Supplementary Document 16: Detailed Sector Assessment: Agriculture, Natural Resources, and Rural Development

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ADB	Asian Development Bank
AEZ	Agro Ecological Zone
AMTP	Alternative Machinery Tractor Parks
APF	Association of Private Farmers
BISA	Basin Irrigation System Authority
CAREC	Central Asian Regional Economic Cooperation Organization
CIS	Commonwealth of Independent States
CPS	Country Partnership Strategy
EEU	Eurasian Economic Union
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GOST	Government Organization for Standardization (Russia and CIS)
GOU	Government of Uzbekistan
GWP	Global Water Partnership
Ha	Hectare
HACCP	Hazard Analysis at Critical Control Points
HVC	High Value Crop
ICBA	International Centre for Bio-saline Agriculture
ICARDA	International Centre for Agricultural Research in Dry Areas
ICWC	Interstate Committee for Water Coordination
IFAD	International Fund for Agriculture Development
IPM	Integrated Pest Management
ISO	International Standardization Organization
MOA	Ministry of Agriculture
MFERIT	Ministry for Foreign Economic Relations Investment and Trade
MOE	Ministry of Economy
MTP	Motor Tractor Park
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
OIE	World Organization for Animal Health
RBAS	Rural Business Advisory Center
R & D	Research & Development
UAE	United Arab Emirates
UARPC	Uzbek Agriculture Research & Production Center
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UZS	Uzbek Sum
VAT	Value Added Tax
WIS	Welfare Improvement Strategy
WHO	World Health Organization
WTO	World Trade Organization
WUA	Water Users Association

I. GENERAL ECONOMY CONTEXT

1. Uzbekistan is a landlocked country stretching approximately 1,500 km west-to-east and 1,000 km north-to-south, with common shared borders with the fellow former Soviet Union countries of Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan plus Afghanistan to the south. The climate is typically continental and relatively dry, with low rainfall, long hot summers and mild winters. Located within the country are significant reserves of natural resources including large deposits of gold, copper, lead, zinc, uranium, natural gas and oil. It has the largest population of the five Central Asian Republics, recorded at 31.5 million in 2015, of which 80% are Uzbek, with the remainder being Russians (5.5%), Tajiks (5%), Kazakhs (3%), Karakalpaks (2.5%) Tatars (1.5%) and others (2.5%). Of the total population, around 49.2% are reported to live[1] in rural areas, with the capital city of Tashkent being the main urban center with a population of around 2.5 million. The Uzbek population is very young, with more than two-thirds under 24 years old. The working-age population is increasing and producing an excess of supply on the labour market, which leads to important migration flows to Russia and Kazakhstan.

2. Since 2000 the economy of Uzbekistan has grown consistently; over the period 2005–2013 gross domestic product (GDP) grew at an annual average rate of 8.4%, reaching $56.8 billion in 2013, proving extremely resilient to the downward pressures exerted from 2008 onwards on other economies by the global financial crisis. More recently there has been a slight dip in performance—Uzbekistan's economy expanded 7.8 % year-on-year in January–June of 2016 compared to 8.1 % growth in the same period one year previously. While other sectors declined or were stagnant, agricultural output advanced at a faster 8.1 % rate in comparison to the same period of 2015 (+6.8 %). Even so, the agriculture sector value adds to the overall economy (% of GDP) declined from 19.3% in 2010 to only 18.3% by 2015.[2]

3. The World Bank estimates that broader GDP in Uzbekistan will continue to grow at a healthy rate during 2015–2017 periods, dropping slightly from 8.1% in 2014, to 7.6% (2015) and 7.8% (2016), before rebounding to 8.0% by 2017. By comparison, the Russian Federation is forecast to have only relatively weak growth in GDP up from 0.7% (2016) to 2.5% (2017) while neighboring Kazakhstan is forecast for GDP growth of 2.9% (2016) and 4.1% (2017) and Tajikistan 4.4% (2016) followed by 5.2% (2017).[3]

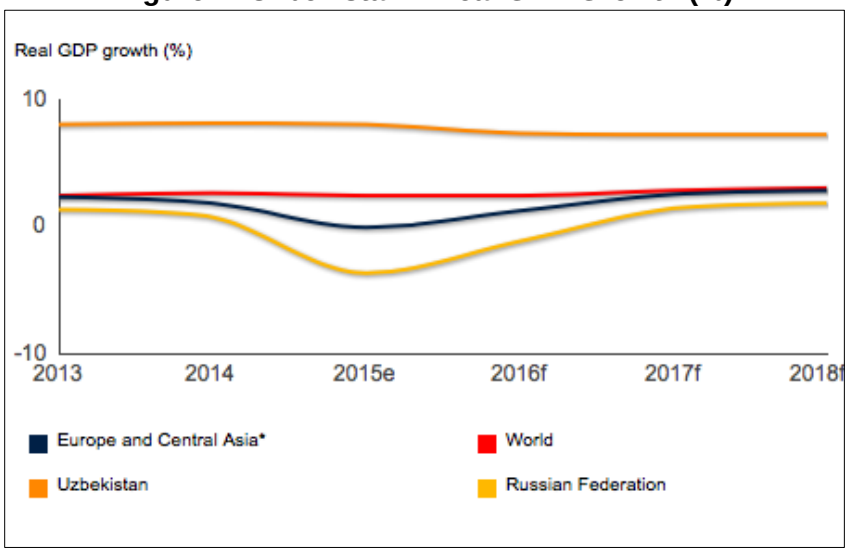
4. The World Bank also estimates that GDP growth in Uzbekistan will continue to outperform other areas, including the World and European averages and also the Russian Federation as indicated in the following chart which indicates that growth in Uzbekistan will remain stable through 2018:

[1] Women and men of Uzbekistan, 2015. Tashkent. p30.

[2] World Bank.

[3] The World Bank – Global Economic Prospects.

Figure 1: Uzbekistan – Real GDP Growth (%)



Source: World Bank.

5. Even though Uzbekistan's economy is relatively closed, it has been growing steadily due to its vast natural resources of oil, natural gas and gold. Receipts from these key industries allow the government to control the economy through investments in services (accounting for 48 % of GDP) and industry (accounting for 40% of GDP). Uzbekistan is currently the world's fifth largest producer of cotton but is attempting to diversify its agriculture towards alternate products, including fruits and vegetables.

6. Given the government's policy of maintaining broad self-sufficiency in food grains and energy, the Uzbek economy is also cushioned against global food and energy price fluctuations. Over the 2005–2012 period gross national income per capita (based on international dollar purchasing power parity) grew at an annual average rate of 8.9% and has continued to steadily increase, reaching a value of $6,110 per capita in 2015. As a result, overall poverty declined from 27.5% of the population in 2001 to 12.8% in 2016 due to the rapid economic growth, creation of new small businesses and employment, large government investments in education, health and infrastructure, increases in public sector salaries, and increased remittances. However, the elasticity of poverty reduction to GDP growth remains low, reflecting low productivity of the agricultural sector, regional differences in growth, and the rural-urban income gap. In this context, agriculture accounted for 27.2% of total employment in 2012, 60% of the total population of 31.2 million live in rural areas,[4] and 75% of people living below the poverty line reside in rural areas[5] (a poverty rate of 17% for rural households and 11% for urban households in 2015).[6]

7. The government's Welfare Improvement Strategy (WIS II) aimed to reduce the national level of low-income people from 17.7% in 2010 to 12.8% by 2016. This entailed primarily a

[4] World Bank.

[5] The significance of agriculture in total employment has declined steadily. In 2000, the sector accounted for 34.4% of total employment. Population data and the estimate of the number of poor in rural areas is from United Nations Development Program (UNDP) (http://www.uz.undp.org/content/uzbekistan/en/home/countryinfo/). Supplementary data is also provided from World Bank

[6] United Nations Development Programme. 2015. Uzbekistan Millennium Development Goals Report. Tashkent. http://ria.ru/world/20150501/1062042920.html

greater rural productivity and more income-generating activities. Key measures to achieve these objectives were (i) further structural reforms to agriculture and the diversification of agricultural production; (ii) mechanization of the sector, infrastructure build-up, and agribusiness development; (iii) more productive use of land and water; and (iv) greater financial stability of farm entities and more market-oriented agricultural policies. These approaches continue in 2016 to form the main framework of the government's welfare strategy.

8. ADB's Country Partnership Strategy (CPS) defines the Banks own strategic approach in Uzbekistan for 2012–2016 and is aligned with Strategy 2020, the country's own development strategy, This CPS supports Uzbekistan's transformation into a modern industrial and service economy through sustained and inclusive growth, a reduction in poverty, and expanded regional cooperation. Strategic assistance to be provided under the CPS will catalyze industrial development, accelerate economic diversification, promote private sector development, ensure climate-resilient investment, and create new jobs for women and men.

9. Support to agriculture remains a government priority and to prevent continuing issues with labor movement and labor scarcity in rural areas, government is also keen to introduce modernization within the sector, including expanded use of machinery, through the following policy mechanisms:

(i) Exemption of joint stock agriculture machinery companies from customs and value added tax on imported agricultural machinery,
(ii) Promotion of import substitution of farm machinery and equipment, and
(iii) Establishment of a special fund in the Ministry of Finance to be used exclusively by "Uzselhozmashlizing" to provide lease finance at beneficial rates on agricultural machinery for agricultural machinery tractor parks, other joint stock agriculture machinery service providers and farmers.

10. While the share of government investment in agriculture was 5.2% in 2011, by 2014 this had fallen to only 4.6%. The main factor in this change is primarily due to the changed priorities in the last 3 years, where the Government has concentrated investments mainly on other sectors such as industry, construction, housing and communal services and others (Table 1). These changes reflect a growing maturity of the broader economy and the need for infrastructural support to maintain that growth while agriculture is gradually being seen as more robust now that production is primarily in the private sector. It also possibly reflects an increasing understanding within Government that agricultural production is changing and that cotton is no longer the main driver of the sector.

Table 2: The Share of Budget Investment in Fixed Capital By Sectors in 2011–2013

Economic Sectors	2011	2012	2013
Overall	**100**	**100**	**100**
Including:			
Industry	33.8	34.2	34.2
Agriculture	**5.2**	**4.8**	**4.6**
Building	1.8	1.2	1.5
Transport and communications	20.2	17.8	17.9
Trade, public catering, material and technical supply, etc.	4.7	4.8	5.4
Housing services	20.2	21.7	23.2
Health care, physical culture, social security	2.5	4.0	3.1
Education	2.3	2.8	2.6
Other branches	9.3	8.7	7.5

Source: State Committee of Statistics of Uzbekistan.

11. While Table 1 indicates a decline in broad Government investment for agriculture, the private business sector in Uzbekistan has also generally been restrained towards large scale investment in the sector which is viewed as unappealing because of the poor cash flow (seasonal income only) and the perceived low efficiency, all of which combine to deter interest of private businesses and external investors from getting involved in the sector. Cotton and wheat production is heavily influenced by Government at all levels and the opportunity for significant improvement in performance and thereby income in these sectors remains somewhat limited which is a deterrent to large scale investment. Limitations on land tenure also affect potential investor sentiment. However, the horticulture sector is viewed as an exception outside of this general sentiment for agriculture with the result that there is significant private sector interest in being involved in all stages of the fruit and vegetable value chain, from production, through storage, processing and marketing.

12. Nevertheless, the volume of overall agricultural production in terms of both quantity and value shows a tendency to increase in the recent years. This is primarily driven by the small-scale producers,[7] usually operating at a family level with low costs rather than the industrialized cropping of cotton.

13. More recently, government has realized the growing importance of the horticulture sector in its increasing contribution not only to the national GDP, but also in the increasingly important role that fruits, and vegetables play in the agriculture export market, plus the contribution that production of fruits & vegetables makes to rural household income through the *dekhan* plots is now realized as significant. Subsequently, recent policies have been announced that aim to support and develop this sector significantly over the next 4 to 5 years.

14. Looking forward, the government aims to enable Uzbekistan to become an industrialized, high middle-income country by around 2050, based on a strategy of continuing the transition to a more market-oriented economy to ensure equitable distribution of growth between regions and to maintain infrastructure and social services.[8] The country's policy goals and priorities are to (i) increase the efficiency of infrastructure, especially of energy, transport, and irrigation; (ii) enhance the competitiveness of specific industries, such as agro-processing, petrochemicals, and textiles; (iii) diversify the economy and thereby reduce its reliance on commodity exports; and (iv) improve access to and the quality and outcomes of education, health and other social services.

15. Ease of Doing Business in Uzbekistan improved to 87 in 2015 from 103 in 2014. Ease of Doing Business in Uzbekistan averaged 139.63 from 2008 until 2015, reaching an all-time high of 166 in 2011 and a record low of 87 in 2015. Ease of Doing Business in Uzbekistan is reported by the World Bank.

II. AGRICULTURE, COUNTRY & CLIMATE

16. The economy of Uzbekistan is intrinsically influenced by its geography. The country is situated in the basin of two main rivers: the Amudarya, which runs from Tajikistan and provides the Uzbek borders with Afghanistan and Turkmenistan, and the Syrdarya, which flows from Kyrgyzstan through Kazakhstan and their tributaries and rivers, the main of which are the Kashkadarya and Zarafshan. The main flow of the Amudarya is formed within the territory of Tajikistan and the Syrdarya - in Kyrgyzstan. The total area of the Syrdarya river basin is about

[7] *Dekhan* farmers.

[8] In 2011, the World Bank re-classified Uzbekistan from a low-income to a lower middle-income country.

345,000 km^2. The main river is formed by the confluence of the Naryn and Kara plus the Chirchik—the biggest right-bank tributary of the Syrdarya. The river has a maximum discharge in June (581 m^3/s), minimum in February (69.1 m^3/s). With a length of 2,800 km, 2,000 of which are outside of Uzbekistan.

17. The Amudarya normally provides 2/3 of the total water resources of the Aral Sea basin. The length of the Panj Amudarya from its source to the Aral Sea is 2,540 km, of which more than 1,000 km flows through the territory of Uzbekistan. The river mainly crosses desert and semi-desert and is the dividing line between the Karakum and Kyzylkum deserts. On the plain of Kerky to Nukus, the Amudarya loses much of its flow through evaporation, water diversion and irrigation. Maximum flow is between April-September accounting for 77%–80%, while December-February is only 10%–13%. The Zarafshan river basin is 143,000 km^2, out of which 131,000 km^2 is within the territory of Uzbekistan. The total length of the river is 576 km. The basin of the Kashkadarya river, flowing from the western tip of the Zarafshan and Hissar ranges, is 310 km long, has a catchment area of 8,780 km^2. Because of the intense water abstraction for irrigation after it leaves the mountains, not all sections of the river basin of the Kashkadarya has permanent water flow.

18. In 2005, total water withdrawal was 56.0 km^3, of which 50.4 km^3 (90%) was for agriculture, 4.1 km^3 (7%) for municipal and 1.5 km^3 (3%) for industry. Total groundwater withdrawal was 5 km^3 or 9% of total water withdrawal, of which 49% for urban and rural water supply, 34% for irrigation and 17% for industry. Around 2000, the direct use of drainage water was an estimated 6.84 km^3, of which 4.21 km^3 were from the Syr Darya and 2.63 km^3 from the Amu Darya system. In addition, 6.1 km^3 of water may be considered environmental flow, which is the average amount annually allowed to the Uzbek portion of the Aral Sea since the early 1990's (Abdullaev et al., 2009).

19. During the Soviet period, sharing of water resources among the five Central Asian republics was based on the master plans for water resources development in the Amu Darya (1987) and Syr Darya (1984) river basins. In 1992, the Interstate Commission for Water Coordination (ICWC) was established and the newly independent republics decided, with the Agreement of 18 February 1992, to prepare a regional water strategy and continue to respect the existing principles until the adoption of a new water sharing agreement. This new agreement was confirmed by the 'Agreement on joint actions to address the problem of the Aral Sea and socio-economic development of the Aral Sea basin', which was signed by the Heads of the five states in 1996. Over the years, the ICWC has achieved the conflict-free supply of water to all water users, despite the complexities and variations of dry and wet years. In 2002, Central Asian and Caucasus countries formed the CACENA Regional Water Partnership under the Global Water Partnership (GWP). Within this framework, state departments; local, regional and professional organizations; scientific and research institutes; and the private sector and NGOs cooperate to establish a common understanding of the critical issues threatening water security in the region (SIWI, 2010).

20. Kazakhstan, Kyrgyzstan, and Uzbekistan signed an agreement concerning dams in the upper Syr Darya river basin in 1998, which includes provisions for Kazakhstan and Uzbekistan to share equally in the purchasing of summer hydropower from Kyrgyzstan (SIWI, 2010). However, water allocations and water usage remain a contentious issue between all countries involved, particularly with so much at stake in terms of agriculture and the environment generally.

21. Irrigated land accounts for more than 90% of crop production. About 44% of the total irrigated area is in the Syr Darya basin and 56% in the Amu Darya basin. The state of the irrigation system has deteriorated—ADB's own Sector Assessment in the CPS comments that "Uzbekistan has over-allocated its water over too large an irrigated area; and is facing increasing water scarcity and salinity, poor service delivery, and low agricultural productivity of water. These problems are interrelated, occur at the river basin level, and require new solutions and a challenging transition from infrastructure development to integrated river basin management. At the irrigation system level, infrastructure continues to deteriorate, organizational management capacity remains limited, and agriculture faces various constraints."

22. Because of the hot dry climate, almost 95% of the cultivated area has to make use of irrigation to produce crops, which is an area of approximately 3.36 million ha. With rainfall in most areas reaching no more than 400 to 800 mm per year, coupled with temperatures in the main growing season often in excess of 45^{o}C and increasing soil salinization, then most of the irrigation demand for successful crop production has to be met from the resources of the rivers. With cotton and wheat traditionally being the predominant crops in terms of both area and priority for the Government, these have had precedence in terms of water allocation and this has traditionally been strictly enforced during key stages of cotton and wheat growing seasons mainly at a local level through Hokimyats, often with the result that other crops are often not able to meet their full potential for growth and yield.

23. Climate change projections for Uzbekistan from 2005 to 2050 indicate that (i) water demand will increase from 59 km^3 to 62–63 km^3, (ii) supply will decrease from 57 km^3 to 52-54 km^3 and (iii) the present water deficit will increase by over 500% from about 2 km^3 to 11–13 km^3.[9] Increased efficiency is the ubiquitous prescription to address water scarcity. However, the only real way to save water and increase its availability is to reduce consumption, primarily by reducing the irrigated area by taking (the least productive) land out of production. [10]

24. About 3.3 million ha of the irrigated land requires drainage. The total length of main and inter-farm collectors was about 30 000 km, while the on-farm collector-drainage network extended about 110 000 km. In total, the Ministry of Agriculture (MOA) mentions 7,447 wells, including 3,344 for pumped-well drainage and 4,103 vertical wells for irrigation. The intra-farm open collector-drainage network is to some extent satisfactorily maintained in Bukhara, Kashkadarya, Ferghana and Namangan regions. The "Drainage, Irrigation and Wetland Improvement Project" in South Karakalpakstan, recently improved drainage in that region. In other areas it is in a less than satisfactory state of repair (FAO AQUASTAT).

25. The move to increase wheat production in an attempt to improve security of grain supplies has had a longer term detrimental effect on the drainage system which has been less well maintained due to the standing over wintered wheat crops being in the field through the winter months when maintenance to drainage canals was traditionally carried out.

26. Meanwhile, the subsequent shift to horticultural crops has helped improve the water demand situation since they normally use less water than cotton. A recent study by Aldaya, Munoz and Hoekstra (2010) estimate that about 4,426 m^3 of water is required to grow a ton of

[9] World Bank. 2010. Climate Change and Agriculture Country Note. www.worldbank.org/eca/climateandagriculture.

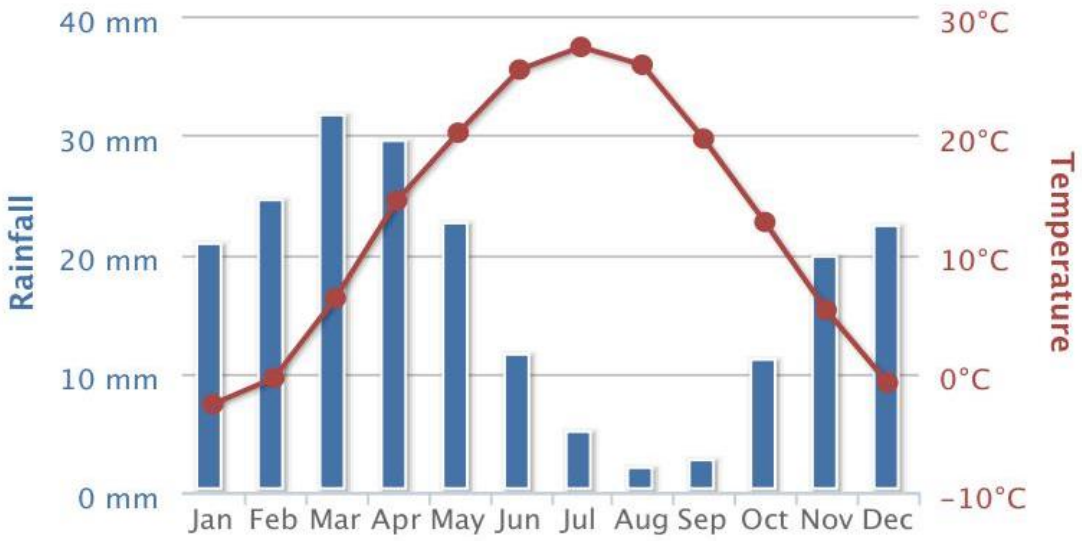
[10] C. Perry et al. 2009. Increasing Productivity in Irrigated Agriculture: Agronomic Constraints and Hydrological Realities. Agricultural Water Management 96. pp. 1517–1524; and C. Perry. 2007. Efficient irrigation; insufficient communication; flawed recommendations. Irrigation and Drainage 56. pp. 367–378.

cotton in Uzbekistan; about 2,068 m^3 of water is required for wheat.[11] Although comparable numbers are not available for Uzbekistan, a study of global water footprints using similar methodology (Mekonnen and Hoekstra, 2010) suggests horticultural products require substantially less than cotton and in some cases less than wheat.[12] For example, grapes require, on average, 2,400 m^3 of water per ton, while apples require about 820 m^3. New orchards in Uzbekistan generally employ modern and efficient drip irrigation technologies and therefore most likely less water than international average values would suggest. In economic terms, based on these conservative estimates, a cubic meter of water used to irrigate grapes in Fergana generates SUM625, compared to SUM169 for cotton. A cubic meter of water in Samarkand used to grow apples generates SUM1,829, compared to SUM169 for wheat.

