THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

SMART VILLAGES IN AZERBAIJAN

A Framework for Analysis & Roadmap

March 2021

RIGHTS AND PERMISSIONS

ACKNOWLEDGEMENTS

Contents

INTRODUCTION

1

1. This paper is the main output of an analytical and research program aimed at identifying policy options to develop technology and social innovation driven "Smart Village" approaches that can improve service delivery and local economic development in rural areas. The concept of "smart villages" focuses on enabling communities—in partnership with local government and the private sector—to identify opportunities and solutions that are right for their own areas based on demand (bottom-up/participatory needs assessment), on transferring knowledge and innovation, and on policy incentives. With these three elements in place, customized "smart" solutions for rural areas can result in greater local economic development with better connectivity and improved services, increased livelihoods and incomes, and improved quality of life.

2. The paper is presented in six sections, each representing an element of the research and analysis undertaken to define and apply the concept of "smart villages" in Azerbaijan. The first section presents the context of rural development, particularly aspects which relate to the rural-urban divide, public policies and programs aimed at advancing rural development, as well as the digital dimensions of development. The second section introduces the concept of "smart villages." What does this mean? How do other countries apply this term? What are the core principles and elements? Following from the definition and global examples of smart villages, the paper lays out a framework for assessing the smart village readiness of villages in Azerbaijan, viewing them as spatial clusters and drawing on global "big data" and national data sources to rank village clusters with common spatial characteristics as the most versus the least ready to apply smart village approaches.

3. To illustrate the capabilities of the smart village analytical framework, two of the fourteen most ready, or "amplify," village clusters were selected to elaborate on the challenges and opportunities that emerge from exploring data from the agriculture and tourism industries, two of the most important economic sectors in these clusters. The analysis concludes with a deeper, qualitative investigation of the perspectives of community members, government and business leaders and owners in the two clusters. This final analysis identifies priorities for advancing development in the village clusters along the lines of the five key areas of the Smart Village Readiness (SVR) Index. The concluding section summarizes recommended next steps in adapting, adopting, and applying the SVR Index Framework in Azerbaijan, identifying policy and programmatic approaches to advance smart village readiness, monitor progress and achieve development targets which diversify rural economic activity and bridge the rural-urban divide.

4. This research and analysis took place mainly during the first half of 2020, before and during the outbreak of the Covid-19 pandemic. As such the original plans for engaging international consultants for dialogue and research development with national counterparts was limited. Much of the work was managed from a distance with some local partnerships allowing for field data collection and rapid reporting. Nonetheless, the availability of global "big data" sources and ongoing, strong engagement with government and civil society partners enabled the report to adjust its approach to undertaking this analytical work, the results of which are presented below. The preliminary results of this work were presented by the two primary consulting firms, Geoadaptive, and Intellecap, in May-June 2020. The report also incorporates feedback received at that time from key stakeholders in the Government of Azerbaijan.

RURAL DEVELOPMENT CONTEXT

Although rural poverty in Azerbaijan has decreased, rural areas in Azerbaijan face persistent gaps in economic opportunities and access to services.

5. Despite a recent slowdown, in recent decades, economic growth in Azerbaijan has enabled poverty to decline. Much of Azerbaijan's growth has been driven by oil. The country's significant oil resources have traditionally been the country's main export (90 percent of exports in 2019)[1] and one of the largest contributors to GDP (oil and gas revenues were 63 percent of the total budget revenue in 2019).[2] Rapid economic growth, which was sustained at 11 percent for over a decade (2000 – 2015), combined with a rise in wages and social transfers, has enabled living conditions to improve[3] and poverty to decline dramatically, from 49 percent to under 6 percent.[4] During this period, the government also invested in infrastructure projects to improve basic services and connectivity. However, the fall in oil prices in 2014 and subsequent devaluation of the Azerbaijani Manat highlighted the risks of reliance on the oil sector as a driver of economic growth, halting the rapid rise in GDP and constraining the government's ability to sustain high rates of employment and social benefits.

6. Unlike other former Soviet states, Azerbaijan's population has grown consistently in rural as well as urban areas. Since independence in 1991, the country's population has grown from 7.2 million to 10 million. Nearly half of Azerbaijan's population (47 percent) resides in rural areas, a slightly higher share than its South Caucasus neighbors (42 percent in Georgia and 37 percent in Armenia) yet comparable to the world average (49 percent) and lower than the average in Central Asian countries (58 percent).[5] Although the population is denser in certain areas, it has grown across the country. Due to the arid sub-tropical climate in most of the country's territory, the population is concentrated along the Caspian coastline and the Kura river valley in the east and north (Figure 1). The cities of Baku (2.3 million people) and Sumgayit (345,300 people) on the Absheron peninsula are the largest urban centers. Population size and density have grown fastest in the south-eastern rayons[6] of Massali, Jalilabad, and Lankaran, followed by the Shamkir and Tovuz rayons and the northwest city of Ganja, but all rayons, urban and rural areas alike, have registered growth. For example, one of the most sparsely populated rayons, Khizi, more than doubled its residents between 1990 and 2015. The population is relatively ethnically homogenous with about 90 percent citizens identifying as ethnic Azerbaijanis and 99 percent claiming proficiency in the Azerbaijani language.[7]

1   Central Bank of Azerbaijan
2   Ministry of Finance of Azerbaijan
3   World Bank. 2019. South Caucasus in Motion.
    www.documents1.worldbank.org/curated/en/614351556553124178/pdf/South-Caucasus-in-Motion.pdf
4   Using the national poverty line and as reported by the National Statistical Committee, also reported in World Bank, Azrip II
    Implementation Completion Report; Asian Development Bank. 2019. Azerbaijan: Country Digital Development Overview.
    www.adb.org/sites/default/files/institutional-document/484586/aze-digital-development-overview.pdf; and UN. 2017.
    Azerbaijan – 2030. From the Millennium Development Goals towards the Sustainable Development Goals.
5   Geostat.ge; World Bank Development Indicators; FAO. 2019. Europe and Central Asia: Regional Overview of Food Security
    and Nutrition. Structural Transformations of Agriculture for Improved Food Security, Nutrition and Environment. Budapest.
    A rayon is an administrative division of Azerbaijan. The country has 56 rayons, 10 cities, and the Nakhchivan autonomous
6   republic, which in itself is sub-divided into 7 rayons and 1 city.
7   UNFPA. 2018. Population Situation Analysis. Beyond the Demographic Transition in Azerbaijan.
    www.azerbaijan.unfpa.org/sites/default/files/pub-pdf/PSA%20book_eng_final.pdf based on 2009 Census

FIGURE 1: Population by rayon, 2019

Measurement unit: thsd.person
- 10.0 - 86.0
- 86.0 - 132.0
- 132.0 - 2295.0
- Information has not been processed
Method: Quantile
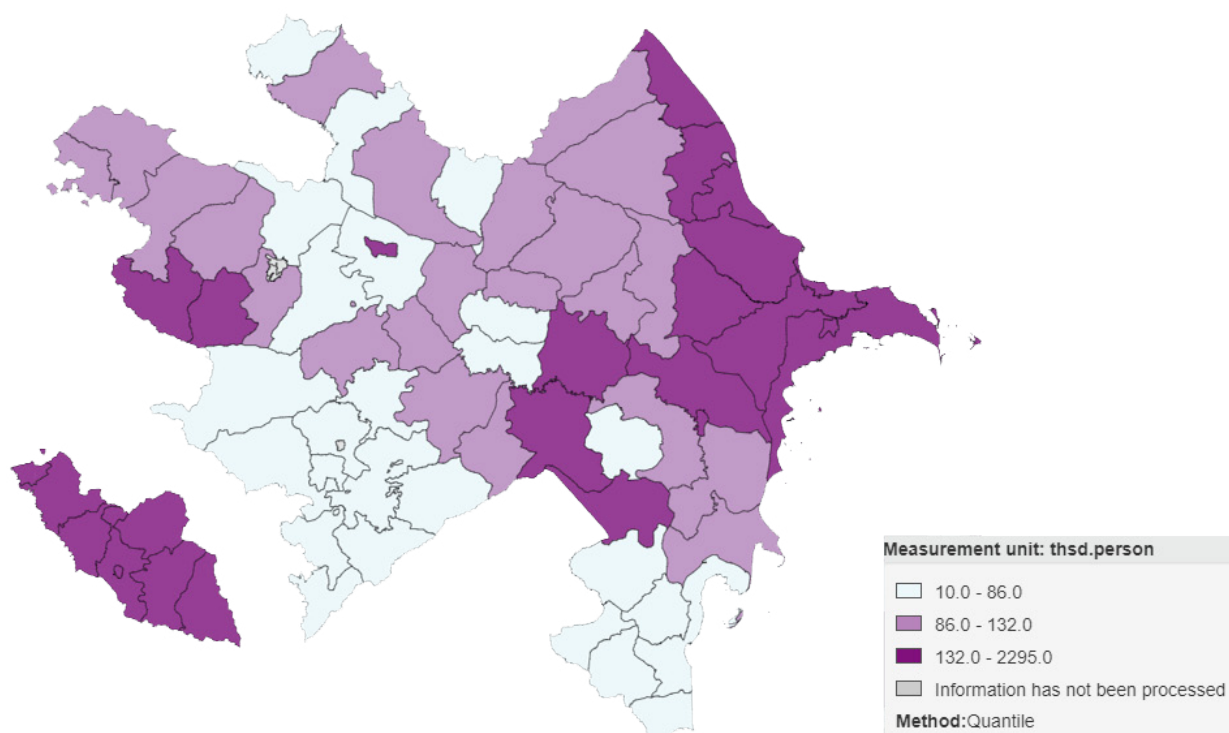
Source: State Statistical Committee of Azerbaijan

7. Despite this relatively consistent population growth, the benefits of Azerbaijan's economic growth have been unevenly spatially distributed. Industry and services are concentrated in the Absheron peninsula, Nakhchivan Autonomous Republic, and a few rayons in central Azerbaijan (Figure 2). Spatial inequalities in GDP are wide. Azerbaijan exhibits more than two times the inequality of any other country in Europe and Central Asia, suggesting that inequalities in production have been persistently high across the country's economic regions.[8] Incomes of the population (Figure 3) outside of Baku and the Absheron and Sumgayit rayons do not correspond proportionately to the level of economic activity or population density. Meanwhile, the effect of growth on inequality in Azerbaijan has been insignificant. This can mostly be attributed to the absence of economic diversification and structural changes in the economy, combined with low urbanization and persistent human capital gaps between urban and rural populations. This has limited the inclusivity and sustainability of Azerbaijan's growth and constrained its impact on people's well-being.

---

8   World Bank. 2019. South Caucasus in Motion

FIGURE 2: Outputs of goods and services in main sectors of the economy, per capita, 2019 (AZN)

Measurement unit: manats

- 24.0 - 2769.0
- 2769.0 - 3622.0
- 3622.0 - 26655.0
- Information has not been processed

Method: Quantile
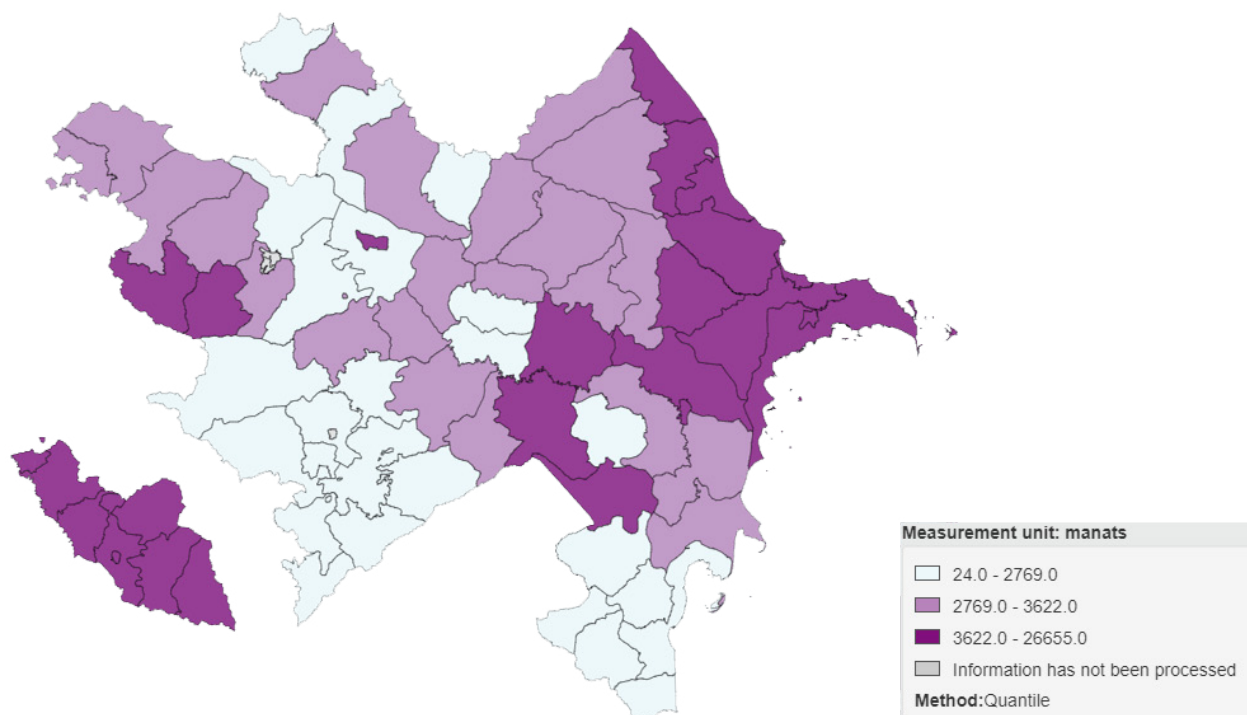
Source: State Statistical Committee of Azerbaijan

FIGURE 3: Income of the population, 2019 (million AZN)

Measurement unit: million manats

- 40.0 - 244.0
- 244.0 - 413.0
- 413.0 - 32964.0
- Information has not been processed

Method: Quantile
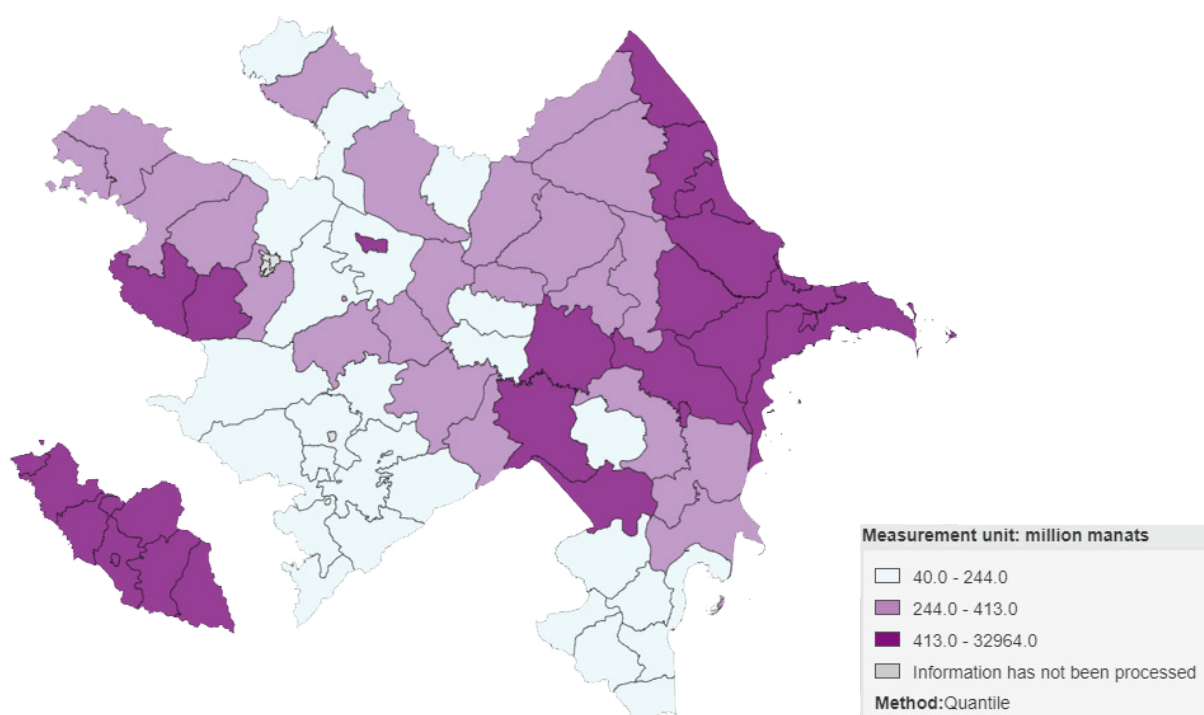
Source: State Statistical Committee of Azerbaijan

8. Spatial inequalities are also reflected in disparities in poverty and access to services. Over 60 percent of poor people reside in rural areas and about 57 percent of the population is vulnerable to falling into poverty should they experience unanticipated economic, health-related, or other shocks. Despite government investment in regional development programs through the 2000s, rural-urban disparities in access to basic services remain significant. Access to drinking water and heating is almost universal in Baku and other urban areas, while in rural areas, only 76 percent of households have access to water, and 82 percent to gas. Access rates are higher in Absheron and Baku and lower among poorer populations in Aran, Daghlik-Shirvan, Ganja, and Guba. The targeted social assistance program reaches less than 10 percent of the population. The share of pension recipients is higher in urban areas which may reflect higher levels of informality in rural areas, where the majority of the population is engaged in agriculture and is predominantly self-employed. Meanwhile, employment opportunities in rural areas are scarce.

9. Rural households face significant barriers to social and economic mobility. These are driven by gaps in skills and education, a digital divide, and constraints to agricultural productivity, such as poor market linkages and limited access to finance. Azerbaijan grapples with poor learning outcomes in rural areas, poor teacher quality, and gaps between the skills provided by educational institutes and those required to enhance the competitiveness of the private sector.[9] The country has one of the lowest rates of tertiary education enrolment among the Eastern Europe and CIS states (20.4 percent compared to a ECA average of 55.6 percent in 2012)[10], with rural residents having on average lower educational achievement than their urban counterparts. Meanwhile, Azerbaijan also has a digital divide between urban and rural areas. There is a 20-percentage point gap between rural and urban households in fixed internet penetration. This digital divide is mainly due to shortages of fixed infrastructure and lower levels of digital literacy in rural areas.[11] Meanwhile, the agriculture sector—which employs over 40 percent of the population but accounts for merely 5.7 percent of GDP—faces constraints to its productivity. These include undeveloped agro-processing industries, a lack of extension services, limited access to finance, lack of skills and knowledge on modern agricultural technologies, and poor market linkages.[12]

10. These gaps in economic opportunity in rural areas have driven persistent rural to urban migration— though this is partly offset by rural population growth. The ILO estimated youth unemployment rate of 14 percent in 2019.[13] The lack of viable employment has helped push people—particularly youth—to migrate from rural to urban areas. Azerbaijan has seen relatively constant net outmigration from rural areas, and positive migration flow into urban areas, since the 1950s, apart from the 1990s, which, in contrast, saw greater urban outmigration and positive migration into rural areas. To date, 50 rayons continue to register negative net migration, consisting mainly of rural residents migrating to urban centers for jobs or education opportunities. (UNFPA 2018) Although rural-to-urban migration is significant, this has been offset by a natural population growth in rural areas that is 20 percent higher than that of urban areas.

