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The Dost Agropark as Knowledge Corridor

Developing High-Level Skills for New Digital Agriculture

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> *"I think that agriculture should be one of the contributors to employment and key sectors of economy in Zangilan district. Because the natural climate is very favorable, and again, in the example of Dost Agropark, we must see the future of all liberated lands."*
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> – Ilham Aliyev, 4 May 2022

> *If I am not mistaken, [thirteenth- and fourteenth-century Anatolian folk poet and Sufi mystic] Yunus Emre wrote in one of his poems that God creates hundreds of thousands of grains from one spike of wheat. Now we will see the same here [in Dost Agropark]. Inshallah, these spikes will turn into grains and will be sent from here to the rest of Azerbaijan, to Türkiye, and to the whole world. Let us not forget this; we are entering a time when animal husbandry and agriculture should occupy an important place in the world. I am sure that my brother Ilham is taking a very important step in this field. He is implementing this. This place will become a storehouse for grain, a fertile field in terms of animal husbandry, and a region where many countries will knock on its door, Inshallah.*
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> – Recep Tayyip Erdoğan, 20 October 2022

The Food and Agriculture Organization of the United Nations (FAO) defines "smart farming" as a farming management concept using modern technology—including sensors and actuators, geo-positioning systems, big data, and unmanned aerial vehicles—to increase the quantity and quality of agricultural products, increase production per farmer, and become a climate-resilient and resource-efficient producer. Management

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information systems, precision agriculture, and agriculture automation and robotics are three interconnected technologies that provide farmers with added value in the form of better decisionmaking. This leads to greater resource efficiency and environmental sustainability through the use of innovative and sustainable technologies for agriculture. Therefore, in light of the need for Azerbaijan to restructure agricultural production in our global digital age, individual workers contributing value in this increasingly strategic aspect of the economy will need the acquire sufficient digital skills to be able to do so effectively.

Smart Agriculture in Azerbaijan

For the first time, smart agricultural practices—as integrated system of the smart village concept—were introduced in the plans of the Dost Agropark complex in 2021, which is located in liberated Zangilan.

This complex was established within the framework of the Great Return to Karabakh strategy by private investors from two fraternal countries, Azerbaijan and Türkiye, with an investment of $100 million. When fully completed, the complex will employ 500 people, who will also be provided with living, workplace, and recreation facilities. The Dost Agropark will produce cereals like wheat and barley, breed 10,000 heads of cattle, and will feature on-site warehousing and similar facilities. All told, Dost Agropark is expected to meet the region's demand for seeds, fertilizers, and agricultural supplies. An "agro market" will also be established, which will take the products produced there and elsewhere in Karabakh to world markets under the brand name "Made in Karabakh."

Dost Agropark operates on the principle of smart agricultural technologies and will produce halal food. Its executives have indicated that it will operate in accordance with relevant UN's Sustainable Development Goals, e.g., zero waste, renewable energy, and sustainable agricultural technologies and mechanisms.

Thus, aside from advancing regional cooperation within the framework of a broader Azerbaijani-Turkish "knowledge corridor," Dost Agropark will serve as employment opportunity for IDP returnees as well as an innovation and knowledge transfer hub to store and share its best practices with similar future smart complexes and projects in Karabakh, other parts of Azerbaijan, and across the Silk Road region.

Khalil Sarvarov, Dost Agropark's operations manager, has put it this way: "the smart agricultural complex of the Agropark is unique in employing the most advanced high technologies, including application of AI and robotics in production process." In the project's highly digitalized operational environment, he underlined, all workers are required to be proficient in one or more high-level digital skillset relevant to agricultural production, including automated systems operations, autonomous (robotic) systems, AI specialization in machine vision systems, or data analytics.

Currently, the highly-skilled Turkish and Azerbaijani professionals working at Dost Agropark are delivering training programs for the newly-hired workers. However, in order to maintain such high labor productivity in the future, there will be a need for workers to come equipped with high-level digital skills. With the advancement of technological solutions, the gap between workforce digital skills and demand is expected to continue to widen. In the near future, it is hardly inconceivable that the implementation of machine learning solutions will become an integral part of agricultural production—depending, of course, on the level of technology optimization. This widening gap will pose an increasing challenge for educators, as their university curricula play catch up with the demands of an innovating industry.

