMS-informing" service.

2013-personal account was Developed and implemented MyUzcard.uz for cardholders.

2016-software for "Uzcard POS" POS terminals was Developed and implemented.

2016-software for infoterminal "UzcardInfokiosk" was Developed and implemented.

2016-for the First time, the possibility of making transactions with UnionPay International cards was implemented in the National Bank of Uzbekistan.

2017-the Center made it possible to pay with MasterCard cards through POS terminals of the National Bank of Uzbekistan.

2018-DUET card service was Suspended.

2018-Resetting POS terminals for transactions in the terminal network of Uzbekistan using Union Pay International cards.

The 2018 Edition co-badging card "Uzcard-Union Pay International".

2018-acquiring of the Mastercard international payment system is being implemented in stages and is being integrated into the banks of the Republic of Uzbekistan.

## *Humo*



HUMO interbank payment system is the national payment system of the Republic of Uzbekistan. Calculations are made in Sumy. The operator of the HUMO payment system is the national interbank processing center. The first "HUMO" cards were released in April 2019 in a test mode to test the payment infrastructure. Humo is payment system supported on bank payment cards to settle transactions both in Uzbekistan and abroad. The Humo system is an integral part of the

payment system of Uzbekistan. Humo is a complex of the settlement participants, payment instruments and settlement funds, software and hardware, as well as the flow of funds within the country and also the interaction with foreign payment systems.

The operator of the payment system is National Interbank Processing Centre LLC, which performs the data clearing of operations in foreign currency in Uzbekistan, additionally thanks to the processing functions for all operations within the HumoCard payment system. The function of the Bank which carries out settlements in national currency within the HumoCard payment system is performed by the clearing centre of the financial organization of Uzbekistan. The Humo payment system represented by its operator has established relations with international payment systems (Visa, MasterCard, Union Pay International) to make sure the conduct of operations in foreign currency by Humo bank cards abroad and by the cards of foreign banks of the above systems in Uzbekistan.

More than 3 million HUMO cards were issued and more than 180 thousand terminals were installed that also serve Visa and Mastercard international cards at the beginning of 2020. More than 2000 ATMs serving both "HUMO" and "Visa" and "Mastercard" cards are installed on the territory of the Republic of Uzbekistan. HUMO cards can be used as a means of payment via NFC on public transport

### *Click, Payme, Upay*

There are several card-enabled payment service providers (PSPs) in Uzbekistan, such as CLICK, UPAY and Payme. Very few banks have mobile banking application for retail customers. However, some PSPs have web portals and mobile banking applications.



*CLICK* is a payment platform and a tool for managing bank accounts through plastic card holders in Uzbekistan. Through the platform, the user may manage multiple bank accounts and make payments without

coming to the bank. This platform is accessible via the internet, smartphone application, or USSD. Possible payments include: mobile recharge, fixed line telephone charges, internet service providers, cable television, & other services. It has 1 million active subscribers as of November 2015. Currently, of their transactions, 65% are rural and 35% are urban. The most popular payment is for mobile recharge. CLICK has recently launched an initiative where the platform enables payments in shops and restaurants without the need for terminals or cards. Thus far, the project has been working in Tashkent city. Currently, it's the biggest payment platform of its kind in Uzbekistan. In the current context where electronic payments are being promoted and access to internet and smartphones are also increasing, CLICK's business model shows great promise.

*UPAY* is also a payment platform as well as a technology service provider (TSP) to banks. Like CLICK, UPAY links plastic cards to payment services. In addition, UPAY is able to provide a common online banking portal for banks with some level of customization. As banks in the country are in the process of deciding whether to build internet banking portals for their individual retail clients themselves, this could be an option they consider. UPAY also has aspirations to build its services so that ultimately, it can offer a credit reporting interface as well. UPAY used to be SMS Tolov. In September 2015, it was re-branded and re-launched as UPAY. In terms of payment services, UPAY also offers payment services which include: mobile recharge, fixed line telephone charges, internet service providers, cable television, & other services. UPAY is available on internet, USSD, and smartphone platforms. UPAY is Payment Card Industry Data Security Standard (PCI DSS) certified which is a proprietary information security standard for organizations that handle branded credit cards from the major card schemes.

*Payme*, founded in 2011, is a leading payment service provider in Uzbekistan that supplies payment solutions to 1.3 million customers. It facilitates utility payments, P2P transfers, loan repayments, mPOS for QR-based payments and ecommerce purchases. It also provides a marketplace platform for loans from certain Uzbek banks. Payme has grown rapidly in recent years, increasing its number of clients by

around 70% during 2018, while its revenue and net income grew by 41.9% and 24.5% respectively year-on-year. At the end of 2018, the gross assets of Payme stood at USD 0.7 million, while total revenue and profit before tax for the full year 2018 amounted to USD 1.6 million and USD 0.8 million respectively.