11. Meanwhile, the COVID-19 pandemic has exacerbated the vulnerability of poor households and sharpened the risk of rising inequality. Poverty was currently projected to rise by 1.8 to 5.6 percentage points in 2020 because of the pandemic. Households are expected to experience a negative income shock equivalent on average to 11 percent of their income. The share of income loss among the poor is likely to be double that of the non-poor (approximately 21 percent of their income), driven by an increase in unemployment, decrease in wages, and decline in remittances, as well as pre-existing inequalities and vulnerability. COVID-19 is expected to lead an estimated 2.8 percent of the population to fall back into poverty in 2020, reflecting the vulnerability of many households who are 'one shock away' from becoming poor.[14]

---

9   World Bank, 2019. South Caucasus in Motion
10   World Bank. 2015. Azerbaijan Systematic Country Diagnostic
11   Azerbaijan: Country Digital Development Overview, ADB, 2019
12   Assessment of the Agriculture and Rural Development Sectors in the Eastern Partnership countries, The Republic of Azerbaijan, FAO, 2012
      www.data.worldbank.org/indicator/SL.UEM.1524.ZS?locations=AM-AZ
13   World Bank. May 2020. Poverty Projections and Distributional Impacts of the COVID-19 Outbreak in Armenia, Azerbaijan, and Georgia.
14   Projections of poverty impacts for Azerbaijan were updated in December 2020.

> Azerbaijan's digital connectivity offers the potential to improve economic opportunities, access to services, and governance—but to take advantage of this, Azerbaijan will need to overcome the digital divide between rural and urban populations.

12. Azerbaijan has an opportunity to overcome these gaps in economic opportunity and access to services through technology and innovation, thereby exploiting its demographic dividend of a young population. Azerbaijan's population is relatively young, with a mean age of about 30 in 2009.[15] The current barriers to economic opportunity in rural areas present a missed opportunity for the country to capitalize upon this. Using technology and innovation to revitalize rural economies, expand access to services, and improve governance would enable the country to better realize the potential of its young, growing population.

13. Mobile coverage is high. Rural populations have good access to mobile phones, which can provide a strong foundation for digital connectivity. Although fixed broadband connectivity is 20 percent lower in rural than urban areas, rural areas in Azerbaijan are relatively well covered by mobile – over 95 percent of the population is covered by 3G or 4G mobile services. As is the case in many Middle-Income Countries, mobile connectivity has become the mainstay of telecommunications in Azerbaijan and populations across the country are familiar with the technology. With 10.1 million subscribers at the end of 2017, Azerbaijan has more mobile phone subscriptions than people. However, only 65 percent of the subscribers are unique (individuals may have multiple SIM cards) and only 42 percent subscribe to mobile internet services.[16]

14. To ensure that access to mobile phones enables digital adoption, Azerbaijan will need to expand access to high-speed mobile broadband connectivity. Access to mobile phones does not by itself indicate an ability to access and use mobile broadband services, which depend on having access to a device as well as a reliable network built on Next Generation Network[17] infrastructure. According to the 2017 household budget survey, 99.1 percent of households have a mobile phone, with a slightly higher penetration in rural (99.6 percent) than urban (98.8 percent) homes. About 64 percent of households have access to a computer and 40 percent of the population use mobile broadband services.[18] Azerbaijan ranked 70 out of 184 on the International Telecommunication Union's (ITU's) mobile cellular price basket in 2019.[19] The price of a monthly basket of voice calls and text messages was $8.80, or 2 percent of per capita income, and that of low use voice and data subscription is less than 1.5 percent of per capita income. Affordability should also take into account the ability of rural households to afford smartphone devices in order to take advantage of the pervasive mobile network coverage.

---

15 The latest population census for which data is available was conducted in 2009. A new census was conducted more recently in 2019 and data will be publicly available in 2021.

16 GSMA data, 2020. Accessed from: data.gsmaintelligence.com

17 Next Generation Networks are fiber-optic technology-based networks. In the case of mobile, this would entail having fiber-optic connectivity to each tower in the ideal case, but at least to a central point in each community/population cluster to which the mobile towers may connect wirelessly.

18 As per GSMA data for the last quarter, of the active mobile devices, 74.7% are internet capable, 66.3% are smartphones, and 24.3% are basic feature phones with no internet connectivity (www.itu.int/itu-d/apis/clients/res/pdf/country_profile/report_AZE.pdf)

19 Source: www.itu.int/net4/ITU-D/ipb/#ipbrank-tab

15. The country will also need to make broadband internet faster, cheaper, and more accessible. Although overall mobile broadband coverage and adoption is high, there is a significant digital divide between urban and rural areas in the quality/speed, use, and affordability of internet. Entry-level plan prices are low, relative to the country's GNI, but they tend to increase significantly for higher category plans.[20] Additionally, investments in the latest connectivity technologies by mobile and fixed broadband service providers are concentrated in urban areas. Most fixed broadband access is over traditional technologies rather than fiber optic (approximately 20 percent of all fixed broadband connections are fiber-optic based, according to TeleGeography data). This results in low speeds, particularly in rural areas where the quality of infrastructure tends to lag urban centers, inhibiting the ability to use some mobile apps effectively. According to Ookla's Global Index for September 2020, which reports average speeds experienced by voluntary speed tests conducted by users on their platform (speedtest. net), Azerbaijan ranks 111th of 175 countries with an average fixed broadband speed of 23.5 Mbps. Affordability of internet access, as well as of computers and mobile devices, may present a challenge to the productive use of internet in rural areas. The combination of low speed, affordability of devices, and low digital literacy and skills among the general population, service providers, and MSME owners, may be some of the main reasons why internet use is sub-optimal – surveys indicate that most consumers have used it for videos, email, and social media.

16. Low adoption of broadband is also associated with lower use of broadband connectivity in rural areas, and limited development of e-commerce. According to household survey data on ICT use reported by AzStat, in 2018 only 15 percent of individuals used the internet to interact with authorities and avail public services, and 7 percent used it for education or learning activities. The technology and user knowledge of e-commerce and e-payment systems is limited, and trust in such systems is low. Only one in 20 people in Azerbaijan (5 percent) purchased something online in 2017, compared to a worldwide average of almost one in four people (24 percent). Azerbaijan ranks 68 out of 144 countries on the B2C e-Commerce Index, due to low penetration of e-payments, including credit and debit cards, a shortage of domestic online shops, underdeveloped logistics, lack of trust by both buyers and sellers, and low digital literacy of people in general. The use of digital payments and financial services is also low in Azerbaijan. Less than one-third of the population has a bank account, and only one-quarter has a debit card, many of which are social insurance and salary cards. Mobile and internet-based digital payment tools are rarely used due to limits on the amount of a transaction and other restrictions. Another barrier is the high transaction fees associated with international credit card payment networks.

17. The government has developed public e-services but connectivity and knowledge constraints mean these may not be fully utilized in rural areas. The e-government portal[21] offers 443 services that can be completed online. All ministries and most state agencies, as well as local executive authorities, offer services via this Portal. In 2012 the government established the Azerbaijan Service and Assessment Network (ASAN xidmet[22]) under the State Agency for Public Service and Social Innovations reporting to the Office of the President. The ASAN service centers aim to support all state entities in delivering services to citizens in an accessible and coordinated manner. Currently, 20 ASAN centers (public service halls) have been established of which five are in Baku and 15 other regional centers have one each. E-services are also available online and via designated portals.

---

18. The current status of digital connectivity reveals the potential for technology to be used much more intensively for skill-building, education, and advisory services. The majority of general education institutions are connected to the internet through the Azerbaijan Educational Network (AzEduNet), covering around 85 percent of students and 75 percent of teachers. Unconnected schools are in remote rural areas where mobile broadband technologies must be used for internet access and underlying backbone infrastructure strengthened to support the increasing connectivity needs for education. Some learning materials are also available online, including 96 percent of textbooks, interactive tests, and video lessons. Connectivity in the tertiary segment is high, with most of the country's 48 universities having fiber-optic links to the internet.

19. To take advantage of this effectively, Azerbaijan will need to improve skills and overcome the digital divide between urban and rural areas. The country faces several important challenges in introducing digital innovations in rural development. Digital literacy and labor market skills acquired through formal and informal education are not yet sufficient to enable most productive use of technology and local innovations. Between rural and urban areas inequalities remain in the access to infrastructure and basic services such as water and gas, high-speed internet, affordable access to finance for small and medium enterprises, and levels of private sector investment. The local governance structure, being fairly reliant on centralized decision making and budgets, does not enable locally driven development initiatives. Partly as a result of the above, the cooperation and associations among producers and entrepreneurs is relatively weak. Most of the rural population is self-employed and engaged in subsistence or low-earning agricultural activities.

LOCAL GOVERNANCE AND COOPERATION

3

20. The territory of Azerbaijan is divided into 56 administrative units (rayons), ten cities with autonomous administration, and one autonomous republic. The Nakhichevan Autonomous Republic in itself contains seven rayons; it is not linked by land to the rest of the country.

21. Local governance in Azerbaijan is exercised by Local Executive Authorities (also referred to as Executive Committees or 'ex comms'). Executive committee heads are appointed by and subordinate to the President of Azerbaijan. The majority of socio-economic functions fall within the authority of the executive committees. They also administer state budget allocations to the regions. Another tier of local governance is provided by municipalities whose councilors are elected by the public. Municipalities have limited revenues and mandate, therefore, a limited role in initiating or implementing local development programs.

22. In parallel to the existing local governance structures, community organizations and cooperatives have been established under various development projects. For example, the EU Eastern Partnership supported the establishment of advisory councils in a number of local communities with the aim of building 'capacity for increased participation by citizens and increased accountability of elected bodies'. The World Bank-financed Azerbaijan Rural Investment Program established local community groups in over 1,400 villages covering 56 rayons and 90 percent of the country's municipalities. These community groups worked in partnership with the local executive committees and municipalities to identify, prioritize, and implement local development projects. The World Bank's Agriculture Competitiveness project encourages the formation of farmer partnerships in cooperation with agri-business enterprises for value chain development. The WB IDP Living Standards and Livelihoods Project also involved setting up of local community organizations with the purpose of prioritizing, fundraising, and implementing small infrastructure, services, and livelihoods projects in IDP communities.

23. Rural cooperatives and associations are limited in Azerbaijan--outside the community organizations established under development projects (IFI or NGO-led). After independence, land privatization, and the break-up of state cooperative farms, there has been limited farmers' cooperation in Azerbaijan. In 2016 the Government passed the Law on Agricultural Cooperation to regulate the future cooperation in agriculture. The Strategic Roadmap of the sector for 2016-2020 incorporated the objective of enabling cooperation in the sector. A State Program on Agricultural Cooperatives was further developed in accordance with the Roadmap. Currently, eight cooperatives have been registered in Azerbaijan over the last 2 years with four more in formation and plans for nine more expected to be established in 2021.

> The government is seeking to use technology and innovation to revitalize rural economies as part of its strategy of economic diversification.

24. The government is seeking to revitalize the economy of rural areas as part of its overall strategy of economic diversification. Azerbaijan's Strategic Roadmap on the National Economy and Key Sectors of the Economy 2016-2020 calls for diversifying the economy away from oil and aspires to transition to a knowledge and innovation-based economy. This focuses on two areas: public sector management and service delivery, and economic competitiveness, which includes support for enhanced competitiveness of agriculture and rural development. In addition, the State Program of Socio-Economic Development of Regions of the Republic of Azerbaijan 2019-2023 aims at actions to accelerate economic growth across the country, increase employment, improve social services and infrastructure, and enhance overall quality of life in rural areas. As part of diversifying rural livelihoods, the program envisions enabling different types of tourism including rural green tourism, ethno-tourism and eco-tourism, among others. It also envisions the development of "smart villages" pilots in at least two rayons of the country. [23]

25. Digital development and innovation are also among the strategic priorities of the government in its quest for economic diversification and enabling more equitable growth. The Azerbaijan 2030: National Priorities for Socio-Economic Development focuses on the following five priorities: (i) sustainable, growing, competitive economy; (ii) dynamic, inclusive and socially just society; (iii) competitive human capital and modern innovations; (iv) return to newly liberated territories; (v) clean environment and green growth.[24] The National Strategy for the Development of Information Society in Azerbaijan for 2016-2020, and associated action plan consisting of 52 measures toward this goal aims to turn the country into an ICT hub for the Caucasus.[25] The 2016 Strategic Roadmap for Development of Telecommunications and Information Technologies aims to establish an independent regulatory body, liberalize the telecom market, increase investments in mobile infrastructure, increase productivity for businesses by enabling digital payments, enhancing digital literacy and ICT education, and improve electronic systems of government institutions, as well as create an end-to-end integrated e-health infrastructure.[26]

26. The Strategic Roadmap for 2016-2020 focused on a series of measures to improve agricultural productivity. These include enabling access to finance, assisting in the formation of farmer partnerships and cooperatives, strengthening food security information and monitoring systems, and developing science, education, extension and advisory services in agriculture. The Ministry of Agriculture has initiated the development of an online portal to support data gathering and information on local products and producers. It is envisioned that this portal, along with advancements in obtaining international standards and certifications, will help promote the "Made in Azerbaijan" brand abroad. Additionally, the government aims to increase the use of the internet, social media, and mobile phones to provide relevant agriculture information to farmers. The Government of Azerbaijan is keen to develop e-agriculture, including using big and open data, creating online public services for rural areas, incubating agri-tech startups, and encouraging digital literacy for farmers and rural e-commerce. This e-agriculture initiative features three components: (i) an e-agriculture online platform accessed via the internet providing livelihoods information (e.g., on the weather, soil quality, pest control, training, public services, and health) for precision digital farming; (ii) an agriculture business online platform for e-commerce, trade, and supply-chain management; and (iii) an e-learning platform for training farmers and agriculture SMEs.

---

23 The rayons of Barda and Ismaili are mentioned in the Program's Action Plan as potential pilots.
24 Azerbaijan 2030: National Priorities for Socio-Economic Development, www.president.az/articles/50474
25 Asian Development Bank. 2019. Azerbaijan: Country Digital Development Overview
26 Government of Azerbaijan. 2016. Strategic Roadmap for Telecommunications and IT in Azerbaijan Republic

27. In the last decade the government of Azerbaijan has begun several initiatives to support innovation and use of technology to ease access to services for citizens and businesses. The roll out of government e-services through the ASAN one-stop shop system since 2012, mentioned above, is one of the most successful examples of using technology for social purposes. Various universities have established Innovative Business Incubator Centers to support start-ups. Some telecommunication operators also have start-up labs aimed at entrepreneurs developing mobile applications. The Social Innovation Lab NGO[27] offers training and some competitive funding for innovative start-ups. All of these are mostly commercially oriented and mainly operating in urban areas. The Ministry of Agriculture has established a unified platform with over 500,000 registered farmers to facilitate information and access to subsidies, credit, and information for farmers and agri-businesses across the country.

28. Community initiatives and local innovations are less widespread, though selected projects have demonstrated that income-generating groups in rural areas can be successfully formed and use technology to enhance their livelihoods. Under the AZRIP project, since 2018, 38 Women Development and Enterprise Groups were created in 14 rayons bringing together 472 women in total. The groups continue to operate after project's closing, generating own revenues as well as accessing finance from commercial banks and international organizations. The women's groups actively use technology in their daily operations to communicate with each other, with local authorities, financiers, suppliers, customers, etc. Most frequently used technology includes WhatsApp groups, Facebook and Instagram, zoom linking to webinars and information meetings of the Azerbaijan Rural Women's Association, Ministry of Agriculture, RabitaBank, FAO, Small and Medium Enterprise Development Agency (SMEDA), etc. The women's groups are involved in a wide range of activities including animal husbandry, operating bakeries, cafés, restaurants and wedding halls, crafts and souvenirs, among others.

---

27 www.sil.vc/about/

THE SMART VILLAGE APPROACH

> A 'smart village' approach to rural development can enable Azerbaijan to improve economic opportunities, infrastructure and services, and governance.

29. A 'smart village' approach to rural development can enable Azerbaijan to use technology and innovation to drive rural growth. Unlike many countries in Europe and Central Asia, Azerbaijan has a large, growing, and relatively young rural population. Mobile connectivity is high in rural areas. The country has a strategic geographic position close to EU, Russia, and Middle East markets, as well as agricultural production, unique crafts and cultural heritage that can provide basis for exports and tourism development.

30. What is a 'smart villages' approach to rural development? Although policymakers use the term in different ways, the term "smart villages" is usually used to refer to networks of small towns and villages that use innovation, knowledge, and technology to promote development. In addition to the intensive use of innovation and technology, smart villages are well-rooted in local context and leverage local entrepreneurship to improve service delivery. A commonly used definition in Europe is that of the European Union (EU), which defines smart villages as "rural areas and communities which build on their existing strengths and assets as well as on developing new opportunities, where traditional and new networks and services are enhanced by means of digital, telecommunication technologies, innovations and the better use of knowledge".[28] In line with this, we define smart villages as follows, using a simplified definition:

> Smart villages use digital technology, innovation and knowledge to improve rural economic opportunities, infrastructure, services, and governance.

31. What advantages do 'smart village' approaches to rural development have? Approaches to rural development that draw upon technology and innovation enable rural areas to overcome the spatial barriers to development that arise from distance or low population density. Compared to urban areas, rural areas tend to have relatively low access to infrastructure, services, and markets, and lack the agglomeration benefits and concentration of economic activity that come from high population density. Technology and innovation can help rural areas overcome this, in three main ways. First, they can enable rural populations to get access to digital services (such as telemedicine, virtual schools, virtual logistics platforms for farmers, mobility apps and e-governance platforms) and lower the per capita cost of service delivery. Second, they can create jobs and livelihoods opportunities (see Box 1) and improve the labor productivity and operational efficiency of local businesses. E-commerce platforms—such as the ones used by the Rural Taobao villages in China, an Alibaba initiative that enables rural producers to sell directly to urban consumers—can connect rural traders to urban and global markets to which they would otherwise lack access.[29] Finally, they can foster innovation by reducing information asymmetries and creating 'information goods and services' that provide information at near-zero transaction costs, for example in the case of digital payment systems, music, and news. Digital innovations can also be combined with social innovation, i.e., new, more efficient or innovative practices such as crowd-sourcing, resource-sharing or other initiatives based on community collaboration, to help tackle social problems in rural areas, for example through solving a lack of rural transportation through ride sharing apps. Table 1, below, lists sample interventions which may be applied as part of a "smart village" approach in three categories: economic opportunities, infrastructure and services, and governance.