A. Agro-climatic conditions

27. Uzbekistan has a continental climate which is arid, with plenty of heat and light, due to its central-southern location within the continent and because of a large distance from any oceans. According to the United Nations Environment Programme (UNEP) index of aridity, the whole territory (with the exception of the foothills and mountain area) is classified as arid zone, likely to suffer drought, and therefore susceptible to degradation and desertification. The main summer period is from May to October. Maximum temperatures in the summer months (July) reach 45–49°C while the soil surface can be as high as 60–70°C. Average rainfall in the desert area of the country is less than 200 mm / year, and in the foothill and mountain areas from 400 to 800 mm/year, with a peak in the highlands of up to 2,000 mm/year. In all areas the sum of precipitation is subject to significant fluctuations and in some years, may only be half of the long-term norm.

Figure 2: Average Climatic Conditions – Uzbekistan 1990–2012



Source: World Bank (Climate change Knowledge Portal).

[11] Aldaya, M.M, G Munoz, and A.Y. Hoekstra. 2010. Water footprint of cotton, wheat and rice production in Central Asia. Value of Water Research Report Series Number 41. Delft, Netherlands: UNESCO-IHE.

[12] Mekonnen, M.M.,and A.Y. Hoekstra. 2010. The green, blue and grey water footprint of crops and derived crop products. volume 1: main report. Value of Water Research Report Series Number 47. Delft, Netherlands: UNESCO-IHE.

28. Long hot days and cool nights are conducive for the production of a wide range of horticultural crops. Coupled with the relatively benign winters which in recent years carry little risk of seriously cold weather or significant snow fall in most areas, then the risk to perennial fruit crops is limited and easily managed by capable technicians. The early springs also facilitate the production of early crops while other countries are still struggling to come to terms with the effects of the past winter. This gives Uzbekistan a significant comparative advantage which is well known throughout the Former Soviet Union countries due to previous linkages into the supply chain from Central Asia to the main Russian cities and beyond. This is a window of opportunity for the Uzbek horticultural sector, which has the potential to produce early crops and get them to markets (both internal and export) before producers in other countries.

29. Countries with similar agro-climatic conditions have all developed significant production bases for horticultural crops and have subsequently evolved into some of the leading exporters of fresh fruits and vegetables. These include Turkey, Chile and the United States (principally California).

30. In contrast, Uzbekistan is not only able to produce similar crops, but also to do this over an extended period due to the wide range of agro-ecological zones and their dispersion around the country. This brings benefits in that the industry is able to support the national markets year-round in staple crops such as tomatoes, onions, potatoes, cabbage, with production coming from different parts of the country according to season almost on a year-round basis (tomatoes and herbs/greens require greenhouse production in winter), while other crops are either available fresh from the field or storage.

31. Uzbekistan is divided into three main agro-ecological zones (AEZ's). A large part of the country's terrain is primarily desert plains, with about 20% of the territory comprised of mountains and foothills[13]. The Desert Plains and Steppe AEZ at 60 to 150 meters above sea level make up the majority of the land area within the country. The country's most fertile areas are primarily utilized for agricultural production (albeit predominantly under irrigation) and make up the Piedmont AEZ at 400 to 1,000 meters above sea level. The remaining areas, comprise the Highland AEZ, hilly-to-mountainous areas with interspersed high plains at over 1,000 meters above sea level. The desert plains and steppe zones are hostile areas for most agriculture. The Highlands receive the most rain (over 1,000 millimeters annually), but the area is better suited for livestock grazing than for crops. Consequently, most of Uzbekistan's annual and permanent crop production resides in the limited areas of the Piedmont AEZ. This range of AEZ and also the change in altitude enable a wide range of horticultural crops to be produced across a broad season of supply which was well understood by agronomists, but more recently, there have been some alternate interpretations of the plant requirements in terms of adaptability to changed environments and climatic conditions. This has resulted in some planting of expensive (to establish) crops being grown in areas which were previously considered unsuitable—results are not yet clear, due to the fruit trees in question not yet reaching full maturity. However, the trees are already indicating some interesting and unusual growth traits which are perhaps portentous in terms of farmers' investment and anticipated future income. A land use map (land cover) for Uzbekistan can be seen at Annex 1 to this report and broadly reflects the three AEZ's indicated above.

[13] Center of Hydro-Meteorological Services, 2008.

B. Soils

32. The soils of the desert zone, occupy around 14 million ha (32%) and all of them are low in fertility, with a very low humus content of <1%, have a low absorption capacity, high carbonate content and are affected by salinity. Above the lower piedmont plains (from 200 to 700-900 m altitude) the soils are classified as light, typical and dark grey soils, occupying an area of 6.7 million ha (15%). These grey soils have a higher humus content (up to 2%–3%) and are less subject to salinization (except light grey soils). Those soils classified as "typical grey soils" are the most valuable land fund for both rain fed and irrigated agriculture. Hydromorphic soils (meadow-desert, meadow alluvial) occupy 3.8 million ha (9% of the total). They are subject to natural and secondary salinity and irrigation erosion and distributed in all regions of the country, but are mainly concentrated in the middle and lower reaches of rivers, the Aral Sea basin and closed depressions. Between 1,200 to 1,600 meters above sea level there are brown and light-brown soils of different capacities which have humus content from 1.5% to 8.0%. These areas suffer from erosion and because of steep slopes are primarily used as pasture land.

33. A significant issue for crop production in Uzbekistan is the very low humus content of the soil, which is well documented,[14] most soils in Uzbekistan have low water and nutrient holding capacity because of their fine sandy texture, low organic matter content and degradation caused by extended periods of cotton monoculture. With the current practice of removal of virtually all organic materials left over from previous crops from the fields at harvest or before subsequent soil cultivation, coupled with limitations on availability and access to other commonly used organic soil additives, such as animal manure has left the soils in a poor state of natural fertility which has long been compounded by the lack of proper crop rotation across large areas of the available arable land.

C. Broad Indicators for Agriculture

34. According to Government statistics, the total land area of the Republic of Uzbekistan is 44,110,300 ha, of which 46% or 20.4 million ha is categorized as agricultural lands and therefore potentially suitable for crop or livestock production. As of 2014, the area of cultivated lands used by the agricultural sector, constituted 20% of the area designated as suitable for agriculture, or an area of just more than 3.6 million ha. Production is spread across all 12 regions of Uzbekistan and cotton is grown in all regions, although some districts are designated as non-cotton producing. As a result, farmers in these areas do not have to meet any government enforced quota for cotton production, although they may be required to meet production quotas for wheat according to the designation of their farm and the soil classification. Instead, in these areas most farmers produce "cash crops" which are mainly horticultural crops and sometimes fodder crops such as maize or occasionally oil crops like sunflower. A detailed breakdown of crop production areas for Uzbekistan on a regional basis can be seen at Annex 2 – Administrative Map of Uzbekistan and Production Areas by Regions.

35. Because of the hot dry climate, almost 95% of the cultivated area has to make use of irrigation to produce crops (3.36 million ha). According to the State Statistical Committee of Uzbekistan in 2012, 2.86 million ha of the irrigated area was being used by farmers and 0.43 million ha was being used by *dekhan* farmers.

[14] Qushimov, B., Ganiev, I.M., Rustamova, I., Haitov, B., Islam, K.R., 2007. Land degradation by agricultural activities in Central Asia. In: Lal R, Sulaimonov M, Stewart BA, Hansen D, Doraiswamy P (eds) Climate change and terrestrial C sequestration in Central Asia. Taylor and Francis, New York, pp 194–212.

36. Table 2 below clearly shows that there has been a moderate, but noticeable decline in the areas of cultivated agricultural land and further reductions in the areas of crops sown in the period between 2010 and 2014, including on irrigated land. This reflects the problem of increasing soil salinization and also the issues with both soil quality and timely availability of water at some of the outlying farms. Further issues with maintenance of irrigation and drainage systems have also added to the declining areas being sown with crops. Increased interest in livestock production which since the breakup of the state farming system has been predominantly in the hands of the *dekhans* has also put heightened demand on the very limited availability of grazing areas. Following relaxation of rules regarding the type of use of mixed farms (those who are permitted to carry out a number of activities besides cotton and wheat production) and further government interest and support for improvement in the livestock production base[15] then there has been some moves to increase availability of grazing areas and production of fodder crops, including some permanent pasture lands which can be used for the dual purpose of grazing and / or hay production depending upon the season.

Table 2: Key indicators of Agriculture of the Republic of Uzbekistan

Indicators	Unit	Years 2010	2011	2012	2013	2014	Change 2010 to 2014
Total land area	‘000 ha	44,410.3	44,410.3	44,410.3	44,410.3	44,410.3	0.0
Area of agricultural land	‘000 ha	20,487.7	20,473.5	20,481.1	20,469.1	20,417	-70.7
Irrigated land	‘000 ha	4,213.2	4,212.2	4,211.4	4,212.8	4,204.9	-8.3
Sown area of agricultural crops	‘000 ha	3,708,4	3,601.6	3,628.1	3,658.6	3,678.2	-30.2
Sown area of crops on irrigated land	‘000 ha	3,387.9	3,292.8	3,355.,9	3,341.5	3,357.8	-30.1
Agricultural Products included:	Billion, Uzsoum	16,774.7	21,422.3	27,164.2	34,201.4	36,957	+20,182.3
crops	%	59.8	59.6	60.8	62.0	59.0	-0.7
livestock	%	40.2	40.4	39.2	38.0	41.0	0.7

* According to the exchange rate of Central Bank of Uzbekistan as of December 31 of the current period.
Source: The State Committee of Uzbekistan on Statistics. (2014) "Agriculture in Uzbekistan." Statistical Yearbook. Tashkent. 2014.

37. While cotton and cereals are grown in all areas of Uzbekistan, vegetables and fruits are traditionally only grown on a larger scale in areas where cotton is not a specified crop and where conditions are more suitable, such as where soils are less saline and also closer to areas of population density. Peri-urban areas of Fergana valley, Tashkent and Samarkand all have a high proportion of intensive fruit and vegetable production, while Surkhandariya in the far south is a producer of out of season vegetables and fruits thanks to the more favorable winter climate. Melon and water-melon plantations are mainly allocated in the steppe areas of Karakalpakstan, Djizzakh, Sirdarya, Khorezm, and Kashkadarya regions. Oil producing crops are predominantly grown in the less fertile and salted lands of Karakalpakstan and Djizzakh regions, as well as in the mountains and hilly areas. However, in each region, there are districts that tend to specialize in production of horticultural crops. Districts in each region where horticulture is a significant

[15] Presidential Decree–No # 842 dd. 21st April 2008 on “Additional Measures for Strengthening livestock expansion in Household plots, *Dehkan* and private farms and Increasing Livestock Production.”

activity can be seen in Annex 3. A total of 66 districts are identified across all regions. *Dekhan* farms (which have no formal control on type of production) in all areas produce horticultural crops, primarily to support the family unit, but also with the intention of generating some cash income from surplus production.

Table 3: The Structure of the Agricultural Crops of the Republic of Uzbekistan (%)

Indicators	Years 2010	2011	2012	2013	2014
The total sown area	100	100	100	100	100
Cereals	45.3	44.6	44.9	44.9	45
including:					
Grain cereals	42.1	42.8	41.1	42.1	42.1
of them wheat	39.5	39.8	38.7	39.6	39.6
Corn for grain	0.8	0.7	1.1	0.9	1
Rice	1.9	0.6	2.1	1.2	1.3
Legumes	0.5	0.4	0.5	0.5	0.5
Industrial crops	38.2	38.5	37.8	37.7	37.3
including: cotton	36.2	36.9	36.1	35.8	35.4
Potatoes	1.9	2	2.1	2.1	2.2
Vegetables	4.7	4.9	5	5.2	5.2
Melons and gourds	1.3	1.3	1.5	1.4	1.4
Forage crops	8.6	8.7	8.7	8.7	8.9

Source: The State Committee of Uzbekistan on Statistics. (2014) "Agriculture in Uzbekistan". Statistical Yearbook.

38. In accordance with the Presidential Decree of 20th October 2008 "On measures to optimize the acreage and to increase production of food crops", the area dedicated to cotton cropping was reduced and the area under grain crops increased by 50,000 ha. Furthermore, there was also support to significantly enhance other crops, such as vegetable, oil and other food crops. More recently, the area of vegetables and melons had increased from 3.4% and 1.0% of all crops in 2000 up to 5.2% and 1.4% respectively by 2013. The structure of horticulture production has more recently been affected by the Presidential Decree; PP-2460 dated 29th December 2015,[16] which has reallocated further land to the sector and also by the earlier Presidential Decree; PP-1937 dated 13 March 2013,[17] which dealt with viticulture. More detail on these reforms is provided in the later sector of the report dealing with horticulture.

39. Under the direction of the Cabinet of Ministers, land use and cropping patterns have been changed several times to meet new government policy directives, by optimizing the crop for cotton and increasing of areas under grain crops, vegetables, horticulture and viticulture. As a result, between 1991 and 2013, grain crops grown on irrigated land increased in area 5.5 times. Cotton was reduced during this period, often on better soils with good irrigation access. The cotton areas were reduced in Andijan region, and Kasansay and Chartak district of Namangan region, Urtachirchik district of Tashkent region, Uzbek and Buvayda district of Ferghana region, and in Asaka (Andijan region) Yangiyul (Tashkent region) and Jambay (Samarkand region) districts. As a result, more than 30 thousand ha of irrigated land were released, which were subsequently typically used for crops such as vegetables, potatoes, orchards and grapes. Subsequently, for the period 2012–2014, the production of vegetables increased by 16.3 %, melons - 16.6%, fruits - by nearly 21 %. Meanwhile, during 2010–2014 as part of a program of support by government, the introduction of modern planting materials (from

[16] PP-2460 dated 29 December 2015 - On further reformation and development of the agriculture sector in the period 2016–2020.

[17] PP-1937 dated 13 March 2013 - On further development of viticulture in the Republic for the period 2013–2015.

Europe) lead to the creation of new orchards on an area of almost 50 thousand ha, including more than 14 thousand ha of intensive orchards, as well as vineyards on an area of 23 thousand ha.[18] Further reforms, to support improved logistics, processing and exports for a number of activities[19], but including horticulture have also been indicated in the sector plan for 2016–2020 detailed in the Presidential Decree PP-2505.[20]

40. The broad agricultural sector has been extremely important to the Uzbek economy, primarily through its cotton production with Uzbekistan being currently rated as the 6th largest producer of cotton in the world with total area under cotton in 2014 of 1.28 million ha with production reaching 3.40 million tons. However, in 1991, total production amounted to 4.65 million tons, 37% higher than the 2014 figure.

41. Cotton production remains strictly ordered by Government to ensure that production levels are maintained. The national average yield of cotton in 2014 was 2.66 tons per ha. Over recent years, average cotton yield has remained fairly stable with average yields in 2005 of 2.55 tons per ha and in 2012 of 2.64 tons per ha. There is a significant variation in yields by province, ranging from 2.08 to 3.18 tons per ha. In calculating the annual financial support for cotton producers, the government uses a yield "norm" or target yield of 2.4 tons per ha. The national average yield in 2014 was 10% higher than this norm, though for a number of provinces the average yield was below or only marginally above the norm.

42. Studies undertaken by the United States Department of Agriculture who monitored reported yields across the major production areas have highlighted the fact that average cotton yields in Uzbekistan have failed to match worldwide trends over the past 20 years with the result that the gap between yields in other major producing countries and Uzbekistan has gradually widened as modern technologies have been adopted on a wide commercial scale. Even India which traditionally has a low input low level technology approach has seen a steady rise in average yields[21] so that it now almost matches typical Uzbek cotton yields. This is clearly indicated in the chart at Figure 3.

43. With typical cotton production in Australia and the U.S.A. being carried out without use of irrigation, the contrast with Uzbekistan where irrigation of cotton is the norm, but average yields have declined is even starker. This reinforces the view of inefficiency of irrigation water use, lack of investment in technology, use of outdated varieties, poor management of production inputs (primarily fertilizers) and soils.

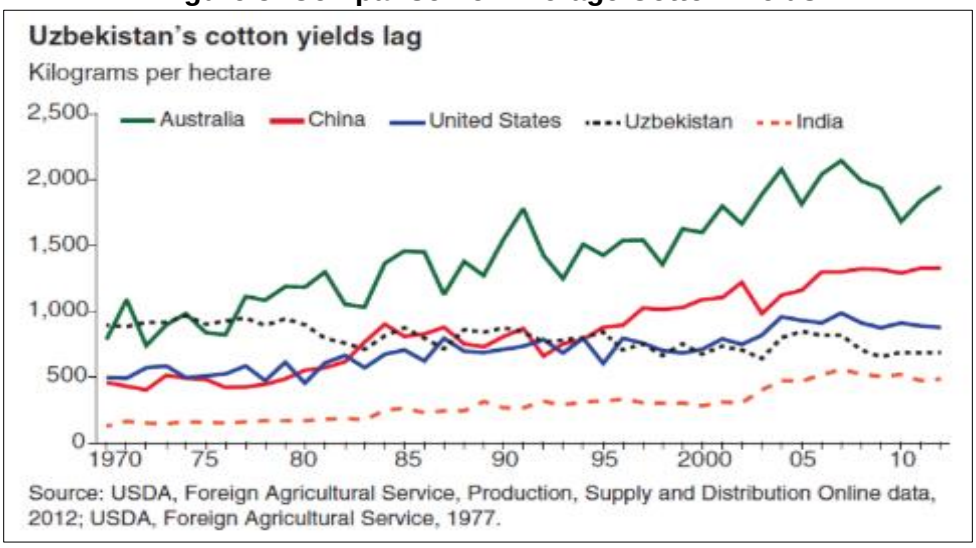
[18] Karimov. The report in the meeting of the Cabinet of Ministers dedicated to the socio-economic development in 2014 and the most important priorities of economic program for 2015, 17 January 2015.

[19] Not including cotton or cereal crops.

[20] PP-2505 dated 5 March 2016 - On measures to further develop the raw material base, expansion in processing of horticulture, meat and dairy products, increasing foodstuffs production and export within 2016–2020.

[21] But cotton (GMO) was first approved for widespread commercial sales in India in 2002.

Figure 3: Comparison of Average Cotton Yields



44. With strict controls imposed by Government on areas of cotton to be produced, quotas on yields to be achieved per ha on each farm and monopolization of cotton procurement through the state system at predetermined price levels, then incentives for farmers to increase production over the programmed target yields are minimal. Instead, farmers focus on achieving the specified target yields with the minimum of input and expenditure and instead focus their efforts on production of other crops where there is incentive to be gained—namely in wheat production which although also subject to state controls on area and setting of target yields, does allow farmers to market up to 50% of the crop themselves through the open market for cash payment once they have fulfilled the requirement of their State Order. This has certainly appeared to incentivize farmers to pay greater care and to invest more into their wheat production than cotton production and as a result, yields per unit area have risen along with farm income. Similar farmer attitudes can also be noted in the horticulture sector where significant increases in unit yield are also apparent in fruits and vegetable crops which have traditionally not been subject to state controls on production or marketing.

45. Wheat is the second major crop produced in Uzbekistan, with Government reporting a total grain yield of 8.05 million tons in 2014/15 production season, out of which approximately 93% (7.5 million tons) is considered to be wheat. Increasing grain production was especially important following independence as government policy focused on aspects of national food security, during this period Uzbekistan pushed hard to increase grain production, moving land and resources into the sector and the country changed from dry land wheat cultivation practices to production on irrigated land. This policy has gradually paid benefits in increased yields (wheat yields on irrigated land are nearly always higher than on dry land) and thus higher levels of production of wheat and flour. However, it has also led to a diversion of resources, such as land and irrigation water away from cotton, but also traditionally high-value fruits and vegetables to wheat, a relatively low-value crop. Annex 4: Crop Areas and Crop Pattern on Irrigated Lands in All Farm Types in 1991–2013, clearly shows the increase in wheat production over the period at the cost of other crops, including cotton, but also indicates significant drops in fodder production areas and also melons and gourds (area of vegetables generally dropped following the introduction of wheat into the cropping pattern, but have subsequently grown back to slightly above previous levels from 1991).

46. FAO statistics suggest that overall wheat yields in Uzbekistan are about 4.6 tons per hectare, reflecting a mix of both rainfed and irrigated wheat. With the initial push for wheat grain self-sufficiency, government encouraged farmers to sow wheat on any available land, both irrigated—when the new relaxations on land use for wheat came into force in 1995, but also on rainfed land much of which was of poor quality and in areas where precipitation was at best marginal but this policy has now moderated and total areas devoted to cereals have declined somewhat in recent years The country is one of the world's largest cotton producers, with cotton being one of its primary export earners. Other significant agricultural products include raw silk, fruits, vegetables, grapes, melons and watermelons, significant quantities of which are exported to neighboring countries. After the most recent changes in land allocation, the area dedicated to higher value crops has again increased and is planned to increase further by 2020 (sector plan for 2016–2020 detailed in the Presidential Decree PP-2505), primarily at the expense of cotton areas, but also to a lesser extent cereal crops.

47. Recent developments have also seen the establishment of 2,135 ha of protected agriculture mainly under simple plastic covered structures, the bulk of which are used to produce intensive vegetables and herbs out of the main production seasons. These are predominantly in the hands of *dekhans* or on gardens where there are no limits on the type of cropping that may be practiced or how the crops are to be used or marketed. The rapid increase in area has subsequently caused overloading of the gas supply system in winter and early spring resulting in gas shortages and the Government has now moved to limit further uncontrolled expansion of protected agriculture.

48. According to the report of the Prime Minister of Uzbekistan for 2014, there were 73,588 farms in Uzbekistan[22] working on 5,939,000 ha of agricultural land, each averaging 80.7 ha in farm size. From out of that total, 39,691 farms specialize in cotton and wheat production on 4,011,068 ha, averaging 101.1 ha in farm size.

49. The planned transition of 19,000 cotton and wheat farms into multi cropping farms under government supervision took place in 2014. Further release of land from cotton has also been undertaken in 2015, with the express intention of supporting the increased production of higher quality horticultural crops – PP2460 (29th December 2015).[23]

50. At various times since independence, government has acted to allocate land to farmers (a summary of this process can be seen at Annex 9), but this is still strictly controlled and farmers and other users only have "land use rights" as all land remains state property. In this case, the full value of land has not been realized as a true market does not exist. Options on most use of land is also still controlled by state order and enforced by the local administration.

D. Improvements to Food Security

51. Improvements in agricultural productivity since 2006 has led to an increased availability of foodstuffs and a knock-on effect on consumption with meat consumption per capita, up by 130%, milk and dairy products up by 160%, potatoes up by 170%, vegetables up by more than 200% and fruits up by almost 400%. Currently, 16 million tons of fruits and vegetables are produced in the country annually which equates to approximately 300 kg of vegetables, 75 kg of potatoes and 44 kg of grapes per capita, which is about three times higher than the optimal

[22] Subsequent farm size optimization has significantly increased this number.

