A stylized illustration of a graduation ceremony. The scene is filled with graduates in black gowns and caps. Many caps are being thrown into the air, creating a sense of celebration and movement. The background is a light, neutral color, making the dark figures of the graduates stand out.

ENHANCING THE CONTRIBUTION OF TERTIARY EDUCATION TO UNLEASH THE POTENTIAL OF JIZZAKH REGION

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1. Introduction

The tertiary education system of Uzbekistan has undergone important changes since the transition of the early 1990s.¹ It inherited an education system structured along Soviet lines, with a few well-developed universities and many specialized technical institutions and research institutes. The economic crisis that affected Uzbekistan after independence in 1991 had a negative impact on the tertiary education sector for almost a decade, but the financial situation has significantly improved in the past decade.

Within the scope of work on development of strategy of socioeconomic development of Jizzakh region Jamil Salmi visited Tashkent and the Jizzakh Region from October 30 to November 2, 2018. The main purpose of the visit was to observe the development of tertiary education in the Jizzakh Region and explore opportunities for the creation of a flagship university. The consultant visited several tertiary education institutions, TVET colleges and research institutes. He also met with the Deputy Prime Minister and Deputy-Ministers of Higher Education, who provided extensive briefings on the present higher education situation in Uzbekistan and the strategic orientations of the Government.

This report, which presents the main observations and suggestions arising from the meetings and conversations held during the visit, seeks to answer the following key questions:

- What is the state of the regional tertiary education and TVET systems in Jizzakh Region?
- What appropriate strategies could be formulated and implemented in order to improve the quality and relevance of the regional tertiary education institutions, and strengthen their contribution to local development? What policy interventions are needed to facilitate these goals?

For this purpose, the report covers the following aspects: (i) present situation and main challenges; (ii) vision of the future of tertiary education in Jizzakh Region; and (iii) principal elements of the strategic plan.

2. Present Situation and Main Challenges

2.1. Tertiary Education in Uzbekistan

To better serve the needs of the new market economy, Uzbekistan has sought to transform its tertiary education system in order to improve existing education programs and expand the research contribution of its universities. Today, 32 universities, 6 academies and 44 institutes operate throughout the country, with an overall enrollment of about 261,000 students (EACEA, 2017). While 6 international universities are active in Uzbekistan, so far there is only one private university operating in Uzbekistan that is Yoju university, unlike what happened in most other post-Soviet countries.

¹ This report adopts the OECD definition of tertiary education as “a level or stage of studies beyond secondary education. Such studies are undertaken in tertiary education institutions, such as public and private universities, colleges, and polytechnics, and also in a wide range of other settings, such as secondary schools, work sites, and via free-standing information technology-based offerings and a host of public and private entities” (Wagner 1999, p.135).

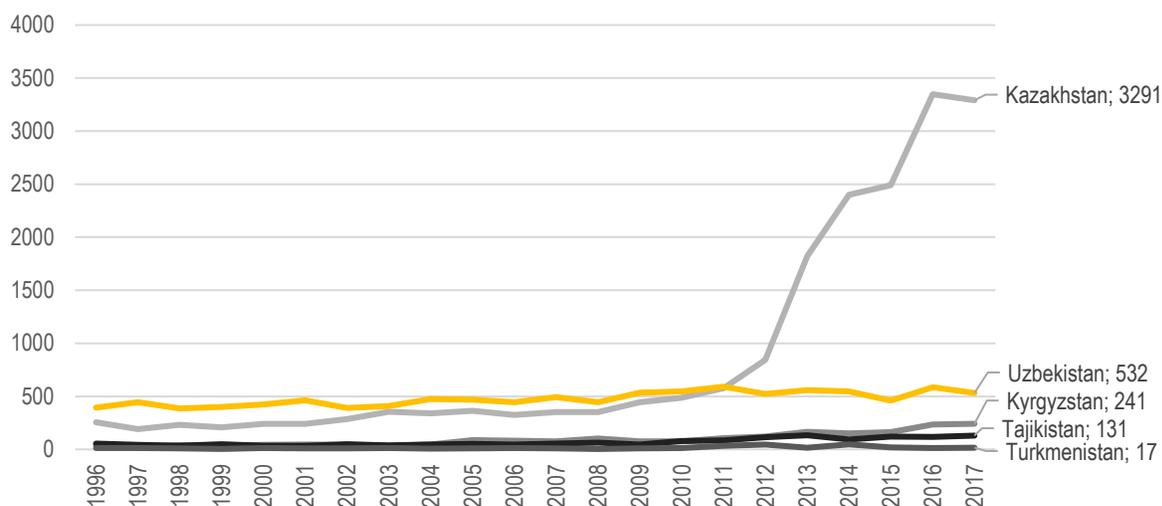
According to the World Bank's 2014 report on Uzbekistan, the main challenges faced by the tertiary education system are (i) low access, (ii) inadequate quality and relevance of graduates, and low research production (World Bank, 2014). In terms of access and equity, Uzbekistan lags significantly behind other countries in Central Asia. At around 9%, the tertiary education enrollment rate is way below international and regional standards. Kazakhstan and Kyrgyzstan both enroll more than 40% of the university-age population. Low enrollment at the tertiary level is a paradox in a country that has achieved one of the highest literacy rates in the world and enjoys almost universal primary and secondary education enrollment. In addition, the proportion of boys is higher than that of girls (60-40), again unlike the situation in other countries in the region. One of the key factors explaining the low level of enrollment is the central planning tradition that determines the number of students who can enroll in tertiary education institutions. This issue is compounded by the fact that a large proportion of institutions are located in Tashkent. While less than 8% of the country's population lives in the capital city, 39 universities and institutes operate in Tashkent, representing about half the total number of tertiary education institutions in Uzbekistan.

Inadequate quality and relevance is the second major issue facing the tertiary education system. While the economy has grown steadily over the past years (average of 8%) and its structure has changed from agriculture and industry to more jobs in services (more than 50% and accounting for 45% of GDP), it appears that the creation of modern programs and the transformation of curricular and pedagogical practices has been held back by elements of the Soviet legacy. The most important constraints are the tight control on course content still exercised by the Ministry of Higher and Secondary Education, heavy reliance on manpower planning approaches that are not well suited to the market economy, insufficient attention to the new competencies needed by private sector employers, poor learning infrastructure in many institutions, and an educational culture that favors conservatism and frowns upon innovation.

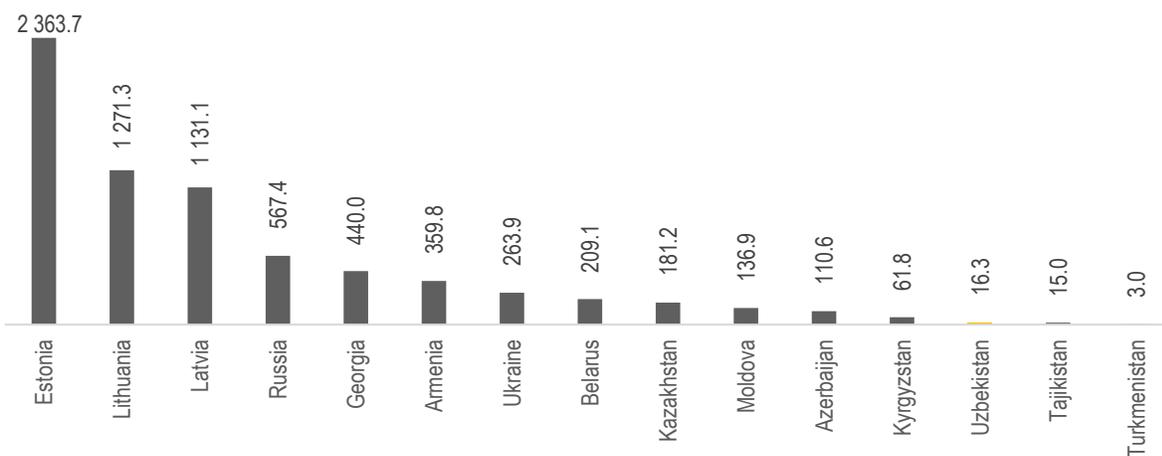
As a result, employers complain about the insufficient numbers of tertiary education graduates produced every year and the less-than-satisfactory quality of available graduates. Across OECD countries, 14.4% of firms identify an inadequately educated workforce as a major constraint on doing business in their country. In Uzbekistan, a survey of 232 firms conducted by the World Bank in 2014 indicated that 49% of employers reported the lack of quality and relevance as a major constraint to productivity growth and innovation. Only one-third of industrial firms said that the skills of graduates were better than a decade earlier, compared to 36% who felt that they were worse (World Bank, 2014).

Low research production is the third major challenge identified by the World Bank report. The scientific production of universities has decreased since independence, unlike what has happened in other countries in the region. Figure 1 shows the growth in scientific publications in Uzbekistan and selected countries between 1996 and 2011.