---

28 EU Rural Review No. 26, Smart villages revitalizing rural services, EU action for smart villages, May 2018
29 www.blogs.worldbank.org/eastasiapacific/e-commerce-poverty-alleviation-rural-china-grassroots-development-public-private-partnerships

TABLE 1: Smart interventions in economic opportunities, infrastructure and services, and governance

Economic opportunities	Infrastructure and services	Governance
Sharing economy Shared mobility (ride sharing apps); Community-based tourism (homestays) etc.	**Optimized clean energy** Smart meters and apps for optimizing energy use in solar lighting, heaters, water pumps, & cold storage.	**Digital IDs** Smart ID cards, Biometric identification etc.
Digital agriculture End-to-end platform bundling services like input procurement, sales, logistics support, agronomy advice, credit etc; digital extension services; peer to peer agri-equipment lending platforms; smart farm cards.	**Edu-Tech** Virtual schools and labs, e-skilling platforms, innovation and STEM labs etc.	**Civic Technology** Citizen feedback apps, digital citizen surveys, virtual consultations, social media artificial intelligence etc.
Smart finance **Payment transfer:** mobile and internet banking, hand-held ATM devices, digital payment platforms etc. **Innovative financing models:** PayGo, results- based financing, crowdfunding, social bonds, impact investments etc.	**E-Health** Telemedicine, tele-mentoring, remote diagnostic and screening devices, e-pharmacies, ATM pharmacies etc.	**Service centers** One-stop shop for public services, electronic kiosks, electronic registrations and payments, etc.
Smart logistics IoT based real time tracking, IoT sensors to measure temperature, pressure, exposure to light in cold chains etc.	**Smart Irrigation** Irrigation debit cards, IOT based sensors, drip irrigation etc.	**Digital community work** Field-based data collection, community-generated video, digital village profiles etc
E-commerce platforms Online marketplaces connecting suppliers and buyers of goods and services.	**Access to clean water** Water ATMs, decentralized water purification systems etc.	**E-Justice** Electronic document filing, access to status of cases in progress, access to archives and registries, teleconference judicial proceedings
Business incubation support Business incubation labs and accelerators, co-working spaces, fab labs etc.	**Smart Transport and Mobility** Sensing technologies, traffic management systems, emergency notification systems	

E-Health
Digital connectivity
Wi-Fi farm networks, satellite
internet, Wi-Fi hotspots etc.

Smart housing
Thermostats / temperature
sensors, rainwater harvesting
structures, energy efficient
lighting etc.

BOX 1: Internet Saathi in India, a digital literacy campaign for rural women's livelihoods

Launched in 2015 by Google and Tata Trusts (a philanthropic organization in India), 'Internet Saathi' aims to digitally empower and create livelihoods opportunities for rural women by providing digital skills training.

The initiative uses a "train the trainer" approach, training rural women "saathis" on using the internet, who then train other women in their villages. The initiative is implemented by local partners of Tata Trusts, with Google providing the android hardware, data packages, digital tools, and training approaches. These local partners train rural women to use smartphones or tablets to access the internet and find information on farming, education, health, job opportunities, and financing. Each Saathi then trains women in at least four villages in her vicinity, receiving a monthly stipend, bicycles for commuting, and voice-enabled tablets and smartphones to help do this. Meanwhile, Tata Trusts, through its Foundation for Rural Entrepreneurship Development (FREND), partners with non-profit, public and private organizations to create job opportunities for these women, who in turn help these organizations aggregate and analyze locally curated information, distribute relevant products and services, and connect them to rural communities.

The Internet Saathi initiative is funded by a grant of approximately USD 10 million[30] and has trained more than 815,000 Saathis, who in turn have reached 28 million women in 289,000 villages.[31] 43,000 women have received livelihood opportunities through FREND, generating US$1.5 million in income.[32] Digital access has helped rural women acquire vocational skills through online classes on textile design, agricultural practices, beauty, and wellness, and created awareness on government schemes and programs. It has also empowered rural women to take household decisions and participate more actively in village affairs. The main challenge faced by the program was overcoming social and cultural barriers to women's leadership, which were overcome through local awareness campaigns, and by poor digital infrastructure in remote rural areas such as high-speed broadband internet and high cost of mobile data.

30 Empowering Rural Women Through Digital Literacy: Internet Saathi; The Bridgespan Group
31 www.internetsaathiindia.org
32 www.frendfoundation.org

32. Smart village frameworks for rural development can have the following key outcomes:

A) Improve economic opportunities by enabling private sector investment in rural areas and creating a conducive environment for businesses and livelihoods to thrive—including but not limited to agriculture. Enhanced digital connectivity and literacy, e-commerce platforms, shared mobility solutions, and improved financial access can enable local farmers and businesses to scale their production and access wider regional and global markets, thereby improving market access. Better use of technology can also enable farmers and other rural residents to diversity into non-farm sectors or agriculture-linked industries such as food processing and retailing, catering, and agro-tourism, thereby enabling them to enhance economic diversification. Meanwhile, e-skilling, incubators, innovation labs, and greater digital connectivity can enable rural areas to attract commercial capital and impact investment, thereby enabling greater investment. See Box 2, below, for example of smart rural and agriculture development in Korea.

B) Improve access to services and infrastructure through digital and social innovation. Innovative technologies, as outlined in Table 1, are able to improve the accessibility, availability, and quality of basic infrastructure and services such as health and social care, education, water and power supply, transport and mobility.

C) Improve local governance through smarter communication and greater transparency. E-governance can enable government entities to communicate more seamlessly with citizens, businesses, and each other, enable the quality of services to improve. They can also help reduce transaction costs and enable applications, licenses, and permits to be processed more quickly. E-governance also enables real-time tracking of program activities and outcomes, budget use, and grievances, thereby contributing to more transparency.

---

33 Innovation, Agricultural Productivity and Sustainability in Korea, OECD, 2018
34 Smart Villages in the EU and Beyond; Emerald Studies in Politics and Technology; 2019

BOX 2: Smart rural and agriculture development in Korea

In 2013, the Korean Ministry of Agriculture, Food and Rural Affairs (MAFRA) adopted the concept of a 'sixth industrialization' of agriculture, aimed at value addition in agriculture through integration with agro-food manufacturing, processing, distribution, export and rural tourism. The government installed sixth industrialization support centers across 10 regions between 2014-18, to develop strategic activities and facilitate business support projects. In 2016, the government established the first Basic Plan for the development of the sixth industrialization strategy 2016-2020 and introduced a system to certify enterprises as sixth industrialization business operators to encourage enterprises with maximum growth potential. As per the plan, the three targets to be achieved by 2020 were: (i) sustain growth rate of sales of certified business operators at 5%; (ii) increase the number of start-ups to 3,000, and (iii) increase the number of tourists to rural areas to 8 million.[33] MAFRA set up a separate fund to promote the 6th industry with six core businesses including production, processing, distribution, rural tourism and immersion, catering and healing.

In 2014, the MAFRA also began implementing the Smart Agriculture Project, which aims to connect and modernize farms through ICT driven solutions. This enables producers, retailers and ICT organizations to collaborate and encourages younger people to settle in rural areas.[34] The MAFRA attracts youth to smart farming by providing training courses and supporting development of large-scale smart farm complexes. The smart farm innovation model incorporates three core elements which include i) educating and training rural youth and farmers through longer-term incubation and provision of rental farms and employment opportunities; ii) enhancing production through smart farming practices (e.g. making 70% of the modern greenhouses smart) and diversification of agricultural exports; and iii) boosting adoption of technology by encouraging academic-industrial-institutional joint research to build innovative ecosystems based on big data. The government's R&D budget for smart farming stood at USD 30 million in 2018.

33. Several countries and regions have employed 'smart villages' approaches to rural development successfully. The approaches differ in line with local specificities but have important commonalities. Among the good practices associated with smart village programs are the proactive involvement of citizens and local communities, partnerships with local, national, or international private sector, and the combination of digital technologies plus use of social networks and community structures (whether or non-digital). Box 3 below provides a summary of common approaches across global experiences with "smart village" programs.

BOX 3: Lessons from the global experience of smart village approaches to rural development

Case studies of the experience of smart villages across high, middle, and low-income settings highlight how technology and innovation can be used to meet diverse development challenges. The high income settings of the European Union, Japan, and Korea have all used smart village approaches to revitalize rural areas (which face challenges of depopulation and outmigration), improve services, and improve rural incomes, with the EU and Japan also using them to build rural-urban linkages, and the EU to help rural areas transition to a low carbon economy. India (lower middle income) and Niger (low income) have also used them to improve rural incomes, as well as to improve access to services and digital literacy (India) and improve people's resilience to economic and climate-related shocks (Niger).

The experience of these programs highlights several lessons. First, successful approaches tended to be 'user-centric', emphasizing solutions that are 'co-created': in other words, citizens are involved in identifying needs and designing, testing, and delivering solutions. Although the precise format of this differed, for example with the EU following a 'living labs' approach and Korea engaging communities in forming local action plans, all approaches emphasized community involvement in designing solutions that were right for their areas. Second, social and digital innovations are both important. Although digital innovations enabled greater access to and reduced costs of services, social innovation is critical to how these services have delivered. For example, in the EU, many communities forged cooperatives or collaborated with local municipalities, private companies, and/or social entrepreneurs to provide services, and in India many digital services are being provided by village entrepreneurs and cooperatives. Third, a cluster-based approach—in which clusters of villages are identified and developed in an integrated manner—enables villages to achieve scale and generate enough demand for the proposed digital and social interventions to be financially viable. Often this takes the form of a nodal village or cluster, which connects a wider cluster of villages around it, providing a catchment area for targeting investment and for private sector enterprises to enter.

Fourth, to be sustainable, enabling local entrepreneurs and businesses to deliver services is important. Smart villages are thus entrepreneur-led and also drive local entrepreneurship. Fourth, collaboration and partnerships are vital. Successful smart village approaches have been built on partnerships between public and private sector enterprises, grassroots organizations, research institutions, social enterprises, cooperative societies, financial institutions, and local community members. Fifth, the sources of financing can differ. The most common source of funding for smart village programs are existing government schemes and funds, but projects have also been financed through crowdfunding from communities, public-private investment funds, and blended funding, such as the Niger blend of donor and government funding, citizen contributions, development loans and grants. Finally, most successful digital strategies include both 'digital' components to improve the supply and safe use of internet services and 'analog' components to stimulate demand for these technologies.

34. The proposed guiding principles for smart villages in Azerbaijan draw on the lessons of these experiences.

TABLE 2: Key guiding principles of smart villages

Scalable and resilient smart villages

1. Are community-led and user-centric
2. Drive local entrepreneurship
3. Use digital and social innovation
4. Take advantage of rural-urban links
5. Invest in cross-sector solutions
6. Enable different actors to collaborate
7. Are data-driven
8. Are digitally enabled (good connectivity & digital skills)
9. Co-financed through existing government funds and external sources
10. Have appropriate governance structures for local needs

• **Community-led and co-created:** Communities and residents are at the heart of sustainable smart villages. A participatory and "user-centric" approach that clearly identifies and expresses a community's needs and vision, and 'co-creates' the desired solutions with community members, is vital.

• **Drive local entrepreneurship.** Although digital technologies and entrepreneurship-driven models can significantly reduce the cost of service delivery, external service providers are expensive. Sustainable smart village models thus need to provide incentives—by way of financing, social recognition, and capacity building and networking support—to motivate local entrepreneurs to identify market needs and provide services.

• **Use digital and social innovation.** Digital and social innovation are equally important: whereas digital technologies can reduce transaction costs and connect rural residents to national and global markets, social innovations can overcome market failures, collective action problems and help address societal challenges in rural areas.

• **Take advantage of urban-rural links:** The concentration of economic activity in urban centers—and the benefits this brings for peripheral and well-connected rural areas—offers huge potential to reduce spatial disparities. Smart village initiatives can be more easily scaled by collaborating with urban areas that are potential markets for rural products and services.

• **Cross sectoral:** Effective smart village models often invest across sectors. Development challenges are often multi-faceted and solving them usually requires a multi-faceted approach. The cross-sectoral nature of smart village platforms enables this to be done more easily than sector-specific interventions.

• **Enable different stakeholders to collaborate.** Effective smart village approaches are often based on partnerships with public and private sector enterprises, grass root organizations, government institutions and key influencers. They leverage these alliances to access local knowledge, design and deliver relevant solutions and mobilize resources for driving interventions.

- **Data-driven.** Good data are the foundation of successful smart village interventions. They enable emerging challenges to be identified and understood, enable decision-making to be evidence-based, and enable outcomes to be measured. They also can help villages match the supply of public services with demand. This is made possible by methods such as (a) automated optimization, which translates data from sensors, cameras, and anonymized cellphone records into intelligence; (ii) predictive analytics, which, for example, uses data to track and predict crop failures and weather patterns; and (iii) evidence-based decision-making and planning to monitor milestones and targets. Data sources range from general demographic and socioeconomic data to emerging data sources such as satellite data, IoT/sensor-based data, mobile usage and social media data, and transaction data. However, strong measures should be taken to require data privacy and security.

- **Digitally enabled.** Digital connectivity is critical for enabling services to be delivered digitally and for enabling people to use technology to connect for social and productive purposes but, in areas where digital literacy is low, should be accompanied by digital skills development.

- **Co-financed through existing government funds and external sources.** Smart village programs make use of existing government resources and build upon local infrastructure to deliver solutions. Convergence with local government schemes and funds in additional to external financing sources is a common feature of smart village programs. Such programs also tend to use existing infrastructure, such as government schools and hospitals, to deliver services, such as virtual classrooms and telemedicine facilities.

- **Appropriate governance structures.** Identifying the right governance structure for the intervention and aligning it with local needs is critical. Communities and local governments should conceptualize and plan interventions—and identify appropriate ownership models and governance structures—in consultation with competent technical experts. Each ownership model has its own advantages; these should be evaluated for the local context. In some cases, communities can manage the system, and in others leasing, franchising and pay-as-you-go models can enable communities or entrepreneurs to be the owners of an intervention.

35. Successful smart village approaches to rural development make use of the knowledge, expertise, networks, and resources of a wide range of actors. See Boxes 4 and 5 below, for examples of multi-stakeholder cooperation to establish the Digital Villages program in Germany and India. Their roles are usually as follows:

- **Community members:** Community members are not only end users of services, but often assume more substantial roles. Most commonly, community members act as knowledge providers, who offer critical insights that enable local needs to be identified, feedback to be gathered, and solutions to be developed and tested. In many cases they also help provide solutions individually or as part of a larger group, NGO or cooperative or can 'co-create' solutions for their areas. Key community members can act as influencers who promote services and can initiate social innovations which may be delivered by other organizations. Consumers can also co-finance solutions, as seen in many smart village projects in the EU.

- **Government agencies and policy makers:** National, regional and local governments are instrumental in creating the right enabling ecosystem for smart villages. In most cases, governments provide the basic infrastructure such as digital connectivity and power supply. They finance or co-finance smart village initiatives through a variety of financial vehicles (including existing program budgets on innovation, rural development, health, education and skilling, sanitation, and energy); joint public-private investment funds or fund of funds; innovation grants; impact/social investment funds; corporate social responsibility funds; and results based financing; among others. Governments also extend non-financial support by connecting local entrepreneurs in villages to potential customers and partners through fairs, exhibitions, and workshops, provide business development services such as market intelligence, training, and skill development, and can set up incubators and accelerators for startups. Local government bodies (such as municipalities) work with grass root organizations to mobilize and engage communities and provide support to integrate social entrepreneurs into the village. Governments also help monitor and evaluate smart village interventions and maintain the infrastructure to ensure their continuity.

- **Local entrepreneurs and larger private sector players:** Larger private sector players often develop the technologies or solutions for smart villages and in many cases finance the supporting infrastructure for these solutions. In some instances, they also participate in program management and community associations to build the capacity of local residents and entrepreneurs to take ownership of the solutions over time. Local entrepreneurs, on the other hand, are core to the smart village concept. Countries like EU, India, China, Japan, etc. have a vibrant entrepreneurial ecosystem that is addressing rural development challenges using innovative business models and technologies. These entrepreneurs play a pivotal role in delivering services, designing offerings, and mobilizing local communities.

- **Civil society organizations** such as non-profit organizations, associations, and cooperatives help engage communities and may be involved in delivering and maintaining services, coordinating between local government and citizens, and other day to day operations of smart villages.

- **Academia and research institutions:** In many countries, governments or enterprises partner with academic or research institutes to develop smart technologies and applications, design and deliver technical trainings, and evaluate smart village interventions.

- **Financiers:** Other than government, many organizations finance smart village programs or related initiatives. These include the regional and multilateral development banks, local banks (especially those catering to SMEs), bilateral donors, impact investors, large private sector enterprises, and conglomerates.

BOX 4: Digital villages in Germany

Rural areas in Germany are seeing their populations age and decline as people move to cities for livelihood opportunities. An important priority is thus to revitalize rural areas, enable their economies and communities to thrive, and ensure that the quality of life can be maintained, making them attractive places to live. This means enabling rural areas to become more fit for the future and bridging the distance between community members in sparsely populated areas.

To help address these challenges, Germany initiated a Digital Villages program in 2015 serving 33 municipalities in rural areas. The program aimed to identify digital solutions and services for people in sparsely populated rural areas. It was initiated by the Ministry of Internal Affairs and Sports Rhineland-Palatinate and the Fraunhofer Institute for Experimental Software Engineering (IESE). It was funded with joint contributions by the national government, state and municipal budgets, and the IESE. The participating associations of municipalities were selected through an open innovation competition. These associations were invited to submit project ideas to improve the quality of life in their area using digital services. The selection committee comprised of an independent jury of experts from politicians, society and research organizations. Applications were selected based on their focus on improving local commerce and combining it with new concepts of digital volunteer work as a cross-cutting issue.

Six unique integrated digital solutions were created as a result, beginning to form a 'digital village' ecosystem to improve local supply services, communication, and local administration. 'BestellBar' is an online marketplace for the sale of products by local vendors. The residents can either collect the goods personally at parcel terminals or get them delivered by volunteers, mostly neighbors travelling on a particular route or professional courier services, using the 'LieferBar' application. Volunteers are paid in digital currency (DigiTaler) that can be used to purchase goods from the marketplace. 'DorfNews' is a news portal that enables municipalities to inform residents about local news and events. It also includes inputs from citizens and associations. This news system is extended to a 'village in my pocket' solution by a mobile application called 'DorfFunk'. The platform allows residents to report grievances, advertise and chat with other community members, and link demand and supply for services including shared rides. It also enables municipalities to update residents on important developments in the villages. At the village level, a local website 'DorfPages' relays current information and events. Additionally, the 'LösBar' intends to serve as a link for more direct exchange between citizens and public administration.

BOX 5: Harisal digital village in India

Harisal, a small village with a population of 1,479 persons, located in the Melghat Region of the State of Maharashtra, has been historically characterized by low human development indicators due to poor public infrastructure and limited employment opportunities. The main purpose for developing Harisal as a smart village was to improve skills, access to healthcare, agricultural productivity, digital connectivity, livelihood opportunities and local governance. The Government of Maharashtra (GoM) aimed to increase the gross domestic product (GDP) of the village through both technological and social innovation, which would have a multiplier effect on various other areas of development.

The Melghat region in Maharashtra was selected for the smart village project due to its low development outcomes in education and health, poor physical infrastructure facilities and negligible digital connectivity. Within this region, Harisal village was selected for the pilot as it is a nodal village for 52 villages in the vicinity. Being a nodal village, the interventions for smart villages could easily be accessed and scaled up in the nearby areas. The project implemented innovative solutions across seven development sectors to drive rural transformation:

(i)   Digital connectivity (optical fiber line till the village, TV Whitespaces, public Wi-Fi hotspots, direct broadband connections at public institutions, and mobile tower);

(ii)   Health (e-Health Centre with telemedicine facility, a diagnostic centre with tele-ophthalmic device, e-Primary Health Centre system to maintain digital patient records, audio-visual and activity-based learning modules on child and maternal health, and web-based portal on nutrition indicators);

(iii)   Education and skills training (interactive e-learning solutions, digital classrooms, ICT and Tally Accounting classes for rural youth, and vocational training centre for women);

(iv)   Governance (Citizen services centre for provision of e-administrative services and e-Public Distribution System);

(v)   Digital financial services (mobile payment applications and ATMs);

(vi)   Agriculture (farmer trainings by agriculture extension workers and mobile based applications for disseminating information on farming practices); and

(vii)   Livelihoods (beekeeping, community-based eco-tourism, local businesses by women, and entrepreneurial ventures by rural youth).