[23] PP-2460 dated 29 December 2015 «On further reformation and development of the agriculture sector in the period 2016–2020·

consumption rates. However, the Ministry of Health recommends an annual per capita consumption of 46.1 kg of meat, 156.3 kg of milk and milk products, and 295 eggs. The UNDP report – "Food Security in Uzbekistan" indicates that these targets were not being met and while this report was dated 2010, the subsequent growth of a coordinated livestock sector which is still in the early stages of development, coupled with increased population growth would indicate that it is unlikely that production has been able to match this level of demand.

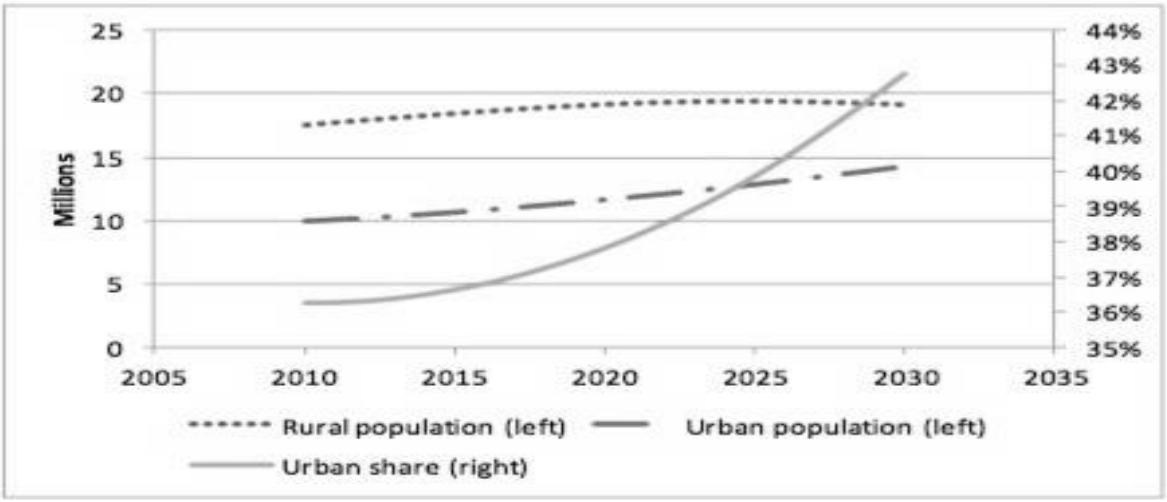
52. The same UNDP report concluded that the average person's diet in Uzbekistan is skewed towards grains, but that the situation is gradually changing. It did call for specific government measures to stimulate the consolidation of the livestock sector, improve animal productivity, expand the fodder production base, and also to reduce tariff and non-tariff barriers for international trade in livestock products. The overall feeling, which is also echoed in the UNDP report, is that food availability in Uzbekistan is adequate in terms of calories and that generally speaking Uzbekistan has a secure supply of food at the national level. There are some concerns about the high reliance upon cereals, especially among rural populations where household income is less, and it is also true that as incomes develop, then there will be increasing demand for livestock products which will add further demand in a sector which is currently under performing.

53. Even so, given that some limitations still exist, there has been a significant improvement of the structure and diet since independence which along with the other factors, has brought about positive change and beneficially impacted on the public health. As a result, during the years of independence, the average life expectancy in Uzbekistan increased from 66 years to 73.5 years.

E. Rural / Urban Population Spread and the Role of Women

54. Although poverty officially halved in the last 10 years, geographic disparities remain among regions and the poorest ones are those with largely rural populations and low population densities. Female poverty tends to be higher, particularly in rural areas. Despite women's prominent role in agriculture, gender imbalances exist in the control over productive resources. Women tend to occupy low-paid positions. Most enterprises started and operated by women are informal small-scale cottage industries or home-based production.

Figure 4: Rural / Urban population spread



Source: FAO and World Bank.

55. Despite women's prominent role in agriculture, gender imbalances exist in control over productive resources. Women tend to occupy low-paid positions (women's salaries are only 82% of men's salaries in the agriculture sector). Women make up the majority of land users and workers of *dekhan* farms. Although women represent a large proportion of water users for agriculture production, they make only a small minority of WUA members and an even smaller number of association leaders.

56. Women in the agriculture sector are traditionally employed as cheap labor, both in production, but increasingly in harvesting & market preparation and this role is likely to continue, even in the introduction of agro-processing facilities which will create jobs, but mainly at a low skill level. On *dekhan* farms, the family unit as a whole works together to grow and produce the harvest. The women of the household will be an integral part of the production process but are unlikely to play a key role in any management or decision taking. Families with more women are under a higher poverty risk. Poverty risk becomes particularly high for families with children of pre-school age. The necessity to take care of children does not allow women to be active on the labor market and forces them to give up looking for a job. In such conditions, women could work on a garden plot and market their own agricultural products.

57. Out of a total of 160,752 registered farms in 2016,[24] there are only a total number of 4,500 farms registered to women.[25]

III. ORGANIZATION AND MANAGEMENT OF AGRICULTURE SECTOR

A. Ministry of Agriculture (MOA)

58. The **Ministry of Agriculture**[26] is responsible for the formulation and promotion of policies and strategies related to the development of agriculture and water resources across Uzbekistan. It is also responsible for matters related to the protection of animals and plants from pests and diseases; management and regulation of water resource availability and use; and the design, construction, and maintenance of water storage, delivery, and drainage infrastructure (for irrigation).

59. **Research**: The principal agricultural Research and Development (R&D) agency is the Uzbek Agricultural Research and Production Centre (UARPC), which does research on agriculture sector under the Ministry of Agriculture (MOA) of Uzbekistan. Most research is carried out by 45 research institutes and research stations of the UARPC, and research labs in Universities. Research centres also provide advisory services based on extension principles, and assist the national government in formulating agriculture policies. The presence of two CGIAR centres in Tashkent - International Centre for Agricultural Research in the Dry Areas (ICARDA) and Bioversity International - is an advantage, supporting and promoting research in the framework of the Eco-Regional Collaborative Research Programme for Sustainable Agriculture Development in Central Asia and the Caucasus.

[24] Post recent optimization.

[25] Information from the Uzbek farmers Council.

[26] As of March 2018, the Government has been undertaking institutional reforms in various sectors including agriculture, natural resources and rural development. Among these reforms, the Ministry of Agriculture and Water Resources has been divided into two ministries, namely the Ministry of Agriculture, and the Ministry of Water Resources. A due diligence will be conducted in association with URM for ADB's better understanding of the sector assistance implications as soon as the Government finalizes the organizational structures and mandates of each new ministry.

60. CGIAR centres have long held relationships with colleagues Uzbekistan and there is a strong record of collaborative work with a number of research and educational institutions centres of Uzbekistan, in the framework of a partnership between CGIAR and the National Agricultural Research System (NARS). Examples include:

(i) Crop improvement for cereal and legume species, with the identification of new varieties well adapted to limiting climate and soil conditions (e.g., the salt tolerant wheat variety “Dustlik”, which is planted on saline soils of Syrdarya region) is undertaken in partnership with the Uzbek Scientific Production Centre for Agriculture, Tashkent State Agrarian University, Galla-Aral Branch of Andijan Research Institute, Kashkadarya Research Institute of Grain Breeding and Seed Production, Uzbeck Research Institute of Plant Industry, among others;

(ii) On-farm trials to check ability of high productivity varieties of fodder crops to tolerate saline/sodic conditions, is undertaken in partnership with the Uzbek Scientific Production Centre for Agriculture at Uzbek Research Institute of Plant Industry, Uzbek Corn Station, Institute of Karakul Sheep Breeding and Desert Ecology, among others;

(iii) Different types of germplasm of potato and vegetable crops and crop varieties resistant to diseases, heat, drought, salinity, are evaluated and developed by the Uzbek Research Institute of Vegetables, Melon Crops and Potato, the Tashkent State Agrarian Institute, the Uzbek Research Institute of Plant Industry, the Mamun Academy in Khorezm region, among others, in collaboration with the International Potato Centre and the World Vegetable Centre; and

(iv) Strengthening high quality seed supply is being addressed by the National University of Uzbekistan, the Uzbek Research Institute of Plant Industry, the Tashkent State Agrarian University, the Uzbek Institute of Karakul Sheep Breeding and Desert Ecology, among others.

61. The Schroeder Institute in Tashkent (also known as M.Mirzaev`s Scientific Research Institute of Horticulture and Viticulture) is the main centre for research and development of tree and other fruit crops (including nuts) as well as grapes. The Institute has recently been collaborating with USAid projects, including the recent “Total value chain approach to horticulture” which aims to improve competitiveness of selected horticulture value chains through targeted institutional and human capacity building. It includes the following interventions: (i) technical assistance to improve production, pre-harvest, post-harvest and processing techniques (e.g. pruning, grafting, improved cold storage) and to produce Uzbek language manual on horticulture themes; (ii) training through field demonstration plots (40 plots over 44 ha) to teach best practices, including efficient water management such as drip irrigation, and exchange program with California; (iii) marketing improvement to increase the profile of Uzbek horticulture in international markets (e.g., Russia, Kazakhstan, Germany, UAE).

62. The Institute facility located on the outskirts of Tashkent includes laboratories and greenhouses that are used for research in plant breeding, cultural management, mechanization, and physiology and biochemistry of crops. The Institute maintains an extensive and unique field gene bank of more than 2000 advanced accessions of apples and pears, about 1,300 grapes, 260 citrus, 500 apricots (Prunus armeniaca L.), 270 peaches (Prunus persica L. Batsch.), 65 plums (Prunus domestica L.), 125 brambles, and 150 nuts {walnuts (Juglans regia L.), almonds [Prunus dulcis (Mill.) D.A. Webb.], and hazelnuts (Corylus avellana L.)}. The Institute also has collections of dates (Zizyphus jujuba Mill.), figs (Ficus carica L.), persimmons (Diospyrus kaki L.), pomegranates (Punica granatum L.), and other fruits (Esenbaev et al., 1981).

63. There is also a total of 17 subsidiary research centers located in the provinces that fall under the overall management structure of the Schroeder Institute. Following the changed government policy on the horticulture sector, the Institute has been active in propagating improved fruit trees on improved dwarfing rootstocks—a total of 5.5 million trees have been produced by the Institute in the past 5 years and subsequently distributed to Uzbek farmers with the aim of improving and intensifying orchard production. Planting material from the institute is highly demanded because of its quality and the institute's reputation, but also because the institute's material is generally less expensive. For example, in the summer of 2012, the price of one sapling (apples, cherries, grapes, etc.) was SUM5,000–SUM6,000 ($2.5–$3.0), while the price of identical imported material was $5–$6. In addition to these formal outlets, many *dehkan* farms produce and trade their own seeds and saplings.

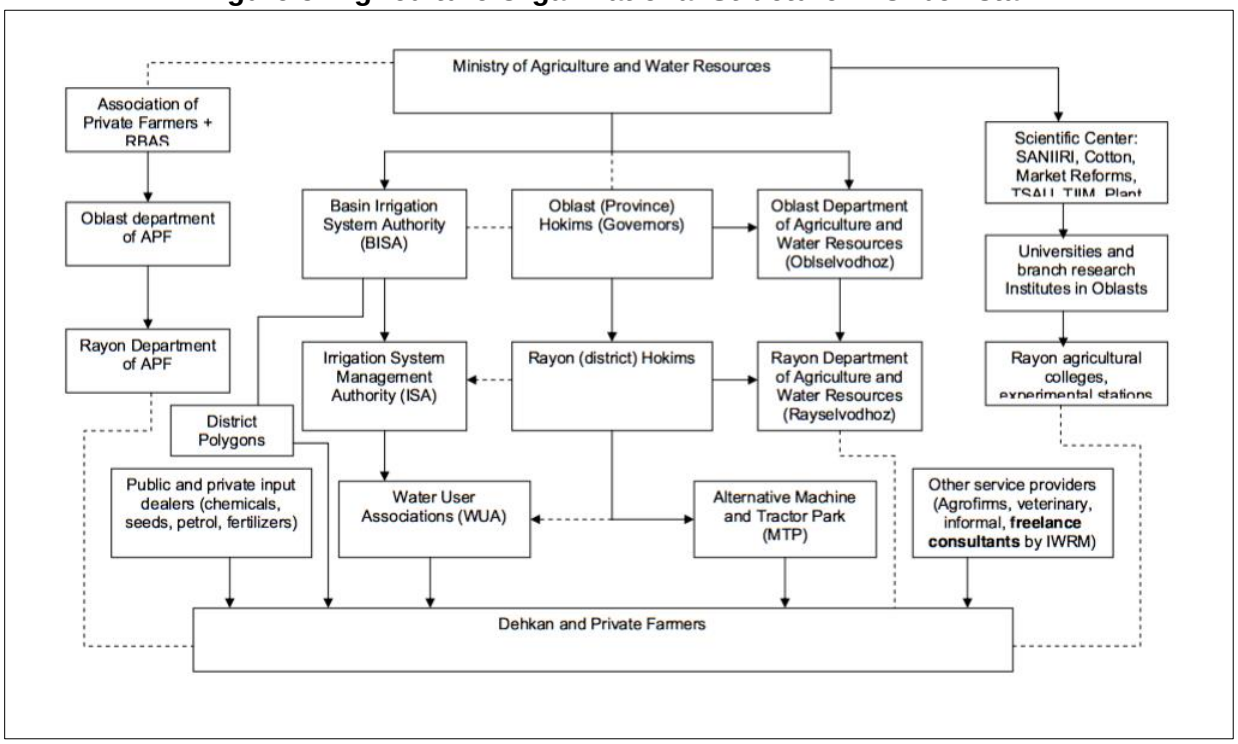
64. The Uzbek Research Institute of Vegetables, Melon Crops and Potato is the main center for vegetable seed development and main research for the vegetable, melon and potato crops. It is located in Zangiota district around 25 km from the center of Tashkent City. During the recent past it has worked to create 44 new varieties of vegetable, including 11 varieties tomatoes, 3 varieties cabbage, 3 varieties onion, 2 varieties carrot, 2 varieties cucumber, 7 types of greens, 8 varieties of melon and 3 varieties of watermelons.

B. Agricultural Extension Services

65. While the Government of Uzbekistan has always recognized and supported the continued development and growth of the agriculture sector which numerous programs introduced over the years to improve cotton production, following independence the increase in wheat area and productivity to support security of grain supply and more recently the gradual awareness of the importance of the horticulture sector to the national economy has also resulted in changed policy approach and increased support. All of these changes reflect the need of the government to build a sustainable agriculture system, partly because of the significant contribution to the national GDP, but also because of the high levels of rural employment that ensue with an active agriculture & horticulture production base. While the main agriculture production can be guided and controlled through the local state organizations, particularly the Khokimats, this has proven less effective for the horticulture sector which is mainly made up of the millions of *dekhan* farms and the small farmers. This is in significant need of advisory and technical support to further enhance development and transformation in to a modern industry.

66. During the past several years, government is trying to establish ways for sustainable development of the sector. The Ministry of Agriculture (MOA) has been made responsible for the coordination of all agricultural activities including extension services to farmers in Uzbekistan, but suffers from limited budget resources from which to really establish new initiatives. Instead, while the structure shown in Figure 4 indicates an extensive management network, this is primarily effective for cotton and wheat support.

Figure 5: Agriculture Organizational Structure in Uzbekistan



67. As a part of the sector reforms over the past 20 years , MOA has initiated several reforms including (i) creation of private farms in the territory of old shirkats; (ii) establishment of Association of Private Farmers (APF) with offices in each oblast and rayon; (iii) introduction of Basin Irrigation System Authorities (BISAs) within inter-farm systems and Water Users Associations for on-farm systems (WUA); (iv) creation of Alternative Machine Tractor Pools (AMTP); and (v) formation of agro-firms to assist the dekhan and private farmers involved in fruit and vegetable production.

68. In this process, there have not been any concerted efforts to develop the necessary technical advisory services that the small intensive fruit and vegetable producers need to keep them informed and aware of world best practice. This industry moves and develops quickly but Uzbekistan has lagged behind in this development to a certain extent. Several attempts have been made to try and establish extension or advisory services within the framework of development projects, but these have generally proven short lived once the project funding ceases. There are still several organizations that provide limited agricultural extension services in Uzbekistan. Some of these organizations are government funded, some NGOs, universities, farmers' associations, research institutes, and others. These organizations are:

(i) Association of Private Farmers (APF)
(ii) Rural Business Advisory Services (RBAS)
(iii) Agricultural Service Center
(iv) Agrofirms
(v) Basin Irrigation System Authorities (BISA)
(vi) Rayon Agriculture and Water Resources Authorities (Rayselvodkhoz)
(vii) District Polygons initiated by MOA
(viii) Water Users Association (WUA)
(ix) Alternative Machine Tractor Pools (AMTP)

(x) Academic and Research Institutes: Uzbeks Agriculture and Production Center, Tashkent State Agrarian University.

69. Development of agricultural extension service in Uzbekistan is becoming a matter of national importance, particularly in respect of the stated aim of significant development for the horticulture sector and development of high quality exports. However, there is no national policy framework on extension service development, which could ensure political and financial commitment of the government and other stakeholders. An effective extension service national policy framework needs to be developed and should indicate national agricultural development priorities; outline the organizational structures necessary to implement these priorities and the corresponding institutional linkages, and the extent and nature of the commitment to encourage farmers. At present, for the farmers involved in fruits and vegetables production, there is only an informal extension services in practice provided primarily through the international input suppliers (Syngenta, Agrico, Enza Zaden, etc.) sometimes in conjunction with aid programs. This support is generally well received and in high demand but is not coordinated and therefore less effective in having a sustained impact.

70. At present there is a significant need for capacity development of practically trained horticulturalists who have experience of modern practices and methods and who can provide real practical management support and technical advice to the developing agribusinesses that are starting to invest in the horticulture sector.

IV. OVERALL AGRICULTURE SECTOR PERFORMANCE

71. In line with the overall growth in the general economy, agricultural GDP in Uzbekistan has grown significantly since 2000. Over the three years 2010–2013 it grew at an annual average rate in nominal terms of 9.8%. However, the expansion of and higher rate of growth in other sectors, largely as a result of significant government-financed investment programs, resulted in a decline in the contribution of the agriculture sector to GDP. In 2000, agriculture accounted for 30.1% of GDP. This had fallen to 25.1% by 2005 and 17.2% by 2015,[27] while in the same period, the share of cotton and wheat, traditionally regarded as strategic crops, in GDP also declined. The share of cotton production in GDP declined from 3.6% in 2000 to 2.3% in 2013. Over the same period the contribution of grains to GDP fell from 3.4% to 2.4%.[28] Meanwhile, the combined share of fruits and vegetables (including potatoes) increased from 5.2% to 10.6%. At present, Uzbekistan's agricultural sector generates about 20% of foreign exchange earnings and it provides not only food for the population, but it is also an important source of raw materials for many other sectors of the economy. It provides approximately 90% of domestic food production.[29]

72. A small decline in the significance of agriculture in respect of employment was indicated by statistics—in 2000 agriculture accounted for 34.4% of employment but only 32% in 2015.[30] Men account for 52% of the workforce and women 48%.

73. There is the significant difference between regional share of employed in agriculture sector. The highest indicators of employment in the agriculture sector are in Jizzakh (44%),

[27] World Bank group–Uzbekistan Partnership: Country Program Snapshot 2015.
[28] Uzbekistan State Committee on Statistics. 2014. *Statistical Report 2014.* Tashkent.
[29] Agriculture in Uzbekistan, Statistical yearbook, Tashkent. 2014
[30] Uzbekistan State Committee on Statistics 2015.

Sirdarya (46%) and Khorezm (36%) regions and the lowest in Navoie region (22.3%).[31] The sector is also an extremely important source of income for the 4.7 million rural households that operate dehkan farm plots. On this basis, agriculture is probably the most significant sector of the economy of Uzbekistan for most families and plays an important role in ensuring economic and social stability buffering the effects of reform. Production of typical agricultural products (cotton & wheat) accounted for activity at 85% of farms, 13% of *dekhan* farms and 2% of farm enterprises.[32] Horticulture products are produced in all regions of the country and the largest producers of vegetables are in Andijan, Samarkand, Surkhandarya and Tashkent regions, which account for almost 60% of the gross harvest of all vegetables produced in the open land of the country.

74. The volume of overall agricultural production in terms of both quantity and value shows a tendency to increase in the recent years. This is primarily driven by the small-scale producers,[33] usually operating at a family level with low costs rather than the industrialized cropping of cotton. Cotton volumes are the only exception, stagnating at around 3.4 million tons per annum in the last five years (Table 4 – Crop production volumes). The share of cotton and wheat, which are traditionally seen as strategic crops, reduced in GDP terms where cotton sector share of GDP decreased from 3.6% in 2000 to 2.2% in 2014. During the same time period, the cereals sector contribution to GDP also decreased from 3.4% to 2.2%.[34] At the same time, the combined share of fruits and vegetables (including potatoes) showed an opposite increasing trend from 5.2% to 10.6%. The changes have also impacted on the area of employment. In 2000, the share of agriculture in employment was 34.4%, but this has also steadily declined and in 2013 had declined to only 27.1%.[35] This is due to a number of factors; consolidation of land holdings into more economically viable size of enterprises following the introduction of Presidential Decrees[36] on land optimization has resulted in numbers of unqualified and inexperienced land owners being disenfranchised, increased and improved mechanization of grain and cotton production, rise of the *dekhan* farm as a production unit which employs primarily family labor, often as a secondary part time job (which is not recorded as actual employment) all contribute to the change, along with steady migration of rural populations to seek greater employment opportunities in major cities or in other countries (primarily The Russian Federation or Kazakhstan).[37] Subsequently employment in agriculture has rebounded following further optimization of horticulture farm sizes in December 2015 as government remains committed to reducing unemployment in rural areas. Statistics show that national agriculture production fulfils 90% of domestic demand for agriculture products and 70% of domestic trade.

75. The total area of cultivatable agricultural land has remained fairly constant during the recent past as indicated in Annex 5: The total area of cultivated arable land by region '000 ha, which shows that the overall area has declined slightly from 4.07 million ha in 2010 down to 4.04 million ha by 2014. This decline is mainly in the Republic of Karakalpakstan and is in the main a reflection of the issues with available water supply and issues with encroaching soil salinization.

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[31] Regional Statistic of Uzbekistan. 2015. Tashkent, Uzbekistan.

[32] Project concept paper, GOU, Tashkent 2015.

[33] Dekhan farmers.