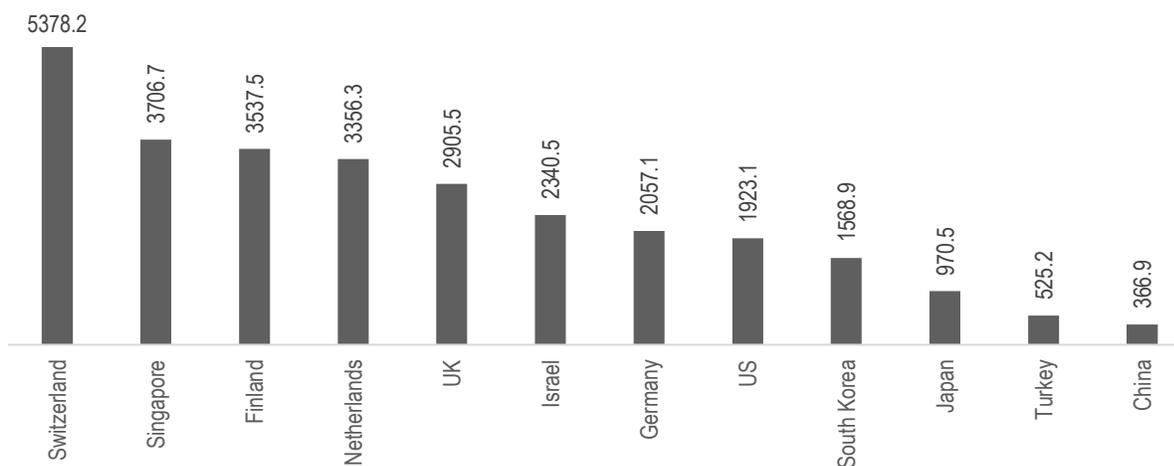
Growth in number of scientific journal articles in Central Asian countries (1996-2017)



Quantity of scientific journal articles per 1 mln population in post-Soviet countries, 2017



Quantity of scientific journal articles per 1 mln population in selected countries of the world, 2017



Sources: Scimago Journal & Country Rank, national statistic agencies, the World bank

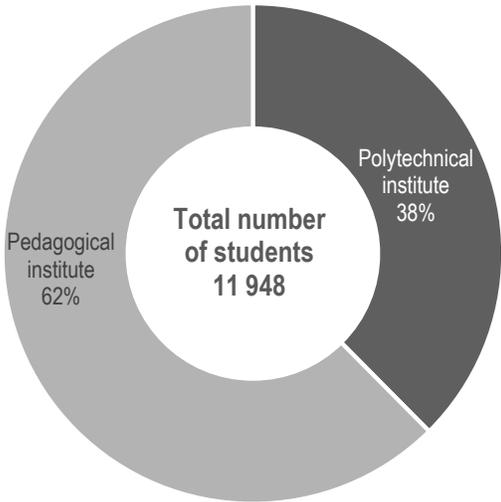
Three factors explain this negative evolution. First, public funding for research, at 0.4% of GDP, is very low. The second factor is the strict separation between research institutes and universities, inherited from the Soviet model of research organization. The third contributing factor is the low proportion of graduate students who study towards a research degree. The proportion of graduate students is only 4.3% of the total student population, compared to around 6% in Kazakhstan and 19.5% in the Russian Federation.

2.2. Tertiary Education in Jizzakh Region

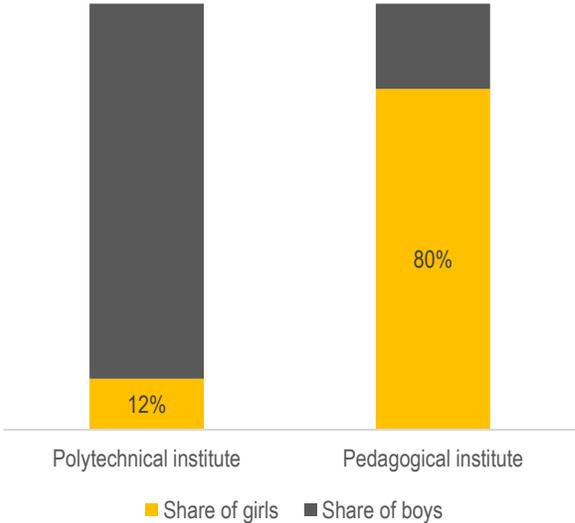
Jizzakh Region, in the middle of Uzbekistan, covers an area of 21.2 square kilometers and is host to 1.3 million people. Its labor force is distributed fairly evenly among agricultural activities (35%), construction and industry (22%), and services (43%). Jizzakh Region operates two free economic zones, one in which factories manufacture products in high demand on the national market, including the production of high-tech equipment, and one dedicated to adding value to farm products for the food and pharmaceutical industries.

To supply the local labor market with qualified personnel, Jizzakh Region has two tertiary educations and 75 colleges of secondary specialized and professional education. In 2018, 3 427 students were enrolled to both insstitutes of the region.

Number of higher education students in Jizzakh region



Gender composition of students

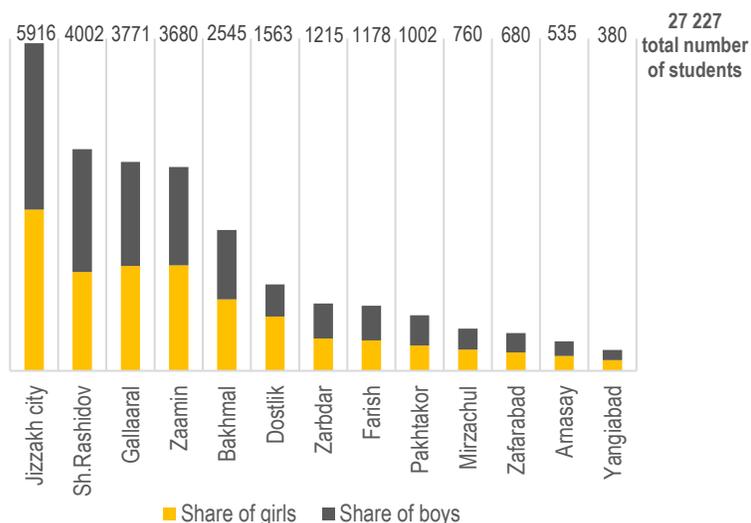


Source: higher education institutions

Number of professional colleges in districts of Jizzakh region



Number of students at professional colleges by districts of Jizzakh region



Source: Regional department on secondary special and professional education

Contribution to Human Capital Development

The companies that operate in Jizzakh Region report that the local educational institutions do not train the specialists and technicians who could meet their needs for qualified personnel. An expert survey with the managers of a number of enterprises revealed that they must hire foreign specialists from Turkey or China to train the local workers. According to these managers, the graduates of Jizzakh professional institutes and colleges do not meet the basic requirements. Very often they have to hire workers who graduated from other specialties and retrain them. The visits of production facilities revealed that the work requiring more qualified labor was performed by specialists from other regions of Uzbekistan, in particular from the Fergana Valley. Even those industries where Uzbekistan has a comparative advantage, such as the textile one, suffer from severe shortages of qualified personnel. One of the region’s textile enterprises explained that they were unable to operate a very expensive equipment that they had bought for lack of specialists

An expert survey was also conducted with representatives of the regional department for the promotion of employment, which is theoretically in charge of coordinating the demand and supply in the labor market. However, due to daily bureaucratic work commitments, the department has been unable to deal with these issues. In addition, the regional authorities have hardly any control on the number of students admitted and the selection of programs as all curriculum-related decisions are made by the Ministries in Tashkent and that requests for changes have to go through complicated and cumbersome procedures.

The main two educational institutions at the tertiary level are the Jizzakh State Pedagogical Institute and the Jizzakh Polytechnic Institute. The Pedagogical Institute in Jizzakh is the only pedagogical institute in the Republic of Uzbekistan that was not transferred to the state university at the time of independence. This Institute prepares teachers in 20 disciplinary areas at the bachelor's level. In many of these areas, the curriculum does

not meet the requirements of the labor market. For example, graduates of the "Pedagogy and Psychology" program experience difficulties in finding appropriate jobs because their training is highly theoretical.

The Polytechnic Institute has better links with the labor market as some academic departments have agreements with production facilities of the Free Economic Zone, which allows them to send students for industrial internships. However, the field visits showed that often the internship opportunities do not correspond to the specialties of the students. For example, during the visit to a factory for the production of plastic pipes and screws, the interns were students in the field of "land transportation systems". The Institute also does not have any agreement with the new oil refinery currently under construction in Jizzakh Region to train specialists and technicians in this area.