Stuart Cullum is President of Red Deer Polytechnic, a well-regarded specialized college in Alberta, Canada. He previously served as the President of rival Olds College, where he was instrumental in establishing the Olds College Smart Farm, a leading hub for innovation, training, and applied research that attracted more than 100 partners globally and tens of millions of U.S. dollars in investment. Cullum has stated that 40 percent of Canadian employers have problems finding skilled agricultural workers, and that demand will only increase as the requirements for greater technical proficiency from those working in the technology fields does. While AI and robots could take over about 75 million jobs worldwide, their use will produce over 130 new types of positions for trained workers. This will happen very soon. Thus, without trained farmers and workers, agriculture will be left behind, Cullum added. In Canada, 96 percent of farms with sales of $1 million or more report significant technology use. In Azerbaijan, the percentage is almost certainly much lower.

This IDD Analytical Policy Brief assesses the need to update the quality content in education and training programs to close the skill gap between labor market and industry. It uses the model of the Dost Agropark smart agricultural complex as a knowledge and technology transfer hub of a broader Azerbaijani-Turkish "knowledge corridor" while providing recommendations on optimal solutions for restructuring the content and delivery methods of higher education and reskilling programs in liberated Karabakh.

The Need for a New Era Workforce and Knowledge and Technology Transfers

There are two main ways for those working professionally in the agricultural field to gain or enhance skills demanded by the labor market in Azerbaijan: through the acquisition of a tertiary education (colleges and universities) and in-service programs, i.e., upskilling and reskilling those currently in the workforce. A snapshot of the present situation for each will be examined in turn and concrete recommendations will be provided.

First, on the education system level, only one university is pedagogically dedicated to preparing a professional workforce for this country's agricultural labor market:

Azerbaijan State Agricultural University. In addition, two comprehensive universities teach separate disciplines in veterinary medicine and animal husbandry (Nakhchivan State University and Lankaran State University). Finally, Baku State University has a program in soil science.

Several studies have been conducted to evaluate the program content of the supply side. For instance, alumni survey conducted by the Ministry of Agriculture in 2018-2019 among 500 recent graduates of Azerbaijan State Agricultural University indicates that, notwithstanding the offer of a separate undergraduate degree in agricultural engineering that covers disciplines like mechanization and automation, students majoring in agronomy, veterinary, and animal husbandry indicated a need to receive additional training programs in learning digital skills (e.g., coding) and computer application programs in order to become technologically savvy.

Interviews conducted with agricultural enterprises by the Ministry of Agriculture (2018-2019), together with an IDD Analytical Policy Paper published by Anar Valiyev et al. on 10 May 2023 ("The Mismatch between the Labor Market and Education Outputs in Azerbaijan"), indicate poor linkage between educational institutions and the labor market, the absence of skills- and practice-based learning, and a lack of coordination and cooperation as main reasons for a lack of market driven-skills in this field.

Thus, although, there are useful programs and initiatives in the agriculture field of study in Azerbaijan—e.g., ADA University, including the nascent Azerbaijan-Italy University—that contribute to the campaign to overcome the aforementioned challenges, a more systematic and fast track approach at the national level is still needed.

Second, on the industry level, the situation is aggravating. According to a 2018-2019 Ministry of Agriculture survey of agro-businesses, those engaged in agricultural activities lack high-level digital skills and need training in using latest technologies applied to agricultural production, as larger enterprises are already demanding a digital skillset from their workers. The findings indicate that while small and medium enterprises are still employing conventional, tried-and-true machinery and are lagging behind delivering training programs needed to their employees, the majority of the bigger agricultural enterprises are already using modern technologies in their production processes whilst providing different in-service digital training programs required for their employees.

This is where the uniqueness of Dost Agropark comes in: the complex is delivering a series of training programs in high-level digital skills and employing robotics and AI in its production process. This includes unmanned automated tractors, the application of AI in analyzing crop production and animal husbandry, and so forth. Hence, all its employees—ranging from less-skilled laborers to highly-qualified specialists—are receiving job-appropriate training (from Turkish trainers) in automated systems operations, autonomous (robotics) operations, and other required AI digital skills.

By adopting a holistic approach (i.e., one that engages the entire agriculture supply and production chain), Dost Agropark endeavors to increase food production, food security, and responsible consumption of natural resources for advancing sustainability benchmarks.

The complex has also announced 500 more vacancies. Each requires such skills as data analysis, recommendations through big data, managing unmanned vehicles, and creating new applications for technologies, including but not limited to autonomous operation systems, tech-agronomists, agriculture and knowledge translators.