[34] The state statistics committee of Uzbekistan 2014, Statistical report, Tashkent.

[35] ADB. 2014. *Key figures in Asia and Pacific in 2014*. Manila.

[36] Presidential Decrees: “Special Committee for Elaboration of Recommendations for Optimization of Fields of Private Farms” (2008) and “Measures for Further Optimization of Private Farms Fields “(2009).

[37] This trend has reversed following the contraction in the Russian economy.

76. A similar small decline in total area of irrigated land is also reflected in data from MOA which shows that the total area dropped from 3.31 million ha in 2010 down to 3.29 million ha by 2014. The full regional breakdown can be seen at Annex 6: The total area of irrigated arable land by region '000 ha. Ongoing issues with regard to the investment in maintenance of the canal network continue to put a strain on the system as noted in ADB's own Sector Assessment in the CPS. Issues with increasing soil salinity in irrigated crop production areas are also highlighted by Annex 7: Irrigated area with saline soils by region, 2010. While this issue can be addressed to a certain extent in field scale cropping of crops like cotton and wheat where it is possible to leach excess salts from the soils in autumn and winter periods, (although it is inefficient in terms of water use) this is a more significant problem for horticulture crops which are appreciably less tolerant of soil salinity than either cotton or wheat – Annex 8: Selected crops salt tolerance – FAO Guidelines.

77. The government retains a strong management role in planning and organization of the agriculture sector with land user rights being directly linked to satisfactory compliance with centrally planned production of the major crops (cotton and wheat) and subsequently administered through central government organizations at several levels, plus locally based officials through the respective Hokimyats, tax authorities and Village Councils. Under this system the strategic crops produced in the country, continue to be directed by the strictly controlled central planning activity for both the production and marketing of cotton and wheat with farmers subjected to quotas to grow large areas with subsidized credits and inputs. Traditionally the same has not been true with regards to horticultural production, where government has generally taken a relaxed view on the sector, but recent changes in 2016 have seen directives issued which begin to exert more direct intervention, primarily as a result of the identified opportunity in near export markets (greater detail is provided in later sections of this document under "Uzagroexport").

A. Production areas and land use

78. According to Government statistics, the total land area of the Republic of Uzbekistan is 44,110,300 ha, of which 46% or 20.4 million ha is categorized as agricultural lands and therefore potentially suitable for crop or livestock production. As of 2014, the area of cultivated lands used by the agricultural sector, constituted 20% of the area designated as suitable for agriculture, or an area of just more than 3.6 million ha. Production is spread across all 12 regions of Uzbekistan and cotton is grown in all regions, although some districts are designated as non-cotton producing. On a worldwide basis, Uzbekistan is the 6th largest producer of cotton with total area under cotton in 2014 of 1.28 million ha with production reaching 3.40 million tons. Wheat is the second major crop produced in Uzbekistan, with Government reporting a total grain yield of 8.05 million tons in 2014/15 production season, out of which approximately 93% (7.5 million tons) is considered to be wheat. Independent estimates indicate 50% to 55% of local wheat production is of a quality suitable for food use.[38] Planted area for grain was 1.42 million ha of which approximately 1.15 million were irrigated.

79. Table 4 shows that in line with the official strategy, that perennial (which would include fruit trees) along with hayfields and pastures have increased in area, while other general arable land has decreased in overall area during the period in question. This also reflects the fact that these crops are generally not grown under the system of state order and procurement and are therefore increasingly interesting in terms of potential income generation. Other data presented

[38] Agrochart.com.

later in this document will also show that these crops have illustrated significant unit area growth in productivity, suggesting that producers are investing into these crops, which are perceived as profitable, with the aim of increasing production and achieving all round greater efficiency.

Table 4: Structure of the total land area and usage by agricultural sector

Year	Total land area (Thousand/ha)	Land area by land users active in agriculture	Arable land	Perennials	Hayfields and pastures	Other land[39]
2011	44,110.3	20,487.7	4,052	337.2	11,128.6	4,969.9
2012	44,110.3	20,473.5	4,045.6	343	1,123.7	4,961.2
2013	44,110.3	20,481.1	4,043.4	344.6	11,134.5	4,958.6
2014	44,110.3	20,469.1	4,035.5	354	11,143.8	4,935.8

Source State Committee Uzgeodezkadastr, 2014.

B. Land Tenure

80. In Uzbekistan, land can only be owned by the state, but following the breakup of the former large state controlled farms in the 1990's and continuing through into the early 2000's, government was keen to improve efficiency and effectiveness in the agriculture sector and subsequently while all land remains state owned and very much state controlled, it has now been transferred primarily to farmers (although there are now developing a number of larger company structures that are getting land) who have user rights to "their" land. These farmers all have long term leases with a duration of between 30–50 years. In return, most farmers are given a production quota for both cotton and wheat production which they must meet or risk sanction by various State bodies or possible loss of the land use right. Failure to use the land or any incorrect use of the land (outside of designated category of farm use) is likely to lead to sanction and removal of land user rights. Numbers of local government or semi government organizations (Khokim, village council, tax authorities, police, etc.) monitor the activities at the farm level to ensure that the land is used as per the specified designation and that the correct crops are grown exactly as specified in the annual plan for the area. Failure to meet the standards set in the plan, which includes not only proscribed areas and yields, but also planting dates, varieties, input allocations, irrigation timing, and harvesting period will lead to increasing levels of pressure followed by sanction and removal of the right to use the land which will then be passed to other farmers. Land user rights are not transferable, but they are inheritable. Under such circumstances, most farmers remain reluctant to seriously invest money or resources in soil or farm improvement over and above those required to maintain the production levels at, or slightly above those set out in the annual production plan for the farm. This policy is therefore adding to the issues of continual cotton production on a minimum rotation with winter wheat to further denude the soil resources and fertility.

81. At the same time, rural households were all allocated plots of land, most of which are close to the household but are small in size (0.35–0.5 ha). These were originally intended to provide a significant contribution to the needs of the households own basic food requirement and encourage an element of self-sufficiency. Production on these sites is largely based on the household labor unit, with all family members contributing at key times. Surplus production form the plot is sold on the local or regional market. These "*dehkan*" farms, generally making maximum use of the available space and resources. A large proportion of the vegetable production is from such plots and almost all of the livestock production is also based on the *dekhan* family production system, although animals are grazed on communal grazing sites or on any spare area where vegetation develops (such as roadsides). A recent trend has been out of season vegetable crop on a very intensive system in plastic greenhouses on *dekhan* plots– many families invested into this technology.

[39] Other land includes residential and industrial areas, canals, infrastructure, roads, etc.

82. Between 2002 and 2007, the government undertook a massive conversion of *shirkats*[40] into private leasehold farms. Further reforms following Presidential Decrees: "Special Committee for Elaboration of Recommendations for Optimization of Fields of Private Farms" (2008) and "Measures for Further Optimization of Private Farms Fields" (2009) led to a reduction in the number of private farms and a reallocation of land user rights primarily to more successful farmers with the aim of improving efficiency and effectiveness. As a result, there were about 66,000 private leasehold farms in Uzbekistan in 2010. These farms remain subject to the state's cotton and/or wheat procurement system, unless they have been designated for growing other crops (for example, horticulture or livestock). Starting in 2006, "agri-firms" non-government associations and private firms that participate in the distribution and processing of fruits and vegetables, were established within the horticulture sector. There are currently around 270 agri-firms in the country.

83. The farm reform process has continued over many years with the most recent changes being introduced in December of 2015 and confirmed by the Commission for Economic Reforms in the Agriculture Sector and approved by the Cabinet of Ministers in May 2016. This latest change sets limits on farm sizes, primarily affecting horticulture farms (fruits, vegetables, melons and grapes). This change has been implemented with the aim of reducing farm sizes to increase rural employment (more farms means more farmers and more workers). There were also concerns about the nonperformance of some farms and levels of indebtedness among farms who had invested heavily into fruit orchards (intensive fruit orchards require high levels of initial startup costs and several years of no income before trees are mature and able to produce fruit). As a result, horticulture farm sizes have been reduced in the latest round of "optimization" to a level that Government considers to be more sustainable.

84. A brief summary of the process of farm restructuring that has been undertaken within Uzbekistan since independence can be seen at Annex 9: Farm Restructuring Process 1992–2016

85. Annex 10: Farms by Number, Size and Category of Use (2016) provides a breakdown of farm numbers in each region by category of type of production. This reflects the situation post the last round of farm optimization in May 2016 and clearly indicates the small size of the horticulture sector farm units (this table is an indication of farms, and does not include *dekhan* plots).

86. **Production volumes.** The State Statistical Committee of Uzbekistan reports predominantly increasing volumes of production and subsequent higher average yields for most crops over the period between 2000 and 2014. During this period, wheat has seen significant increases in production primarily in response to the central Government policy target of achieving self-sufficiency; however, quality is not always of a high standard, resulting in continued imports primarily from Kazakhstan primarily for use in the baking industry. Cotton productivity remains stable and does not share the increases in productivity that have been attained in other sectors.

[40] Former collective farm.

Table 5: Crop Production Volume 2000–2014

	2000		2010		2013		2014	
	Volume	**Structure %**	**Volume**	**Structure %**	**Volume**	**Structure %**	**Volume**	**Structure %**
Gross production of all, billion sum	1,387.2	100	15,810.7	100	30,849.4	100	36,957.0	100
Including								
Raw cotton '000 Ton	3,002.4	11.8	3,442.8	11.1	3,361.2	8.9	3,400.2	8.5
Cereal '000 Ton	4,101.4	11.4	7,504.3	10.8	7,804.8	9.4	8,050.5	8.8
Vegetables, '000 Ton	2,644.7	8.1	6,346.5	16.3	8,515.9	14.6	9,286.7	14.0
Potatoes '000 Ton	731.1	2.8	1,694.8	8.6	2,250.4	10.8	2,452.4	11.4
Melons '000 Ton	451.4	1	1,182.4	2.1	1,558.0	2.7	1,696.1	2.6
Fruit '000 Ton	790.9	3	1,710.3	4.7	2,260.9	6.4	2,490.6	7.0
Grape '000 Ton	624.2	2.6	987.3	4.5	1,322.1	6.2	1,441.2	6.1

Source: State Committee of Statistics of Uzbekistan.

87. Private sector development has resulted in significantly increased fruit and vegetable production, mainly through the adoption of more intensive production techniques and the use of modern (primarily imported) varieties.[41] Government has introduced new Decree's on establishment of intensive orchard and vineyard production which has encouraged private sector to expand areas planted. As markets for these crops are predominantly on a cash basis, the pull of the market economy has also further encouraged expansion. This has resulted in significant changes in the contribution to national GDP, with cotton being displaced as the main contributor from the agriculture sector and being replaced by fruits and vegetables, which have a significantly higher unit value. Expansion trends into export markets have also brought increased significance and further value addition, although significant risks remain in the export market because of the low level of logistical development and the very perishable nature of the product. Until 2015, markets were also fairly unregulated and dependent upon mutual trust between seller and buyer (often many thousands of km distant). This expansion was based mainly on the efforts of individuals, although a number of larger enterprises (5) were designated as responsible for large scale exports of fruits and vegetables. Efforts to develop large scale exports were broadly less effective, mainly because of logistical and organizational issues, but also compounded by the low level of price offered in the importing country for large scale exports from Uzbekistan. These initiatives focused mainly on vegetable crops, which are more conducive to bulk handling and are relatively easy to transport (in comparison to the very perishable nature of fresh fruits) and included onions and cabbage.

88. The contribution and therefore the importance of the major crops to the GDP can be seen in Table 6 below which tracks the change that has occurred between 2000 and 2014. While raw cotton has stagnated at just over 2% of total GDP, the contribution of cereals has also dropped back to around the same level of contribution, making a combined raw cotton and

[41] Increasing market penetration of hybrid vegetable seeds and importation of dwarfing fruit tree saplings under Government supported programs–USDA Global Agriculture information Network (GAIN) report on Uzbekistan Fresh Deciduous & Stone Fruits, February 2014.

cereals total of 4.4%. Meanwhile, combined horticulture crops (potatoes, fruits, vegetables, melons and grapes have all become significantly more important, reaching a total of 10.6% by 2014.

Table 6: Breakdown of Major Crops Contributing to Agricultural GDP in 2000–2014

		2000*	2010*	2013	2014
GDP	Billion sum	3,255.6	62,388.3	118,987**	144,867.9****
Agricultural production value	Billion sum	1,387.2	15,811.0	20,949.7**	36,957.0****
Agricultural production as % of GDP	%	30.1	17.5	17.6**	17.2****
Raw cotton	%	3.6	1.9	2.3***	2.2***
Cereal	%	3.4	2.0	2.4***	2.2***
Potatoes	%	0.8	1.4	2.8***	2.9***
Vegetables	%	2.4	2.3	3.8***	3.6***
Melons	%	0.3	0.3	0.7***	0.7***
Fruit	%	0.9	1.1	1.7***	1.8***
Grapes	%	0.8	0.9	1.6***	1.6***

* The main trends and indicators of economic and social development of the Republic of Uzbekistan during the independence years (1990–2010) and forecast for 2011–2015. Statistical Yearbook, Tashkent "Uzbekistan", 2011.
** State statistics committee data, Statistical Yearbook, Tashkent 2014.
*** Calculated based on data from State Statistics Committee.
**** www.stat.uz

89. This reflects the changed importance of the horticulture sector which in this period has benefitted from increased support from a more expansive and supportive government sectoral policy which has encouraged investment into the sector primarily to improve production technology through adoption of improved quality planting materials and intensification of production. This is typified by the rapid growth in greenhouse production (until curtailed by gas shortages) and also the significantly expanded planting of dwarf rooted fruit orchards on an intensive basis, many of which can be seen in the Tashkent area.

V. HORTICULTURE SECTOR

90. The horticulture sector has primarily been in the domain of the private sector in Uzbekistan, with Government traditionally not playing any significant role in organization or development as long as there were sufficient supplies to feed the local population and there was no significant direct competition for resources (land, water, equipment, fuel, labor, etc.) with cotton and wheat, then small farmers and *dekhans* were allowed to develop under their own resources. These crops are particularly interesting for all farmers, being crops which are not controlled by the Government sector in any aspect of marketing, meaning that producers can sell these crops for cash, unlike cotton which is sold through the state procurement system which is basically a "cashless" system operated through the banking system and also wheat, where around 50% of the crop must also be sold in the same way to the state procurement system.[42] In such circumstances, it is therefore not surprising to find that horticultural crops are grown across all areas of Uzbekistan, even in the more arid areas found in Karakalpakstan.

[42] Once farmers have fulfilled their State Order, the remainder can be sold the for cash under current regulations.

A. Production

91. While horticultural crops are widely produced by *dekhan* farmers for own consumption, the main concentration of more commercial production of fruits and vegetables are in Fergana Valley, Tashkent and Samarkand provinces where soil conditions are more suitable and also closer to the main consumption centers. Samarkand (16.8% from total produced fruits and vegetables), Tashkent (15.5%), Andijan (12.9%), Ferghana region (8.7%), Surkhandarya (8.1%), Namangan (7.1%) and Bukhara (6.8%) regions produce the most fruits and vegetables in Uzbekistan. It is also to a certain extent, a reflection of the Government designation of land in certain areas to be "not under the requirements to produce cotton". These areas have greater independence to choose their own cropping and subsequently often focus on fruits and vegetables. In these 'non-cotton" areas, it is common to see vegetables being produced as second crop after winter wheat, with farmers cultivating vegetable, beans and potato or melon crops. Some *dekhan* farms are the main grape and fruits producers in these areas. More recent trend has seen a move to extend the cropping season by investment into relatively low-cost plastic greenhouses—*dekhan* plots in certain areas have been largely taken up by the greenhouses, with the aim of growing "off season" vegetables to market when prices are high. The demand became so intense that the supply of natural gas for household heating was being put under severe pressure by the extra demand for gas from the out of season vegetables in the greenhouses. As a result, government took steps to control the expansion of the greenhouses and their use of gas as a fuel source. This has subsequently resulted in greatly reduced expansion, but data still indicates that between 2009 and 2015, a total of around 11,500 greenhouses were constructed with a total area of 1,400 ha, including more than 600 modern greenhouses with an area of 585 ha (these were built using advanced technology of European countries, Korea, Turkey, China and Israel), with a further 10,900 low cost lightweight design greenhouses on an area of around 1,500 ha on *dekhan* plots.[43]

92. Local agro-ecological conditions have long been generally favorable for the production of such crops for the markets of Central Asia and more recently the Soviet Union, although during the more recent Soviet management system, cotton production was always more favored, and horticulture took an increasingly minor role within the context of the state controlled collective farms in Uzbekistan. However, following the collapse of the Soviet Union and the gradual decline in the state farming structures, the horticulture subsector has played an important role in feeding the rural population and also as a key source of income for the 4.7 million households that operate *dehkan* farms in rural and disproportionately poor communities. Growing fruit and vegetables is among the most profitable activities on both *dehkan* and private farms and, over the last ten years, the incomes generated by the subsector comprise a growing share of national GDP. Horticultural export earnings have also surged in recent years, growing from $373 million in 2006 to $1.16 billion in 2010 and further increasing to $1.62 billion by the end of 2014.[44]

93. Even though traditionally, cotton and wheat are and are likely to remain the dominant crops in Uzbekistan taking up the main share of land resources, the area devoted to horticulture has been increasing steadily. See Annex 11: Dynamic of the change in area and total production of fruit plantations and vineyards in the Republic of Uzbekistan 2005–2015. This shows that in the 10-year period covered by the data, that areas of production increased by over 100% in both cases, while production volume showed much stronger growth, achieving increases of over 200%, reflecting not only strong demand, but also the high levels of income

[43] http://ifc.uz/en/about_uzb/info_3.php.
[44] Calculated based on data from State Statistics Committee.

that can be generated and the willingness of farmers to invest when the market conditions are favorable and strong stimulus is in place. Vegetables and potatoes have also performed strongly over the same period.

94. Table 7 below indicates just how strong the change and the rate of growth has been in the ten-year period between 2005 and 2015. While the increase in area is significant, the performance in terms of yield growth is very strong and compares starkly with cotton yields which have stagnated.

Table 7: Horticulture Sector - Rate of Growth in Cultivation Area, Yield and Volume of Crop Production, for 2005–2015

Types of crop	Cultivation area, thousand hectare			Crop yield, ton/hectare			Gross harvest, thousand/ton		
	2005	2015	2005 to 2015 %	2005	2015	2005 to 2015 %	2005	2015	2005 to 2015 %
Vegetables	137.7	194	140.9	25.5	52.2	204.4	3,517.5	10,128.1	287.9
Melons	33.9	52	153.4	18.2	35.6	196.3	615.3	1,853.1	301.2
Fruits and berries	208.2	266.2	127.9	4.6	10.3	226.3	949.3	2,746.2	289.3
Grapes	120.7	128.4	106.4	5.3	12.3	231.3	641.6	1,579	246.1

Source: State Committee of Statistics of Uzbekistan.

95. Coupled with the fact that local food security has improved significantly since 2005 and that national markets remain in the main well supplied with products year round, this growth in area and production levels must be as a result of the stimulus of cash payments for the production and reinvestment by the producer of some of the cash into better quality inputs and increased intensity of production with the aim of generating even more income. The significant changes that have taken place with regards to yield are highlighted even further in table 8.

Table 8: Yields for the major crops in Uzbekistan in 2000–2014, T/ha

	2000	2010	2011 г.	2012 г.	2013 г.	2014	Variation, +,-
Cotton	2.18	2.54	2.63	2.64	2.63	2.66	0.48
Cereal	2.70	4.36	4.53	4.46	4.50	4.86	2.16
Potatoes	12.93	19.49	19.57	20.37	21.07	21.32	8.99
Fruits	5.69	9.26	9.73	10.47	11.23	12.05	6.36
Grapes	6.31	9.08	9.78	10.86	11.61	12.13	5.82

Source: State Committee of Statistics of Uzbekistan.

96. The table clearly shows that crops which have access to a free market with cash payment (in the case of cereals–a significant amount can be marketed by the farmer himself) then the producer is stimulated to work harder, invest into the crop and improve production. In comparison, while cotton yields have increased, these improvements are at a much lower rate and have even plateaued in the last 5-year period. Experience shows that cotton farmers will generally ensure that they reach the state quota for their crop but have no great interest in significantly improving yields above that level because the returns do not justify the input. At the same time, the horticulture sector has benefitted from improved access to better quality inputs, a wider range of vegetable seeds have become available from international markets, fertilizers are more freely available, crop protection chemicals are more readily available and there has been an introduction of alternate and improved fruit trees. There is also a reflection of the fact that more information on alternate production techniques is now available and there are also a (limited) number of young and enthusiastic agronomists that have benefitted from overseas

training that have returned and begum to help and advice other farmers on how to improve production quantity and at a field level the quality.

97. When compared with typical international yields from countries with a similar climate, then the picture is different, because yields are still low in Uzbekistan when compared to Turkey for example. Potatoes in Turkey under irrigated conditions (as per Uzbekistan) would be achieving 30–32 T/ha on average, while apples would be around 40 T/ha, while in Uzbekistan the average is only 15–25 T/ha. On this basis, there is still significant room for improvement and further unit growth in the Uzbek production system.

B. Increased Government Interest

98. As the horticulture production sector has increased in value and become more important, government has begun to take note and then to get involved in "organization" of the sector. Policy changes have focused on introduction of advanced technologies and innovation in the development of cultivation of horticulture and viticulture crops, with an initial relaxing on controls of crops that could be produced in certain areas to allow for the creation of new orchards and vineyards, especially on the basis of modern intensive technologies.

99. The first real indicators of this change were when Government has converted cotton and wheat farms into horticultural farms. In particular, in late 2011 (November-December), 112 cotton-and-wheat farms operating on 9.6 ha of land in Asaka District of Andijan Province, 288 farms operating on 27.5 ha of land in Jambay District of Samarkand Province, 113 farms operating on 14.7 ha of land in Yangiyul District of Tashkent Province were converted into farms specializing in the production of vegetables, melons, horticultural products, grapes and other crops.