(viii)   Some of the additional applications and services in the village included training on installation and maintenance of solar powered products, internet awareness and usage, a library, provision of biogas and sanitation services.

A public-private-partnership model was constituted including community members; state, district, and village level government bodies; and businesses. The project is led by the GoM and was implemented by Microsoft in partnership with various private and public sector enterprises. Being a part of the Digital India Initiative, project planning and ICT management was supported by the National Informatics Centre (NIC). The GoM set up a three-layered institutional structure at the central government office (to enable coordination amongst senior government officials and expedite the delivery of the program); district level (by involving the district collectors' office); and village level (by constituting a digital village office consisting of a project manager and a 15 member digital village committee).

DEVELOPMENT AND APPLICATION OF THE SMART VILLAGES READINESS INDEX

5

> A 'smart village readiness index' uses big data to determine the extent to which parts of the country are prepared to apply a 'smart villages' approach to rural development.

36. To assess the conditions across the country for applying smart village approaches, the report developed and applied an analytical framework called the Smart Village Readiness (SVR) Index, drawing on both global "big data" as well as national data sources. Data sources included both spatial and written documentation from the Azerbaijan State Statistical Committee and various ministries, as well as open-source data available from institutions such as MIX Market, the World Bank, the World Health Organization, and the Food and Agriculture Organization.

37. The SVR Index is applied in three steps, starting with a geographic profiling of the country, followed by an application of smart village readiness criteria and then a spatial aggregation at the sub-rayon and rayon levels (Figure 4).

FIGURE 4: Three Step Process to Assess Smart Village Readiness
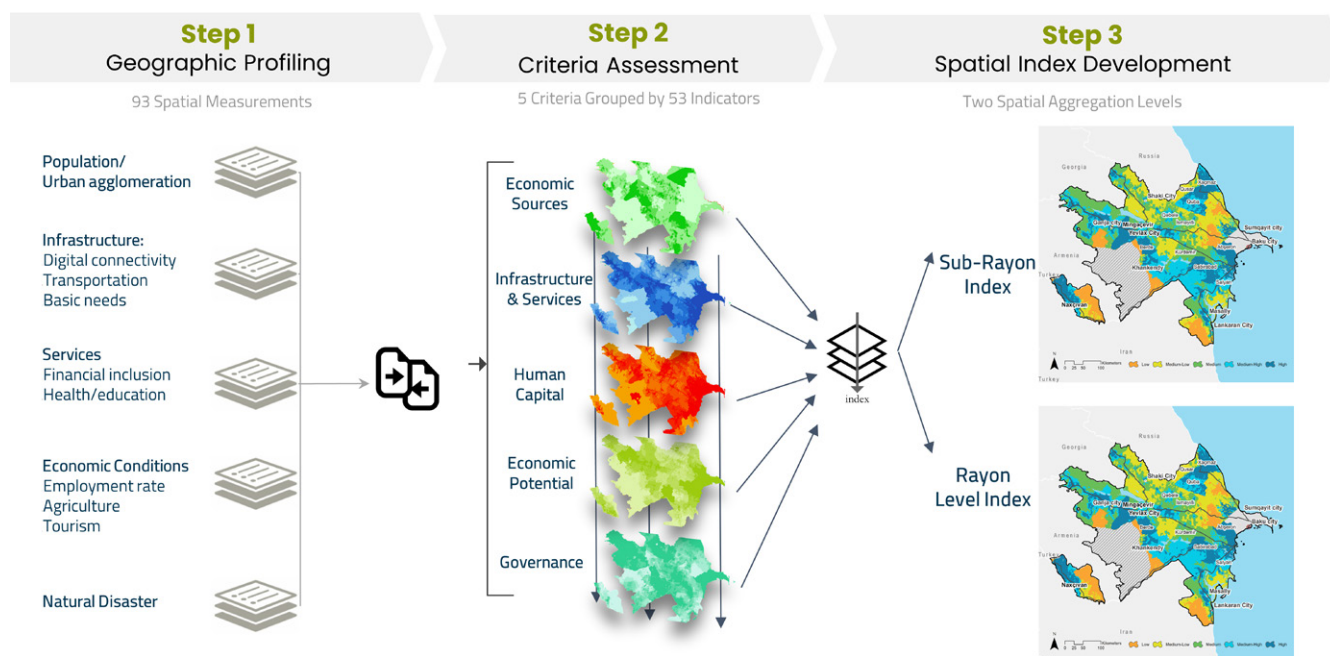
Step 1. Geographic Profiling – A set of 93 indicators were organized into five categories to identify common geographic characteristics: population agglomeration, infrastructure, services, economic conditions, and natural disasters.[35] This mapping of basic social, economic and physical characteristics helps to establish the context for interpreting the results of the smart village readiness assessment. For example, the natural landscape of a region constrains or provides opportunities for potential economic activities. Transportation infrastructure also affects rural-urban linkages.

Step 2. SVR Index Criteria Assessment – A subset of 53 indicators was chosen to construct the SVR Index (see Annex 1 for a Full List of SVR Index Indicators). These indicators were considered to be the most important factors for determining the extent to which a village or cluster of villages could make use of access to digital technologies and social innovation to drive economic growth in Azerbaijan. This subset of indicators was once again broken down into five thematic areas which constitute the SVR Index (Figure 5).

Step 3. Spatial Index Development – The indicators from the above-described steps were applied to the entire country in 100 square meter cells. To allow for a regional administrative view of the assessments, the Index was summarized at both the rayon and sub-rayon levels (Table 3). The sub-rayon, or village cluster, level of aggregation is the most disaggregated and accurate representation of the smart village readiness conditions, extending across rayon administrative boundaries. Many of the clusters identified fall into multiple rayons. While implementation of smart village support across multiple rayons would require coordination between multiple local governments, the areas that are most ready for smart village implementation are more accurately identified using this method. The index was also compiled at the rayon level. While this level of aggregation does not allow for the selection of village clusters beyond rayon boundaries, it can be used by national and rayon government officials to determine how all rayons compare in terms of their overall levels of readiness.

---

35 A list of these 93 indicators is not provided as part of this report as it was only used for geographic profiling. The 53 indicators which were selected from among the 93 indicators is included as Annex 1. This subset of indicators is more fundamental to the findings of the report as it was used for the SV readiness assessment and the classification of areas across the country.

FIGURE 5: Three Step Process to Assess Smart Village Readiness

Dimensions of the Smart Village Readiness Index

Economic Sources for Local Development
- Employment and wages
- Output of goods and services in main sectors of economy
- Distribution of employees by economic activity

Infrastructure and Services
- Transportation network
- Internet and telecommunications
- Electrification

Human Capital
- Education indicators - schools, matriculation rate
- Health indicators - doctors, hospitals
- Security indicators - crime rate

Economic Potential
- Access to market
- Access to financial services
- Concentration of enterprises

Governance
- Social Capital
- Mobilization of Communities

TABLE 3: Rayon vs. Sub-Rayon Comparison

	Rayon Level	Sub-Rayon Level
Geographic Unit	Constructed at Rayon scale	Constructed at sub-rayon scale (100 x 100 meter grid units)
Level of Disaggregation	• Provides a Rayon aggregated level • Representative only as an average condition of the territory	• Provides highest disaggregation level of detail with data available
How Are the Clusters Identified?	• Follows administrative boundaries as it recognizes them as more **homogenous** territories • Presents an aggregate set of territories	• Does not follow administrative boundaries as it recognizes **heterogeneity** of the territories • Presents a more comprehensive and diverse set of "cluster options"
How Many Clusters?	5 Rayons, 4 Economic Zones	14 Clusters (below Rayon level) across 7 Economic Zones, and 43 Rayons Captured
Distribution of the Potential SVP	Distributes the selected territories along the main "economic spine" road E60 from Shirvan to Agstafa	Distributes the candidate clusters in a more comprehensive way spreading them across multiple areas of the country
Areas Covered	18,411.2 sq.km.	14,207 sq.km. (7,084 less areas than Rayon level)
Potential Beneficiaries	1,141,000 people	1,813,467 people (672,467 more than Rayon level)

5.1 RANKING VILLAGE CLUSTERS ACCORDING TO LEVELS OF READINESS

38. To allow for a targeted approach to supporting smart village development, and based on the results of the SVR assessment, the country was mapped out in 100 square meter cells and assigned to one of five categories of readiness from high to low. Five group titles were assigned as follows: Amplify, Accelerate-high, Accelerate-medium, Accelerate-low, and Activate. Table 4, below, summarizes the characteristics of each group. The "amplify" category represents areas that are the most well equipped for smart village development and will see the most success from a smart village program under current conditions. The "activate" areas are the least well-prepared for smart village development and would, therefore, require support to improve their readiness conditions.

TABLE 4: Levels of Smart Village Readiness

Index	Description
Amplify	Areas with the highest population density, established concentration of SMEs and financial services, and significant opportunities to accelerate or improve digital readiness and economic diversification
Accelerate (High)	Areas with established concentration of SMEs and financial services that need to consolidate employment and human capital to increase opportunities for economic diversification and increasing incomes
Accelerate (Medium)	Areas with slightly lower indicators than Accelerate High with lower levels of population density and economic activities
Accelerate (Low)	Areas with similar employment rates to areas in Accelerate Medium but with substantially fewer SMEs and financial services
Activate	Low population density areas with less employment and lowest levels of SMEs and financial services

5.2 FINDINGS FROM SMART VILLAGES READINESS INDEX

39. The map in Figure 6 below illustrates the geographic areas of the country according to their levels of smart village readiness. The dark blue "amplify" areas represent the regions that are best positioned to benefit from a smart village program, while the yellow "activate" areas will require the most work to become ready, or which have low population density and would thus have higher per capital investment costs to bring the areas up to a more suitable level for smart village development. While investing in "amplify" areas is more likely to yield higher returns on investment, support to the less advanced areas may also be considered as a way of helping disadvantaged areas to develop.

40. Table 5 provides a summary of the breakdown of the country along the lines of the five levels of smart village readiness. Villages from each of the areas are fairly similar in terms of physical area and rural-urban balance. The Amplify areas stand out as being wealthier, on average, more heavily populated and having a higher concentration of SMEs. "Activate" areas are particularly constrained by lower population, financial service access, number of SMEs, and employment in the agriculture sector. As highly urban areas with concentrations of social and financial service tend to fall into the "amplify" category, the capital city of Baku and its surrounding metropolitan area were excluded from the analysis as it is too urban to be comprising "villages" as these are rural communities.

FIGURE 6: Smart Village Readiness in Azerbaijan
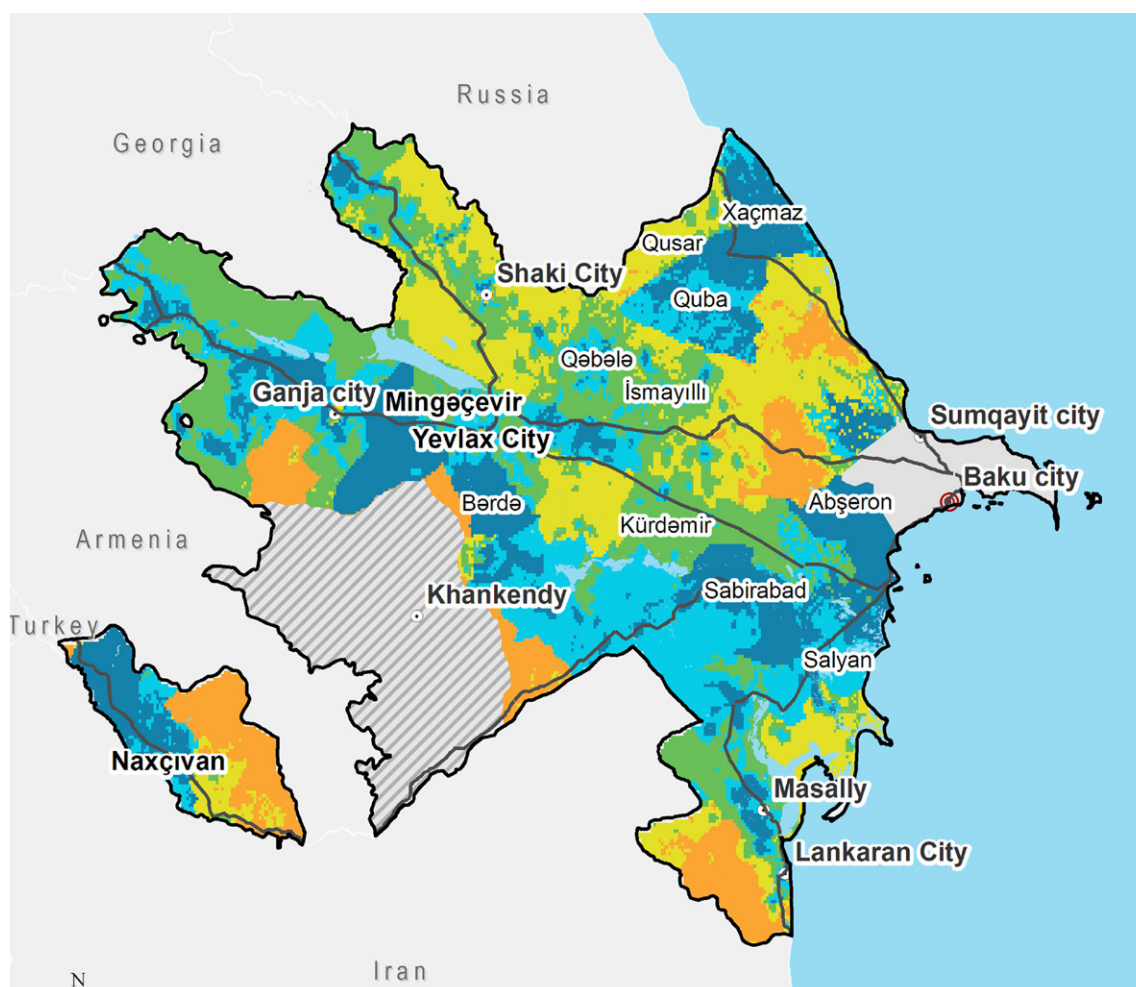
TABLE 5: Criteria for Smart Village Readiness

Index	Total Population	Area (Sq. Km.)	% of Rural Population	Employed in Agriculture	Average Income (M. Manats)	# SME	# of Financial Service
Amplify	2,010,867	26,618	68%	3,443	1,201	21,024	412
Accelerate (High)	1,537,370	27,129	68%	3,619	369	9,650	334
Accelerate (Medium)	1,557,828	30,049	69%	3,674	371	8,045	311
Accelerate (Low)	1,151,232	24,491	67%	3,815	251	5,047	212
Activate	507,605	32,279	70%	1,044	86	1,884	90

5.3 KEY RESULTS FOR SVR THEMATIC AREAS

41. The main findings for each of the five SVR thematic areas summarized below help to explain why some areas are more blue than yellow and indicate which data most influenced the index results.

- **Economic sources for local development:** This thematic area includes data on business enterprises, employment, agriculture employment and production yield, and tourism employment, attractions, and amenities. This is not an exhaustive assessment of the full range of economic sectors in the country, but rather a focus on two of the most significant sectors in the rural economy, agriculture and tourism. The most favorable conditions in each of these thematic areas are primarily found near Baku and the far northwest region of Azerbaijan.

- **Infrastructure and services:** This thematic area included data from not only transportation and urban infrastructure, but digital connectivity and renewable energy. These conditions are concentrated in and around the larger cities of Baku and Ganja as well as along the "spine" of the country that runs from Baku to the northwest, which is also a major transportation corridor.

- **Human capital:** The human capital theme included data on population growth, e-skills, traditional education and training, health services, and the workforce. These conditions are also concentrated in and around Baku and are generally found more in the eastern part of the country.

- **Economic potential (SME):** This theme focuses on the potential for new business start-up as a driver of smart village development. The criteria for this theme included the concentration of SMEs in all sectors as well as access to financial services for businesses.

- **Governance:** This theme focuses on the experience of local governments in administering local investment activities as well as the capacity of communities to take collective action. The data used for this theme included water user associations and rural investment projects. As rural investments are not concentrated in Baku, this theme emphasizes the rural context.

5.4 SV READINESS GAPS TO ADDRESS IN EACH CLASSIFICATION GROUP

42. While each village cluster is different and will require more in-depth analysis and customized responses, there are more significant thematic gaps that emerge in each classification group which can be used to identify the types of interventions which would be most useful. Figure 7, below, illustrates the most significant gaps which emerge from each classification group.[36] The Amplify group, for example, has a much smaller set of gaps along the lines of all indicators, but the infrastructure/services and economic sources for local development gaps are more significant. For the Accelerate-high group, the gap is largest for the economic sources for local development set of indicators.

FIGURE 7: Smart Village Readiness in Azerbaijan
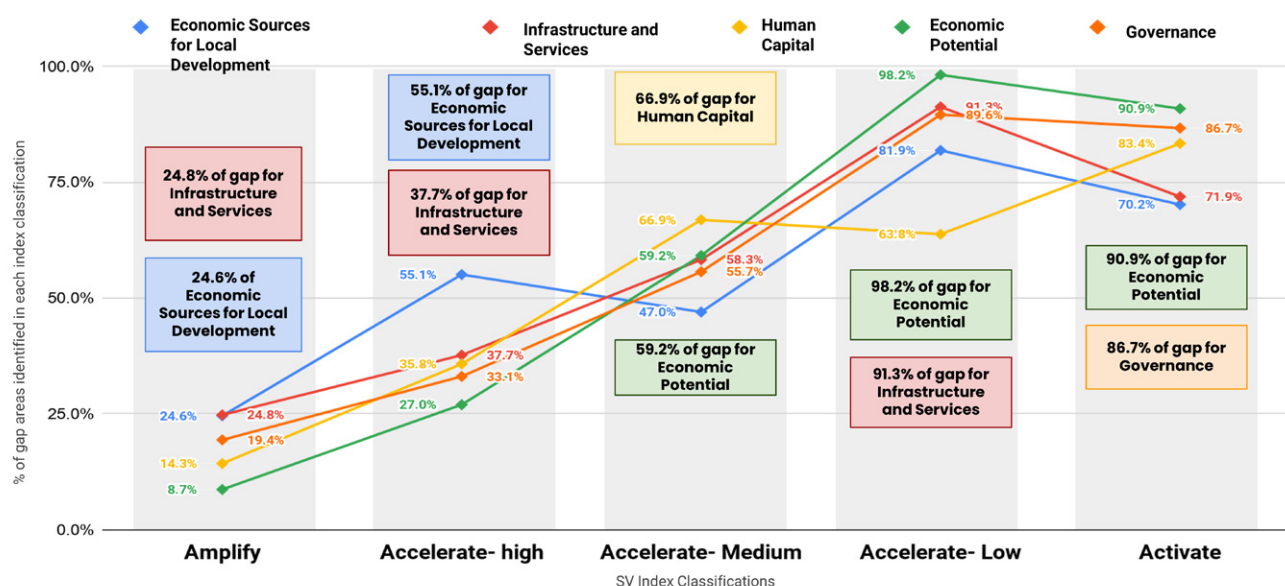
43. Following from the gaps identified in Figure 7, in broad terms, the kinds of interventions which may be most useful in each of the different classification groups are described in Table 6.