The field visits confirmed that the quality of teaching and learning leaves a lot to be desired in the Jizzakh tertiary education institutions. With the exception of the Health Sciences College, programs and curricula are not competency-based. Professors report that they teach a large number of hours and have limited opportunities to update their knowledge. Pedagogical practices tend to be traditional with an over-emphasis on theoretical courses. The centralized control exercised by the Ministry of Higher Education and Secondary Professional Education over course content and the organization of teaching is limiting the autonomy of regional educational institutions to respond more effectively to the needs of students and employers in Jizzakh Region. The official university ranking prepared by the Government of Uzbekistan, released in July 2018, confirms this assessment. The Jizzakh Polytechnic Institute and the Pedagogical Institute are among the last ones at the bottom of the league table, in the 52nd and 56th position, respectively.²

Furthermore, the Jizzakh tertiary education institutions are characterized by a total lack of internationalization. Neither academics nor students participate in international exchanges, there is a low level of mastery of foreign languages besides Russian, and the curriculum contains few elements of internationalization. This is a serious constraint to modernize and equip graduates with the skills needed to work in a region that wants to expand tourism in a significant way.

Contribution to the Local Innovation System

Jizzakh Region does not have a single university or any graduate education program. The local research institute – Gallaaral Scientific and Experimental Station of the Grain and Legume Research Institute was established in 1913 and specializes creation of heat-drought and frost-resistant, early ripening varieties of grain crops, legumes, fodder, oilseeds and moisture-soil and their agro-technology for cultivation, taking into account the conservation and enhancement of fertility of irrigated and rainfed lands of Uzbekistan.

In 2018, 6 employees of the station defended scientific works and received PhD degrees. For 100 years of scientific activity, 246 varieties of almost 20 species of agricultural crops were invented at the station. In the 1970s, the Institute employed 500 people. To date, the number of employees is 77 units, out of which 24 are research workers (1 doctor of science, 9 candidates of science).

² <https://emmasabzalieva.com/2018/07/22/uzbekistan-releases-first-university-ranking/>

The buildings and facilities of the Institute require major repairs. The Institute's laboratories must be equipped with modern scientific equipment and instruments. The equipment and measuring instruments available in laboratories are morally obsolete.

Photos of Gallaaral Scientific and Experimental Station



The only institution with some linkages with industry is the Polytechnic Institute, but these are in the area of training, not knowledge and technology transfer. Basically, at the present time, the knowledge contribution of the local educational institutions to the development of Jizzakh Region is close to nil.

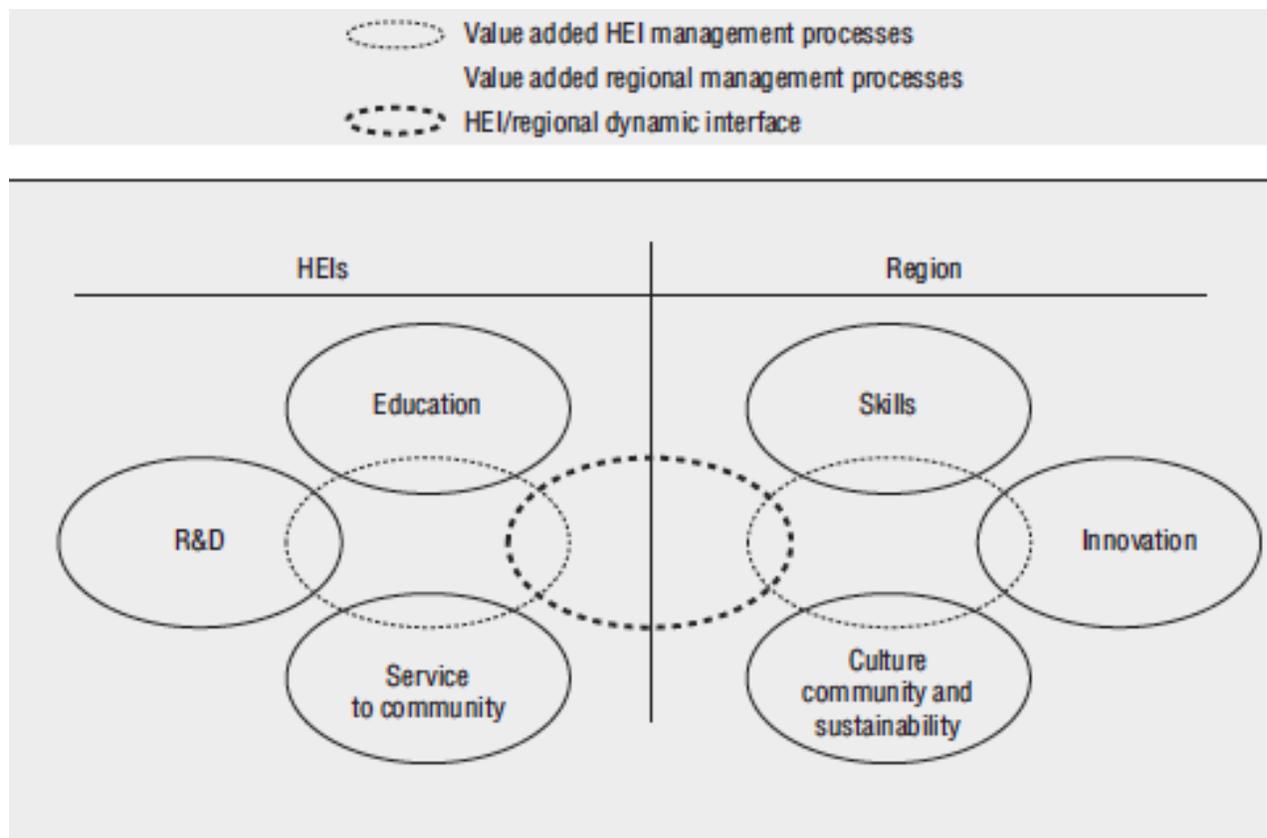
In conclusion, it appears that the tertiary education sub-sector does not meet the skills requirements of the Jizzakh regional labor market and plays no significant role in support of the development of the regional innovation system.

3. Vision of the Future of Tertiary Education in Jizzakh Region

3.1. Potential Contribution of Tertiary Education to Regional Development

Between 1999 and 2007, the OECD's institutional management program (IMHE) conducted a series of studies to explore the contribution of tertiary education to regional development (OECD, 2007). Besides recognizing the direct economic impact of tertiary education institutions as employers, customers and suppliers of goods and services, as well as the direct effect of staff and student expenditure on income, employment and tax revenues—all the so-called backward linkages that are estimated to account for between 2 and 4% of local GDP—, the synthesis report emphasizes that tertiary education institutions play a crucial role in developing the capacity of regions to compete in the global economy in three related ways. First, they prepare the professionals and skilled employees that will constitute the human capital of local firms and organizations. Second, their research outputs contribute to regional innovation. Finally, the tertiary education institutions can have a positive influence on the social, cultural and environmental development of the region. Figure 2 represents the main dimensions of interface between tertiary education institutions (TEIs) and their regional environment.

Figure 2 – Interface between Tertiary Education Institutions and Regions



Source: Goddard and Chatterton, 2003

Over the past decade, the OECD has conducted reviews of the vocational training system in member countries, deriving policy lessons that can provide a relevant framework to assess the performance of the network of

professional and technical colleges of Jizzakh Region (OECD, 2011). The main policy recommendations are summarized below:

- Provide the right mix of skills for the labor market;
- Reform career guidance to deliver effective advice for all;
- Ensure that teachers and trainers are well-prepared with industry experience;
- Make full use of workplace learning; and
- Develop effective tools to engage stakeholders and promote transparency.

In a small economy like the Jizzakh Region, the leading tertiary education institutions can play a critical role as one of the key pillars of the region's innovation strategy, as happens in small states such as Singapore and Hong Kong, or in individual states in large countries such as California, Massachusetts or Miami in the United States. Indeed, the presence of universities and non-university training institutions is important to regional development, through both direct linkages and spillover effects. The successful experiences of technology-intensive poles such as Silicon Valley in California, Bangalore in India's Karnataka State, Shanghai in China, and Campinas in São Paulo State, Brazil, attest to the strongly positive effects that the clustering of advanced human capital alongside leading technology firms can have. Positive results can only be achieved by forging a close relationship, based on mutual trust, between the economic actors and the tertiary education sector. Box 1 contrasts the experience of Oxford and Cambridge in the development of linkages between the University and the local economy.

Box 1 – Creating Dynamic Clusters: The Cambridge Model

The top two British universities, Oxford and Cambridge, are more than 800 years old. They share a similar history and stem from the same academic culture. They are both considered among the best universities in the world. And yet, when it comes to the impact on their respective city, Oxford and Cambridge have followed divergent paths and achieved strikingly different results. Oxford remains an old-fashioned university city, whereas Cambridge has become the “most exciting technology cluster in Europe.” What begun in the 1970s with the creation of business parks to welcome entrepreneurial academics and their doctoral students has evolved into a hub of 4,000 knowledge-intensive firms in electronics, pharmaceuticals, biotechnology and other frontier domains. It is today the most dynamic place in Europe where professors, Nobel Prize scientists and angel investors plot their next startup.

With a productivity level 30% higher than London’s, Cambridge generates more patents than its next six British rivals taken together, it hosts more billion-dollar firms than cities ten times bigger, and it boasts near full employment.