100. In parallel, during the period from 2008 to 2014 a total of 44 thousand ha of fruit orchards and a further 30 thousand ha of vineyards were created. In addition, Government ordered the renovation of a further 76.4 thousand ha of orchards and 37.8 thousand ha of vineyards. In other words, about 40% orchards and 30% of the vineyards have been updated and replanted.[45]

101. As a part of this campaign, the Government has provided significant support to horticulture, focusing on the creation of high-density orchards with dwarf and semi-dwarf fruit trees. Pursuant to orders from the Cabinet of Ministers, seedlings of dwarf and semi-dwarf fruit trees and drip irrigation equipment were imported from Poland, Serbia, Turkey, Ukraine, and other countries, feeding an expansion of about 2,500 ha of high-density orchards in 2011, and other 4,000 ha in 2012. For 2011–2012, the value of various plants, rootstocks and equipment imported for orchards were valued at $28,255,000, including the importation of 2,688.8 seedlings of dwarf and semi-dwarf trees worth $7,933,700. Concurrently, measures were taken to supply seedlings of dwarf and semi-dwarf trees through local nurseries by importing rootstocks. In 2011, Uzbekistan imported 1.7 million dwarf and semi-dwarf rootstocks of fruit trees, valued at $777,000, and in 2012, 2.2 million rootstocks, valued at $1,136,200. Planting materials and orchard equipment were also given preferential tax treatment, and between 2011 and 2012, the amount of customs and tax exemptions for the subsector totaled $10,824,500, of which import duties made up $6,488,700 and VAT $4,325,800.[46]

[45] See information on Shroeder Institute and supply of fruit trees in previous sections of the report.
[46] World Bank. Strengthening the Horticulture Value Chain.

102. The Government provides a number of benefits and preferences to economic entities, be involved in the importation and subsequent distribution of seedlings, rootstocks of dwarf and semi-dwarf trees, as well as the necessary equipment. In theory, all of these entities are supposed to follow the strict quarantine regulations, but anecdotal evidence suggests that this may not always be happening and that trees are coming in from some sources with little control. In accordance with the orders of the Cabinet of Ministers, the necessary seedlings dwarf and semi-dwarf fruit trees and drip irrigation equipment to create intensive orchards were imported from Poland, Serbia, Turkey, Ukraine and other countries, some of which do not have such stringent and effective plant health inspection services in place.

103. The result has been a big stimulus for the horticulture sector and has resulted in the significantly increased areas of production already noted. Following the introduction of varieties and trees from outside of the country, including the relatively new practice of intensive orchards with a high density of trees on dwarfing or semi dwarfing rootstocks, the fruit production industry has undergone a significant upgrading in this period. While there are still a significant number of old varieties and traditional tree spacings in orchards, there are also many new or renovated orchards using the new varieties and intensive production practices. Many of these have yet to achieve full fruiting maturity and it remains to be seen whether this rush to adopt modern practices is fully suited to the local environmental conditions and also if such style of production can be effectively managed by the technically less adept managers and small farmers.

Table 9: Area of Fruit, Grape Plantations in the Republic of Uzbekistan

'000 ha

Indicators	Years					Change from 2010[47] to 2014 (%)
	2010	**2011**	**2012**	**2013**	**2014**	
Area of fruit orchards	235.3	244.3	250.9	254.6	261.9	111.3
Area of fruiting maturity	184.4	193.1	196	201.3	214.6	116.4
Area of vineyards	127.9	127.1	126.9	127.8	128.9	100.8
Area of fruiting maturity	108.7	111.5	111.1	113.8	119.4	109.8

Source: The State Committee of Uzbekistan on Statistics. (2014) "Agriculture in Uzbekistan". Statistical Yearbook.

104. With so many young trees, not yet reaching full fruiting maturity, there is still significant potential for volumes to increase further from existing orchards and vineyards in the upcoming 4 to 5-year period. With further expansion of orchard and vineyard planting also foreseen, then there may be the risk of pressure on markets when full volume is achieved.

105. Intensive orchards have a very high density of planting which is significantly different to traditional systems:

(i) Traditional — 6 m x 4 m = 416 trees/ha
(ii) Semi dwarf (MM106 rootstock) — 4 m x 1.2 m = 2083 trees/ha
(iii) Intensive (M9 rootstock) — 3.5 m x 0.8 m = 3571 trees/ha

106. Management techniques are very different for the traditional and intensive systems. Farmers and managers need significant training and support to be able to effectively maintain and manage the trees in good condition. Failure to effectively control growth and tree form through better water management and pruning has the potential to reduce yields and also significantly shorten effective life of the orchard. It is imperative that such intensively planted trees are well pruned and growth controlled to prevent them becoming overgrown, losing their

[47] 2010 = 100%.

shape and resulting in overgrown dense foliage which can lead to pest and disease problems. There is also a risk of nutrient problems with trees requiring accurate monitoring of both soil and foliage nutrient status, coupled with an effective fertigation regime.

107. Vegetable crops have received less direct support from Government as part of the new policy, but there has been support through the Uzbek Research Institute of Vegetables, Melon Crops and Potato which is the main center for vegetable seed development and main research for the vegetable, melon and potato crops. However, this Institute remains inadequately funded and struggles to carry out the tasks it has been assigned. The World Bank Horticulture Development Project has identified this institute (among others) for support in capacity development to improve local seed breeding and seed selection for vegetables, melons and potatoes. Imported hybrid vegetable seeds bring many benefits in terms of yield improvement and also in some cases, resistance to pest and diseases, but they are also extremely expensive in comparison to locally selected varieties. For the *dekhan* farms, the choice is limited as the amounts of seed they need are small.

108. The local seed production industry therefore needs support and strengthening to supply the millions of small producers with reasonably priced but better quality selected seed. Scientific research institutions should take a leading role in the creation of new varieties and hybrid seeds of vegetable crops according to the market requirements, using advanced technology, involving the genetic collection of new varieties with improved traits. Meanwhile, there are problems with the introduction of new locally developed varieties - "Uzplodoovoschsemenaprom" should coordinate seed production for the republic, organizing production of seeds of super-elite and elite quality at specialized farms or at the research station above. Problems arise with the further multiplication of these seeds into commercial seed lots as "Uzplodoovoschsemenaprom" association has no funds for the breeding farms. As a result, many small farmers and *dekhan* farms save their own seed or buy from neighboring farms. These risks spread of disease and also puts at risk the vitality and vigor of the crop in the longer term.

109. With the seed farms poorly supported, there are serious problems hindering the production of quality seeds of vegetable and melon crops:

(i) Lack of high-quality elite seeds for some varieties,
(ii) No specific customer base for the elite seeds as commercial multiplication has declined through lack of support and guidance,
(iii) No organized marketing structure in the seed market,
(iv) Lack of information on the production of seeds of melons for farmers, and
(v) The absence of links between producers and buyers of seed.

110. The seed farms themselves suffer from a low level of technical equipment at most seed farms, with outdated seed cleaning and sorting technology and a lack of equipment for packaging seeds. To improve the local research and seed production of vegetable crops it is important to adopt a clear, stable and consistent policy of seed production for vegetable crops, which defines the organization, function and communication, and provides mechanisms for coordinating action and monitoring the progress of the national seed industry. The scientific research institutions should take a leading role in the creation of new varieties and hybrid seeds of vegetable crops according to the market requirements, using advanced technology, involving the genetic collection of new varieties with improved traits. A proper marketing structure should also be developed which is able to inform farmers about the benefits and the range of products available and where to find them. These are activities that MOA should be active in organizing and developing, along with the Uzbek Agricultural Research and Production Centre.

111. MOA is aware of many of these issues but is still primarily focused on the continual support and overseeing of the cotton and wheat industry which takes considerable effort and resources. Recent plans for development (which are discussed later in more detail) indicate that MOA does expect to see a significant increase in vegetable production, with production areas increasing by 91,000 ha compared to 18,000 for orchards by 2020.

112. There are local variations in production practices and also where and how the products are marketed by the farmers. The main crops of the Zangiata district of Tashkent are wheat and cabbage. Tomatoes and onions are grown on a small scale, mostly for home consumption. Melons are also grown, both for consumption at home and for sale in local markets. Horticultural production is more market oriented in the Samarkand district of Samarkand, where the main crops are apples, grapes, cherries and tomatoes. Roughly half of production is sold to markets. There are several processors in the district, producing tomato paste and juices. Grapes are widely grown and are processed as raisins and are sold fresh. Onions and cabbage are also grown and sold in local bazaars. In the Oltiorikskyi district of Fergana, the main crops grown include wheat, cotton, apples, grapes and cherries. There are no processing facilities present in Fergana, but the region has a strategic geographical location facilitating exports to the neighboring countries. Consequently, fruit and vegetables produced in the district are consumed locally or exported, mostly to Russia, Kazakhstan, Kyrgyzstan and Tajikistan. Apples, cherries and grapes are often exported to Russia by refrigerated trucks. Tomatoes, cabbages and onions are grown for exports and for the local market.

113. **Production areas for vegetables and potatoes** have shown steady growth (between 9 and 10% over the three-year period) in terms of area of production as can be seen in Tables 41 & 42 below. Over the same period, yields have increased by as much as 25%. Since 2010, Uzbekistan increased its total vegetable planted area from 173,000 ha to 186,800 ha, during which time the yields have increased from 33 tons/ha to 41 tons/ha on average. By 2015, the total production area had increased again to 191,500 ha.

114. Tashkent, Samarkand and Andijan areas produce almost 50% of all vegetable production in Uzbekistan. About 81% of Uzbekistan's vegetable crop is consumed fresh, 11.3 % is processed by the domestic food industry, 4.3% is utilized for seeds, and the remaining 3.4% is exported. Most fresh vegetables are grown by private farmers and small household farms and supplied to local markets. Also, there are large Agro-firms, which grow and supply vegetables under contract to fruit/vegetable processing companies.

Table 10: Vegetable Production (Area & Volume) – 2010 until 2013

Regions	2010		2011		2012		2013	
	Plant Area (hectares)	Production (tons)	Plant Area (hectares)	Production (tons)	Plant Area (hectares)	Production (tons)	Plant Area (hectares)	Production (tons)
Karakalpakstan	6800	134300	7200	145500	8500	166100	8700	201401
Andijan	14500	861700	14700	952400	17300	1072600	17600	1203428
Bukhara	8300	354800	7500	391200	7800	427500	8000	478081
Djizakh	8600	230800	9200	258200	8900	282200	9000	309001
Kashkadarya	14400	321500	14800	362800	15600	396200	15900	433750
Navoi	3300	149100	3400	171300	3500	180600	3600	200723
Namangan	13000	439400	13000	488700	13900	527400	14200	574564
Samarkand	25700	1049700	24600	1149200	24900	1250200	25200	1350785
Surkhandarya	13200	486400	14400	540200	13500	632900	13800	689835
Syrdarya	4300	182700	3500	195700	4000	216400	4300	247898
Tashkent	31700	1299100	31500	1418200	33700	1518300	34100	1716090
Ferghana	17000	459300	17800	520100	17800	569500	17900	638739
Khorezm	12200	377700	13800	400500	14300	437500	14500	471615
Total	**173000**	**6346500**	**175400**	**6994000**	**183800**	**7677400**	**186800**	**8515910**

Source: The State Committee of Uzbekistan on Statistics.

115. In the same period, the area of planting of potatoes had increased from 70,800 ha in 2010 up to 80.292 ha by 2015.

Table 11: Potato Production (Area & Volume) – 2010 until 2013

Regions	2010		2011		2012		2013	
	Plant Area (hectares)	Production (tons)	Plant Area (hectares)	Production (tons)	Plant Area (hectares)	Production (tons)	Plant Area (hectares)	Production (tons)
Karakalpakstan	6000	31100	4600	32900	5100	36400	5300	39435
Andijan	5600	169500	5600	179900	6100	201200	6400	231910
Bukhara	3600	115200	3900	128200	4200	141700	4400	157479
Djizakh	1900	38300	1600	43200	1600	46200	1700	50673
Kashkadarya	6200	97700	6400	112000	7000	126300	7300	140149
Navoi	1200	42700	1300	45800	1400	51200	1450	58238
Namangan	6100	152800	6500	167000	6700	188100	6900	207279
Samarkand	10900	371700	10700	409100	11600	449500	11800	480881
Surkhandarya	7400	127600	9200	145100	8900	159000	9000	174879
Syrdarya	1900	28800	1800	30900	1700	33600	1800	36506
Tashkent	7700	268800	8100	291400	8400	319700	8600	336715
Ferghana	7700	170100	8500	189000	8300	208000	8450	234358
Khorezm	4600	80500	5500	88000	5200	96300	5400	101864
Total	**70800**	**1694800**	**73700**	**1862600**	**76100**	**2057200**	**78500**	**2250366**

Source: State Committee of Uzbekistan on Statistics.

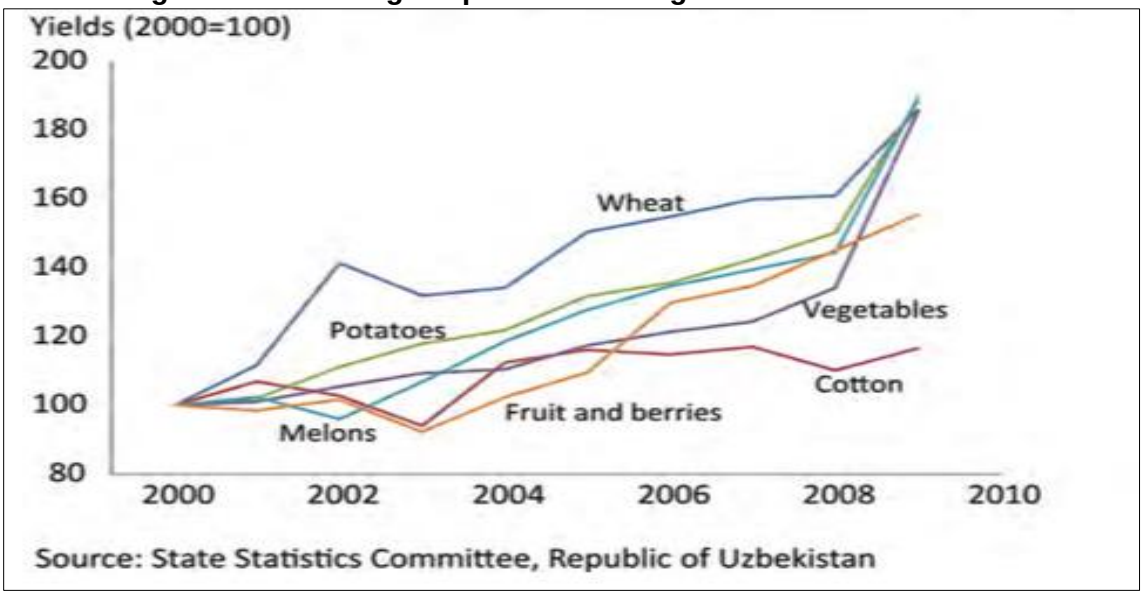
C. Main Products

116. **Tree fruits** - Uzbekistan is one the leading producers of fresh deciduous and stone fruits in Central Asia. According to Food and Agriculture Organization (FAO) statistics, Uzbekistan is among the top five producers of apricots in the world, the sixth largest producer of cherries, and 17th in apple production. In the past 10 years, Uzbekistan increased the total area of fruits orchards 1.2 times.

117. Uzbekistan's continental climate with hot summers is ideal for growing apple, pears, pomegranates, cherries, apricots, peaches and other popular fruit crops.

118. The production of such higher value crops (HVC) has shown a rapid tendency to increase, both in area (where permitted), but also in terms of unit area yields. This productivity growth has also influenced the more recent structural changes that have been occurring in agriculture in Uzbekistan. Constrained by water and land resources, the growth in agriculture was driven in large part by yield gains. In fact, the capacity to sustain growth via productivity gains appears to be a traditional strength for Uzbek agriculture on the whole. As shown in Figure 6, land productivity gains were widespread and, with the exception of cotton, yields are up by more than 50% for all of the major crops since 2000.

Figure 6: Increasing Crop Yields- Strong Growth for Horticulture



Source: State Committee of Statistics of Uzbekistan.

119. **Water melons, melons and squashes.** These are very traditional crops for Uzbekistan, all of which are well known on international markets (primarily the FSU countries) for their quality and flavor. Government and farmers work hard to maintain and develop this opportunity and to maintain the opportunity for value addition in export markets.

120. Most growers of these crops are primary producers of fruits and mainly concentrate on production, giving limited attention to harvesting, which results in bruises and damage to products. Also, little attention is given to the temperature of the product during and after harvest, which is critical to the later stages of processing, packaging, storage, distribution and sale of fruits. The quality of all types of fruit products in particular suffer very badly during the post-harvest handling and marketing process. This is an area requiring much support at a local level to improve reliability and quality.

121. Also, little attention is given to the temperature of the product during and after harvest, which is critical to the later stages of processing, packaging, storage, distribution and sale of fruits. This is critical if sustainable export markets are to be developed from this type of product from Uzbekistan.

122. **Grapes.** Uzbekistan is the largest table grape producer in Central Asia and one of the leading fresh grape exporters in the region. Most table grapes are grown in the south, especially in Samarkand, the Surkhandarya regions, the Ferghana Valley, as well as in the Tashkent

region. The long warm weather period from early spring to late autumn allows farmers to grow more than 37 varieties of grapes. The most widespread grape varieties used in wine production are Soyaki (champagne, cognac), Saperavi (table and dessert wines), Rkatsiteli (dessert wines), May Black (dessert wines), Rosy Muscat (dessert wines), Hindogni (dessert and table wines), Bayan-Shirin (dry wines, champagne, cognac), and Aleatico (vintage and dessert wines). Popular grape varieties for fresh consumption are Khusayni, Rizamat, Kishmish and Damskiy palchik.

123. Over the past 4–5 years, the GOU has paid considerable attention to the development of grape production and expansion of vineyard areas. In March 2013, the GOU adopted a special decree on the development of viticulture in the republic during 2013–2015. Within the framework of this decree, they plan to optimize spacing and the regionalization of prospective grape varieties, as well as expand the planted area of vineyards. Also, the GOU decree targets assistance to farmers and other enterprises in the wine industry to market their products for export through specialized trading companies, as well assist agro-firms to establish their own trade houses in CIS and other foreign countries. The GOU also plans to assist in pre-financing export contracts for grape producers and processors.

124. **Vegetables.** Grown in all areas of Uzbekistan primarily by the *dekhan* farms, there are a number of specialized areas in each region that were always designated as the horticulture production centers. Annex 3 identifies the main areas on a regional basis where horticulture production is significantly more important. In four key areas, where cotton is not the designated crop, vegetables have become especially important to the local economy. These areas are Andijan, Samarkand, Surkhandarya and Tashkent region which accounts for as much as 60% of all vegetable production. While soil conditions in these areas are generally good and more suited to vegetable production, it is the availability of water and the proximity to major urban consumption centers that has encouraged production in both Samarkand and Tashkent, while Andijan has a special micro climate more suited to vegetable production and also has well established proximity to routes for export of products northwards to Kazakhstan and beyond. Surkhandarya to the far south has a well-established vegetable production system for out of season production due to its favorable winter climate that allows the production of cabbage and onions, along with tomatoes when these are not available from other areas.

125. There has also been significant development of low-cost greenhouse production in the Surkhandary area with the aim of extending the out of season production, bringing it even earlier or extending it past the current end of season phase. This low-cost approach is with the aim of producing greens and other salads crops in the winter and early spring, couples with opportunities for raising early cabbage and other plants to advance the growth in spring time. In the Navoie area, to the mid-West of Uzbekistan, higher technology levels are applied in more modern greenhouses with the aim of producing high value crops deep into the off season with the aim of marketing these for high prices, both locally, but also more significantly in major export markets to the north. The greenhouses have developed here due to the availability of warm waters from geothermal springs which can be used to heat the greenhouses to acceptable temperatures, even in winter. This brings significant cost benefit and allows the farm managers to adopt a higher quality approach with the aim of hitting the highest prices.

126. Production is then well presented and packed in a uniform and controlled manner and the shipped by airfreight to high end customers in Moscow and other northern cities at a high price level. While the main crop being produced for this market is tomatoes, other crops are also being produced in increasing volumes. The main crops (by volume) are; tomatoes–27% by volume, onions–13%, cabbage–11%, cucumbers–7%, garlic–2% and other mixed vegetables–

20% of the total volume produced. Significant quantities of herbs, including dill, coriander, parsley, green onions, garlic shoots and also radish are also grown in the winter period.

D. Inputs and Equipment for the Horticulture Sector

127. **Labor requirements.** *Dehkan* farms (households) are producing more than 65% of the total fruit and vegetable production on the country which is a significant contribution to the income and wealth of the household and the rural area as a whole. While the number of *dekhan* farms is around 4.7 million, the total estimated employment on these *dekhan* farms and the small farms working in the horticulture sector is reported to be close to 8 million. Changes to this sector will have a significant impact on a large portion of the population of the country and also play a serious role in the development or control of the problems associated with poverty in the village and potentially also on higher level food security issues.

128. In comparison to other typical crops, horticulture is not only intensive in nature, but also with requirements to access to labor. Cotton crops require on average 5.3 persons per 10 ha to care for the crop over the production cycle, wheat only 1 person per 10 ha, while vegetables can be as high as 21 persons per 10 ha.

129. Most of the employed population in *dekhan* households are women who are often paid with a percentage of the production, which can be either consumed or sold on local markets to raise cash. However, with this type of workforce there are a number of constraints, such as the lack of general technical knowledge or understanding on modern technologies; lack of access for obtaining the necessary logistical and financial services, and lack of knowledge on modern management. *Dekhan* farms are also limited by the size of the land holding on which they operate and also because they have no official legal status as a business and are therefore unable to benefit from loans or other investment activities from which they can invest, develop and increase in size and scale.

130. **Fertilizers.** Across Uzbekistan there is reasonable access to fertilizers for all farmers with over 1,000 shops registered to trade in agricultural fertilizers. Cotton and wheat farmers benefit greatly from subsidized supplies of necessary fertilizers for the area of crops to grow their state order (quota). They receive fertilizers from the regional branches of the Joint Stock Company "Uzkishlokhuzhalikkimë" under the state fertilizer distribution program. Horticultural sector producers are not supported with subsidized access to fertilizers and have to make use of the open market to procure their own supplies as needed, or as they can afford.

131. Figures dating from 2011 indicate that private farms and *dekhans* made use of the following fertilizer supplies; 20.13 thousand tons of mineral fertilizers in total, comprising of 15.8 thousand tons of Nitrogen based fertilizers, 4.2 thousand tons of Phosphate based fertilizers and 1.3 thousand tons of Potash based fertilizers. This gives an application (or use ratio) of 1 part N: 0.3 part P: 0.08 part K, (this is related to the chemical content of the specific fertilizer) which is less than the ideal ratio generally recommended which is 1 part N to 0.7 parts P to 0.5 parts K. Discussions with farmers support this disparity and state that this is because of issues with availability and the cost. Nitrogen based fertilizers are readily available from the Uzbek factory (production is more than enough for internal demand with increasing quantities being exported), but there is a short fall in both P and K production. This plays a part in the level of yield that is likely to be achieved and also has potential to affect the storage life, and subsequent nutritional value of the stored product, as well as the processing value of the product.