---

36 Percentage gaps are calculated by dividing lagging indicators within the 5 thematic area from the SV index by the total area of
     SV index classification groups: 1) amplify, 2) accelerate-high, 3) accelerate-medium, 4) accelerate-low, and 5) activate.

TABLE 6: Priority Gaps and Types of Interventions for Clusters with Different Readiness Classification

AMPLIFY	With the most significant gaps around infrastructure/services and economic sources of local development, support could be concentrated on further strengthening transport links from villages to markets and service centers via road, rail and air. Remaining gaps in access to, quality and cost of, digital connectivity and electrification could also be targeted to enhance conditions for private sector growth. Various forms of support could be provided to strengthen local economic sectors, building value chains from farm and labor productivity through to processing, marketing and sales. Such support would be highly dependent upon the local sources of economic activity.
ACCELERATE HIGH	The gaps in this group are similar to the Amplify group, yet with a much larger gap around the economic sources of local development. Such a scenario would entail a more significant focus on stimulating entrepreneurial and business activity, boosting agricultural production and improving inputs such as irrigation, access to, and use of arable land.
ACCELERATE MEDIUM	For this group, human capital stands out as the most significant gap. This thematic area includes indicators on education, health and safety. Interventions could include improving access to education in terms of physical proximity as well as online access, particularly for higher levels of education and skills development. Increasing the use of computers and the internet, for employees, in particular, would also help to strengthen human capital, particularly in the use of digital, smart technologies.
ACCELERATE LOW	This group of village clusters suffers from a very significant gap in indicators on achieving economic potential. To address these constraints, efforts would need to be made to enhance access to finance, including proximity to financial institutions and the use of savings and loan services. There is also a low density of small and medium-sized enterprises, so other constraints to private sector development beyond access to finance would need to be addressed such as entrepreneurship, business skills and market information.
ACTIVATE	While this group also faces significant challenges around economic potential indicators, it also stands out in its limited ability to leverage local governance for development. To address this thematic challenge, support would need to be provided to empower local government through both human capacity and financial resources to identify, prioritize and invest in local development. Mechanisms for harnessing the initiative of civil society organizations and community groups would also strengthen this group's ability to stimulate and apply social innovation, a key component of smart village development.

5.5 CLUSTER IDENTIFICATION

44. Based on the results of the SVR Index, 14 village clusters were identified comprising contiguous areas (in blue) with the highest level of smart village readiness, the "amplify" classification. As per the map in Figure 8, below, these clusters are found throughout the country. The table provides an overview of key characteristics of each cluster. The clusters vary in size, ranging from 228 square kilometers in more rural areas to over 2,000 square kilometers in areas with more homogenous urban landscapes near the capital city. For the purposes of this report, clusters were not identified for the other four readiness classification groups. However, this should be done as part of the implementation of a support program to allow for customized approaches to be designed and delivered to adapt to the varying levels of readiness.

FIGURE 8: Smart Village Clusters in the "Amplify" Category
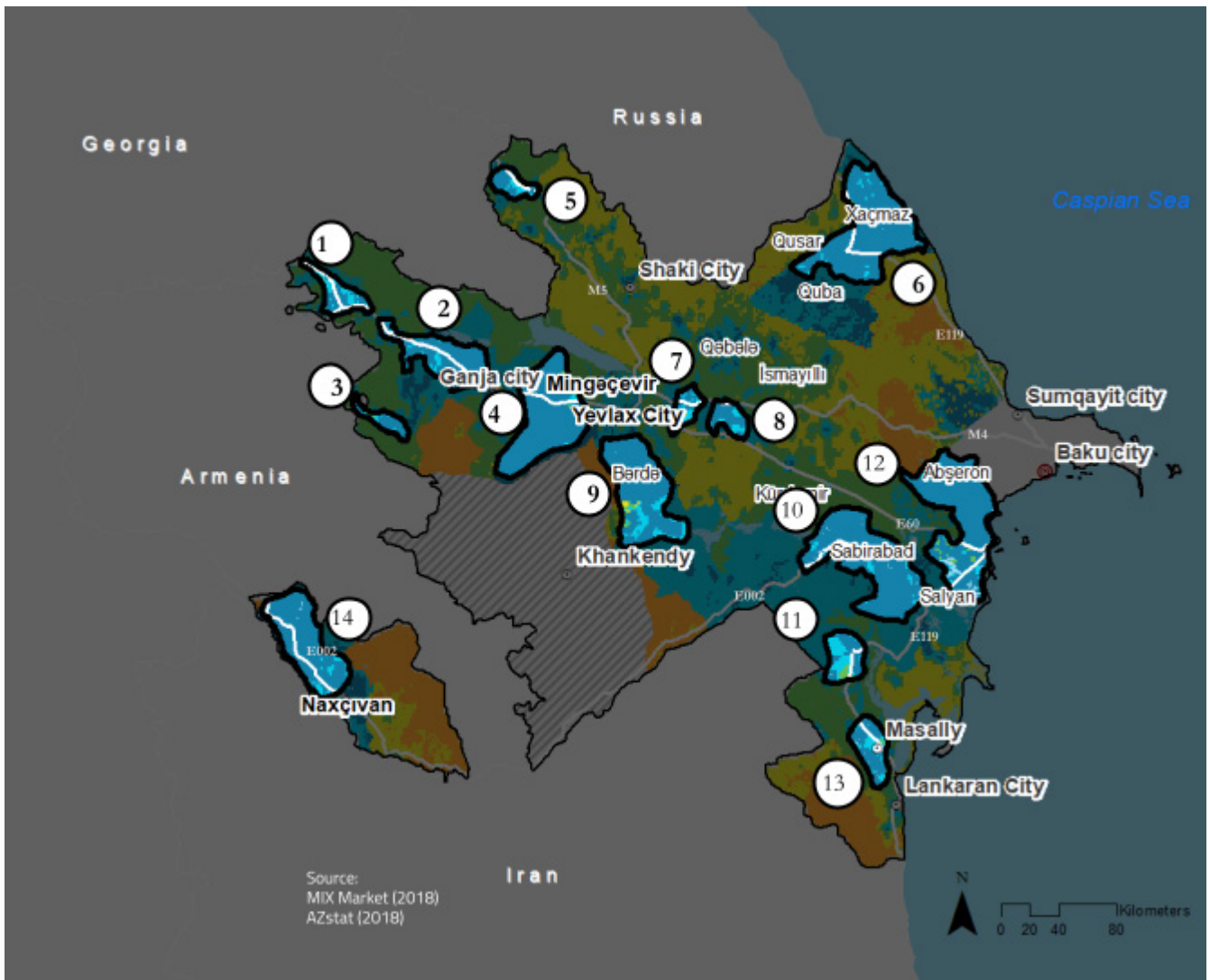
TABLE 7: Socio-economic profile of the 14 'Amplify' category clusters

Cluster	Economic Region	Population Density (Pop/sq.km.)	Population	Area (Sq. Km.)	% Rural Population	Agriculture Employment	Average Income (M. Manats)	# of SME	# of Financial Service
1	Ganja-Qazakh	110.2	46,187	419	77%	150	238	180	9
2		123.5	118,209	957	68%	99	635	400	11
3		80.6	18,368	228	89%	No Data	294	84	3
4		60.7	102,552	1,689	77%	312	337	474	38
5	Shaki-Zaqatala	118.0	30,808	261	84%	8	312	148	8
6	Guba-Khachmaz	101.9	202,701	1,990	67%	681	618	1,420	52
7	Aran	89.4	23,524	263	66%	64	407	90	6
8		166.0	49,648	299	68%	63	486	244	18
9		132.4	213,497	1,612	69%	207	496	1,185	62
10		111.4	228,902	2,055	80%	418	402	1,533	18
11		85.2	42,845	503	76%	135	391	241	10
12	Absheron	224.1	467,755	2,087	27%	1,079	4,849	10,275	116
13	Lanjaran	255.8	133,020	520	76%	37	617	896	15
14	Nakhchivan	102.3	135,451	1,324	94%	No Data	No Data	158	1
TOTAL			**1,813,467**	**14,207**				**17,328**	**367**

5.6 SELECTION OF VILLAGE CLUSTERS FOR DEEPER ANALYSIS

45. Upon presentation of the SVR Assessment findings to concerned government counterparts two of the highest ranked Smart Village Clusters were selected for further analysis. These clusters are shown in Figure 7, above, as Village Cluster 2 (Shamkir-Tovuz) and Village Cluster 6 (Guba-Gusar-Khachmaz). Two types of analysis were undertaken for these two priority areas. First, a sub-set of the data from the SVR Index was used to conduct a rapid assessment of the economic potential of each of these two clusters, focusing on the two main economic sectors in these areas: agriculture and tourism. This deeper data analysis was aimed at identifying opportunities and challenges to development in these two sectors. Second, a qualitative analysis of the two village clusters was undertaken through focal groups and key informant interviews. This aimed to develop a more nuanced understanding of the extent to which there are both the enabling conditions, existing platforms and the demand for applying smart village approaches in these two high priority clusters. The sections below will summarize the results of this further analysis.

5.7 RAPID ASSESSMENT OF ECONOMIC OPPORTUNITIES IN PRIORITY CLUSTERS: AGRICULTURE AND TOURISM

46. To illustrate the ways in which the data and analytical tools used for the SV Readiness Index could be applied at the cluster level, two "Amplify" clusters were chosen for deeper analysis: the Shamkir-Tovuz and Guba-Gusar-Khachmaz clusters. While these clusters already have high levels of SV readiness, there are strategic assets that can be mobilized and gaps to be addressed that would stimulate further development in these areas. As the SV Readiness Index focused mainly the two economic sectors of agriculture and tourism, these sectors were the focus of this deeper sector analysis.

47. In addition to the data used for the SV Readiness Index, the cluster analysis drew upon further official Azerbaijan Government sources, as well as open access data from the World Bank and the European Space Agency, and online information from sources such as TripAdvisor and Flickr. This data analysis was also informed and guided by information collected through the qualitative field research summarized in section 5.8, below.

Shamkir–Tovuz

48. The Shamkir-Tovuz cluster is comprised of approximately 12 towns/villages ranging from 800 to 35,000 people. The area is known for its cultural and historic attractions and high agriculture production. This cluster has the potential to capitalize on its proximity to Ganja city along with its prime location on the transportation "spine" of Azerbaijan. It is well connected to the regional road network, with the M2 road intersecting the cluster, suggesting opportunities to expand agriculture commercialization to larger markets like Ganja city, Baku, and even international markets. The proximity of the Ganja International Airport could lead to increases in international tourism if there is better infrastructure connecting the two regions along with increased marketing to international groups. The abundance of historical/cultural attractions around Shamkir can lead to opportunities to preserve and support local culture and social fabric through culturally relevant tourist attractions. The cluster also falls into the highest concentration of economic sources for local development in the SV Readiness Index, indicating there is potential for local development of the agriculture and tourism sector.

49. The map of the Shamkir-Tovuz cluster below (Figure 9), identifies the concentrations of crop production as well as high tourism activity. The areas where crop production and high tourism concentration overlap in the Shamkir-Tovuz cluster are in the city of Shamkir and the rural region to the southeast of Tovuz. These areas that combine historical and cultural attractions around the towns of Shamkir and Tovuz and agricultural activity, including wineries and grape production, in the nearby rural areas provide opportunities for expanding agritourism.

FIGURE 9: Map of Shamkir-Tovuz cluster: crop production and tourism concentration
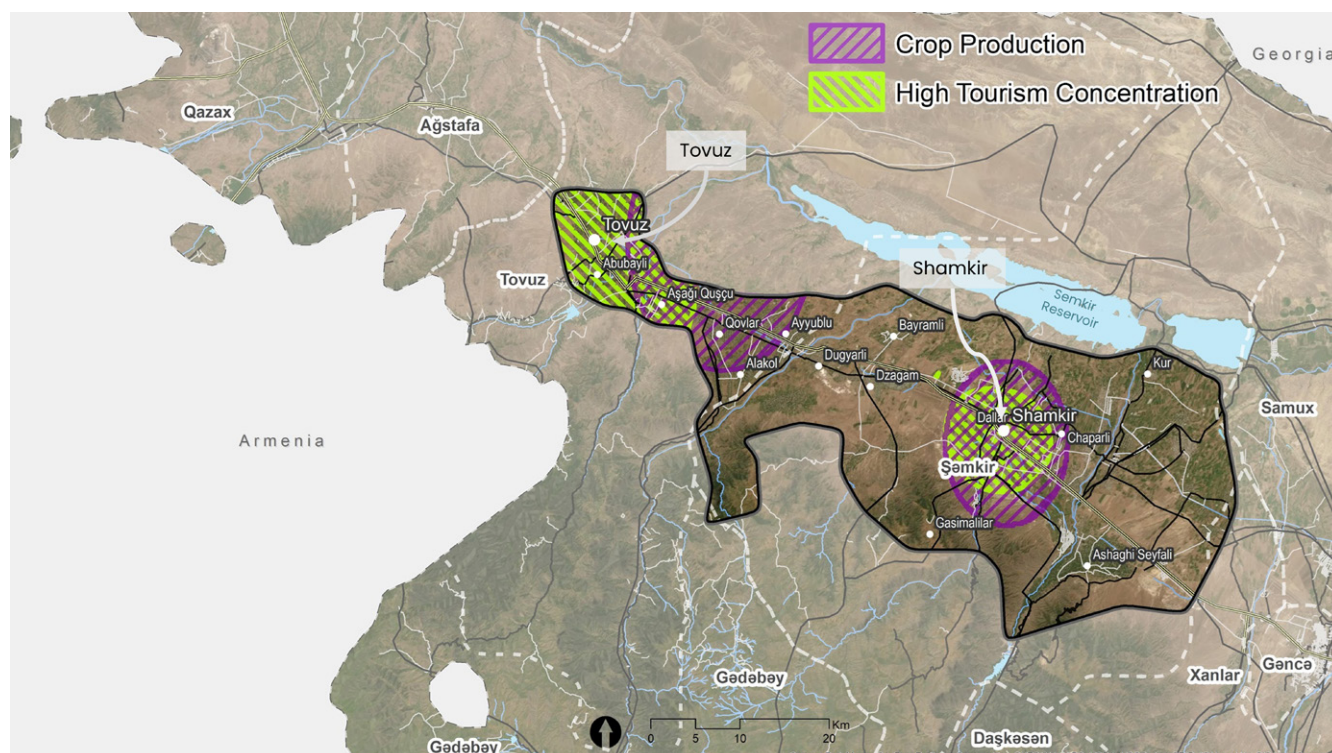
50. The Shamkir-Tovuz cluster is located in one of the country's top agriculture production regions. While cabbage, onion, cherries, persimmon, tomatoes, grapes, and potatoes are all grown in the area, this study selected tomato and grapes to represent the spatial structure of agriculture in the region. As shown in Figure 10, production in the Shamkir-Tovuz cluster is concentrated in the eastern part of the cluster, while processing and commercialization are both concentrated in the western region.

FIGURE 10: Shamkir-Tovus cluster: production and commercialization opportunities for tomatoes and grapes

Production
(Tomato, Grape)

- Area: 394.51 sq km (41% of Cluster)
- Total Population: 76,022
- Workforce (15–64): 50,224

Transformation/Processing

- Area: 660.57 sq km (69% of Cluster)
- Total Population: 130,117
- Workforce (15–64): 84,876

Commercialization

- Area: 645.79 sq km (67% of Cluster)
- Total Population: 105,594
- Workforce (15–64): 69,651
- 2 commercialization points
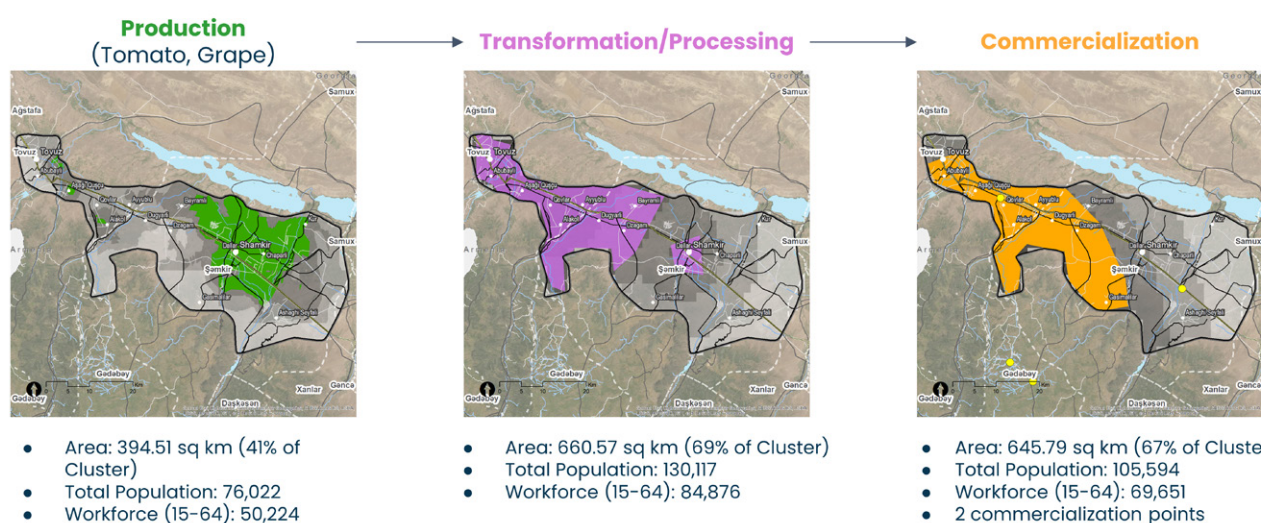
Source: GeoAdaptive 2020

51. Figure 11 provides an overview of the agriculture value chain in the cluster. Within the cluster, economic agriculture concentration occurs in the areas surrounding Tovuz, Shamkir, and Ayyublu-Dugyanli. Grapes and tomatoes are produced in different areas of the clusters, but each production region has access to processing and commercialization. The economic analysis determined that there is good connectivity within the cluster between production, processing, and commercialization areas.