The secret to Cambridge’s success seems to lie in a balanced approach combining enlightened policies to provide the right infrastructure and economic environment and a laissez-faire attitude that trusts human ingenuity and serendipity. On the one hand, the university, the city council and the neighboring authorities have worked in a coordinated way to create a favorable ecosystem by setting up science parks and incubators, encouraging the development of business and housing estates, attracting investors and lobbying the government for more open immigration policies. On the other hand, they have kept away from imposing strategic priorities and micromanaging the city’s economic development. The city does not decide what type of high-tech industry is more likely to become tomorrow’s industry, and the university gives incentives to academics interested in setting up companies, making the membrane between its laboratories and private firms as porous as possible. This has resulted in dynamic partnerships where firms provide advice free of charge and invite students to help them, while academics and angel investors work together to chaperon new companies.

Unlike many universities in the United Kingdom that still work in silos, Cambridge University has been particularly good at stimulating collaboration across academic disciplines. As explained by Jeremy Sanders, one of Cambridge University’s pro vice-chancellor, the university’s philosophy is to “hire people smarter than you, give them as much freedom and research funding as possible, stand back, and reap the harvest ten years later.”

Source: The Economist (2015)

3.2. World-Class University or World-Class System?

The Government of Uzbekistan is considering the desirability and feasibility of establishing a world-class university in Jizzakh Region, which would have the capacity of producing leading-edge research and transferring the results of this research to promote economic growth in the region and beyond. This could be achieved either by (i) creating a new university from scratch with significant public resources, or (ii) selecting among the existing tertiary education institutions the one that could be upgraded with additional public funding.

The establishment of Nazarbayev University in Kazakhstan and Hong Kong University of Science and Technology are illustrations of the first approach. With respect to the second approach, relevant examples come from Thailand, selected nine of its public universities as recipients of additional resources to improve their research capacity and output, or Malaysia, which designed the Science University of Penang as “apex” university and gave it additional funding.

In the case of Uzbekistan, the authorities need to take a hard look at the pros and cons of setting up a new university from scratch with the ambition of making it into a world-class institution. International experience indicates that it would involve a sizeable initial investment of at least 50-100 million dollars, and high levels of recurrent funding in a sustainable manner (Altbach and Salmi; Altbach *et al*, 2018). It would also require significant changes to the legal framework and governance regulations for public universities in Uzbekistan, following the example of Nazarbayev University, which enjoys a more favorable governance setup than the other public universities in Kazakhstan from an institutional autonomy viewpoint. Finally, it is not clear that Jizzakh Region can offer at present all the ingredients of a cosmopolitan city that are necessary to attract the caliber of foreign partner institutions and academics who could help to jump-start the development of a new University with the ambition of achieving international recognition in an accelerated fashion.

A perhaps more feasible and worthwhile alternative would be to work on progressively establishing a world-class tertiary education system in Jizzakh Region as a model for the whole country. The remaining parts of this report outline the steps towards achieving this goal.

3.2. Vision for the Jizzakh Tertiary Education System

It is striking to observe the presence of no less than ten Californian universities among the top 100 universities in the Shanghai global ranking, nine of them placed among the top 50 in the world. This impressive outcome is not due to chance, nor does it reflect only the outstanding efforts of each of these eleven universities. It is also the direct result of a clear vision elaborated and implemented in the early 1960s, reflected in the much-celebrated “Higher Education Master Plan”, which set out to define the respective roles and contributions of the various types of institutions constituting the tertiary education system of the State, from the junior colleges to the top research universities, together with the pathways allowing for the fluid movement of students through the system (Box 2).

Box 2 - Setting the Vision for Tertiary Education in California

California pioneered the establishment of a policy framework for a state system of higher education in the United States when it developed and implemented its first Master Plan in 1959-60. The primary issues considered at that time were the future roles of the public and private sectors and, in particular, how the public sector should be governed and coordinated to avoid duplication and waste.

The fundamental principles that emerged from the initial master plan still shape the state's system today:

- Recognition of different missions for the four components of the higher education system (University of California, California State University, community colleges, and private universities and junior colleges),
- Establishment of a statutory coordinating body for the entire system,
- Differential admission pools for the University and State Colleges,
- Eligibility of students attending private institutions for the state scholarship program.
- Availability since 1965 of grants from the federal government (Pell Grants) for low-income students throughout the state system.

The California Master Plan for Higher Education, which is revised about every ten years, is not a rigid blueprint to control centrally the development of California's system of higher education. Rather, it sets some general parameters, focuses primarily on the boundaries among the four sectors of higher education, and strives for a system that balances equity, quality and efficiency.

Source: Salmi, 2017

The Jizzakh regional and municipal authorities may envisage a similar approach to guide the development of tertiary education and secondary professional education in the Region. This would involve elaborating an audacious vision for the future and formulating a master plan to translate that vision into concrete policy measures and investment programs. The master plan would define the size, shape and institutional configuration of the regional system by year 2030, with the overarching goal of producing highly qualified graduates and relevant research in support of a more dynamic and diversified local economy.

The design of the tertiary education and secondary professional master plan for Jizzakh Region would be informed by the following key strategic questions about the size and configuration of the future sub-system:

- How much will or should the participation of young people expand further,
- taking into consideration current demographic trends and possible measures to improve internal efficiency?

-
- What pathways should be established to improve the flow of students across all categories of tertiary education and secondary professional institutions?
 - How should existing tertiary education institutions organize and strengthen their lifelong learning / retraining / career change programs?
 - What partnerships could be established between the Free Economic Zone and the tertiary education institutions?

To ensure ownership of the results, thereby increasing the probability of successful implementation, the preparation of the master plan should not be a technocratic exercise undertaken by the regional and city administrations on their own, but would need to be conducted in a participatory manner with the active involvement of the various relevant authorities (Governorate, City leaders, Ministry of Higher Education and Secondary Professional Education, other relevant Technical Ministries), the leaders of tertiary education and secondary professional institutions, representatives of employers, and representatives of society at large, using a citizen-based consultation approach. Denmark was one of the pioneers in developing this approach at the beginning of the new century (Box 3). Other governments have joined the movement in the past decade, for example Canada, Estonia, Madagascar and Tanzania. The Government of Chile recently created LabGov, directly inspired by the Danish experience. Operating as a multi-disciplinary team, its main goal is to « put citizen at the core of the Chilean government policies » by using human-centered and experimental methods.³

³ <http://www.la27eregion.fr/the-strange-life-of-lab/>

**Box 3 – Involving Citizens and Businesses in the Search for
Appropriate Public Policy Solutions:
the MindLab Experience in Denmark**

MindLab is a Danish cross-governmental innovation unit, which involves citizens and businesses in developing new solutions for the public sector. MindLab has been instrumental in helping key decision-makers and employees from its parent ministries view their efforts from the outside-in, to see them from a citizen's perspective. MindLab uses this approach as a platform for co-creating better ideas.

MindLab was created in 2002 for the Ministry of Economic and Business Affairs as an internal incubator for invention and innovation. At that time, the vision of an in-house laboratory as a centre of creativity and innovation was unique for a government agency.

MindLab works with service users, citizens and other stakeholders at early planning stages of service delivery. For example, Mindlab worked with citizens to test mobile devices for doing tax returns and collected their feedback, which resulted in modifying government plans and avoiding costly service mistakes. It developed social networks with and for highly skilled migrant workers to motivate them to stay in Denmark.

In 2007, the Danish Government set a new strategy and a new goal for MindLab: its focus would be the active involvement of both citizens and companies in developing new public-sector solutions. At the same time, MindLab acquired two additional parent ministries, namely the Ministries of Taxation and Employment. In this manner MindLab also became a platform of intra-governmental cooperation. Finally, the strategy involved MindLab hiring a number of professional researchers, with the aim of establishing a more robust methodological foundation for its work.

Today, MindLab has considerable experience with innovation processes that are based on the realities experienced by citizens and businesses, and which also promote collaboration across the public sector. MindLab has become a part of three ministries and one municipality: the Ministry of Business and Growth, the Ministry of Education, the Ministry of Employment and Odense Municipality; it also forms a collaboration with the Ministry for Economic Affairs and the Interior.

Source: Open Government Guide (2015). Available at
<http://www.opengovguide.com/country-examples/denmarks-mindlab-involves-citizens-and-business-in-developing-new-solutions-for-the-public-sector/>

3.3. Strategic Development Areas

The future contribution of tertiary education institutions to the development of the Jizzakh regional economy can be organized around two principal potential growth areas: existing sectors and new clusters. In the first case, agriculture and food processing, pharmaceuticals, mining, oil refining, automotive industry, telecommunications, sustainable development, tourism and hospitality management are key spheres with a high growth potential for Jizzakh Region. The tertiary education institutions must work in close collaboration with the regional authorities and business partners to develop programs that lead to high value activities in these sectors.