In the meantime, Dost Agropark has already begun to realize its initial mission to become an "exemplary model" in transferring knowledge and technology to other agropark complexes in the liberated lands. For example, the firm supplied Aghali smart village with automated (unmanned) machinery together with a training package. Dost Agropark has already provided jobs to returnees and is expected to hire even more local residents.

Recommendations

Integrate computer science into the agriculture curriculum.

- While new disciplines are certainly important to consider in the learning process, computer science (coding, data analysis, machine learning, etc.) should be integrated as a core science on par with traditional school (physics, chemistry, biology, etc.) and university-level programs in agriculture such as agronomy, soil science, veterinary, food science, and animal husbandry. The practice of integrating coding (computer science) into core school and university curricula has been observed in many developed countries that are highly-ranked on the 2022 Global Innovations Index.
- For example, Türkiye is included on the list of Top 50 Innovative Countries in the World. The country has six unicorns with an investment of $1 billion each. Türkiye started integrating coding into high schools and universities in 2017. There is no reason for Azerbaijan not to follow this example, as well as others.
- The Ministry of Science and Education should thus require all relevant instructors to have computer literacy and integrate computer programs in their teaching/ learning process. It should also require coding to be put on par with traditional disciplines in both schools and higher education institutions.

Encourage greater public private partnerships (PPP) to upscale smart agriculture practices.

- Holistic and planned interaction between companies and universities, including public research centers, can help solve technical problems, increase R&D capacity, drive innovation based on best practices, and improve the scientific basis of decisionmaking in both industry and government. In the context of the Azerbaijani

public policy debate, there is no discernable downside to linking more closely education and industry in the field of agriculture.

- The Ministry of Agriculture should provide support by coordinating the process of establishing network and cooperation between agriculture pedagogical institutions, agricultural producers, processors, and associations, and companies like Dost Agropark.
- Project-based learning is a successful pedagogical approach in many countries, which can involve advanced students being placed in companies as part-time employees. Students would be tasked by their instructors and employers to work on real-world problem-solving projects. Integral to the success of this approach is the establishment of a national network to help companies and universities identify suitable job placement opportunities as well as the provision of relevant grants for Small and Medium Enterprises to alleviate some of the student employment costs.
- Such a placement network could itself be supported as a PPP project by the Ministry of Agriculture in cooperation with Dost Agropark or other smart projects to be established in Karabakh and elsewhere in Azerbaijan.
- Another way forward could involve companies supporting higher education innovation in the form of new curricula or new academic or training programs designed to meet labor market demands. This would be of particular relevance in the context of graduate programs. This practice is widely used in the UK and the U.S., which enables universities to keep up with rapidly advancing industry practices and ensure the continuous upgrade of educational programs to meet the demand for skills in the labor market.
- Dost Agropark and other smart agricultural complexes could cooperate with ADA's Azerbaijan-Italy University and other agricultural universities to create greater synergy between industry and pedagogy.

Accelerated investment in upskilling and reskilling programs by industry, supported by the government.

- A key finding of a 25 January 2021 World Economic Forum report is that accelerated investment in upskilling and reskilling of workers could add at least $6.5 trillion to global GDP, create 5.3 million (net) new jobs by 2030, and help develop more inclusive and sustainable economies worldwide. In Azerbaijan, such new jobs are being created as a result of launching large-scale smart complexes like Dost Agropark. State funding in support of upskilling and reskilling of workers by industry is in the national interest.
- In order to ensure mass reskilling program to ensure productive workforce, Dost Agropark can serve as a knowledge and technology hub by establishing liberated Karabakh's first research and training center.
- Such a center could receive financial support from the Ministry of Agriculture and the Ministry of Science and Education for
- online short-term and long-term education and training programs, which would be free for returning IDPs;

- an experimental agro-field space for scientists and researchers with high-level digital skills;
- the establishment of AI research institutes and programs that focus on agricultural studies, the sustainable consumption of the natural resources, renewable energy, and food security.
- The above would build on the best practices of similar successful projects in Canada, Finland, and the United Kingdom. Not only would these be designed to provide concrete solutions of agricultural challenges in Azerbaijan, but such centers would also have the additional public policy benefit of attracting and retaining AI talent as well as constituting an important contribution to the nascent Azerbaijani-Turkish "knowledge corridor."