FIGURE 11: Areas of economic agriculture concentration (focus on grape and tomato) in Shamkir-Tovuz cluster
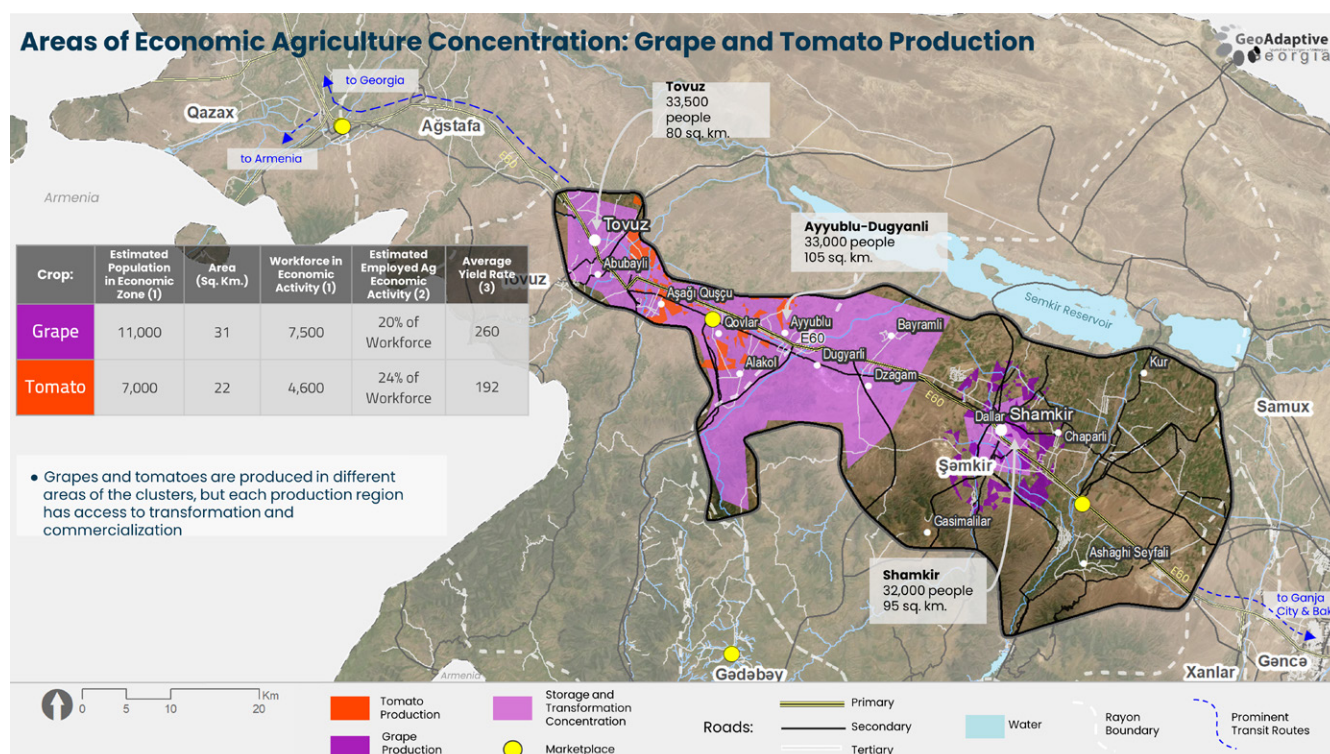
52. The Shamkir-Tovuz cluster boasts an impressive array of historical attractions thanks to its historically German heritage. There are approximately 20 tourist attractions and 19 lodging facilities in the cluster. Lodging tends to be concentrated in urban areas around Tovuz and Shamkir, while attractions tend to be more spread out across the cluster. The data analysis indicated a high concentration of tourism demand in Shamkir and the area surrounding Tovuz. When the supply and demand concentrations are overlaid, the optimized tourism zones are in the area around the cities of Tovuz and Shamkir. The abundance of historical and cultural attractions around Shamkir can lead to opportunities to preserve and support the local culture and social fabric through culturally relevant tourist attractions. The cluster also has good access to air travel because of its proximity to the Ganja International Airport, which can lead to more international tourism. However, there is a potential for decreased demand in tourism in the next few years due to the impacts of the Covid-19 pandemic on international travel.

FIGURE 12: Shamkir-Toviz cluster: summary of tourism concentration

Tourism- Shamkir-Tovuz Cluster Summary of Tourism Concentration

- High concentration of tourism attractions and lodging around Shamkir and Tovuz
- Several cultural and historical attractions around Shamkir, including the Shamkir Fortress Ruins and Annenfeld (German heritage) 4) street
- Fewer tourism attractions and hotels compared with other cluster

Zone	Estimated Population in zones (1)	Area (Sq. Km.)	Estimated % Rural Population (2)	Estimated Workforce (3)	Estimated % of Tourism Employment within zone (4)	approx # of Tourism Attractions (5)	approx # of hotels/ lodging (5)
High Demand	130,000 (49% of cluster)	394 (41% of cluster)	74%	85,000 (48% of cluster)	84%	12	19
High Supply	116,000 (43%)	378 (40%)	70%	77,000 (44%)	84%	13	19
Combined: Optimized Tourism Zones	82,000 (31%)	144 (15%)	76%	54,000 (31%)	79%	11	19

Notes:
(1) This was estimated using WorldPop data on a raster level.
(2) This statistic was calculated using a proportional analysis from azstat information aggregated at rayon level.
(3) These numbers were estimated using WorldPop data for ages 15-64.
(4) This was calculated by dividing the number of tourism attractions and lodging in the zone by the total number in the cluster, with the assumption that employment is spread evenly across different types of attractions/lodging.
(5) Data was collected from the Azerbaijan Tourism Board and Google Earth.
Source: MIX Market (2018), AZstat (2018), Ganza DMO (2020)

Legend: High Demand · Optimized Tourism Zone · High Supply · Lodging · Attractions · Roads: Primary, Secondary, Tertiary · Water · Rayon Boundary · Prominent Transit Routes

Source: GeoAdaptive 2020

53. Tourism infrastructure and the cluster's accessibility are among the key constraints for the development of agri-tourism. The Shamkir-Tovuz cluster has fewer attractions and lodging facilities compared to the Guba-Gusar-Khachmaz cluster. An increase in tourism demand would necessitate an increase in tourism services such as guesthouse and hotel accommodations. Furthermore, there are two optimized tourism zones within the cluster that are approximately 30 km apart, which could lead to fragmented development. Improving transportation between the two zones, by shuttle service or rail, as transportation and accessibility from Baku and other major cities in the area has the potential to strengthen the development of each zone through more unified economic sectors.

Guba-Gusar-Khachmaz

54. The Guba-Gusar-Khachmaz cluster is comprised of approximately 13 towns/villages ranging from 400 to 33,000 people. This cluster has mountainous geography in the west and the Caspian Sea coast to the northeast. It is well connected to the regional road network and corridor of E119 connecting to Russia, which can increase the number of domestic and international visitors to the cluster and can expand agricultural commercialization to larger international markets. The abundance of natural and adventure-based attractions in the Caucasus Mountains can lead to opportunities to promote ecotourism and increased economic activity in the cluster. The cluster falls into the highest category for governance, indicating there is high local involvement for various projects that can improve the tourism and agriculture sector of the economy. Crop production and the optimized tourism zone do not overlap in the Guba-Gusar-Khachmaz cluster, indicating a need for greater infrastructure to connect the two areas to integrate the agriculture and tourism sectors.

55. The map of the cluster below (Figure 13) identifies the concentrations of crop production, with a focus on tomatoes and apples, as well as of high tourism activity. Compared to the Shamkir-Tovuz, Guba-Gusar-Kachmaz cluster has a completely different climate. It has a high prevalence of agriculture as well with the production of tomato, cucumber, cherries, apple, hazelnut, and plum. Across the six well-known crops in the area, this study selected tomato and apple given their export value has been increased with the high production and yield rates.

FIGURE 13: Guba-Gusar-Khachmaz cluster: crop production and tourism concentration
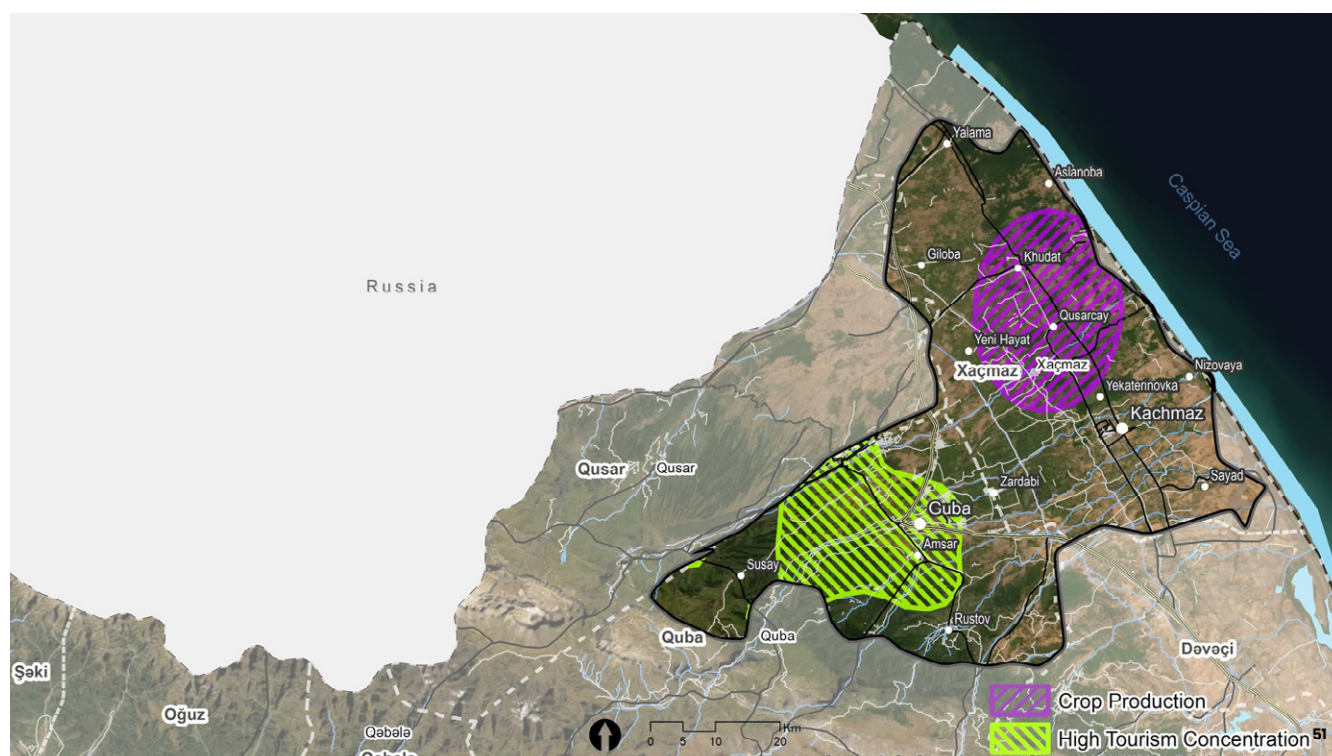
56. As shown in Figure 14, below, in the Guba-Gusar-Kachmaz cluster, production and transformation are both concentrated in the northern region, while commercialization is concentrated in the south. In both clusters, the distance between the areas of concentration is not large, and more insights can be drawn by assessing the production areas by crop.

FIGURE 14: Guba-Gusar-Khachmaz cluster: production and commercialization opportunities for tomatoes and apples

Production
(Tomato, Apple)

Transformation/Processing

Commercialization

- Area: 1,012.46sq km
- Total Population: 57,637
- Workforce (15-64): 40,188

- Area: 1,405.17 sq km
- Total Population: 80,724
- Workforce (15-64): 55,553

- Area: 1,403.05 sq km
- Total Population: 99,334
- Workforce (15-64): 68,163
- 1 commercialization point
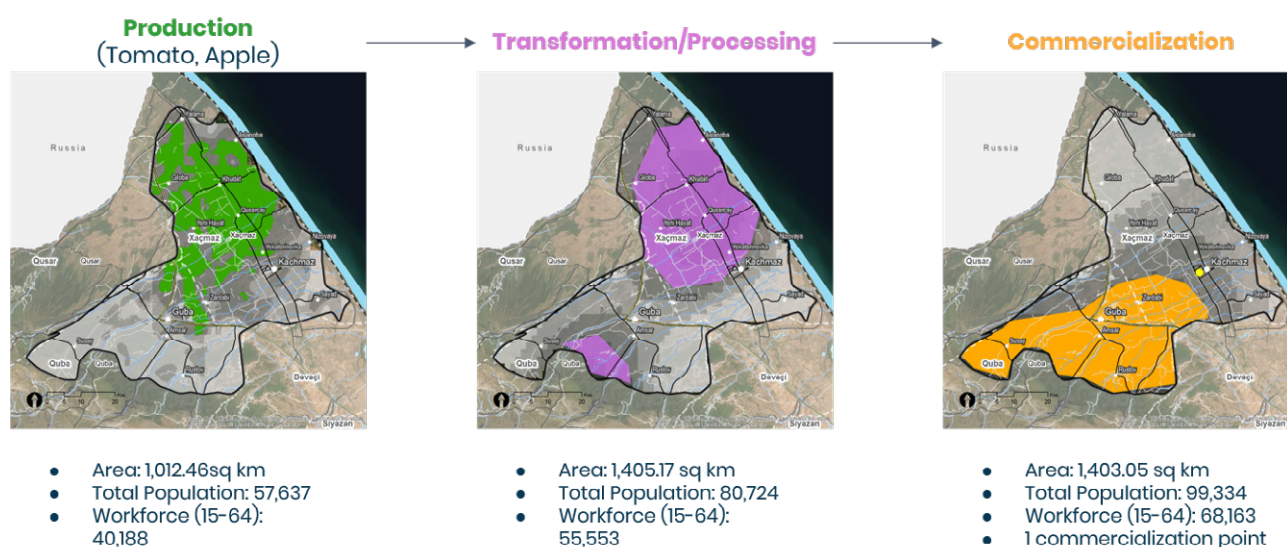
Source: GeoAdaptive 2020

57. Agriculture production and transformation is concentrated in the northern part of the Guba-Gusar-Kachmaz cluster, which can be seen in Figure 15. Apples and tomatoes are both produced in the cluster, though the yield rate for tomatoes is nearly twice that of apple production. There is a region in the south of the cluster that has a concentration of both transformation and commercialization, indicating that there are other agriculture activities happening outside of the cluster, but close by. There is an opportunity to improve connectivity within the cluster to create better linkages between the production within the cluster and other areas of transformation and commercialization. Because of the concentration of production and concentration coupled with the high local governmental involvement in projects in the cluster, there are opportunities for local development in the northern part of the cluster. However, the part of the cluster with the lowest rating for human capital is in the same region as the concentration of the agriculture sector, meaning that improving access to human capital opportunities (e.g. education) will be crucial for improving agricultural production and economic development in the region. Furthermore, the cluster falls into one of the lowest categories for infrastructure and services, indicating the region is not a current priority for infrastructure projects.

FIGURE 15: Areas of economic agriculture concentration (focus on apple and tomato) in Guba-Gusar-Khachmaz cluster

Source: GeoAdaptive 2020
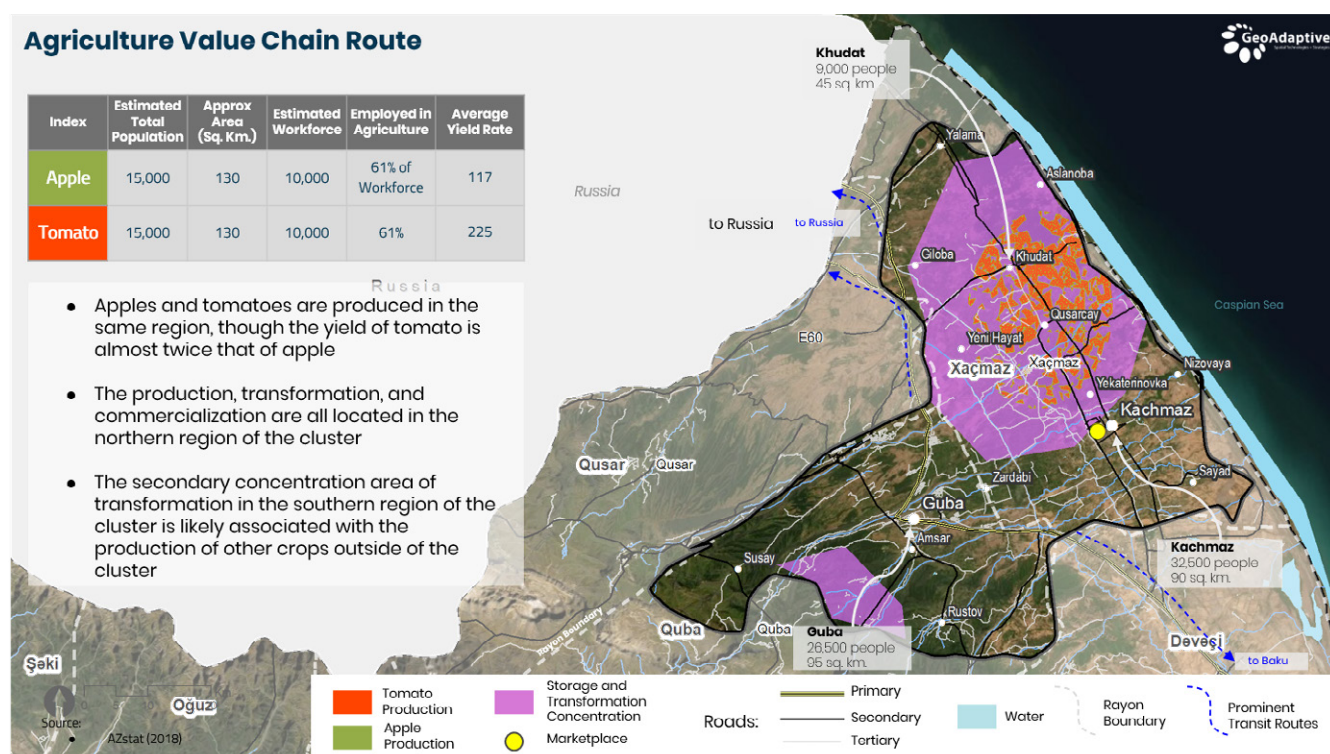
58. The Guba-Gusar-Kachmaz cluster is a center of domestic tourism across the country. It is known for its ecotourism and outdoor activities due to the proximity of the Caspian Sea and Caucasus Mountains. The cluster has more lodging facilities and attractions than the Shamkir-Tovuz cluster, with approximately 98 lodging options and 86 attractions. Lodging tends to be concentrated in urban areas, especially in Gusar, Guba, and Kachmaz. There is also a large concentration of lodging in smaller villages in the northern part of the cluster along the Caspian Sea. Attractions tend to follow a similar spatial pattern, but with few attractions along the northern part of the Caspian Sea coast. Demand for tourism is centralized around the urban areas of Guba and Gusar, which is also where the optimized tourism zone is— potentially due to the numerous nature and adventure-oriented attractions and lodging in the mountains. Figure 16, below, summarized areas of tourism concentration.