132. By comparison, *dekhan* farmers who operate on a smaller scale and who are the primary holders of the majority of the livestock in Uzbekistan generally make use of only organic fertilizers, although these may be supplemented by small applications of mineral fertilizers where very intensive production is taking place or where the crop has potentially high value—such as out of season tomatoes in greenhouses.

133. **Agri-chemicals.** Officially, these products should only be available through the regional centers of "Agrokimeyamarkaz", but being a state-controlled organization, it does not always have a wide range of products for crops other than cotton and wheat. Instead, the burgeoning horticulture sector is better served directly by some of the representative offices of the major international companies that are now beginning to establish themselves in Uzbekistan, such as DuPont, Syngenta, Bayer, etc. These companies are more flexible and have the capability (technical and financial) to organize proper field trials and demonstrations and then to hold field days where interested farers can participate and get training and information about the latest products and also about the pest and diseases as well.

134. Farmers who have the financial capability can buy products direct from the companies, but the majority of small farmers struggle in this regard. Therefore, there is significant risk of major outbreaks of pests and/or disease in some areas because many farmers try to manage without any crop protection–primarily because of the cost of the product. In 2016, there was widespread reports of infestation of tomato and aubergine crops across the whole of the country by tomato leaf miner (*Tuta absoluta* which is a devastating pest of Tomato, originating in Argentina and only crossing to Europe in 2006. It has spread widely in the past ten years and can destroy tomato and other crops). Yields have been significantly denigrated and prices have subsequently increased on local markets. Co-ordination and very good hygiene is necessary to effect any kind of control, but this is not likely to happen with many thousands of small scale producers who themselves are technically weak and unaware of the pest or the danger it can be to their crops. This pest is a serious risk to the newly developing greenhouse production of tomatoes out of season for both internal and export consumption all of which is based on an expensive investment business model.

135. Many *dekhan* producers who have little technical knowledge buy small retail packs of “treatments” from local markets which are mainly unregulated. These packs may be from any number of sources and have no warranty and the seller provides no proper guidance on correct use. During field visits, farmers (*dekhans* and small farmers) showed packets of products they had bought cheaply at local markets which were 100% in Chinese language with no translation. Questions were asked by the farmers on how to use the product to control a specific pest, but it was never possible to answer because the packet was unreadable. This practice is dangerous and must be controlled to prevent serious damage. In this case, the authorities need to ensure that such products cannot be imported and subsequently sold in the country.

136. Farmers also need support through more organized access to training and information on pest and disease identification and control methods. They also need access to proper equipment with which to apply these products safely and effectively. While small motorized sprayers are available quite cheaply on local markets they are not long lived and farmers do not understand how to calibrate and use them properly. Further need of training and capacity development, especially for the stated intention of developing export market potential for high value fruit crops. For the development of the export market, farmers also need to be made aware of and subsequently follow the requirements of record keeping necessary under the stringent quality and systems safety control schemes operating in many importing countries. If GlobalGap is introduced this is a minimum requirement which absolutely must be followed.

137. **Equipment for the horticulture sector.** Data indicates that while the general agriculture sector in Uzbekistan is reasonably well provided with access to equipment, with farmers increasingly investing their own resources into more modern equipment, coupled with well-established tractor and machinery services available from Machinery Tractor Parks and service centers run by some of the international machinery suppliers such as Case New Holland and Claas Tractors, the horticulture sector does not benefit from the same level of support. Most of the equipment at the MTP's and Service Centers is for field scale production of cotton and wheat and is simply not of a suitable size, scale or economy for the horticulture sector. Estimates made on data provided by MOA indicate that only around 5.5% of the required mechanization capacity for the horticulture sector is currently being met. This is partly because the scale of the farms size (and *dekhan* plots) is more akin to hand labor than mechanization, but is also a reflection that such equipment generally is not available on the local market. For example, China which also has small sized land holdings relies heavily on the use of two-wheeled tractors in rural areas, while in Uzbekistan these are simply not available although they would be very appropriate in terms of cost, operating efficiency and size. None availability may be a reflection of the feeling in certain levels of society that such small things are not relevant in Uzbekistan whose agriculture sector prides itself on the field scale production of cotton and wheat using large sized powerful equipment. However, this scale of large sized equipment is totally inappropriate for the horticulture sector. It may also be a reflection of the high-level government strategy of increased employment in rural areas which does not lend itself to increased small scale mechanization strategies, not matter how efficient and cost effective.

138. Other reported reasons included:

(i) Lack of in country production of mini equipment used in the fruit and vegetable sector;
(ii) High price of imported equipment;
(iii) Insufficient financial provisions to support farmers to acquire the necessary technical equipment; and
(iv) Due to the fact that private farms produce fruit and vegetables on small plots of products using mainly manual labor and is not appropriate and cost-effective to provide mini-tractors and farm machinery for them on a permanent year-round basis.

VI. DEVELOPMENT OF NEW POLICY APPROACHES

A. Move away from cotton – release of land for other crops

139. After analysis of the sector over the past five years, in parallel with regular comments from international donors and other technical organizations (FAO, IFAD, ICARDA, ICBA) Government has recognized the value opportunity to be gained from a broad loosening of agriculture sector policy. This has taken the form of a shift away from the rigid application of support for the cotton sector which has continued to underperform on a direct unit area yield basis when compared with cotton production worldwide.

Table 12: Cotton Yield in 2014/15 in Selected Countries

Country	**Yield (tons per ha)**
Uzbekistan	0.661
Pakistan	0.782
United States	0.939
China	1.484
Australia	2.385

Source: Office of Global Analysis, Foreign Agricultural Service, United States Department of Agriculture. 2015. http://apps.fas.usda.gov/psdonline/circulars/cotton.pdf.

140. With increasing issues with sufficiency of irrigation water availability at key growth stages, increasing soil salinization, decreasing soil fertility (humus content continues to decline under established cropping practices using a cotton–wheat rotation) and the identified need for significant investment into improved production technology–better varieties resistant to pest and disease, and more efficient and effective equipment and mechanization of harvesting, it has long been clear that there was need for a review of continuation of this approach. With international and some national agencies also warning of potential climate change risks, then there was need of a new and fresh approach to offer alternative solutions for parts of the sector.

141. Even though traditionally, cotton and wheat are and are likely to remain the predominant crops in Uzbekistan taking up the overriding share of land resources, the area devoted to horticulture has been increasing steadily. In 2010, an additional 240 thousand ha of land was reassigned to horticultural production under new government policies, primarily by reducing cotton production in specific areas. See Annex 11: Dynamic of the change in area and total production of fruit plantations and vineyards in the Republic of Uzbekistan 2005–2015.

142. Decree, No. 311 dated 20th November 2013 issued by the Cabinet of Ministries of Uzbekistan looked to encourage further development of the horticulture sector to produce increased amounts of products, up to a further; 8,880 thousand tons of vegetables, 1,594 thousand tons of melons, 2,398 thousand tons of potato, 2,472 thousand tons of fruits and 1,362 thousand tons of grapes. This was as a result of understanding at high levels in Government that horticulture offered the potential to become a significant generation source of hard currency through exports of both fresh and processed products, both to traditional markets but also to newly identified markets, both in Central Asia, but increasingly on the developing world markets.

143. As a result, in 30 districts, designated as specializing in vegetable and fruit production, 6,200 ha of new orchards and 5,700 ha of new grape vineyards were established. During 2014, plans were put in place to establish 3,000 ha of new orchards and 9,900 ha of new vineyards for grapes. To date 2,400 ha of orchards have been established (79%) and a further 9,000 ha (91%) of grape orchards are completed. It is also planned to create a further 5,900 ha of dwarf (intensive) orchards out of which, 5,600 ha (95%) are reportedly already completed. According to statistical data[48], a grand total volume of 17, 367,000 tons of fruit and vegetables were produced across Uzbekistan, comprising of:

(i) Vegetables 9,286,700 tons;
(ii) Melons 1,696,100 tons

[48] The state statistics committee of Uzbekistan.

(iii) Potato 2,452,400 tons
(iv) Fruits 2,490,600 tons
(v) Grapes 1,441.200 tons.

144. Available data from the program so far indicates that of this production from the improved sites, 2,296,500 tons were delivered for processing, while a further 1,701,000 tons were sold in to the major markets of Tashkent and other major city markets around Uzbekistan while 605,800 tons of fresh vegetables and fruits were exported.

B. Future Planned Development – Strategy Plan 2015–2020

145. In a further continuation of this development, following the issue of the Presidential Decree of the Republic of Uzbekistan dated 5th March 2016, PD-2505 "On measures for further development of the resource base and increased processing of agricultural products in 2016–2020", MOA has developed a strategy for further expansion and improvement of the sector for the upcoming five-year period until 2020. While the Presidential Decree (PD-2505) identified targets for production and subsequent processing of the main types of horticultural products, including the development of significantly increased processing capacity and storage of agricultural products, a parallel but linked strategy proposed by MOA looks to further enhance the capacity of the sector by continuing the realignment of land use, away from cotton and grain production and instead, primarily into fruits and vegetables. The clearly stated intention for this decree, backed up by the strategy change is the targeting of the export markets and the potential to earn significant income.

146. Decree PD-2505 sets out the outline plan and provides for:

(i) Development of a resource base to increase the production volumes of horticulture, potatoes, melons, grapes products;
(ii) Plans for the implementation of 109 investment projects worth more than $461.6 million for construction of new and renovation, upgrading and modernization of existing enterprises involved in processing of agricultural products and production of semi-finished and finished food products, and
(iii) Development and improvement of warehouses equipped with modern refrigeration and storage facilities, creation of suitable conditions for primary processing, packaging, storage and transportation, organization of logistical centers, as well as construction new modern cold rooms for storage of horticulture products with a total capacity of 325 thousand tons.

147. The decree also foresees the regional development of a further 463 small projects for modernization of production and processing of horticulture, meat, milk and other products. At the same time, the tax breaks first granted in paragraphs 5 and 6 of the Cabinet Ministers decree dated April 7, 2011 №105 "On measures to develop and strengthen material-technical base of the horticulture products storage for period 2011–2015", will be extended until 1st of January 2021. This allows micro and small enterprises involved in harvesting, processing and storage of vegetables, fruits, melons, potatoes and grapes, which start in 2016–2020 to benefit for 3 years from the date of opening (commissioning) through paying a single tax payment which is reduced by 50%.

148. The stated objectives of the decree are to provide a stimulus to the horticulture sector and through that the rural economy resulting in:

(i) Increased horticulture sector productivity, improvement of the economic and financial sustainability of farm enterprises and agricultural firms;

(ii) Introduction of new varieties of seeds and seedlings, modern technology, water-efficient processes, improved methods to combat pests and diseases;
(iii) Improving access to credit resources for creation of better production and export infrastructure;
(iv) Creation of timely collection, storage, transportation and processing of horticulture products by creating trade and logistical centers; and
(v) Increased value-added finished products through using modern technologies in processing and packaging.

149. Expected results through realization of these activities by 2020 are the increasing production in volume terms of horticulture, potatoes, melons and grapes products by 1.3 times; the increasing export volume of horticulture products by 2.9 times and increases in volumes of processed horticulture products by between 2 to 2.7 times.

Table 13: Changes to be Introduced Under PP-2460 and PP-2050

Name	Unit	Parameters to 2020 in accordance to #PP-2460 and #PP-2050	
		Capacity	Amount (mln. $)
Intensive orchards	'000 ha	18	270.0
Cold storage	'000 tons	325	146.2
Processing and packaging equipment	'000 tons	145	82.6
Total	**Million $**	**498.8**	

Source: State Committee of Statistics of Uzbekistan.

150. **MOA Sector Policy Development Plan to 2020.** As discussed in the previous section, in parallel to the refocusing of Government support into further development of the horticulture sector under Presidential Decree's 2460 and 2505, MOA has also been working with the Government Committee for Land Resources in Uzbekistan to further assist in enhancement of horticulture production while at the same time trying to reduce problems with underperforming cotton and grain farmers. The result has been the development of a further land reform strategy that was presented to the Uzbek Cabinet of Ministers in December 2015 and received final approval for implementation from the Cabinet of Ministers on 29th December 2015. This new strategy will see further land resources made available to the horticulture sector over the 5-year implementation period until 2020. Full details of the reforms on a regional basis and by sector of production can be seen in Annex 12: MOA – Plan of Cropping Optimization – 2015 to 2020, but the main details are as follows; cotton and grain crops will be reduced in area by 220,500 ha during this plan, mainly through the re-designation of underperforming farms, with this land be allocated to either horticultural production or fodder crops to support the developing livestock sector. The changes to the horticulture sector will comprise of increases in area of production; potatoes will increase by 36,000 ha, vegetables increase by 91,000 ha, fruit orchards by 18,000 ha and vineyards by 11,200 ha.

151. **Benefits**. This process shows recognition of the need to support diversification, also reflects on the changing face of agriculture production where horticulture crops have now become more important in terms of income generation for Uzbekistan, particularly on international export markets. As mentioned in other sectors of this document, increasing areas of fruits and vegetables does bring benefits in terms of water efficiency (both use significantly

less water), especially where an integral part of the diversified development is the requirement for installation and use of drip or other alternate controlled irrigation systems.

152. **Problems.** Any land freed from cotton production is not always in a good condition, generally suffering from poor soil structure, lack of soil organic matter, low fertility (years of cotton / wheat cropping) and also soil salinity. Vegetables and fruit crops have need of higher quality soil that is well structured and offers deep rooting potential. Organic matter content should be high and fertility at a significantly higher level than that normally required for either cotton or wheat. Both fruits and vegetables are significantly less tolerant of soil salinity than cotton and there will be both yield and quality loss if soils freed up from cotton are not of high quality.

153. **MOA Land Optimization Plan.** Further work has also been done on trying to restructure the farm sizes into what is perceived by Government as more effective production units. In 2008, 2009 and 2010, special resolutions were adopted to optimize farm areas. Selective leases were revoked and farm land optimization was implemented by administrative measures. As a result, the number of farms declined from 219,900 to 66,100, or by 70 %, while the average size of land plots increased from 27 ha to 80.1 ha, or became three times as large. During this period of time the “optimization” process worked to make general farms larger and also more efficient in terms of reaching various economies of scale. It also worked in that it made most cotton and wheat farms of a size that they required a reasonable set of their own equipment and at that size they were normally able to gradually build up their own machinery and equipment so that work became much more efficient.

154. For horticulture, land allocations were generally less and so the economies of scale were less noticeable, plus with the limited availability of suitable sizes of general tractors and almost no availability of specialized precision tools such as seed drills, planting machines, high volume crop sprayers or orchard / vineyard crop sprayers, then these farmers were less able to quickly develop in the same way. Instead, they continued to rely heavily on hand labor to get the work done. In April 2016, another round of land optimization was undertaken aimed primarily at the horticulture sector. During this process the maximum size of any farm involved in production of vegetables, fruits and grapes was reduced down to 5 ha only, while combined farms designated for use as grain and vegetable farms was set at 10 to 15 ha and those farms which were growing vegetables, fruits or grapes and also had their own storage or processing facility on the land were able to have a maximum land area of 10 ha.

155. Reasoning behind this downsizing is complex–comments have been made with regard to Government concern about growing indebtedness of farmers investing in fruit orchards, particularly those adopting intensive production techniques which require high initial investment and then generate little income for 2–3 years while the trees mature leaving some farmers with loans that they are unable to maintain in the short term, but this does not seem to fit well with the overall Government plan to continue to increase intensive fruit orchard production and so it is likely that the more significant reasons are something else. It is certainly more likely that with numbers of people returning from working overseas as a response of the economic downturn in Russia for example, there were noticeable increases in unemployed in the rural areas and that the latest reform is an attempt to try and create more employment opportunities for some of these returned workers. While there is an increase in the number of farmers themselves, it is the need for every farm to have at least 3 or 4 workers to get all the manual work done in an environment that is not heavily mechanized that could be the main driver of this process.

156. It does have one potential effect on the creditworthiness of these farms which will have an impact on the proposed credit project – smaller farms are less likely to generate sufficient income to be able to secure any significant size of loan from a commercial bank and so investment into improvements in production are less likely to move forward now following the optimization.

Table 14: Effects of "Optimization Process" on Overall Farm Numbers and Sizes 2016

Changes in Farm Numbers and Size 2016								
Farm types	Farm details on 1st April 2016 before optimization		Farm details on 25 May after optimization		Difference			
	Farmer numbers	Average farm area in ha	Farmer numbers	Average farm area in ha	Farmer numbers		Average farm area in ha	
					(+;-)	%	(+;-)	%
Cotton & Wheat	53,702	56.1	53,862	55.2	160	0.30	-0.90	-1.60
Horticulture (Fruits & Vegetable)	3,489	9.5	6,480	4.0	2,991	85.7	-5.6	-58.4
Wheat & Vegetables	6,470	22.3	12,341	9.2	5,871	90.7	-13.1	-58.9
Horticulture & Grapes	25,006	7.5	74,113	2.8	49,107	196.4	-4.7	-62.5
Livestock	6,900	28.2	6,974	29.3	74	1.1	1.1	4.0
Other farms	5,887	9.1	6,602	7.9	715	12.1	-1.2	-13.5
Total	**101,454**		**160,372**		**58,918**			

Total Farmers	**160,372**
Women Farmers*	**4500**

* Source: Uzbek Farmers Council

157. The effect on farm numbers and farm sizes across the country can be seen in Annexes 13, 14 and 15 which show the effect on a crop sector basis and by regions. With the average fruit and grape farm now being only 2.8 ha in total size, it is difficult to see how this can be viewed as either sustainable in the longer term or able to generate enough income with which to invest into improvement.

158. Under the same process, there are also some considerations of the need to provide such farmers with access to subsidized inputs supplies, such as fertilizers, fuels and lubricants in a similar way to the cotton and wheat farms also benefit. However, this is likely to require farmers to then use the commercial banking system and in particular those state-controlled banks who are generally involved in the operation of the seasonal credit schemes. This has serious consequences as farmers would then have to operate through the banks, rather than in the cash society which brings many benefits. Provision of the subsidized credits is also likely to be linked to production quotas as for cotton and wheat which is again a further way of imposing greater state control over the sector. At the time of writing this report, it remains unclear how this policy will be implemented.

C. Post-harvest & Markets for Horticultural Production

159. At present a number of market channels for horticultural products coexist. Most horticultural goods are destined for domestic markets, a large portion of which moves along informal channels based on cash transactions and personal relationships. These traditional markets serve small and dispersed *dehkan* farms well and this will likely continue into the future. Recently following the farm consolidation program, private farms have become significant players in the subsector, and export and processing markets potential are growing rapidly. In general, larger scale operations with a geographically dispersed set of customers prefer to use more formal markets that are traceable and contract based, because they can address risks related to quality, safety and timely delivery in advance. By contrast, the majority of *dekhan* farmers are still predominantly consuming large proportions of their own production and bartering or selling any small surplus on nearby retail markets—products are sold in small lots in the administrative district centers nearest to the farm.

160. The largest is wholesale market is Kuylyuksky market on the outskirts of Tashkent. Here, farmers and *dekhans* with greater quantities of product compete to sell seasonal fruits and vegetables, potatoes, melons, and grapes, with the farmers or their staff doing the selling themselves. Middlemen also operate in the production areas, visiting farms and also *dekhans* and buying up products directly in the field at lower prices. Under this system, the price is set according to who is doing the harvesting and supplying packing materials. For fruit crops, especially those for export markets, middlemen return every year to the same farms where they know they will get good reliable quality of product and buy directly from the farmers. In this case, the middleman will almost always bring their own staff for harvesting because of the need to ensure that the fruit is carefully handled and packed so that reliability and quality is ensured. If a farmer is very good and has built up a relationship with the middleman, he may be able to get some advance payment for his crop early in the production season, but most middlemen will only pay for a crop at harvest.

161. As, increased portions of the production develops on private farms that focus exclusively on commercial markets new marketing channels will begin to emerge that coexist with traditional markets, and together serve *dehkan* and private farms, local markets, processors, and export markets. Private farms are more likely to sell to processors and higher-end destinations, including firms that produce juice, pasta sauce or the dried vegetables that are used for soup. There is also a nascent formal market for supermarkets, hotels and restaurants that receive goods from private farms or intermediaries. However, these are generalizations, and goods originating on either type of farm can flow through either channel. Moreover, intermediaries, formal and informal, are present who direct goods to whichever market offers better terms.

162. Uzbekistan’s favorable agro-climatic conditions support the production of high quality horticultural goods which have well established and enduring traditional market outlets. Once produced, the goods travel along different market channels with their own logistical and institutional features that impart characteristics to the product as it appears in destination markets. These characteristics are in turn relevant for consumers and intermediaries. They affect prices, and in some cases, determine whether the products can enter certain markets. Flavor, appearance, freshness, shelf-life, packaging, product safety and reputation are examples of key product characteristics. As a result, it is useful to think of the entire value-chain, from field to consumer, as producing the final good and to recognize that different value-chains produce different products, even when the products are cultivated on the same farm. Often, good agricultural practices (GAP) in the field and post-harvesting handling practices affect both

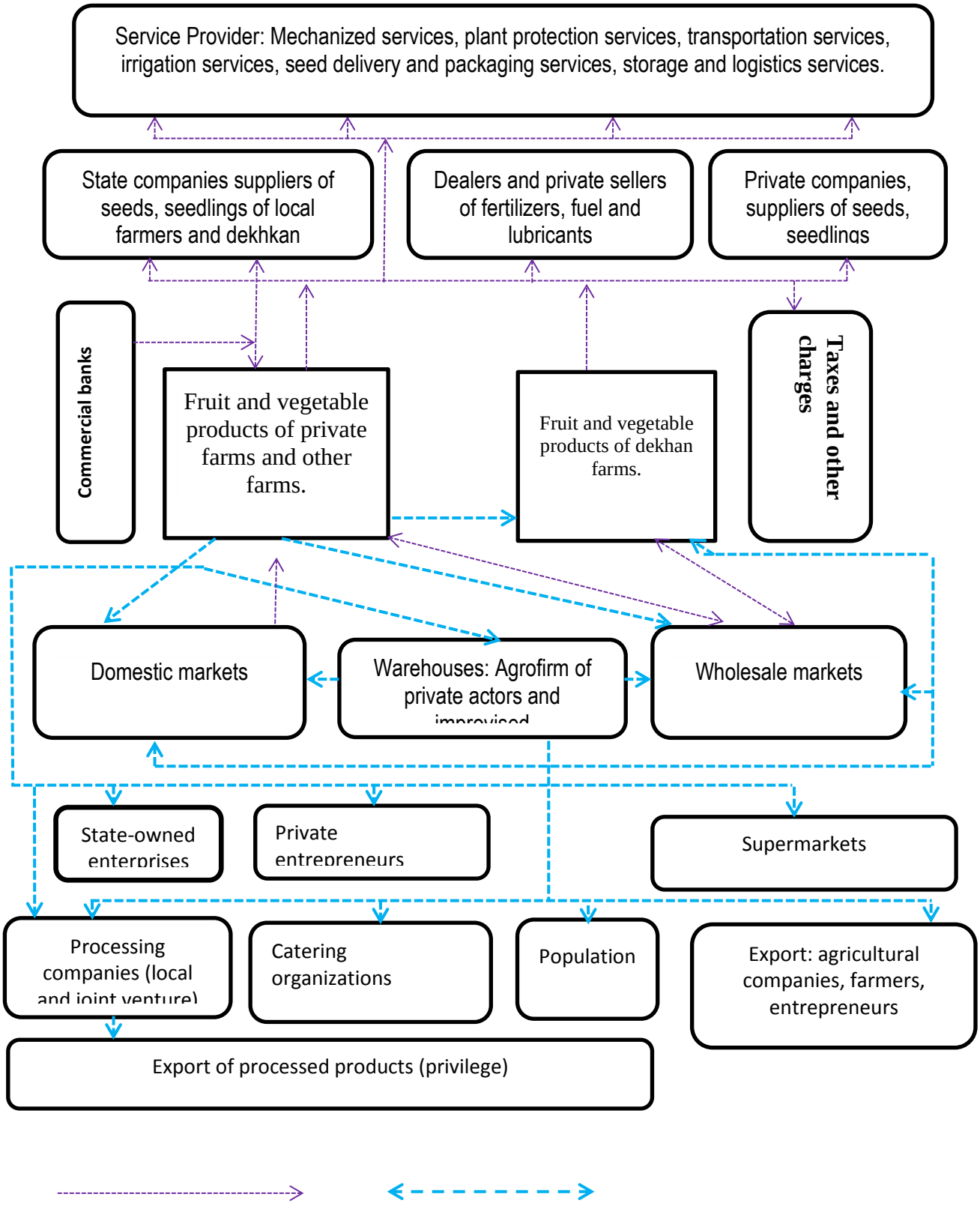
the appearance and flavor of the produce and mitigate food safety hazards, which are vitally important to consumers, but difficult to observe directly at the point of purchase.