In the second case, the leading research and training institutions in the region could consider new areas of growth that are brain-intensive rather than capital-intensive, for instance biotechnology, health services, ICT and the creative industries. In addition, they could study the feasibility of new training programs and research activities directly linked to the region's natural resources. In Australia, for example, James Cook University reconfigured its programs with the ambition of becoming the leading university in all scientific fields directly linked to the tropical areas, its natural environment. The Jizzakh tertiary education institutions need to think how they could orient and configure their programs with that same principle in mind. Box 4 illustrates the potential of biocontrol as an alternative to herbicides and pesticides in the protection of crops. An upgraded agricultural research institute could work towards this goal.

Box 4 – Biocontrol to Protect Crops in a Safer Environment

Not a single fly leaves here without invitation. Between the two doors of Entomopolis, sticky traps and an ultraviolet lamp intercept any insect in freedom. Precaution is required in this pavilion of the Sophia Agrobiotech Institute in Antibes (Provence-Alpes-Cote d'Azur), because there are invasive insects that are ravaging France and other exotic species that are being considered to introduce in the countryside to fight the first. We organize biological control.

"Currently, crop protection relies heavily on synthetic chemicals. The methods of biocontrol allow a defense much more respectful of the environment and human health," says Thibaut Malausa, scientific coordinator of biocontrol at the National Institute of Agricultural Research (INRA), to which the Sophia Agrobiotech Institute is attached. Biocontrol involves pitting insects, bacteria, viruses or fungi against harmful organisms, dispersing odorous molecules away from them, spreading natural substances to kill them, or rearranging the landscape to favor the presence of their natural enemies.

Insects can be used against other insects. Against the codling moth, the aggressor that motivates 30% to 40% of insecticide treatments in orchards in France, you can send micro-wasps *Mastrus ridens*, a parasitoid of Kazakhstan, natural enemy of the codling moth. Against *Drosophila suzukii*, a fly of Japanese origin that spoils many fruits, including cherries, berries and apricots, you can use the micro-wasp *Ganaspis*,

another parasitoid esophagus who loves to deposit its larvae in eggs *Drosophila suzukii*.

Source: "Le biocontrôle, une alternative aux pesticides". *Le Monde*. 6 June 2018

Box 5 documents how the State of Queensland, in Australia, strengthened its university sector as an integral part of its strategy to become a regional knowledge economy.

**Box 5 - An Australian 'Smart State' Serves Up
Lessons for a Knowledge Economy**

Sixteen years ago, the Australian state of Queensland was famous more for its beaches than for its brain power. Fellow Australians thought of Queenslanders as miners, farmers, or surfers, not as professors or scientists. When Queensland announced in 1998 that it was planning to become a "Smart State," or a knowledge economy, locals quipped that the government had used the word "smart" only because Queenslanders couldn't spell "intelligent."

But since then, the number of scientists in Queensland has more than doubled, to 18,100. Spending on research and development has also increased twofold, to more than \$4-billion. The state's universities are studded with 36 new research institutes that are hiring talent and turning basic science into products, patents, and drugs. And a \$354-million Translational Research Institute, to be finished in September, will have two university partners and the ability to manufacture drugs, a capacity that had previously been missing in Australia, forcing clinical trials overseas. Along the path of the 14-year drive to become a Smart State, Queensland's university officials, scientists, and nascent philanthropists have learned some lessons that might benefit other governments interested in nurturing knowledge economies.

Australia has its own special challenges, though, given its distance from other research and manufacturing. "We're a small country on the edge of a large part of the world," says Ian O'Connor, vice chancellor of Griffith University. "Our costs will always be significant."

Queensland's Smart State effort started at the top. Peter Beattie, the former Queensland premier who helped spark the Smart State, said that his thinking about it began before he was in power. "As I traveled the world looking for ideas, it became clear that any future governmental economic strategies could not ignore innovation and knowledge, which would be a major driver of future economic growth." Just as oil-rich countries such as the United Arab Emirates were planning for a post-oil future, coal-rich Queensland needed to develop intellectual resources, Mr. Beattie said. As he looked around in Queensland, the state had good, if somewhat

under-appreciated, universities, and academic leaders who were eager to work with the government.

Two of Mr. Beattie's key allies in his early efforts were Mr. Feeney, an Irish-American philanthropist who made his money from duty-free stores, and a Scottish medical researcher, Ian Frazer. During his visit to Queensland, Mr. Feeney, already a philanthropist with an interest in medicine, met academic leaders he came to respect and saw medical-research institutes that were strong but needed more investment to create laboratories with the potential for long-term payoffs. "In Queensland, he found an enthusiastic and committed group of scientists, educators, and government leaders who shared this vision," writes Christopher G. Oechsli, president of Mr. Feeney's Atlantic Philanthropies, in a statement.

Mr. Feeney became a regular visitor to Brisbane and began to apply the strategies that had made him successful elsewhere. He grasps the principles of levers, his admirers say, which can amplify force both in moving rocks and in giving away money. One of the Smart State buildings now under construction, the Translational Research Institute, is an instructive example of using leverage in fund raising. The Institute has its roots in the years before the global recession, when Dr. Frazer, a scientist who moved to Brisbane in 1985 to work at the University of Queensland, was developing a vaccine that has prevented cervical cancer in women around the world and won inter-national acclaim. Dr. Frazer says he was desperate for new laboratory space and went to Mr. Beattie, who in 2006 offered \$100-million in state money. But by January 2009, with the global financial crisis still raging, construction had not begun.

The Atlantic Philanthropies' executive in Australia approached the federal government to discuss an unusual arrangement. If the government would provide half of the \$205-million, then Atlantic would give the other half. In May of 2009, the federal government announced grants totaling \$170-million. Atlantic kept its pledge of \$102.5-million, which it calls "the largest set of grants made by a philanthropic foundation for higher education and medical research in Australia's history." "In some ways, [Atlantic]... has been the glue that has gotten the governments to co-invest and the universities to partner."

The Smart State strategists have long ago moved from a "bricks" theme to a "brains" theme, and recruiting talent continues to dominate many leaders' thoughts. "The key to recruitment is to have four or five really top people," says Perry Bartlett, director of the Queensland Brain Institute. "If you build a beautiful building, but don't have any good people in it, forget it."

Source: Wheeler, 2012

In addition to contributing to the local economy through salaries and the purchase of goods and services, the local tertiary education institutions can become important economic agents through relevant applied research and the training of qualified professionals who can help make the firms in Jizzakh Region more innovative and productive. They can fulfill this role in several ways, not only by participating directly in new innovations, but perhaps even more importantly by facilitating technology upgrade and absorption. Box 6 illustrates how the Catholic University of Chile, one of the two leading universities in that country, has become a change agent through very innovative programs supporting both economic and social development.

**Box 6 – Promoting Economic Development and Social Innovation
in Chile**

The Catholic University of Chile, the country's premier private university, has had a significant impact through two initiatives of its business school (*Escuela de Administración*). The PYME UC initiative, driven by the observation that three quarters of Chilean small and medium firms fail within ten years of starting, offers training for SME entrepreneurs. Alumni and faculty mentors work together to provide strategic guidance and business insights. The course addresses the main aspects for effective management of an SME and simultaneously mentors the entrepreneur through a competitive analysis of the company—to identify main areas for improvement—and through the preparation of a business plan.

Mentors participating in the program are outstanding undergraduate and MBA alumni, with extensive professional experience, that carry out this activity voluntarily. Undergraduate students play a significant role in accompanying entrepreneurs, which gives them a chance to put their knowledge into practice. In that way the initiative is an important formative experience for undergraduate students.

PYME UC also provides a SME's self-diagnostic program with a 10-hour online training course and an in-class closing session. Through the self-diagnosis, entrepreneurs are able to identify areas for improvement in management and acquire new tools through the training course. Finally, in order to train a greater number of companies, the first MOOC was offered during 2015 and a second MOOC course is currently being designed.

In terms of impact, the initiative helps improve organizational competitiveness and strengthen economic development as well as the labor market across Chile. Since 2008, 563 entrepreneurs have been trained through this program. More than 200 alumni have participated as mentors in the program. 55,000 people have taken the MOOC since its creation in 2015, of whom 38,000 are active learners and 3,000 have already completed the course. The online course has also allowed PYME UC to expand its contribution beyond Chile by reaching entrepreneurs from Mexico (20

percent of registered students), Peru (13 percent), Colombia (12 percent), Spain (6 percent), and Ecuador (4.5 percent), among others.

The second initiative is the The Changemaker Academy, an interdisciplinary and inter-university program with three fundamental objectives: (i) creating agents of positive social change who catalyze sustainable development in our economies; (ii) connecting actors in the ecosystem with the diverse realities of the country in which they work, supporting the emergence of new ideas and projects that bring solutions to problems our country is facing today through new, sustainable business models; and (iii) disseminating the idea of social innovation (its tools and models) as a way to solve the country's social and environmental problems.