FIGURE 16: Guba-Gusar-Khachmaz cluster: areas of tourism concentration
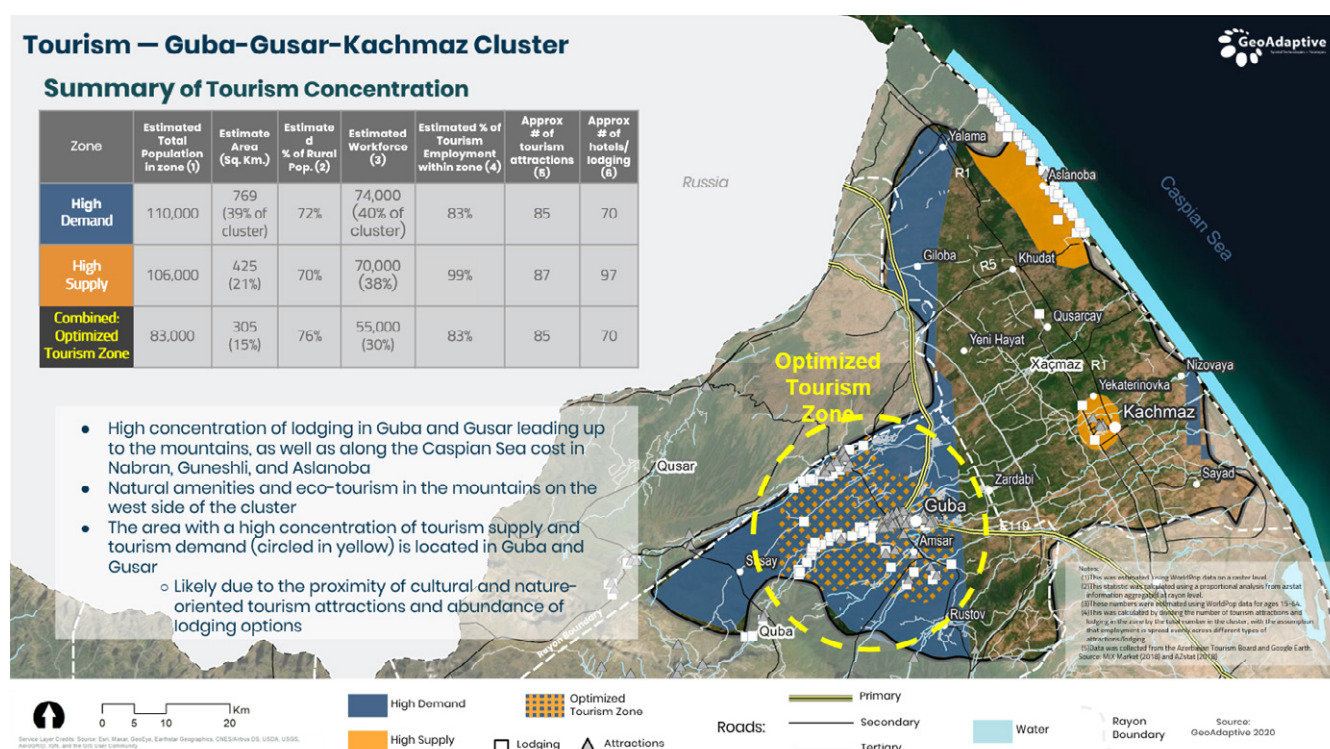
59. While the Guba-Gusar-Khachmaz cluster has good connectivity to the road network from the northwest and southeast, the Caucasus Mountains restrict movement to the south of the cluster, potentially limiting domestic tourists from the south of the country. The cluster falls into one of the lowest categories for infrastructure and services in the smart village readiness index, indicating the region is not a current priority for infrastructure projects. The gap between crop production and optimized tourism areas can pose a challenge for the cluster, indicating a need for greater prioritization of infrastructure to connect the two areas to better integrate agriculture and tourism sectors. Within the optimized tourism zone, better transportation options connecting Guba and Gusar, which are areas with a high concentration of tourism, could increase the number of visitors to both cities and thus lead to better economic growth in the cluster.

60. While the use of data and geospatial mapping can be a powerful way of identifying opportunities to stimulate economic growth, this must be complemented with in-depth, on the ground, qualitative analysis to fully understand the local context, what may or may not work and why. As such, the following section takes forward the key findings from the data analysis, using interviews and discussions with local government, private sector and civil society leaders to explore past experience, ongoing initiatives and future goals and interventions to include in smart village development strategies and plans for technical support and investment.

5.8 DESIGNING A SMART VILLAGES APPROACH FROM THE GROUND UP: FINDINGS FROM DISCUSSIONS IN GUBA-GUSAR-KHACHMAZ AND SHAMKIR-TOVUZ CLUSTERS

61. Successful 'smart village' approaches to rural development are designed together with rural populations and informed by their priorities and realities. This report's analysis of readiness to apply a "smart villages" approach in Azerbaijan is thus also informed by the views and feedback gathered from rural residents in June 2020. The two clusters that were examined through a deeper application of the SV data and analytical framework were then two targets for a rapid rural assessment. The assessment included a brief socio-economic profile of the respective rayons and villages in each cluster, as well as discussions and interviews with population, local government and service providers. Six focus group discussions (FGD) covering six villages—three within each cluster—and twenty-nine key informant interviews (KII) were conducted.[37] FGDs were conducted with households including youth and women, farmers and agri-business owners and employees. KIIs were conducted with rayon executive committees, municipality representatives, public education, health care, irrigation, and transport service providers, NGOs, among others.

62. The analysis shows that while there is high awareness of digital platforms such as social media and public e-services among rural residents, their usage is limited. Specific constraints to the use of digital services and platforms include: (i) weak internet connectivity; (ii) high cost of internet access, internet devices, and/or of using online learning platforms; (iii) lack of information or skills to use available e-services and platforms; and (iv) lack of robust digital networks and logistics that reach out to the village level (e.g. ride-sharing services, delivery services, e-commerce and shipping).

63. Despite limited connectivity and information, there is openness and potential to expand the use of technology in a number of sectors. This is evidenced by multiple individual examples from the education sector, entrepreneurs, and farmers. The COVID-19 lockdown has further highlighted the need to ensure the availability of technology, connectivity, and literacy and skills to adapt to virtual and remote service provision. The examples provided by local residents reveal that they are actively using or testing available opportunities for online commerce, advisory services, learning, healthcare and others even though these are limited. Local government respondents and service providers, including internet service providers, see opportunity to scale up connectivity in villages and encourage further local economic activity through digital tools. In addition to

---

37 The research was conducted jointly by the Azerbaijan Rural Women's Association (ARWA) and Intellecap. Intellecap, an impact consulting firm based in India and Kenya, developed the questionnaires and discussion guides, supervised the research, and prepared an analysis used as background for this report. The two clusters for primary research were selected in consultation with the Ministry of Agriculture.

contributing to economic diversification and jobs, digital tools can have an important role in lowering the cost of basic services for rural residents and improving their quality of life.

64. The feedback from rural residents in the two clusters is presented below. It is organized around nine themes: digital connectivity, local governance and public e-services, agriculture and agri-business, tourism and crafts, transport and mobility, access to finance, public utilities, education, and health.

Digital connectivity

65. Respondents in both clusters note the same set of challenges to the use of technology: slow or unavailable broadband internet connection, low affordability of devices (smartphones, computers), high cost of mobile data, and lack of information and skills on using digital tools more productively. For example, more than 50 percent of households in the three villages in Tovuz-Shamkir cluster where FGDs were conducted did not have broadband internet; many FGD participants also noted they do not own smartphones so they cannot take advantage of the wider mobile internet coverage. This has adversely impacted school children who live in houses without internet connectivity or smartphones. In the opinion of respondents, as many as half of the students in selected villages in Guba-Gusar-Khachmaz cluster could not attend online classes during the COVID-19 pandemic with the situation being worse in higher mountain locations. Internet speeds have also worsened with the higher internet traffic during COVID-19 quarantine.[38]

66. Even with limited connectivity, the demand for using online platforms is evident among the respondents in rural areas. Common social media apps used by the locals include Facebook, WhatsApp, Instagram, YouTube, Telegram, and Google Hangouts. Owners of small businesses (beauty salons, cafes, restaurants) use Instagram and Facebook to advertise their services. Some residents shop online, mostly from Turkish websites, but note they still need to travel to the rayon center to receive their shipments. Farmers have used WhatsApp to consult agronomists and some have ordered seedlings online. Some larger businesses also use platforms such as export.az for sale of products. While these examples are usually isolated initiatives by individuals, they indicate an untapped potential to scale up the use of technology in all areas of life – services and income generating activities.

Local governance and e-services

67. The establishment of the ASAN service centers was a significant achievement in simplifying public services for citizens, but rural residents face barriers in using them. Azerbaijan has been widely acclaimed, both globally and in the Europe and Central Asia region, for establishing these centers, which are widely used in urban areas. Still, rural residents—even in the better-connected clusters, such as the ones surveyed in the study—cannot take full advantage of this platform. Both the FGDs and KIIs revealed that citizens prefer to either physically go to ASAN centers for any administrative services or wait for the ASAN mobile bus to come to their village. Smaller villages (for example, Bayramli village in Shamkir with population of 3,465) are not served by the ASAN mobile services. As a result, very few rural residents know how to or have ever used public e-services, for example for tax or utility payments. Enabling citizens to receive these services online independently—either from their homes or community spaces in their villages—can be both time- and cost-efficient for residents. Moreover, it can contribute to inclusion as it is the elderly, person with disability, single parents, caregivers or other groups whose mobility is more limited that are likely to benefit most from e-services available at their location.

---

38 The chief of AzerTelekom in Shamkir recommended increasing the number of ATS in Shamkir to improve internet speed in remote areas. He also mentioned that installation of systems that can boost internet signal for homes that are further away from the ATS, can also be beneficial. There is one such system installed in Shamkir. There is also potential to setup Wi-Fi hotspots in public spaces in the villages for easy access to internet.

68. FGD participants indicated they are open to receiving training to use ASAN services online provided that their villages have sufficient internet connectivity. Training citizens on basic digital skills and usage of e-governance platforms (especially the elderly) could improve the uptake of the e-services. The elderly mostly seek support from youth in the village to access internet and mobile applications. A targeted capacity building program for village residents, providing community spaces with access to faster mobile connection where residents can receive such training, could be useful to increase the adoption of e-services while also providing some additional employment for youth in rural areas.

69. Many government services still require written applications from citizens and entrepreneurs to grant licenses and permissions; these may be digitalized for faster service delivery. For instance, submission of driver's license application or booking of bus tickets in Shamkir requires written or in person communication with the local transport department. An online platform can potentially provide all these services in one place. Stakeholders agreed that online services could facilitate advance bookings and save the time and resources of customers and entrepreneurs. They were very open to the idea of having such a platform.

70. Capacity building of municipality staff on the use of digital technologies for local governance activities, especially tax collection, and on improving service delivery in villages was also identified as a need, particularly by respondents in the Tovuz-Shamkir cluster. According to an NGO representative in Shamkir, a more transparent system of tax collection is needed. This respondent noted he would encourage municipalities to leverage digital tools for tax collection to help improve accountability and transparency in the system.

Agriculture and agri-business

71. The main needs shared by farmers in both clusters relate to water shortages, access to finance, access to storage facilities, refrigerated trucks, and overall logistics of getting produce to market, absence or very limited forms of farmer aggregation and cooperation, as well as wishes to develop further agro-processing industry in their areas. While some of these needs cannot be addressed solely by use of technology, digital tools and information networks have a role to play in each of these areas. Most farmers, especially in the Guba-Gusar-Khachmaz- cluster, report being registered on EKTIS, the government's e-agriculture platform. As this platform already has a wide subscriber base, it can be used more intensively to pool market information, facilitate logistics, provide more transparency in access to subsidies and private finance, as well as links to advisory services. Participants noted the potential for expanding production and sales with better branding of produce from these regions can be explored which may also open opportunities for broader-based farmer cooperation (for example, in marketing of 'Tovuz potatoes', 'Guba apples', etc.) Farmers also referred to the need to expand extension services, including through digital platforms where connectivity allows, as many of them find it difficult to connect to qualified agronomists and receive needed advice. Considering the critical challenge faced by farmers in accessing water for irrigation, the adoption of technologies such as the expanded use of drip irrigation or other water conservation techniques should be pursued.

72. Respondents in both clusters report using social media to connect with buyers and seek advice from skilled agronomists, but this is usually done on individual basis and is not widespread. Many farmers use WhatsApp to share photos of their products with potential buyers, track their products; and seek advice from agronomists in other countries. Farmers in Duyarli village in Shamkir, and in Guba, mentioned that they send pictures of their produce to their buyers in Russia via WhatsApp and the buyers confirm the receipt of goods by sharing a photo of the goods received. The buyer also informs the farmers of any delays via WhatsApp. A few farmers noted connecting to agronomists in Turkey via social media when they were unable to find expert advice in-country. Some use the internet to look for information on market prices. Having trusted sources of information, and the awareness and skills to use these resources can help more farmers access more profitable markets.

73. Digital platforms can also be used to achieve greater transparency in the use of subsidies. Some farmers complained of delays in receiving subsidies. Many participants also stated that subsidies are usually transferred to farm owners but do not reach the farmers who rent and cultivate their lands to use for actual agricultural purchases.

Tourism and crafts

74. In both clusters FGD and KII participants noted that community-based tourism is gaining popularity but will require improving infrastructure, connectivity, information, and skills. In Guba-Gusar-Khachmaz the potential for mountain hiking, skiing, cultural heritage, ethnic cuisine by Lezgin minority, crafts and souvenir shopping were highlighted. In Tovuz-Shamkir, the winery businesses and ethnic German heritage and architecture were highlighted. There are few commercial hotels in these areas. Representatives from the Destination Management Organizations (DMOs) in the clusters recommended further strengthening of infrastructure for tourism including homestays. They also stressed that the sector can benefit from greater cooperation and interaction between rayons in a particular destination zone and from more robust data on the tourism sector. Development of tourism was particularly welcomed as a way of providing employment for youth in the area.

75. Traditional crafts producers note that the low market prices are a deterrent to develop their activities. For example, producers of traditional carpets in Guba noted that prices of inputs are high and market prices to sell are low, additionally there is not lot of demand from tourists directly in their regions. As a result, they are unable to compete with larger carpet factories. They indicated that the government should provide incentives to local entrepreneurs to help them scale and compete with larger players. Organizing market fairs or exhibitions of local crafts and/or developing platforms for online marketing can also help local producers.

Access to finance

76. Some of the key problems faced by rural residents in accessing finance involve high interest rates charged by banks, high value of collateral demanded by banks,[39] and a general lack of trust in the banking system. As an alternative, households prefer to use informal systems of borrowing from friends, relatives, or via community savings. For example, most women in Ashaghi Gushchu in Tovuz participate in a lottery system, which allows each woman to draw money once a month from a pool of funds created through contributions from all the women in the group. This type of borrowing is more affordable compared to commercial banks. The respondents acknowledge that it is only good for small-size loans but that is often sufficient to address their immediate households or micro and small enterprise needs. Further use of community-based financing and self-help help groups can be explored in rural areas along with formation of cooperatives and income generation groups.

---

39 For example, multiple participants noted that house or apartment (including apartment on Baku) are
    required to take a credit, which they are unwilling to take given the uncertainties of farmers' revenues.

---

77. Additionally, rural residents report lacking trust in the banking system. Due to the recent closing of a bank in one of the clusters, and loss of deposits by its customers, many prefer not to keep savings in a bank. Cash access is also difficult in rural areas where there are no functioning ATMs. There is a need to rebuild the trust of local communities in the banking system through greater engagement with potential borrowers through the local branches. There is scope to provide easy access to credit through mobile banking, and faster cash withdrawals through digital devices such as hand-held ATM devices. Some respondents suggested the development of mobile banking solutions with suite of all financial products (such as insurance, saving, credit) for rural areas.

78. Another reason for mistrust is the reported widespread misuse of agricultural loans for non-agricultural purposes. Examples were stated for example of farmers accessing low-interest loans for agricultural activities and using them for weddings, home construction, or other non-agriculture needs. Further efforts are needed in transparency and verification as well as in making affordable finance available to rural residents overall. Suggestions were made for the Ministry to Agriculture to help farmers access credit directly without any financial intermediaries and/or to facilitate collateral free loans for farmers and local entrepreneurs.

Transport and mobility

79. The high cost of transport in a few villages emerged as an area of concern. Shared mobility solutions can potentially lower this cost, presenting an alternative to traditional mobility options in these areas. Public transportation options are either scarce or do not exist in the rural areas. Where they do exist they are still more expensive than the options available in urban centers (for example, respondents in Tovuz-Shamkir cluster compared a ride for their village to the regional center at 0.90 AZN with a 0.30 AZN ride for the same distance in Baku). Taxi charges are also high at 10-15 AZN on average to go to a regional center and ridesharing is difficult to arrange in the absence of a consolidated information platform or network to connect drivers and passengers. Respondents in both clusters indicated that there would be interest and uptake of private transport services if there would be better coordination between transportation companies and passengers, and services were more affordable.

80. Additionally, there is scope to boost local jobs and small businesses related to passenger or logistics transport. Transport stations for buses, taxis, or trucks can be established and accompanied by spaces for local retail shops, cafes, or other services. This would provide opportunities both for transportation entrepreneurs and for creating local jobs while also improving the overall services and mobility options for the communities.

Public utilities (water, sanitation, electricity)

81. The government has introduced advanced technologies for water management such as smart water meters. Consumers are comfortable using digital payment technologies such as payment kiosks, payment transfer mobile applications, and smart cards for payment of utility bills. In Guba the department of Azerishiq is conducting a pilot project which involves installation of integrated smart card prepayment electricity meters. These customers can prepay their electricity bills at designated shops, through the smart cards provided to them. The smart meter is activated once the payment is received. The customer receives electricity supply based on the amount credited to their cards. This also eliminates the need for generating physical electricity bills. The smart card customers can recharge their cards as per their requirements at the post office or special desks at shops in the nearby markets. Many village residents in Shamkir and Tovuz pay their utility bills, any penalties etc. through "eManat" kiosks. The kiosks can be used to pay utility, telephone, internet & cable TV bills, top up mobile phone etc. The service is provided by MODENIS LLC. MilliÖn as another digital payment platform used to pay utility bills by locals in the region.

82. For many rural residents, however, basic lack of connectivity to services is still a pending priority. For example, in the Guba-Gusar-Khachmaz cluster some of the villages still lack water supply to their residence, drawing instead from common water sources in the village. Many households note that their electricity supply is unreliable, as a result of which the use of e-payments is a further concern. In Tovuz, concerns were raised around the quality of drinking water and the need for a water purification system in the village to address the problem. Currently, the locals allow the particles in the water to settle down over a period of 3 days before consuming it, to get rid of the impurities in the water. The households in the village expressed interest in a centralized water purification system to lower the cost of water treatment and improve drinking water quality.

Education

83. Use of technology in education can be particularly beneficial for rural residents, enabling the online provision of the regular school curriculum (as was required during the pandemic), professional training and vocational education, and qualification courses for teachers. During the COVID-19 lockdown as many as half of the students in some of the surveyed villages could not attend classes due to low broadband connection. Poor digital literacy among parents of school going children can also adversely impact learning outcomes. There is potential to train local youth who can further educate adults in the community on important ICT applications. The respondents were open to the idea of developing and training youth as digital champions in villages to promote digital literacy among the elderly and parents of young school going students. In Khachmaz online education was also cited as an opportunity for girls to continue secondary education after early marriage.

84. The government is exploring partnerships with private sector organizations to pool financial resources for achieving better education outcomes. The Ministry of Education (MoE) started a program called "Virtual Schools" in partnership with Microsoft in April 2020 to provide distance learning opportunities to students and ensure the interactivity of TV lessons broadcasted throughout the country.[40] The Ministry supplied teachers with computers and collaborated with telecom operators like Azercell to provide high speed mobile data access to 40,000 teachers across Azerbaijan for a fixed period. The MoE also introduced online vocational classes for courses on information technology and automation/simulation. In addition, the MoE began broadcasting education classes on TV on the "ARB Gunesh" and "Culture" channels, to facilitate education for students with no internet access or smartphones. Students can access these TV lessons and other educational videos on MoE's portal at www.video.edu.az. This also involves some private sector players like Madad Azerbaijan which is a national organization that provides professional development courses for teachers.

85. Youth unemployment emerged as a major challenge in the cluster, primarily due to a lack of skills and limited employment opportunities for youth. E-skilling of youth especially in the ICT and tourism sectors were cited as critical needs in the area. In Yeni Heyat in Khachmaz, the household members stated that majority of the high school graduates in the village have difficulty finding jobs. They either become daily wage workers in the village or migrate to Turkey earning meagre wages. The manager of community house in Guba also conveyed that there is a shortage of skilled professionals in the tourism sector. The chairperson of Guba Carpetmakers' Association advocated the introduction of skill-based courses (such as sewing, cooking etc.) at the school level. The representatives of the Ministry of Education agreed that opportunities for online skill development would be beneficial for youth. One of the representatives suggested focusing on skill building on ICT for youth and generating awareness about job opportunities in the ICT sector.