163. In many cases in Uzbekistan, producers are a long way from markets and have little opportunity to exchange information with or understand market needs and demands. The lack of information can be confusing for producers and can sometimes lead to production of products that find little market demand. In Uzbekistan the issue is generally less complicated and more basic in that the lack of suitable farm or local level post-harvest facilities is detrimental to potential shelf life, quality and appearance which often closes many of the potential market channels, forcing producers to take the route of least resistance to sell the products, which is generally also the lowest priced option.

164. For most small individual producers, access to export markets can only be made through one of the “official” exporting organizations who buy products from farmers, collate into larger quantities and then export when they have obtained permission from the Cabinet of Ministers and satisfied the questions and demands of the central bank with regard to all payments and contracts.

165. The general marketing channels are indicated in Figure 7 below:

Figure 7: Uzbekistan Fruit & Vegetable Value Chain (Post harvest)



166. Many products are packaged in the field (or orchard) into nets for vegetable products or wooden trays of boxes for fruits. These are then sent to one of the markets identified above or to a warehouse for preparation for export. Farmers and producers have virtually no access to any kind of storage facilities for their products and, so they remain at the bottom end of the value chain with little opportunity for value addition. Instead they are simply price takers in the market chain, usually having to take the price on offer at the time of peak production–usually the lowest price. For fruit of apples and pears, the main harvest is in the August, September–October period and at this time apple prices are at their lowest while products which are stored through the winter into February or March will normally be at price levels 2.5–3 times higher than at the time of harvest.

VII. POST-HARVEST AND VALUE CHAIN

167. One of the major problems existing in this sector is the significantly high level of postharvest losses resulting from improper harvesting (damage during harvesting), poor handling, poor hygiene in packaging (wooden packing materials are not disinfected) and inadequate storage after harvesting. Usually small growers do not have any access to storage or packing where large amounts of fresh fruits can be collated, prepared, stored, calibrated and packaged ready for the local or export markets. Most are farmers, and all *dekhans* are primary producers of fruits and mainly concentrate on production, giving limited attention to harvesting, which results in bruises and damage to products leading to rapid loss of product life and quality. Also, little attention is given to the temperature of the product during and after harvest, which is critical to the later stages of processing, packaging, storage, distribution and sale of fruits. MOA calculates that as much as 45% of some of the most perishable products are damaged or lost to waste in the post-harvest value chain resulting in significant economic loss.

168. Suitable lack of post-harvest facilities. either at farm level or at a local collection level seriously inhibit larger scale development of export potential for fruits and vegetable crops as quality will be unreliable and there is a significant possibility of loss of shelf life and accelerated decay. The World Bank and Government recognize this fact and are using the credit lines in the “Horticulture Development Project” to provide enterprises with preferential credit lines with which to invest into such facilities to support farmers with the aim to develop exports.

169. In the meantime, about 69 % of Uzbekistan’s **deciduous and stone fruits** crop is consumed fresh. About 20 %, on average, is destined for processing (jams, juices, dried fruits), and about 11 % of Uzbekistan’s deciduous and stone fruits are exported. Uzbekistan’s 2013 fruit exports were around 250,000 tons, while in 2015, this had fallen back to only 109,000 tons but is expected to increase to 245,000 tons by 2016 following the expansion program of the Government and the recent trade agreements with Russia. Major fruit exports are cherries, apples, apricots and melons. Uzbekistan’s main export markets are its neighboring Commonwealth of Independent States (CIS) republics (in particular Russia and Kazakhstan), as well as some European and Asian countries. Exports to Europe and Asia are currently limited by the lack of traceability and reliability in the production and value chain, along with the need for reliability in certification. There are also concerns about product quality, freedom of pests and diseases which also need to be considered in light of very strict phytosanitary controls in those markets. Government plans for fruit exports in 2016 reflect the growth that has taken place in the sector:

Table 15: Export Trends of Key Horticulture Sector Crops

	2015	2016 (forecast only)	2020 Gov't plan
Fruit	108,700	245,000	383,000
Grape	187,000	219,000	326,000
Melons	7,700	175,000	268,000
Vegetables	286,600	774,000	1,212,000

Source: The State Committee of Uzbekistan on Statistics & PP-2505 dated 5 March 2016.

170. Fluctuations in some of the production and export numbers for fruit crops in particular are a reflection of the effect of the weather and the vulnerability of producers in some seasons. Late frosts have devastated yields on some fruit crops in the recent past leaving only limited supply which has then been in high demand on domestic markets. At particular risk are the early flowering trees, such as cherry, apricot, plum and peach.

171. About 81% of Uzbekistan's **vegetable crop** is consumed fresh, 11.3% is processed by the domestic food industry, 4.3% is utilized for seeds, and the remaining 3.4% is exported. Most fresh vegetables are grown by private farmers and small household farms and supplied to local markets. Also, there are large Agro-firms, which were set up to help smaller farmers by working on developing export markets, but a number of these agro-firms have integrated vertically in to the value chain and are now producers in their own right, usually focusing on intensive orchard production. Some larger producers also work with smaller farmers to develop the growing and supply of fresh vegetables under contract to fruit/vegetable processing companies.

172. Uzbekistan's 2013 vegetable exports were at 337,000 tons, and 2015 exports were down at 286,600 tons following issues with the Uzbek Government placing strict controls of exports by road, particularly to Kazakhstan in the summer of 2015.[49] This control particularly impacted on small consignments of vegetables being exported on an individual basis by small producers which was very common for vegetable crops such as cabbage, carrots and onions. Further declines in the purchasing power of the Russian economy following falls in the Russian ruble also played a part in the declining volumes. Major vegetable exports are tomatoes, cabbage and carrots. Uzbekistan's major export markets are the neighboring CIS countries (specifically Russia and Kazakhstan).

173. About 73 % of Uzbekistan's **grape crop** is consumed fresh, 23% is processed domestically, and the remaining 4% is exported. One of the biggest grape processing companies in the country is Uzvinsanoat Holding Company, whose main activity is alcohol and wine production, as well as a range of juices. In 2013, Uzvinsanoat Holding Company had 120 grape processing enterprises all over the country, of which 83 were wineries while this number was planned to be increased to 90 with a concurrent increased production volume of 215,000 tons by the end of 2014. Uzbekistan is focusing on improving quality, reliability and presentation of wines with the aim of increasing both production and its quality to levels needed to export on a regular basis to more developed markets. At present, some local wines are exported to neighboring countries and some smaller amounts go to Europe.

174. Uzbekistan also produces significant quantities of dried fruits, of which about 55,000-60,000 tons of raisins are produced annually. The quality of this production is high and is considered reliable resulting in around half of this production being exported, including to developed markets in Europe and Asia.

[49] Cabinet of Ministers Decree 249, dated 28 August 2015.

A. Storage and handling

175. Prior to independence and the subsequent breakup of the collective farming structures, the entire fruit production and marketing sector was managed as a single, integrated organization. In this process, the collective farms, the consolidation units, and the logistics operators had a certain degree of freedom to decide on some issues, but the strategic decisions were made by higher, centralized authorities. After the collapse of the Soviet Union and privatization of land and marketing infrastructure (cold storages), all those links disappeared, and a market led type of value chain governance was established. Farmers were in the man left to their own resources, growing fruit with almost no Government oversight or interventions. As previously discussed, market channels and linkages that were in place disappeared and producers were left to make their own connections. Export sales were done by the farmers themselves or intermediary companies with no or little experience in the field (frequently the basis for their involvement with export were some older connections/friends residing in Russia or another part of the CIS); the marketing channels were very fragmented, mirroring the extreme fragmentation of the retail activity in these countries. Big margins, but also big losses due to buyer default were typical outcomes.

176. Along with the demise of the market channels, the supplementary facilities also collapsed or were used for other more lucrative purposes. One key element that disappeared for the fresh fruit and vegetable production sector was the access to and availability of cold storage with which to prolong the life of the products and therefore the season of supply. Most of the structures were not modern refrigerated storage, rather simple forced air systems, but still capable of providing suitable storage for more durable crops like apples and pears for 3–4 months. These were all lost to other uses or were not properly maintained and thereafter became inefficient. The only option for any small producer was to sell the products in the field at harvest time to middle men or agents, sell the produce themselves on the local or regional markets (time consuming and not efficient) or to try and develop their own simple storage capacity. The last option was a typical solution for many small producers, with spaces under houses being developed into cellars where at least some of the production could be stored for 3 or 4 months with the aim that prices would increase as supplies dwindled. It also provided a source of supply for own household consumption. Temperature regulation was minimal and subsequent losses were often high,[50] with problems being initiated by the poor handling techniques and rough treatment in the field during the harvesting process cited as one of the main disease development causes.

177. Most stone fruits and berries could not be stored for any period beyond a few days before quality deteriorated These include apricots, peaches, cherries, cherry and plum and were either sold immediately onto the fresh market or were sold for processing (predominantly drying) or used for small scale home processing (cottage industry).

178. **Cold storage** availability for the fruit and vegetable sector remains limited in Uzbekistan. Annex 17: Cold Storage Availability 2014, shows that in 2012, a total of 1,843 stores were available with a volume capacity of 454,000 tons or an average capacity of 246 tons each. By the beginning of 2014, these had increased to 2,001 stores with a volume capacity of 491,000 tons or an average capacity of 245 tons each. Government plans were for further expansion during 2014, after which numbers increased to 2,287 stores with a volume capacity of 588,000 tons or an average capacity of 257 tons each. When considered on a regional basis, there are significant variations in average capacity of stores, which reflect the local producers in those

[50] Hence, based on MOA's statistics, staff estimate that as much as 45% may be lost or wasted.

regions; Andijan 131 tons average capacity, Djizzak 37.6 tons average capacity, Fergana 341 tons average capacity, Namangan 822 tons average capacity and Samarkand 833 tons average capacity. Andijan and Djizzak are production areas, with small producers, while the other three are all areas which have long been active in developing export related activities for the horticulture sector or have more significant processing capability in the area.

179. It is clear that producers need better access to storage to improve their market opportunities and to create options for value addition through extension of the marketing options over a longer period. The small size of most producers[51] makes it unlikely that typical farmers will have the level of financial resources required or the amount of product available themselves to fill a modern cold store. Instead, it is more likely that any new stores will be concentrated in the hands of middlemen who buy up products at harvest time from farmers before storing and subsequently selling when prices are high in the off season. The current land optimization plan which reduces farm sizes in the horticulture sector does not support the development of improved farmer options or increased value addition opportunities for farm producers.

180. Existing cold storage will be only enough to store 2.3% of the total planned fruit and vegetable output by 2020 and there is a significant need to expand to meet potential export led demand. Storage will also need further expansion to support the planned expansion of the agri-processing sector which would normally expect to operate on a year-round basis (with off season raw material supplies being taken from store) to ensure maximum efficiency and most effective returns on investment. With processing sector recorded as using 2,547,000 tons of raw fruits and vegetables in 2015, then it is clear that this will not all be used at harvest time and that a large proportion of this amount will need to be stored to enable extended production capability.

181. On this basis, there is scope for significant investment into improved storage facilities to reduce waste and post-harvest losses, but this must be done on an efficiency basis and be matched to the likely demands of the markets–i.e., (i) the demands for off season sales in national markets, (ii) known demands for the processing sector, and (iii) likely demands of export markets.

B. Processing Sector

182. The Food Processing Industry is one of the fastest developing sectors of the economy. Given Uzbekistan's potential to develop into a major food exporter to Central Asia, Russia, and Eastern Europe, the demand for modern packaging and processing equipment could greatly expand if the agricultural sector is reformed and trade barriers are eliminated. In accordance with a Government decree on expanding and developing the food sector, the Government plans to work in conjunction with the private sector in the process of building and renovating 130 plants specialized in processing of fruit, vegetables and grapes by the end of 2016. Most of these plants will be established in the main production areas of Surkhandarya, Tashkent, Namangan and Andijon regions, and 78 of them will be newly constructed plants equipped with new equipment and technologies. A further 26 plants are planned to be renovated in accordance with modern international standards in food hygiene and food safety, incorporating HACCP, ISO 2020 and GlobalGap approaches. This will allow an increase in annual total processing capacity of 63,100 tons. Experts believe that further development would require more investment into processing, packaging, and cold storage facilities but will increase

[51] Especially following the recent optimization program.

opportunities to match increasing demand in sophisticated markets such as Europe where high levels of quality, traceability and food safety are absolute minimum requirements for entry.

183. In the eleven-year period between 2004 to 2015, the overall volume of processed raw horticultural materials and grapes increased more than 2.5 times (from 550.3 thousand tons of raw material in 2004 up to a significantly higher level of 2,547 thousand tons of raw horticultural produce and grapes processed in 2015). In this increase, the level of materials processed (out of total horticultural and grape production) increased from 11.5% in 2004 up to 17.6% of all products by 2015. This rapidly increased demand was primarily led by significant increases in the production of juices and dried fruits which continue to be in strong demand in both internal and external markets. Overall production in 2015 reached a total of 252.7 thousand tons of horticulture preserves, fruit juices and concentrates were 162.9 thousand tons, 5.3 thousand tons of ketchup and sauces, 4.3 thousand tons of tomato paste and more than 137 thousand tons of dried fruits.

184. The Government investment program, for the period 2013–2015 for the local food processing industry planned to implement projects worth $60 million, mainly aimed at establishing new production lines for vegetable and fruit juices, and canned products. By the end of 2016, Uzbekistan targets the annual production of 610 million units of canned fruits and vegetables (460 million units in 2011), 155,000 tons of dried fruit (123,000 tons in 2011), 220 million cans of fruit juice (155 million cans in 2011) and 35 million jars of tomato paste (30 million jars in 2011).

185. The sector is open to companies interested in juice, vegetables and fruits processing, as well as manufacturers of equipment to process, label, and package products. Government is actively trying to encourage private sector development in these areas, but real agricultural reform will be necessary if its efforts are to make a significant difference in the sector's development. There is a high demand for packaging materials, such as cardboard, paper, glass, aluminum foil, and shrink wrap, but these materials are still not produced in any significant quantity in the country. Small scale processing equipment is in demand and is more affordable for small businesses. Cold storage warehouse equipment is also in big demand, at a number of levels, from individual farmers wishing to extend their marketing season, exporters who require cool storage facilities to consolidate export consignments (and extend supply season) through to large scale processing facilities that need to ensure continuity of supply of raw materials on a year-round basis wherever possible.

186. Uzbekistan's food processing industry needs newer technology and equipment related to cooling, processing, packaging and storage to improve the quality and longevity of fruits and vegetables. Integrated chains of production need to be introduced to maintain the cold chain and utilize new technologies and best practices throughout production, transportation, processing and storage of sensitive categories of fruit and vegetables to improve quality, safety and efficacy.

187. Companies specializing in the processing of most fruit and vegetables are mainly located in the regions of the Uzbekistan, usually in close proximity to major areas of raw materials supply. Samarkand region is a major area, accounting for around 30% of all production while the Tashkent region accounts for a further 15%, Andijan 14%, Namangan 13%, and Fergana 10%. Additionally, processing of grapes is located in the Samarkand region for 30% of production, 26% in Tashkent region and a further 12% in Namangan region.

188. Currently the main producers are:

(i) **"Shark Sanoat"**, the largest producer in Uzbekistan juice concentrates purees and pastes, frozen fruits, vegetables and berries, dried fruits. Products are:
   (a) Tomato paste – 15,000-20,000 tons annually
   (b) Apple juice concentrate – 4,000-5,000 tons annually
   (c) Pomegranate concentrate - 800-1,000 tons annually
   (d) Concentrated Cherry juice - 800-1,000 tons annually
   (e) Apricot puree – 2,000-2,500 tons annually
   (f) Apple sauce – 2,000-2,500 tons annually
   (g) Peach puree – 3,000-4,000 tons annually
   (h) Frozen vegetables (tomatoes, eggplant, onions, beans, peppers, etc.)
   (i) Shock frozen fruits (apples, apricots. peaches, etc.).
   (j) Fresh frozen berries (raspberries, cranberries, strawberries, etc.).
   (k) Dried fruits
   (l) Orchards on 10,000 ha

(ii) **Green World JV.** Processing locally grown vegetables and fruits, including:
   (a) Fruit processing (apple, pear, grape, pomegranate) - 5 tons per hour;
   (b) Fruit processing (apricot, peach, plum, cherry) - 5 tons per hour;
   (c) Tomato paste processing - 5 tons per hour;
   (d) Aseptic filler with sterilizer- 4 tons / hour;
   (e) Juices and nectars production line in tin cans - 18,000 cans/h (240g stainless steel cans).

(iii) **MARVEL JUICE CO.** fruit processing
   (a) Processing line with a total capacity of 35,000 tons of raw apples per year.

189. The most common types of processing in use in Uzbekistan at present are the old-fashioned canneries that seal vegetables in metal cans (previously bottled vegetables), but the new investment is primarily interested in the following types of processing as this will address the market demands and is easier to store and transport for long distances if the correct conditions are maintained:

(i) IQF freezing (blast freezing) - is the best and most effective method of preserving delicate foods such as fruits (especially berries). IQF fruits are processed within hours of harvest to maintain maximum freshness. They are sorted and graded by hand to ensure uniformity and quality. Vitamins, minerals, and fibers are naturally preserved in the frozen fruits, including original taste, flavor and color and used for adding in yogurts, ice creams, etc.;
(ii) Drying offers easy portability and storage of finished product. In high demand for the prepared foods market in Russia and CIS countries – more appropriate on a large scale for vegetables which are tougher than delicate fruits, but can also be practiced on a home scale for fruits like apricots and grapes where air drying or solar drying is preferred.

190. **Issues** – as with basic agricultural production, in the processing sector it is necessary to carry out significant work to bring the product into compliance with the internationally required quality standards that would facilitate greater opportunity in product marketing. To ensure compliance with the phytosanitary requirements of export products in foreign countries requires a full system to be put in place, from the basic farm production level all the way through the harvesting and value addition processes so that the consumer enjoys a perfect product which is

safe, reliable and also fully traceable. Manufacturers of food products that rely heavily on the quality of products, need to work directly with agricultural companies and farms to ensure adequate supply of high-quality raw material production. International quality standards such as ISO 9001, have gradually begun to be introduced in the country, but at this time it is being driven by the market while Government institutions still refer to the original GOST standards as their reference point, even though they are increasingly irrelevant, even for exports to Russia and other CIS countries. To date, only a very few companies have been certified in basic standards and systems such as HACCP.

191. **Government support** - For agro-processing companies actively investing into development for the export market, Government is keen to support and promote development of the sector, even looking to identify suitable interested foreign investment partners for potential joint venture development, buying fruits and vegetables at low prices that will facilitate processing of fresh produce into export oriented ready–made food products with a high added value. At the same time there are several schemes and government incentive programs that can bring benefits to investors in this sector. Some of them are available to all investors, others only apply to companies with foreign investment capital. Incentives include:

(i) Tax relief for companies with foreign capital: any joint venture with an investment of 300,000 US dollars or more is exempt from the single tax, income tax and other taxes for three to seven years, depending on the amount invested; and
(ii) Freedom from customs duties and VAT on imported technological equipment used in the investment projects.

C. Development of Horticulture Sector Exports

192. Uzbekistan has significant agricultural export potential. More than 180 species of fresh and processed fruit and vegetable products are regularly exported to more than 80 countries. The main importers are Russia and Kazakhstan where traditional market linkages are gradually being replaced by new approaches. According to FAO, Uzbekistan exports of dried apricots is the second largest in the world, while exports of fresh apricots from Uzbekistan is the 4th largest, plums is 7th largest, cabbage 8th largest, raisins the 9th largest worldwide, peaches and grapes from Uzbekistan are the 10th largest in the world. This clearly shows that Uzbekistan is already well-established as an exporter of fruits, vegetables and other horticulturally based products, both in a fresh and processed state. Uzbekistan benefits from relatively low production costs, high quality of its basic production and ample opportunity for significant value addition.

193. Vegetables account for 27% of all export contracts, grapes for 25 %, fruits for 20%, dried and processed fruit and vegetables 17.6 %, legumes (dried beans, peas, etc.) 8.4% and melons 2%.

194. The main types of fresh vegetables exported are: carrots and other root vegetables, which accounted for 32.7% of total exports of vegetables, cabbage at 21.8%, cucumbers 18.4%, tomatoes 6.3%, onion 5.7% and 15.1% including a mix of other vegetables. The export of fresh fruit includes: apples, pears and quinces which together accounted for 1.2% of total exports of fruits, stone fruit species: apricot, plum, cherry, peach 69.8% and others around 29%. Longstanding traditional exports are dried fruits dried apples, dried prunes, dried apricots and dried grapes.