The Changemaker Academy is a platform for collaboration among university professors, mentors, and university students aiming at strengthening their connection with their own motivations, knowledge, and actual community problems. The mentor accompanies the social change agent throughout their formation process, connecting the agent with the social innovation network. The facilitators are university professors who have acquired Art of Hosting tools and lead the work of creating the environment and the transformative experiences. All key players are constantly connected to the social innovation ecosystem (national and local government agencies, foundations, NGOs, firms).

Source: AACSB website www.aacsb.edu

3.4. Expansion and Institutional Diversification Strategy

Developing a vision for the future is not sufficient in itself. It must be translated into a comprehensive strategic plan that articulates quantitative targets linked to the expansion of the various sub-sectors and types of institutions in a balanced and complementary way, and sets out overall goals in terms of quality improvement and enhancement of the relevance of programs.

In most developing countries, rapid growth of enrollment cannot be achieved only in the traditional mode of building and funding new public universities with government budgetary resources, considering the limited public funding available for tertiary education. Therefore, the configuration of the tertiary education system has crucial financing implications. Spreading enrollment growth across a variety of tertiary education institutions—universities and non-universities, public and private—, instead of simply expanding the public university sub-sector, can be an effective strategy for expanding enrollments in Jizzakh Region in a more financially manageable way from a public resources perspective. As they seek to achieve a balanced enrollment growth, the Jizzakh authorities could consider a four-pronged strategy: (i) establishing one flagship university, (ii) strengthening the existing non-university tertiary institutions, (ii) developing cost-effective distance education modalities, and (iii) stimulating the expansion of a vibrant, good-quality private tertiary education sub-sector.

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- While Jizzakh Region does not need to have a “world-class university” able to compete with the best in the world, it would make sense to create a good-quality university that would be the focal point for advanced training and research in the region. For that purpose, the authorities must assess whether it is preferable to upgrade the existing Pedagogical Institute or the Polytechnical Institute, or rather to start a new university from scratch, considering the unimpressive track record of both existing institutions. Under either scenario, it would be desirable to integrate the agricultural research center into the new University, to create synergies between training and research.
 - The existing institutes and technical colleges must transform themselves into dynamic and modern institutions that can offer high-quality training and work closely with employers.
 - The Government of Uzbekistan should encourage tertiary education institutions to explore the potential of online learning, that other countries have harnessed in a very effective way to reach out to students in remote areas and also offer lifelong learning opportunities. Continuing education, including executive development, retraining, upskilling, and career change programs, is a promising area of potential growth for both campus-based and online education institutions.
 - Finally, the Jizzakh authorities may want to allow private institutions to also offer training programs in close partnerships with employers, as happens in most post-Soviet countries. The existence of private providers can also stimulate a healthy competition pushing public institutions to boost up their performance.

As the regional authorities work on expanding learning and training opportunities in Jizzakh Region, they must not lose track of the need to achieve gender balance. Looking at the proportion of girls at the various training institutions (Table 1 in earlier section) shows worrisome variations across types of programs, which are not conducive to effective talent development. With both social justice and economic efficiency considerations in mind, the public authorities must lead efforts to achieve a better gender balance in all spheres of human capital development.

Finally, as they plan for the respective growth of each type of tertiary education institution, the Jizzakh authorities would be well served to bear in mind the importance of maintaining the right balance between professional and technical levels of training, as illustrated by international experience (Box 7).

**Box 7 - Achieving the Optimal Ratio of Professionals to Technicians
for Economic Growth**

A number of studies have cataloged the different mixes of specialists (or professionals) and various kinds of technicians employed in the production process across a range of countries and industries. The first category typically refers to graduates with university degrees, while the second encompasses skilled workers who possess secondary vocational education or similar qualifications. While there is no consensus on the correct mix of inputs to use in the production of various goods and services, it is generally agreed that an unbalanced ratio of these complementary inputs leads to waste and a

suboptimal allocation of resources (one example would be a factory with 90 engineers and only 10 technicians or 1 engineer and 99 technicians).

One report by the University of California at Berkeley examined the mix of skills held by workers in the competitive semiconductor manufacturing industry (Brown, 1996). It found that, for every engineer employed by US manufacturers, they employed an average of 1.7 technicians and 6.6 operators. For Asian manufacturers the ratios were slightly lower – 1.2 technicians and 5.9 operators for every engineer. Moreover, the manufacturers employed one supervisor for every 13 operators and one manager for every dozen engineers. An average facility with roughly 600 skilled workers (technicians, operators, and supervisors) would, therefore, employ approximately 85 university graduates (managers and engineers), a ratio of 7 to 1.

A more recent study (Mason, 2012) examined trends in employment within the UK's science, engineering, and technology (SET) sector. It found that university graduates made up 22 percent of the UK's SET workforce in 2010, up from 11 percent in 1994. During this time, the ratio of vocationally educated technicians for every university graduate in the British SET sector decreased from 4 to 1 to 2 to 1, while the ratio of lesser skilled workers to engineers dropped from 5 to 1 to 1.7 to 1. As a result, there were 3.7 technicians employed for every engineer in Britain by 2010, down from 9 technicians per engineer in 1994. This was a consequence of the SET sector in Britain employing larger numbers of university graduates and probably becoming more productive as a result.

As these case studies indicate, the optimal mix of vocational technicians and university educated specialists in the science and technology industries is likely to lie somewhere in the range between 2 to 1 and 7 to 1. The 10 to 1 ratio currently being produced in Uzbekistan is clearly out of line with internationally competitive standards. Increasing the production of higher education graduates in the sectors that are demanding ever larger numbers of highly skilled professionals would be a wise policy response to ensure that Uzbekistan achieves greater competitiveness and productivity.

Sources: Brown, 1996; Mason, 2012

Finally, the master plan should carefully document how the various tertiary education institutions, in their new configurations and with higher levels of performance, would contribute to the development of Jizzakh Region, along the following dimensions:

- Direct economic impact (operational and investment expenditures of each institution, supplier chain expenditure, expenditures by staff, students);
- Additional earnings (and spending) of graduates as a result of their new degree;
- Knowledge products from research and technology transfer;
- Entrepreneurship (new university as hub of entrepreneurial activity);

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- Cultural activities;
 - Community service (service learning, volunteer work, etc.);
 - Contribution to public policy (through relevant policy studies);
 - Equity impact through scholarships (income and gender dimensions);
 - Environment (sustainable campuses).

4. Principal Elements of the Strategic Plan for Implementing the Vision

Change is happening quickly. The clock is ticking. The alternative is not business as usual – it's obsolescence.

Barbara Vacarr (Encore.org)

The results of well-performing tertiary education institutions—highly sought graduates, leading-edge research, and dynamic knowledge and technology transfer—can essentially be attributed to three complementary sets of factors: (a) high concentration of talent (academics and students), (b) abundant resources to offer a rich learning environment and support quality research, and (c) favorable governance features that encourage strategic vision, innovation, and flexibility, enabling institutions to make decisions and manage resources without being encumbered by bureaucracy. While the configuration of results—research, learning and technology transfer—depends on the nature and specific mission of each institution (research intensive, teaching, applied science, technical, continuing education, etc.), the alignment of the three sets of factors is a requirement for any kind of institution (Salmi, 2009). This analytical framework can be used to make specific suggestions about key areas of potential progress for tertiary education institutions in Jizzakh Region.

4.1 Talent Development

Improving the quality and relevance of graduates in Jizzakh Region will require working on five aspects: (i) qualifications of faculty members, (ii) mindset, (iii) curriculum modernization, (iv) innovative pedagogical practices; (v) alignment between learning and assessment, and (vi) strategic partnerships.

Qualifications of Academics

The first step to upgrade the quality of educational programs at existing tertiary education institutions, and in particular at the New University, is to hire faculty members with higher qualifications. As new positions become available, it will be important to set the bar high and make sure that only suitable candidates with a PhD are selected. The leadership team of existing institutions will also need to take a hard look at the existing group of faculty members to guarantee that everyone's performance meets their quality standards and aspirations.

Mindset

Bringing experienced faculty members with high academic qualifications on board is a necessary but not sufficient condition to create an institutional culture of excellence at all existing tertiary education institutions and at the New University. Equally important is a mindset that embraces change, with an open attitude towards curriculum modernization and the introduction of innovative pedagogical practices. One way of achieving this goal is to identify those innovative professors who are willing to transform their courses and pedagogical approaches in an effective manner and to get them to lead the transformation of the institution as “champions of change”.

Curriculum modernization

The most effective approach to increase the relevance of programs and courses is to transform and redesign the curriculum in close partnership with industry. Box 8 summarizes the experience of UK universities in making employer engagement a core dimension of their curriculum development practice. Effective labor market feedback mechanisms, such as tracer surveys and regular consultations with employers and alumni, are indispensable for adjusting curricula to meet the changing needs of the economy. All tertiary education institutions need to set up a unit that is responsible for systematically monitoring the labor market trajectories of their graduates.