## **Social network-based startups. Telegram based startups**

### *GoTaxi*



GoTaxi is a taxi service based on a Telegram bot, which was able to take a place in the market and make a profit in six months. GoTaxi was founded in December 2016. It is the first bootstrapping startup in Uzbekistan. The main goal is to provide high-quality taxi service. All the complexity and logic lie in the server part, and it is easy to write a bot, it is enough to have basic programming skills and you can always Google it. Telegram gave us a very cool access point to the client — we get into his "personal space". After all, your Telegram is not like mine, you know all the contact icons, you are free to navigate there, and when the Go Taxi icon appears among them, this is a completely different level of personalization. Compared to taxi services that work through the app, the customer does not need to download anything, wait. In addition, the bot is easy to share with friends and family. There are now 10 people in the staff, the whole process is so automated that we can grow further without increasing the number of staff. Now we have more than 15,000 active users and more than 300 cars.

### *GoApteka*



GO PHARMACY is an online sale of medicines with delivery. This is a real pharmacy inside your smartphone, which solves most of the difficulties with finding the right drugs. The company has a large warehouse where all the drugs are stored. The service works directly with the largest drug suppliers, which helps to avoid intermediaries and reduce the price to a minimum. Therefore, the proposed price for medicines will be lower than in most pharmacies in Tashkent. GO Apteka, unlike GO Taxi, is not limited to the Telegram bot — you can also order via the website and mobile apps. As for prescription drugs, GO Apteka reported that they are no different from regular pharmacies here and have the ability to sell prescription drugs if the patient has a prescription. Check upon delivery.

### *Arzon Apteka*



ArzonApteka is the service that helps to find medicines at the lowest price. Basic product is F Apteka, software for automating the entire cycle of pharmacies. Based on the data received from the software installed in pharmacies. They launched the most popular product – the arzonaptek reference, which has versions of the Telegram bot, website, applications, and telephone hotline. The service allows to determine the availability of a particular drug in nearby pharmacies, as well as compare prices. This is the only service in Uzbekistan that is based on reliable data from pharmacies. Plans to scale the B2C sector: up to 3 million users. Currently, pharmacies pay a subscription fee of \$50 per

month. In the future, it is planned to introduce a subscription fee for use (\$1 per year).

Competitive advantages:

- The fastest way to find the right medicine
- Ability to compare pharmacy prices in order to buy cheaper
- Search for convenient locations and the ability to see a pharmacy assortment near your home
- Over 600 thousand users are looking for drugs online
- Stable user reference growth
- Continuous service improvement for easy drug discovery
- Qualified call center pharmacists unload calls to the pharmacy and send only ready-made customers
- Guaranteed sales growth.

### **Problems of IT projects in Uzbekistan**

Amid increasing government investment, experts in Uzbekistan believe the country can be within the right direction|not off course to become a regional leader in the IT startup sphere.

The state has taken variety of measures to support the country's emerging hi-tech industry since President Shavkat Mirziyoyev came to power in 2016, not least improving internet access.

More than 33 million people live in the most populated country in Central Asia, with 68 per cent of them able to access the web through mobile subscriptions. In 2018, on Mirziyoyev's personal initiative, the network bandwidth grew ten times from 110 to 1200 gigabits per second.

And state agencies are joining with private players to facilitate the startup industry. A large-scale IT initiative project is additionally being start by the Youth Union, the chamber of commerce and industry, the

ministries of innovation and labour by support of the UNDP with ten projects to be implemented for the improvement of IT innovation ecosystem within the near future. In September this year, a VC fund was opened under the aegis of IT-Park.

Foreign tech leaders were also entered the Uzbek market, including the Russian company Yandex and also the American EPAM. This year (2019) an IT company from Uzbekistan completed a deal for over five million dollars. The Uzbek payment service provider Payme completed the deal with the Georgian bank TBC Bank Group PLC for the amount of 5.5 million dollars to sell 51 per cent of its share.

Uzbekistan could become the leading country in Central Asia's IT sphere within the next two years. But nowadays IT business in Uzbekistan faced several problems, including an absence of experience, an underdeveloped market and insufficient funding. It's necessary to require variety of important steps. Government need clear rules of the game, which are equally important for the business as an entire. These are legislation that actually works in practice, a properly functioning judicial system and protection of the rights of entrepreneurs. Only then the potential investor will come to the market, and it'll develop. And, of course, a discount within the tax burden will help.