Health

86. The medical services provided at the village level are limited to basic first aid and vaccination. For any serious injuries, surgeries, medical tests, among others the locals have to visit the hospital at the rayon center or Baku. This is challenging especially in cases of emergency given that ambulances are not available in close proximity to rural areas. Health providers in both clusters agree that digital technology is not being fully utilized to deliver essential healthcare services in the region. The chairman of the health workers trade union in Shamkir and the director of the central hospital on Guba noted the relevance of providing online consultation to patients in remote rural areas by doctors at the central rayon hospitals through tele-medicine facilities, to compensate for the shortage of trained medical personnel and specialists in these areas. Online training could also benefit therapists and frontline medical staff.

87. A few FGD participants stated that they are already consulting their doctors in Baku through WhatsApp due to travel restrictions imposed during Covid19. The community members were also eager to adopt online health services, as long as they were more affordable than the existing ones. However, the local medical health points must be provided with internet to scale tele-consultation services and digital trainings in the villages.

88. Another constraint that was identified is lack of pharmacies in smaller villages, especially in the mountainous areas. Respondents noted they have difficulty buying medicines due to limited number of pharmacies in these areas, and mostly travel to the rayon center. The need for an e-prescription system that can digitally transfer electronic prescriptions by the doctors to all the pharmacies in the area was suggested in both clusters. Some of the participants expressed their willingness to adopt and pay for online services for delivery of medicines to the village.

89. Online learning and materials can be especially useful in the areas of preventive healthcare and nutrition. Many respondents welcomed the idea of more awareness materials being available to young mothers and women on maternal health and nutrition. In Shamkir respondents noted there are many cases of oncological and craniological diseases, but there are no dedicated trainings for patients and caregivers around disease management over time or around preventive care. Respondents were also open to the idea of using mobile applications to train communities on preventive healthcare and lifestyle especially in relation to chronic diseases.

PROPOSED ROADMAP FOR IMPLEMENTING AN AZERBAIJAN SMART VILLAGES PROGRAM

6

90. So, what next? The analytical framework and results presented above provide a robust and flexible tool for the Azerbaijani government to target policies and investments to the unique characteristics of rural areas across the country. To adapt, adopt and apply this analytical approach would entail commitments to capacity building for appropriate government agencies to process, analyze and act on data from a wide range of sources; inter-ministerial platforms for collaboration to advance targeted, regional development; and a program of support over a period of time that pilots, extracts and applies lessons, invests and assesses the effectiveness of various interventions. Below are a set of recommended priority actions, and a simple roadmap, for clarifying and realizing a vision of smart village development in Azerbaijan to lift rural households out of poverty, to bridge the rural-urban divide and allow for more equitable social and economic development across the country. The roadmap is also summarized in Figure 17 below.

FIGURE 17: Roadmap for Development of Smart Villages Program
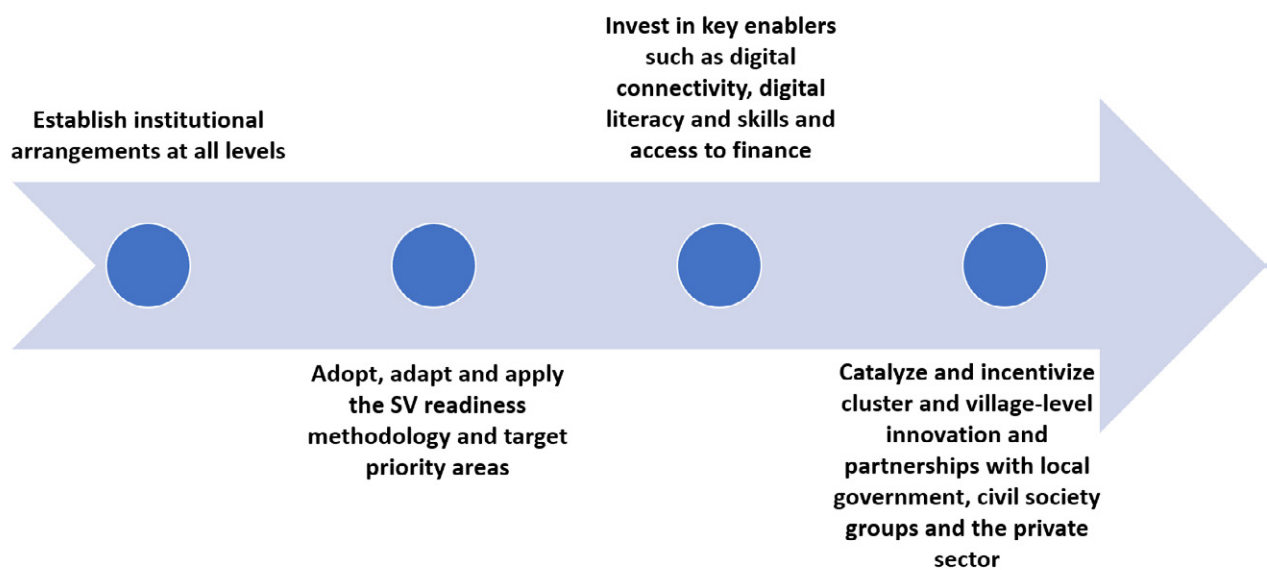
91. *The Smart Village Program should be aligned to the key priorities of the government and the performance should be measured against these goals.* Some of the possible outcomes for a Smart Village Program are highlighted in Table 8 below, and aligned to the State Program of Socio-Economic Development, Azerbaijan (2019-2023).

TABLE 8: Possible key outcomes of a Smart Village Program

Goal 1: Achieve balanced growth

- Increase investment in rural areas
- Improve economic growth by adopting advanced and innovative technologies
- Increase employment opportunities especially in non-oil sectors and non-farm sectors
- Boost entrepreneurship
- Strengthen financial sustainability of small and medium enterprises (SMEs)
- Develop tourism in rural areas (including rural green tourism, ethno-tourism, eco-tourism, winter tourism, trans-boundary tourism)
- Increase agricultural productivity
- Promote farmers cooperatives and partnerships in agriculture
- Increase market competitiveness
- Improve access to financial resources for farmers and entrepreneurs
- Strengthen domestic and export market linkages (especially in non-oil sectors)

Goal 2: Enhance social-well being

- Improve infrastructure and service quality (health, education, transport, water & power supply etc.)
- Increase the range of social services
- Improve accessibility of services to vulnerable population
- Undertake capacity building initiatives for government officials and staff
- Implement an insurance system
- Expand coverage of high-speed fibre-optic broadband internet and advanced communication services

Goal 3: Efficient use of natural resources

- Expand the use of renewable energy sources
- Increase production of environmentally safe products
- Enhance sustainability of natural resources (water, forest, land, air etc.)

92. *Adapt and adopt the SVR readiness assessment framework for targeting interventions and assessment progress over time.* The SVR Index is a robust framework with a wide range of variables, but it has not yet been fully tested and adjusted to the Azerbaijani context by the most appropriate and well-equipped government officials. As the data framework is complex and requires a high degree of technical skills to manage and apply to decision-making, an appropriate government agency will need to be identified so that that the data systems and knowledge to maintain and develop the system can be cultivated. The result of this process should be the full adoption of the data framework by the government and its use in development planning, investment, results monitoring and evaluation.

93. *Identify and prioritize a range of more and less ready village clusters for early investment and learning.* The SVR index should be used to prioritize geographic areas which are, to varying degrees, ready to receive support for smart village development. It is recommended that village clusters across the range of readiness, from high to low, be selected for the pilot. By picking the most and least ready, pilot investments would likely reveal the more immediate results of investing in areas that are more likely to produce more immediate results as well as the challenges of investing in areas with less favorable conditions, but potentially deeper impacts due to the disadvantaged nature of their circumstances.

94. *Invest in regional and national, digital connectivity to make internet services more affordable, robust and reliable.* While this recommendation has broader national development implications, it is an essential element of a smart villages approach. Unless the digital, rural-urban divide can be bridged, at least initially in target locations, the promise of "smart" solutions to rural development problems will not be realized. Beyond essential broadband connectivity, access to affordable smart mobile devices that are capable of harnessing the power of high-speed internet will also be essential. This requires targeting mobile and internet service phone providers with support, as well as the users of such technology, particularly entrepreneurs, SMEs and basic service providers and one-stop centers such community spaces, public services; agriculture extension centers; schools; hospitals; and others.

95. *Assess, target and increase digital literacy among the general population, but particularly for the low use population such as older and disadvantaged individuals to bring them into the digital marketplace.* Drawing upon global and national data sources, target groups for awareness and marketing campaigns, incentivize service providers to target potential customers/users with training/educational programs, and partner with civil society organizations to develop programs to support disadvantaged and vulnerable group to increase their knowledge and use of mobile apps and digital tools more broadly, including the use of electronic and mobile ASAN services. Field work in the two village clusters identified high potential to develop digital skills to drive productive uses of internet such as business transactions and online trading, online learning and skilling, job search, e-governance, online banking, access to relevant business-related information etc. Digital champions could be identified at the village level to lead a country-wide or a regional digital empowerment campaign. Municipalities and Rayon ExCom village representatives can identify proactive unemployed youth and women who can be trained by local NGOs or private sector enterprises and incentivized to deliver digital training in their own and nearby villages. The government can forge partnerships to design the curriculum and supply low cost tablets and data packages on which training can be provided.

96. *Catalyze local government and community groups to move digital, to innovate and adopt approaches that support local decision-making and economic activity.* While there is some use of electronic tools at the local level, there is great potential beyond this, to provide technical support to farmers and other self-employment businesses, to make decisions on local resource use, to share information on the quantity and quality of public services to strengthen public service provision. Small-scale farmers can also be supported to engage in cooperatives to aggregate goods among farmers with a focus on production, processing, exports, storage and marketing of agricultural produce and inputs; agro-based industries; agro-allied sectors like fishery, dairy and livestock, horticulture; handlooms and home-based businesses (such as carpet weaving), community-based tourism etc. As social innovations are mostly community and entrepreneur-led, it is important to build the capacity of local government representatives who interact regularly with the local communities and are elected by them. These representatives should be well versed with the use of technology and equipped to address any questions or grievances posed by local citizens during program implementation.

97. *Apply private sector approaches such as crowdsourcing to identify and support social innovations and generate financing to get started or to scale up.* To harness the creativity and the problem solving capacity of the private sector, the government should design and support a competition, perhaps through an "innovation fund" for applying smart village approaches to diversifying economic activity in target, village cluster areas, bridging pre-identified rural-urban divides, and more broadly coming up with digital and non-digital solutions to rural development problems, regardless of sector. Efforts may be made to leverage the financial resources of the private sector to finance such entrepreneurial, innovative initiatives, but ongoing support to strengthen the viability of such initiatives will need to be sustained by the government in partnership with civil society and the private sector. Institutions and portals like Azerbaijan Export and Investment Promotion Foundation (AZPROMO), www. EnterpriseAzerbaijan.com, www.export.az etc. that link local entrepreneurs, traders and technology providers to domestic and foreign investors and suppliers can be leveraged to promote and provide information about the Smart Village Program, and garner support to scale innovative technological and business models.

98. *Form an inter-ministerial, Smart Village Working Group, to identify and agree on Smart Village Program priorities and investments and to be held accountable for results.* Given the national, cross-sectoral nature of the smart villages approach, no one ministry, nor level of government can be responsible for implementation. One ministry or government agency may lead, but many must provide support and use their strategies and resources to bring about meaningful impacts. The Government of Azerbaijan must decide which agencies to include, lead and implement, but this will provide a center for collaboration and a clear point of entry, support and partnership for development partners and the private sector.

99. A four-tiered institutional structure at the national, cluster, rayon and village level will be needed to enable coordinated effort and ensure effective implementation of the Program. The governance structure and the roles of different government agencies are elaborated below.

- **Smart village central unit at the national level** would have the following responsibilities: identification of priority geographic areas; budget allocation; partnerships and alliances; overall program monitoring.

- **Cluster development and management unit (CDMU) at the cluster and rayon level** would be responsible for the identification and development of Cluster Development Plans and Detailed Project Reports.

- **Program management unit (PMU) at the rayon level** would be setup constituting key representatives from the Rayon ExCom and line ministries to oversee the implementation and monitoring of the program across all villages within the rayon. It would also build the technical capacity of the project execution team to deliver the desired program outcomes.

- **Smart village committee at the village level** would be constituted in each village to oversee program implementation and ensure accountability. This committee will be headed by the village ExCom representative and the municipal representative in the village, and will include 10-15 members including local entrepreneurs, youth, women, farmers and key opinion leaders from each village. The committee would be responsible for mobilizing the communities to facilitate needs assessment in the beginning of the project, provide capacity building support, and coordinate day to day activities.

100. While this paper does not provide a detailed plan for the implementation of a Smart Village Development Program, there are broad stages that should be considered for rolling out the activities briefly described above. At first, the institutional arrangements for conceptualizing and implementing the program at the national levels, down to the villages would need to be elaborated that established. The technical framework and process for identifying priority areas and undertaking in-depth data analysis for each area would need to be developed and combined with, bottom-up planning processes. Once the capacity to plan and implement are in place, core investments can be made to improve the enabling conditions for smart villages approaches to succeed. These would aim to bring all target areas up to similar levels of SV readiness to enhance the likelihood of success in making further investments. Finally, a system for drawing out and encouraging innovative approaches for local development would need to be put into place, leveraging a range of policy, technical assistance, analysis, investment and partnership vehicles. Again, this is a very broad framework, so if there is interest to go further, a detailed program would be designed laying out how all of these inputs would work and result in outcomes described in Table 6, above.

ANNEX I:
SMART VILLAGES READINESS INDEX – DATA CATALOG

Dimension	Category		Criteria	Data	Measurement
1 **Economic Sources for Local Development**	**Overall**	1	Concentration of existing enterprises	AZStat (2018)	Number of existing enterprises by Rayon
		2	Concentration of employment	AZStat (2018)	Number of employees by Rayon
		3	Access to business	AZStat (2018), OSM (2020)	Travel time to employment centers
	Agriculture	4	Availability of arable land	ESA (2015)	Arable Land
		5		AZStat (2018)	Useful land for agriculture (ha) by Rayon
		6	Access to storage	AZStat (2018)	Number of warehouses by Rayon
		7	Access to irrigation	FAO (2018)	Land equipped for agriculture irrigation by total area by Rayon
		8	Areas with high production	AZStat (2018)	Heatmap of agriculture production (tons) by product
		9	Access to domestic/ international markets	OSM (2020)	Travel time to port and market
		10	Distribution of workforce in agriculture	AZStat (2018)	Heatmap of average annual number of employees engaged in farming by persons
	Tourism	11	Tourism attraction agglomeration	OSM (2020)	Number of tourist attractions (tourist attractions, viewpoints, museums, art galleries) by total area by Rayon
		12		Azerbaijan DMO office (2020)	Heatmap of tourism attractions including: 1) Guba-Gusar, 2) Lankaran, 3) Ganja, 4) North corridor, 5) NW corridor, 6) Balakan, 7) Oguz, 8) Gakh,9) Sheki, 10) Zaqatala, 11) South corridor, and 12) West corridor
		13	Availability of lodging services	AZStat (2018)	Number of beds in hotels and similar establishments
		14	Distribution of lodging services	AZStat (2018)	Number of overnights stays in hotels and similar establishments by Rayon

	Dimension	Category		Criteria	Data	Measurement
		Digital Connectivity	15	Access to landline network (telephone)	OSM (2020)	Heatmap of telephone lines
			16	Access to broadband	AZStat (2018)	Number of internet users by 100 people by Rayon
			17	Access to public internet service	OSM (2020)	Travel time to public Wi-Fi
			18	Access to 2G and 3G network	ITU (2020)	2G Coverage (polygon)
			19			3G Coverage (polygon)
			20		GSMA (2020)	LTE Coverage (polygon)
			21	Access to cell network	OSM (2020)	Number of cell towers by population by Rayon
		Transportation Household Infrastructure	22	Access to major road	OSM (2020)	Km of primary roads by Rayon
			23	Access to public transportation	OSM (2020)	Km of railway by Rayon
			24	Access to personal vehicle	AZStats (2018)	Number private vehicles by 100 families by Rayon
			25	Access to transit hubs (e.g. airport)	OSM (2020)	Travel time to airports
2	Infrastructure and Service	Household Infrastructure	26	Access to electrification	AZStats (2018)	Electricity consumption (million kWt hour) by Rayon
			27		WB - Electricity transmission network (n.d.)	Km of power lines by Rayon
			28		WB - Location of powerplants (n.d.)	Number of powerplants by Rayon
			29		WB - Location of electric transmission substation (n.d.)	Number substations by Rayon
			30	Access to water/ sanitation	AZStats (2018)	Water consumption (million cubic m) by Rayon
			31		OSM (2020)	Number of public toilets by Rayon
			32		OSM (2020)	Number waste disposal sites by Rayon
		Renewable energy	33	Solar energy	WB Global Solar Atlas (n.d)	Heatmap of direct normal irradiation
		Urban Agglomeration	34	Human settlement concentration	UN Global Built Settlement Growth (2016)	Km of built settlements by Rayon
			35	Rural population	MixMarket (2018)	Percentage of rural population by Rayon

Dimension		Category		Criteria	Data	Measurement
3	Human Capital for Capacity Building	Population Mobility	36	Population change	AZStat (2018)	Computer users by 100 habitants by Rayon
		E-skills	37	Digital capability	AZStat (2018)	Number of employers using internet by Rayon
			38		AZStat (2018)	Number of employees using computers by Rayon
			39		AZStat (2018)	Number of persons aged 15 - 65 by total population by 100 sqm
		Workforce	40	Distribution/ concentration of workforce	Wpop (2020)	Number of pupils at day general educational institutions at the beginning of the school year by towns and regions of the country (number) by Rayon
		Education/ training	41	Access to formal education	AZStat (2018)	Travel time to educational institutions (schools/ colleges/ universities, kindergarten)
			42		OSM (2020)	Travel time to healthcare (clinics, doctors, pharmacies, hospitals, dentists)
		Health Services	43	Access to health care services	OSM (2020)	Number of physicians by 10 000 population (persons) by total population by Rayon
			44		AZStat (2018)	Number of physicians by 10 000 population (persons) by total population by Rayon
		Safety	45	Areas with safety (e.g less crime)	AZStat (2018)	Number of registered crimes by towns and regions of the country by Rayon
4	Economic Potential	Economic Clusters	46	Proximity to economic clusters/ links	AZStat (2018)	Number of registered SMEs by Rayon
			47	Access to finance	OSM (2020)	Travel time to banks and ATMs
			48		MixMarket (2018)	Number of financial institutions (banks, NBCO, credit unions and post offices) by Rayon
		Financial Inclusion	49	Access to savings and loans through banks	Central Bank of Azerbaijan (2020)	Savings by the economic region
			50			Loans by the economic region
			51	Access to markets	OSM (2020)	Travel time to domestic market
5	Governance	Local Governance	52	Proactiveness of local government bodies and civil society organizations	WB AZRIP (2020)	Density heatmap AZRIP projects (point)
			53	Government's development priorities and policies	WB Water User Associations [WUA] (2020)	Density heatmap of WUA locations

Notes