Box 8 – Good Practices of Employer Engagement for Curriculum Improvement Purposes

A recent study in the United Kingdom has identified four main categories of employer engagement in tertiary education provision (course development and delivery):

- Giving accurate and up-to-date information, advice and guidance to students about the knowledge and skills needed to enter particular industries and professions;
- Facilitating and supporting work placements and internships to provide students with valuable work experience;
- Developing curricula, pedagogy, learning materials and learning-related research projects; and
- Establishing bespoke learning and teaching facilities aimed at providing students with the specialist skills they need in the workplace, often with financial support from firms.

Experience shows that successful and sustainable partnerships require specialist staff, on-going relationship management and significant development time. Typically, this engagement will take place with companies in close proximity to the university. While research and knowledge transfer activities are often administered centrally and thus highly visibly in universities, employer engagement activities tend to be managed at faculty level or below.

The five case studies documented in the report yielded the following findings:

- Collaborations should be designed to respond to a strategic need recognized by all partners. This need will often be a shortage of graduates with the skills required by a particular company or group of companies, but it may encompass areas of research, particularly in advanced manufacturing or engineering. There may also be more specific needs such as identifying innovative delivery methods.
- Collaborations require strong leadership from the senior teams of all the organizations involved, including the recognition that developing and

implementing projects of this kind will be time-consuming and that engagement will need to be sustained indefinitely to keep curricula current.

- Co-location of staff and joint appointments can support the culture change required to work together effectively and speed-up decision-making.
- External funding streams can be important to give initial impetus to the partnership and give all organizations the confidence to release their own funds.
- Benefits to business can include: availability of graduates with relevant skills, recruitment efficiencies and access to other university/business services. Benefits to universities include the development of an up-to-date and relevant curriculum, which will increase student recruitment and progression outcomes and enhance the university's reputation.

Source: University Alliance, 2015

There is no better linkage than when tertiary education are fully integrated into the regional development strategy. This is what happened in Finland, where the young University of Oulu has become one of the best universities in the Nordic countries despite being located in a remote area close to the Arctic Circle. The small rural community of Oulu was transformed into a high-technology zone where winning companies (led by Nokia), science parks dedicated to applied research in electronics, medicine, and biotechnology, and the 13,000-student university function in symbiosis.

In addition, the Jizzakh Region authorities could also use data analytics to map out future labor market needs and influence the shaping of the curriculum, following the example of the city of Manchester, which has tried to chart the competencies, skills and attributes in demand in the Greater Manchester area by analyzing 600,000 LinkedIn profiles of people working in the region. The British Council recently supported a project to use big data for the same purpose in Africa. A pilot survey of graduates of pharmacy programs at the Universities of Ghana, Lagos and Western Cape was successfully conducted to test the potential of mobile phones for the collection of labor market results data (Yeld, 2018).

Innovative pedagogical practices

The Ministry of Higher Education and Secondary Specific Education, working together with the Jizzakh Region authorities, should promote and support the establishment of well-resourced Teaching and Learning Centers in all tertiary education institutions. These centers would have the mission of supporting innovations in the teaching process that would promote active learning (problem-based learning, gaming, simulations, peer-to-peer learning, artificial intelligence software for independent learning, etc.).

MIT recently published the findings of a major study looking at the evolution of engineering education, which could help the Jizzakh Polytechnic Institute think about relevant innovations in its science and technology programs, and make the entire education experience more student-centered (Box 9).

Box 9 – The Future of Engineering Education

The trend is a move towards socially relevant and outward-facing engineering curricula. Such curricula emphasize student choice, multidisciplinary learning and societal impact, coupled with a breadth of student experience outside the classroom, outside traditional engineering disciplines and across the world. While many of these educational features appear within engineering programs at the ‘current leader’ institutions, they are often “bolt-on activities” and are isolated within the curriculum. As a result, much of the benefit of these experiences remains unexploited because they are unconnected with other curricular components and students are not encouraged to reflect upon and apply what they have learned in other areas of the degree program.

In contrast to the ‘current leaders’, many institutions identified as ‘emerging leaders’ in engineering education typically deliver distinctive, student-centered curricular experiences within an integrated and unified educational approach. In most cases, their curricula were designed from a blank slate or were the result of a recent systemic reform. Experiences such as work-based learning and societally relevant design projects are embedded into the programs in a way that provides a solid platform for student self-reflection and a pathway for students to both contextualize and apply the knowledge and skills they have gained elsewhere in the curriculum. However, many of these ‘emerging leader’ exemplars – such as at Olin College of Engineering and Iron Range Engineering – cater to relatively small cohort sizes. The key innovations that are likely to define the next chapter for engineering education are the mechanisms by which such features can be integrated across the curriculum at scale: delivered to large student cohorts under constrained budgets.

Source: Graham, 2018, pp. iii and iv.

Aligning Teaching, Learning and Assessment

In one of his speeches, the father of peer instruction, Eric Mazur, described assessment as “the silent killer of learning”.⁴ Indeed, curricular and pedagogical innovations can transform learning only if the assessment criteria and processes are fully aligned with the educational experience of the students. For instance, traditional end-of-semester exams may not be appropriate any more to evaluate the learning outcomes of students who participated in a problem-based course organized around group work and peer learning.

In order to support the acquisition of 21st century skills by students, tertiary education institutions need to implement assessment strategies that are different from the ranking and classifying practices commonly applied. Two disruptive practices have emerged in recent years in the design and use of assessment in university settings. The first one, highlighted earlier, is a progressive shift towards a competency-based education model, in contrast to the traditional content-based model of course design and delivery (Henri, Johnson and Nepal, 2017). The second one, triggered

⁴ <https://www.youtube.com/watch?v=8sh6wsUFQTO>

by the increasing reliance on competency-based evaluation, is the move away from high-stakes summative evaluations to a formative assessment model (Gomez-Garibello and Young, 2018).

Formative assessment is used to monitor student learning in order to help learners identify areas that need additional work and provide information to instructors to recognize where students are struggling (Eberly Center, Carnegie Mellon University). Assessments are formative when the information that they generate is used to adapt the instruction process to student needs. Results obtained from these tasks can be used to rethink learning goals, modify the curriculum, or adjust instruction strategies (Pellegrino, 2009).

Strategic Partnerships

As mentioned earlier, the few existing post-secondary institutions in Jizzakh Region have very few links with foreign institutions of higher learning. An effective way of strengthening them in an accelerated manner, therefore, is to forge strategic partnerships with foreign universities, with the purpose of improving the quality of their programs, developing their research activities, and building their overall institutional capacity.

The idea behind strategic partnerships is not to emulate the practice of many universities in the world, which tend to sign dozens—sometimes hundreds—of Memoranda of Understanding with institutions in other countries, usually focusing on academic and student mobility. Strategic partnerships are different. They are deep, transformative relationships with a small number of carefully chosen institutions that are not necessarily at the same level of development but do share a common vision and similar values. The principal objective would be to undertake together mutually beneficial projects spanning the entire range of academic and administrative activities, including the development of joint academic programs and/or double degrees, collaborative applied research projects, joint services to the community, and possibly joint benchmarking exercises that could help institutions in the Jizzakh Region in the identification of gaps and definition of stretch goals. The strategic partnerships should not be restricted to other colleges or universities, but could include government entities, NGOs, private firms and community groups.

4.2 Financial Sustainability

Strengthening the financial position of tertiary education institutions in the Jizzakh Region would require actions at two levels: (i) seeking to obtain more public resources from Government, and (ii) diversifying the institutions' income sources.

Support from the National Government and Regional Authorities

The first element of a sustainable financing model for tertiary education institutions in Jizzakh Region is an adequate resource mobilization strategy that provides sufficient resources to meet the enrolment expansion, quality improvement and research strengthening goals. It would imply higher levels of public investment in tertiary education in the region. Public funding for research also needs to increase. Most research funding should be allocated to research teams and projects on a competitive basis, with independent peer reviewing of research proposals.

The regional authorities in Jizzakh Region could consider setting up a special fund to encourage regional development initiatives, either through competitive grants or through matching grants, to reward those tertiary education institutions that are successful in raising private funding for collaborative projects with industry.

Resource Diversification

All tertiary education institutions should pursue an active income diversification strategy. This would require systematically looking at opportunities to tap the following principal funding modalities to complement the regular operational and investment resources provided by the Government:

- Continuing education
- Contract research and consultations
- Sale of goods and services
- Donations

Tuition fees. With better quality and higher relevance programs, the tertiary education institutions in Jizzakh Region could raise revenues through continuing education and executive education programs. The rapid development of the digital labor market, commonly described as the fourth industrial revolution, implies that lifelong education has now become indispensable as an approach offering avenues for training, retraining and upskilling.

Contract research and consultations. The New University and the Polytechnic Institute need to put in place proper incentives to induce their most active faculty members to seek consulting opportunities with local authorities, firms and other organizations. The main purpose would not be only to generate additional income but also to apply the results of the institutions' research work in the search of innovative solutions to address local development needs.