Whether in Uzbekistan, Europe and even in Africa, the issues of IT start-ups are very similar. It's not enough to own an idea; efforts must be made to understand it. It'll require the involvement of developers, investors. For example, there's a project, an idea, but there aren't any opportunities for implementation. this can be probably the most problem of most innovation projects. Nevertheless, an extremely 'cool project' can easily interest an investor. The priority thing is to supply a product that's useful and pleasant in every sense. Developers should create products focused on foreign markets, as domestic opportunities are limited. Individual entrepreneurs drive the industry forward.

## Success Factors of Technological Innovation in Uzbekistan

131 IT companies from Uzbekistan participated in the survey. Each participant wrote max 5 main factors, at least 3 factors.

Ranking	Success Factor	Frequency Reported	Share
1	Significant value/demand	92	14.7%
2	Resources and financial support	84	13.4%
3	Technology/infrastructure	71	11.3%
4	Cost efficiency	65	10.4%
5	Professional development and training	62	9.9%
6	Effectiveness	60	9.6%
7	Quality, reliability, and flexibility of technology	51	8.1%
8	Strategic planning and governance	49	7.8%
9	Innovative culture/collaborative environment	47	7.5%
10	Political support by Government	46	7.3%
Total		627	100.0%

Table -15- Success Factors of Technological Innovation in Uzbekistan

## Methodology

### *Research questions*

The chapter sums up the procedures used to address the following research questions:

1. What are the critical success factors (3-5 factors) for technological innovation and adoption in Uzbekistan in your view?
2. Prioritization of the identified critical success factors.
3. How do government institutions perception of critical success factors for technological innovation, adoption, and diffusion compare to those of IT leaders?

## *Appendix A*

### The initial survey

1. Please, write your organization name

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2. Please, write your position

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3. Please, write 3-5 factors which can be critical success factors for technological innovation and adoption in Uzbekistan in your view

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Thank you !

## Appendix B

### The final survey

1. Please, write your organization name

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2. Please, write your position

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3. Please, give from 1 to 100% according to priority for the following factors which are more critical success factors for technological innovation and adoption in Uzbekistan in your view

Factors	Priority
Significant value/demand	
Resources and financial support	
Technology/infrastructure	
Cost efficiency	
Professional development and training	
Effectiveness	
Quality, reliability, and flexibility of technology	
Strategic planning and governance	
Innovative culture/collaborative environment	
Political support by Government	

4. Please, write 3-5 factors from the list above, where government institutions perception is critical for success of technological innovation, adoption, and diffusion in Uzbekistan

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Thank you !

### *Instruments*

Two survey instruments were used for this study, an initial survey (see Appendix A) and a final survey instrument (see Appendix B). Fink (2003) defined a survey as “a system for collecting information from or about people to describe, compare, or explain their knowledge, attitudes, and behavior”. Surveys were used in this study to collect information from IT leaders in Uzbekistan, regarding their views of critical success factors for technological innovation, adoption, and diffusion in the region.

The initial survey was used to identify critical success factors from IT companies (not leaders or new companies). This information was based on the factors they believed to be critical to successful technological innovation and diffusion in Central Asia and in Uzbekistan. The final survey instrument incorporated the critical success factors identified by the initial survey and was administered to the IT leaders (successful IT companies in Uzbekistan). The information collected from the final survey was used to help compare the critical success factors from the perspectives of government effort and IT leaders, to determine how the government and IT leaders in the region viewed their performance in relation to the critical success factors identified, and to gain insight into other factors affecting technological innovation and diffusion in higher education.

### *Data collection*

Two data collection methods were used for this study: web-based surveys and participant interviews. Data collection extended over a 3-week period as outlined in Table -16-. The initial survey instrument was used to solicit feedback from the IT companies and the final survey instrument was used to obtain responses from the IT leader participants in Uzbekistan. Interviews were performed with randomly selected participants from the both study groups. Interviews were conducted either via telephone or in-person depending upon individual interviewee's location and availability.