Sale of goods and services. Along the same lines, the management of the various tertiary education institutions ought to encourage their faculty members to seek concrete applications to their academic work that could result in the sale of goods or services produced by the institutions. The College of Health Sciences, for instance, could run a clinic that would serve as an application center for faculty and students, and could generate a little amount of resources.

Donations. Notwithstanding the lack of philanthropic tradition in Uzbekistan, the potential for fund raising through donations is great. The tertiary education institutions must establish a close relationship with their alumni, and appoint a dynamic manager responsible for alumni relationships and development. Fund raising is not an easy task. It takes time, resources, and imagination. But the experience of universities in other countries that, like Uzbekistan, do not have tradition of gifts to educational institutions clearly shows that significant levels of donations can be captured over time from alumni, their families, and philanthropists more generally. Box 10 summarizes the experience with fund raising in Europe, where universities are new to fund-raising, with the exception of the United Kingdom.

Box 10 - Lessons from Fund-Raising Efforts in Europe

A 2011 European Commission survey on the fund-raising efforts of European universities found that success was related to three main factors. The first is what is defined as institutional privilege, *i.e.* the wealth and reputation of the university, as well as pre-existing relationships with potential donors. The second is the level of commitment of senior academic leaders and other research staff in this regard. The third and final factor has to do with the environmental of a university, namely its location and the geo-political context in which it operates.

With regards to the type of donors, the survey showed that European universities raise money mostly from private corporations, while contributions from alumni are much less frequent.

Experience indicates that successful fund-raising involves the following dimensions:

- Commitment of management and governing bodies.
- Full participation of academic staff.
- Financial and human investment in fund-raising activities.
- Rewards for staff successful in attracting philanthropic donations.
- Production and dissemination of materials for fund-raising purposes, such as a website, leaflets and brochures.
- Use of a database to maintain and update records on interactions with donors.
- Reporting on philanthropy in universities' annual financial reports.

One of the successful cases of effective fund-raising efforts came from the United Kingdom, where a government-sponsored matching funding scheme was set up in 2008, following similar positive experiences in Singapore and Hong Kong. Between 2008 and 2011, the government matched any eligible gift made to a participating tertiary education institution.

Sources: European Commission (2011), *Giving in Evidence: Fundraising from Philanthropy in European Universities*, Brussels.

<http://ec.europa.eu/research/era/docs/en/fundraising-from-philanthropy.pdf>.

Universities UK (3 April 2008), "Information for Members: Formal Launch of the Matched Funding Scheme for English HE institutions", *Investor in People*, London.

4.3 Governance Aspects

One option to channel the commitment of the Jizzakh Region authorities to the development of an integrated human resource base in support of the region would be to establish a dedicated agency, as other countries or cities have done. It could be named the Regional Talent Development Agency, following the model of the Singapore Workforce Development Agency (WDA). WDA was established in 2003 with the mandate to “lead, drive and champion workforce development, enhancing the employability and competitiveness of Singapore's workforce.”⁵

Another governance aspect to take into consideration is the need to unify and integrate all specialized colleges under either the Ministry of Higher Education and Secondary Specialized Education or under the proposed Regional Talent Development Agency. The recent decision to put some specialized colleges under the direct authority of the Ministry of School Education and others under the responsibility of sectorial ministries carries the risk of fragmentation of the tertiary and specialized secondary education sub-sectors in Jizzakh Region.

A third governance consideration has to do with the degree of institutional autonomy enjoyed by the tertiary education institutions. Trends in governance patterns in OECD countries reveal that governments can be more successful in developing their tertiary education sectors by steering from a distance rather than exercising too much of a direct supervisory role (OECD, 2004). This governance mode can be achieved through a regulatory framework that encourages and facilitates, rather than controls, innovations in public universities and private sector initiatives.

Therefore, to improve their performance and become more innovative, tertiary education institutions in Jizzakh Region must enjoy the ability to make decisions in a more autonomous manner and manage their academic and financial resources with more flexibility. Institutional autonomy is a key element in the successful transformation of public tertiary education institutions (Salmi, 2017). Autonomous institutions are more responsive to incentives for quality improvement, resource diversification, and efficient use of available resources. Autonomy includes among its many characteristics the ability of each institution to set its own admission requirements, determine the size of its student body, assess tuition fees, and establish eligibility criteria for financial assistance to needy students. Institutions must also be free to determine their own employment conditions, such as hiring and staff remuneration, to be responsive to new and rapidly changing labor market demands. Finally, institutions must have the ability to reallocate resources internally according to self-determined criteria. Independent fiscal control is necessary so that institutions can strengthen weak academic units, cross-subsidize programs, and fund new initiatives quickly and flexibly in response to evolving needs.

Academic autonomy is also key to improving the quality and relevance of programs. To enhance their responsiveness to local and regional labor market needs, tertiary education institutions that are licensed and been granted institutional quality accreditation should have the freedom to decide what programs to open, what courses to offer, how many students to take, and what syllabuses to teach. The decision to open new programs and courses should be consulted with the relevant employers, who would be invited to help design and evaluate

⁵ <http://www.wda.gov.sg/content/wdawebste.html?parent=topnavhome>

them. Tertiary education should also be free to close down or modify courses if employer or student demand dries up.

Moving towards increased autonomy implies a substantial redefinition of the respective roles and responsibilities of the Ministry of Higher Education and Secondary Specialized Education, on the one hand, and the tertiary education, on the other hand. With this in mind, the Ministry would work on promoting greater autonomy—organizational, staffing, financial and academic—while putting in place adequate accountability mechanisms. As a result of this new approach, the Ministries of Higher Education would be less involved in direct management issues. They would focus instead on strategic functions such as vision setting, medium term planning, guidance on development priorities and related training needs, resource allocation to stimulate quality improvements and overcome disparities, and career guidance and labor market information management. Box 11 illustrates how a career guidance and labor market observatory could operate, either at the national level or in Jizzakh Region, as a pilot experience.

Box 11 – Establishing a Career Guidance System and a Labor Market Observatory

Establishing a career information system and a labor market observatory is essential to perform the information management functions that are needed to guide the tertiary education and TVET sub-system. A career information and guidance system can be defined as a set of tools and services intended to assist individuals of any age to make educational, training, and occupational choices and to manage their careers. To operate in an effective manner, the career information and guidance system must be designed and put in place as a coherent system linking all necessary stakeholders (Ministry of Education and Science, Ministry of Labor, Ministry of Economy, city authorities, tertiary education and TVET institutions, Chambers of Commerce, Association of Employers, etc.) together. It must rely on sound measurement tools for assessing quality throughout the system, including the quality of the specialists and the quality of the information offered to students and graduates.

The system should facilitate information access, allow for self-help and self-development, lead to increased use of information and communication technologies, and promote interaction among tertiary education institutions, TVET institutions, the private sector and NGOs. Finally, it would be important to use evidence-based processes, through which the system could track who uses what information and to what extent the services offered are based on client demand and usage.

As part of the career guidance system, the labor market observatory would monitor the labor market outcomes of tertiary education and TVET graduates on a continuous basis, widely disseminate information about careers and pathways, and advise decision-makers on necessary adjustments at the level of tertiary education and TVET institutions as well as labor market policies. The labor market observatory could function as an independent policy research body or as a policy research institute attached to a university.

Source: Watts and Fretwell (2004)

5. Conclusion

The quality of their learning experiences and the environment in which students learn will shape the future development of our society.

Hunt Report, Ireland, 2011

Human development is at the heart of any policy to promote innovation and raise productivity. In a recent visit to the United States, the Prime Minister of the Canadian province of Ontario observed that, in today's knowledge-driven economies, the main source of comparative advantage that countries can rely on is not capital, technology or raw materials anymore, but the talent of their educated population. In the same vein, the Prime Minister of Norway declared in one of her recent speeches to the nation that "knowledge is the oil of the future." Jack Ma, the co-founder and chairman of the Alibaba Group, said recently that "the future will not be about the competition of knowledge, but the competition of creativity, the competition of imagination, the competition of independent thinking".

In the same vein, knowledge and human development can be key pillars of economic and social development in Jizzakh Region. For this purpose, the provincial and municipal authorities need to fully integrate the growth and consolidation of the tertiary education system into their overall development vision and investment program.

The former rector of the Danish University of Aarhus used the concept of "change without a burning platform" to describe the difficulty faced by academic leaders seeking to drive transformative initiatives into their university when things are going reasonably well, making it arduous to sensitize the university community to the need for further change. In the same spirit, the main challenge for the Uzbek authorities is to create a sense of urgency that would help persuade all stakeholders in the tertiary education sector to undertake the priority actions that would allow them to attain higher levels of performance and serve the Jizzakh economy and region more effectively.

The fundamental decisions that will be embedded into the vision and the strategic plan will determine the role that tertiary education institutions succeed in playing as a key pillar of development in Jizzakh Region in support of economic diversification and social innovation. Indeed, the future configuration and areas of excellence of these institutions will directly affect their ability to contribute to the regional innovation system through their graduates, research products, and engagement with the community and the local economy.

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