<i>Weeks</i>	<i>1</i>	<i>2</i>	<i>3</i>
<i>Procedures</i>	The initial survey	Identifying CSFs	The final survey

Table -16- Data collection period plan

## Results

### *Critical Success Factors Identified*



Figure -10- Model of Critical Success Factors

The following table has identified critical success factors according to the initial survey result analysis:

<b>Success factors</b>	<b>The initial survey answers</b>
Significant value/demand	Good choices in terms of the technology chosen
	Rationale
	Utility provided by the technology
	Satisfies a specific need
	Need for improvements
	Identified need
	Improves delivery system
	Need for technology
Resources and financial support	Adequate financial resources
	Financial support
	Funding
	Money
	R&D budget
	Sufficient funding
	Institutional purchase of software
	Access and availability of technology
	Access to equipment
	Access by users
	Availability of technology
	Availability of software
	Equipment
	Functional technology
	Internet Access
	Strong infrastructure
	Variety of delivery methods available
	Affordable
	Cost
	Cost effective
Cost efficiency	Cost effectiveness
	Cost of the technology must be kept low
	Low cost
	Price
	Technology should be affordable
	End-user education -the audience needs to know how to use it
	Adequate training for users
	Access to technology training
	Available online documentation-detailed instructions and FAQ
Professional development and training	Education and training

	End-user training
	Good training and support
	Instruction on how-to-use
	Training, training, training (and self-help/FAQs)
	Workshops and/or training sessions
Effectiveness	A method for rapidly measuring results and broadcasting them (marketing)
	Data-based decision making
	Educational research or survey
	Examples of benefits
	Follow up to ensure tech is working as intended once deployed
	Identification of best practices
	Lessons learned
	"Selling" effectiveness of the idea to those users especially older ones
	Realistic expectation
	Positive results
	Successful application of knowledge
	User studies and feedback
Quality, reliability, and flexibility of technology	Ease of adoption
	Convenient/easy to use
	Ease of use
	Easy to explain
	Usability
	User friendliness
	User friendliness of the technology
	Simplicity of the interface and use thereof
	Adaptability
	Cross-platform
	Quality of infrastructure
	Software flexibility
	Supports many platforms (mobile, etc.)
	Use of risk management and mitigation tracking
	The innovative technology must work -no bugs upon distribution
	The technology must be reliable
Strategic planning and governance	Back-up plan in the event of failure
	A successful pilot test
	Good project management
	Good time management
	Implementation management
	Pilot/testing prior to adoption
	Timing

	Technology management
	Understanding of the effective implementation and usage of technological innovation
	A decision-making model that fosters teamwork
	Careful planning
	IT Governance
	Planning
	Strategic Planning that ties innovation to the organizations vision, mission, purpose, goals, and objectives.
	Vision of new technology use
Innovative culture/collaborative environment	Innovation
	Institutional policies that encourage, not discourage, innovation
	Open-minded environment & seeking innovation
	Technology focused environment
	Teamwork
	Willingness to try new things
	Willingness to open to new technologies
	Acceptance of the populous, part of culture, to accept and adopt change
	An atmosphere conducive to new ideas
	Atmosphere that supports taking chances
	Being open to technological innovations for increasing speed and accuracy of processes
	Collaboration among departments and universities
Political support by Government	Reduced burden on business formation
	Incentivized Tax Laws
	Guaranteed Intellectual Property Rights
	Access to funding for SME's and Start-ups
	Inclusion of business within education curricula

Table -17- Identified Critical Success Factors from the initial survey data

## Conclusions

There are two main reasons that hinder the development of business prospects of the IT sector. The first is the low (relative to other countries) standard of living and income of the population. The less people earn, the worse the quality of services they can afford, and the more likely the market will collapse. The second is expensive Internet and mobile communication, as a consequence of the state monopoly. Entrepreneurs are confident that the rejection of it will allow business to develop faster and truly reveal the potential of reforms.

According to the co-founder of Newmax, the most urgent problem today is weak logistics. To resolve related issues with the right technologies for the development and implementation which in turn requires investments. On their own income is not necessary to count – Express 24, for example, despite the large marketing costs, has not yet made a profit.

Government institutions faced with reduced budgets and increased demand for technological resources must be more efficient in their IT-focused innovation efforts by identifying the most critical items impacting innovation and focusing their resources on those factors. This study identified ten factors that IT leaders of Uzbekistan believe are critical to a business's ability to be competitive in today's market of IT innovation. The critical success factors identified and the model presented in this study may be used to enhance Uzbekistan innovation efforts. By gaining a better understanding of the critical factors for technological innovation, government institutions can focus their efforts to address those factors that are most critical for IT innovation projects, thereby maximizing their chances for success.

Further, I attempt to provide guidelines with respect to choices of priority factors and market for startupper beginning their journey of IT innovation issues in Uzbekistan. I hope that the review and the success factors presented will initiate and encourage many fruitful studies on this topic in the future.

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