Table 16: Exports of Agricultural Products in Uzbekistan (thousand ton) Past 5 Years

Product '000 tons	Year				
	2010	2011	2012	2013	2015
Fresh vegetables	292.4	315.7	200.4	337.3	286.6
Melons & watermelon	65.9	87.9	41.8	45.7	7.7
Fruit	148.8	178.1	117.3	204.1	108.7
Grapes	66.4	111.1	118.9	22.1	186.9
Dried fruit	24.2	48.2	41.7	46.1	
Raisins	29.8	36.1	35.9	26.1	

Source: State Customs Committee of the Republic of Uzbekistan.

195. Uzbekistan has significant potential for export of early vegetables, melons, fruit and grapes, which normally ripen earlier than in the countries situated to the north of Uzbekistan. Uzbek fruits and vegetables have been for many years famous for its quality and organoleptic qualities across the CIS countries. Recent developments have seen moves to improve relationships between neighboring States with the formation of a Customs Union of Kazakhstan, Belarus and Russia to increase exports of fruits and vegetables.

196. With the Uzbek Government retaining strict control over exports. Only limited border crossing points have been identified for exports. These are highlighted in Annex 18: **Central Asian Regional Economic Cooperation Organization (CAREC)–six economic cooperation corridors.** This annex highlights some of the issues that remain for exporters, with fresh perishable produce often being held up by bureaucracy at the limited border crossing points. In full production season, it is possible to see queues of large articulated trucks laden with fruits and vegetables held at the border. Issues that have been identified in delaying this process include:

(i) Risk based border inspections, on clearly defined risk based categories for foods, are minimally conducted – instead, virtually all shipments are opened and inspected.
(ii) Some of the CIS countries in CAREC have a common legislation; Regulation on Sanitary Control at Border Crossing Points of May 22, 2000 # 927. This system is based on GOST standards by which potentially unnecessary checks are conducted which may be obstacles to trade.
(iii) The system of Certificates of HACCP Compliance is not applied at any part of the chain.
(iv) The border control legislation for food products has not been harmonized with the various Codex standards.

197. The following actions are required to improve product flow and monitoring at the border post:

(i) Certificates of HACCP Compliance are recommended to be applied. This requires HACCP to be mandatory in the legislation.
(ii) Application of Certificates of HACCP compliance has to be embedded in the system of Risk based inspections.
(iii) The countries have to be trained regionally on the various Codex documents related to border control.

198. Due to its landlocked location and distance to major markets, exporting from Uzbekistan is not easy, not least because any export remains tightly controlled by Government which is not

conducive to easy and fast movement of what are typically perishable agricultural products.[52] The World Bank Group report on Doing Business in Uzbekistan 2015 ranks Uzbekistan 189th out of 189 countries for ease of trading across borders with a time taken to export requirement of 54 days (OECD countries required 10.5 days) mainly due to the number of official documents that were required – 11 in total (OECD countries required 4 on average).[53] This significantly increases both the cost and the risk involved for Uzbek producers in attempting to access international markets. Significant issues also exist in crossing neighboring countries borders with agricultural products, which can be held at the border for several days waiting for clearance to continue. Recently, Government has made efforts to improve awareness of opportunities for export of agricultural products, operating training and information services for producers interested in international markets, but little has been done so far to remove or reduce bureaucracy. With most fruit and vegetable producers being small in scale, Government remains keen that products for export are channeled through one of the “official” Government owned export organizations.

199. The following organizations are involved in horticultural export:
- (i) Uzagroexport
- (ii) Uzagrozahira (Uzbekistan agricultural resources agency)
- (iii) Uzmevasanoatholding (Uzbekistan horticultural and vegetable industry holding company)
- (iv) Uzavtosanoat (Uzbekistan Automobile Industry Company)
- (v) Uztadbirkor (Enterpreneurs Organization under MFERIT)
- (vi) Large-scale Farmers can also directly export.

200. All of the above organisations should get export registration at Uzagroexport and all fall under the Uzagroexport system of control.

201. Uzagroexport has three main responsibilities:
- (i) Monitoring agricultural export revenue (including mandatory selling procedures of 50% of hard currency revenue);
- (ii) Establishing 3-way contracts between seller and buyers and ensuring that payment is made up front before product is delivered to the buyer and clears the border post, and
- (iii) Exploring new markets for potential export.

202. Uzagroexport was formed by Presidential Decree on 7 April 2016, as a part of the holding company "Uzbekoziqovqatholding" which itself is a specialized foreign trade company for export of fresh and processed fruit and vegetable products. The objectives for the creation of the new company is the more efficient use of the country's export potential and rapid development of modern trade and logistics infrastructure to promote exports of fruits and vegetables or their products.

203. The company will also introduce a modern system for the promotion of production logistics for export and pre-export organization of its preparation (sorting, sizing and packaging). When the new company will operate a quality management system and standardize the Central "Food Laboratory" and specialized transport and logistics company, as well as trade and logistics centers in Tashkent and other regions. The document also establishes that from 1st May 2016, all enterprises and organizations involved in exporting fresh or processed agricultural

[52] Excluding cotton which is a commodity crop.
[53] http://www.doingbusiness.org/data/exploreeconomies/uzbekistan#trading-across-borders

products, including micro, small businesses, farmers and private farms are obliged sell their products for export through Uzagroexport (3 way contract: seller, buyer and Uzagroexport) while 50% of any foreign exchange earnings coming from the export of the fresh fruits and vegetables, grapes and melons must be sold at the official Government exchange rate.

204. **Export process–Summer 2016 onwards.** System after implementation of Presidential Decree 2520 (April 2016). Requirements to undertake export of fruits and vegetables out of Uzbekistan:

(i) Contract between:
   a. Uzagroexport
   b. Customer
   c. Farmer/Exporter/Agent
(ii) Certificate of product origin
(iii) Phytosanitary certificate
(iv) Fumigation certificate – applies to all products.

205. Prior to Presidential Decree 2520, the only contract needed was between the Customer and the Farmer.

206. The farmer / exporter / agent can all find their own buyer, or Uzagroexport can help them to find a buyer. Uzagroexport publishes lists of prices for products on a daily basis and these are available to buyers and sellers.

D. Changing Structure of Exports

207. The structure of agricultural exports is shifting—total exports grew at an annual average rate (in current dollar terms) of 12.5% between 2000 and 2013. Over the same period cotton exports grew by an annual rate of only 2.0%. In fact, cotton exports declined between 2010 and 2013 from $1.47 billion to $1.16 billion. As a result, the share of cotton exports in total exports fell from 27.5% in 2000 to 11.3% in 2010, 7.7% in 2013 and reportedly to 7.4% in 2014. By contrast, the share of food products in exports had risen, from 5.4% in 2000 to 9.8% in 2013 and a further 2.1% in 2014 according to reports. Data for 2014 indicate that the share of cotton continued to fall (to 7.4%) while the share of food products rose to 11.9%.54 For fruit and vegetables, exports grew from $68.7 million in 2000 to $1.16 billion in 2010 and to $1.45 billion in 2016 equating to an average annual growth rate of 21%. Consequently, the share of fruit and vegetables in total exports increased from 2.1% to 8.9% over the same period. Therefore, as of 2013, the share of fruit and vegetables in the value of exports exceeded that of cotton. By 2014, data for fruit and vegetables indicate that the value of fruit and vegetables in comparison to cotton has increased again, with fruits and vegetables now being worth almost $ 0.5 billion more than cotton (approximately 30% more).

[54] Ministry of Foreign Economic Relations, Investment and Trade (www.mfer.uz).

Table 17: Exports From 2000 to 2014

	2000	2005	2013	2014
Exports ($ million)				
Value ($ million)				
Total	3,264.7	13,044.5	15,080.8	
Cotton	897.1	1,474.0	1,162.9	1,036.6
Food products	176.4	1,265.3	1,479.0	1,559.8
Fruit and vegetables	68.7	1,155.2	1,346.0	1,498.5
Shares (%)				
Cotton	27.5	11.3	7.7	7,4
Food products	5.4	9.7	9.8	11,9
Fruit and vegetables	2.1	8.9	8.9	

Source: Ministry of Foreign Economic Relations, Investment and Trade (www.mfer.uz).

208. The significant increase in the export market share of food products and also, fruits and vegetables from Uzbekistan is a longer term trend, but has recently accelerated. This can be partly attributed to the ongoing political problems in Ukraine and the sanctions applied to Russia by the European Union (among others) which have prevented exports of such products through normal channels from Europe to the Russian market. Further increased demand from the Russian market in the spring of 2016 came as a result of the political disagreement between the Russian and Turkish governments, after which, the mutual borders were closed resulting in large quantities of Turkish horticultural produce not having access to one if its major markets in recent times. Because of these issues there were shortages of fresh fruits and vegetables in shops and supermarkets across the Russian Federation in late winter and spring with the result that the Russian Government made serious efforts to open other supply corridors, one of which was to return to the old trading partner for supply of such products–Uzbekistan.

209. As a direct result of this new approach, Russia agreed to write off almost all of the $890 million debt owed by Uzbekistan while in return Uzbekistan and Russia will “consult” on improvements to the free trade zone agreement between Uzbekistan and the Russian led Eurasian Economics Union. Uzbek agricultural products were specifically named as a key product required to have a long-term market presence on the Russian market.[55]

210. Discussions have long been ongoing between the Uzbek and Russian governments about improving trade ties, especially for agricultural products: The first deputy prime minister of Uzbekistan, Rustam Azimov, said in November 2014 that exports to Russia in this group had fallen by 10% since the beginning of that year, but those to Kazakhstan had risen by 10%. He blamed the lack of direct export routes to Russia, and said that many exports to Kazakhstan were re-exported to Russia. Mr. Azimov also blamed higher tariffs for imports into Russia from outside the Eurasian Economic Union (EEU), a regional free-trade bloc of which Uzbekistan is not a member. The Uzbek government had previously indicated its desire to fill a gap in the Russian market after the Kremlin banned fruit and vegetable imports from EU countries and elsewhere last year, in retaliation for Western sanctions imposed on Russia. Uzbekistan's Ministry of Agriculture said in 2014 that Uzbekistan could double exports of fruit and vegetables

[55] www.themoscowtimes.com/article.php?id=513096.

to Russia by 2016. In line with currency-revaluation effects, the latest Russian data show that Russian imports of Uzbek foodstuffs declined by 41% in the first five months of 2015.[56]

211. While Uzbekistan does have an increasing range of export partner countries, including Russia, Kazakhstan, Afghanistan, Iran, China, Turkey, UAE, Azerbaijan, India, Iraq, and Korea. The main target of the recent Government push for export development is the Russian market. Other markets are also developing, but they are very minor by comparison at this current time; In 2014, Uzbekistan started to export products to Italy (apricot kernels), Czech Republic (dried apricots, peanuts), Malaysia (mung bean), Vietnam (mung bean), Singapore (cherry and fresh apricots) and Lebanon (walnut). 2015 has also seen trial shipments of sweet cherries to South Korea.

212. About 80% of production is currently to meet the demands of the internal market and the national population, while around 14% of production has been going for use in the processing sector and only a relatively modest 3% of production has been exported until the recent promotion of export markets, while the remaining 3% of production is used for seed crop production. Overall, fruits and vegetables account for over 9% of all exports out of Uzbekistan and 50% of all exports of small and private businesses. Fresh vegetables account for 27% of all export contracts, grapes for 25%, fruits for 20%, dried and processed fruit and vegetables for 17.6%, legumes and other pulses 8.4% and melons (including water melons) 2%.

213. The 1st International Fruit and Vegetable Fair was recently held in Tashkent, organized by Uzagroexport to promote the horticulture sector in Uzbekistan with the specific aim of increasing export potential for fruits and vegetables from the respective regions. News reports from the exhibition indicate that there was high international interest and that many contracts to supply were signed. According to the exhibition information bureau, the most expensive agricultural export product from Uzbekistan is salted apricot kernels, whose price per ton varies between $3,100 and $4,000. While the second most expensive export item are fresh grapes of the Rizamat variety, with a price per ton varying between $1,840 and $2,500, closely followed by fresh sweet cherry, with prices between $1,700 and $2,300 per ton. Uzagroexport sets prices for export sales according to supply and demand and prevailing prices on the international market.

214. **Government expansion plans for fruit and vegetable exports**–following earlier decrees from Government on development of the horticulture sector and expansion of exports, MOA has developed an aggressive plan for development and expansion, including implementation of 180 projects amounting to an investment value of $596 million for the modernization and reconstruction of various enterprises processing agricultural products, on the basis of state order procurement of stocks and export of fresh and processed fruits and vegetables, all of which will be supported by Uzagroexport. Under this plan of development, there are significant planned increases in both levels of production and export volumes.

Table 18: Five-year Plan for Development of Exports

	2015 In fact		2020 Forecast	
	Quantity '000 ton	Value million $	Quantity '000 ton	Value million $
Vegetables	286.6	478.7	1,212.3	2,024.6
Melons	7.7	5.1	267.4	178.0
Fruits	108.7	359.0	383.0	1,264.9
Grapes	186.9	350.0	326.3	611.1

[56] The Economist Intelligence Unit–September 9th 2015.

Total:	**589.9**	**1,192.8**	**2,189.1**	**4,078.6**

Source: Ministry of Agriculture.

215. The Ministry for Foreign Economic Relations Investment and Trade (MFERIT) has also been working to support the development of the fruit and vegetable export industry, supporting the establishment of an Uzbekistan Trading House in Latvia called "Uztadbirkorexport," one of four foreign trade companies under MFERIT. The aim is to boost Uzbekistan's successes in marketing and selling products (not cotton) through a trading house arrangement in a foreign country. Latvia was chosen because the country can serve as a gateway to the European markets—allowing Uzbekistan to export its goods to Latvia itself and then use Latvia's transport networks to move goods further into the EU. This small Baltic country is a part of the Trans-European Transport Network and is crisscrossed by several strategic EU rail, road and water corridors. Finally, Latvia's simplified customs rules made this Baltic State particularly attractive to Uzbekistan exporters[57]. While the initial focus has been on marketing of dried fruits and vegetable products, fresh produce will also now be marketed through this channel.

E. Costs along the market chain

216. With the very extended length of the potential market chain and the perishable nature of the products that are potentially being exported, the products need treating with significant respect and great care to ensure that they arrive in the intended market at the right time, in a good condition and with a fresh and appealing appearance. To address all of these issues requires time, attention to significant detail and an effective plan of operation. Cost is certainly going to be a significant factor in getting the products into market and this cost will vary significantly, depending on the distance to the market, the nature of the product and the mode of transport employed.

217. The World Bank spent some time analyzing the market chain for fruit and vegetables for the export market as part of their studies for the Horticulture Development Project and a summary of the findings of the assessment of the value chain for different products and markets can be seen at Figure 7 below.

218. **Cost of transport** – varies according to the location and distance to market, but in every case, is significantly a higher cost than the farm gate value of the product itself, even with a reasonably high priced product like grapes and low cost transport (truck). For early cabbage, which would normally be one of the higher priced vegetables, the disparity between transport cost and the farm gate value of the product is very large.

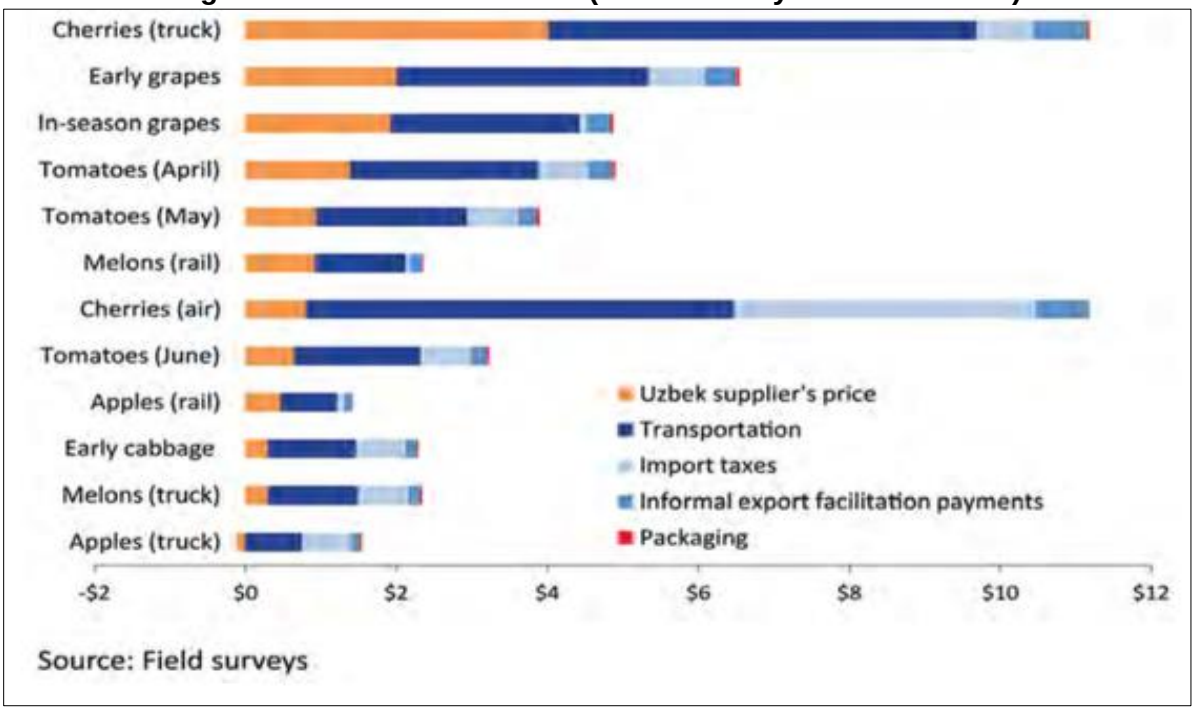
219. **Informal payments** – the study shows that all products required a certain level of "informal payment" to make the system work. This is highly unfortunate and is something that Government should be trying to eliminate from the system if it is serious about trying to really develop a sizeable export led production system. While checks and controls are always going to be necessary, there are far too many in the bureaucratic system employed in Uzbekistan which only encourages the demand for this kind of payment. Automated services should be employed wherever possible with checks and monitoring being risk based only.

220. **Minimal investment in packaging** – At various points in this report, comments have been made about the inadequacy of the packing materials and the damage caused to the product in the value chain by the low level of protection provided. This chart clearly identifies

[57] Economic Review magazine Facebook page, May 19, https://www.facebook.com/ecoboz).

that the investment being placed in to appropriate packaging materials that can provide proper protection is minimal – the cost of packaging is so insignificant that in some cases it hardly registers on the chart.

Figure 8: Market Chain Costs (Calculated by the World Bank)



Source: The world Bank.

F. Reliance on the Russian Market

221. Russia accounts for 80% of all exports from Uzbekistan, but Uzbek imports only account for 3% to 4% of all fruit and vegetable imports to Russia. The unbalanced trade relationship with Russia creates both opportunities and risks. Uzbek exports could expand significantly by capturing incremental shares of the Russian market. On the other hand, since Uzbekistan lacks a diverse set of trading partners, a loss of share due to competition on price, reliability or quality can greatly harm the industry. The same is true for disruptions related to unilateral changes in Russian import standards or policies.

222. Russian supermarkets as a key export market for Uzbekistan, it is the destination for more than half of the fresh cherries, grapes, melons and cabbage exported. Supermarkets have been expanding quickly in Russia and this trend is expected to accelerate with Russia's WTO membership and the entry of foreign retailers. Russian supermarkets commanded 20% of the fresh fruit and vegetable market five years ago and that share now stands at 40%. Experts believe the share will reach 60% to 70% in five years. Supermarket chains in Russia are much more demanding than local Uzbek supermarkets. For most products, they require pre-cooled and properly packed produce. Since supermarkets in Russia do not want to deal with bulky packaging, they usually require high-quality cardboard packaging for most of the products supplied. These boxes need to sustain the trip to Russia and will be used to display produce in the store. This means that the boxes should be robust but also economical.

223. Most products shipped from Uzbekistan to Russia fall short of handling these requirements. Managing the temperature of the produce is important for retaining quality and extending the shelf life of the produce, which ultimately drives the preferences of buyers. Produce should be picked at cooler times of the day, kept cool and moved quickly. Pre-cooling chambers and hydro-coolers are not available for use in Uzbekistan, neither are optical scanners, which reduce sorting time. Moreover, most Uzbek produce is shipped in wooden or cardboard packaging, which requires additional handing for better presentation in stores. All of this explains why Uzbek produce often ends up in open markets or wholesale markets where requirements are not as high. Wholesalers in Russia and CIS are much less demanding about the quality than supermarket chains. Usually they accept produce from Uzbekistan in whatever packaging it comes as long as the packaging adequately protects the produce during transport. After the product is received, they re-sell it on the local wholesale and retail markets. For some products like apples, onions and early cabbage, wholesalers might re-pack the produce for supermarkets.

224. Lack of knowledge and understanding of the issues surrounding the life of the product in the post-harvest chain after the farm gate and up to the end consumer are significant drawbacks on the export potential of the fresh produce industry in Uzbekistan. Knowledge of maturity indexes (for harvest) that take into account delivery times to intended markets, standards of quality, including uniformity of appearance, size, shape and color, use of appropriate packaging materials that are light weight and yet offer appropriate standards of protection for the contents are limited – most fresh fruit is still packed into softwood crates or boxes and with fruits wrapped in paper, while field heat removal and cool chain systems are not available to typical farmers.[58]

225. Russia is highly dependent on imported fruits which make up almost 50% of Russian fruit sales. Most imported fruits are available during the first six months of the year and consumption peaks from October to May. Imports are lowest in the summer (July-September) when the market is full of cheap local fruits from Russia, Moldova, Ukraine and the Central Asia republics, as well as the Middle East. In 2013, Russia bought around €1,076 million worth of fresh and processed fruit and €769 million worth of fresh and processed vegetables. The fast growing sales to Russia include tomatoes (from €6 million in 1999 to €116.5 million in 2011), potatoes (from €7 million in 1999 to €198.5 million in 2011), apples (from €53 million to €284 million), and pears (from €19 million to €169 million), among others.[59]

226. The largest Russian Fruits Suppliers are: Ecuador (bananas), Poland (apples), Turkey (citrus, grapes, and stone fruits), China (apples, citrus, stone fruits), Argentina (apples, pears, and citrus), and Chile (grapes). In general, imported fruit is expensive in Russian retail outlets. Importers typically mark up by around 5%, while the supermarket mark-up varies from 10%–30% and specialized fruit stalls mark-up much as 100% depending on the fruit variety. In terms of vegetables, tomatoes are the largest imported items, followed by Potatoes and then Onions and Garlic.[60]

227. Russian and Former Soviet Union country suppliers have struggled to maintain their position in the face of such change and the rapid growth of imported fruits and vegetables into

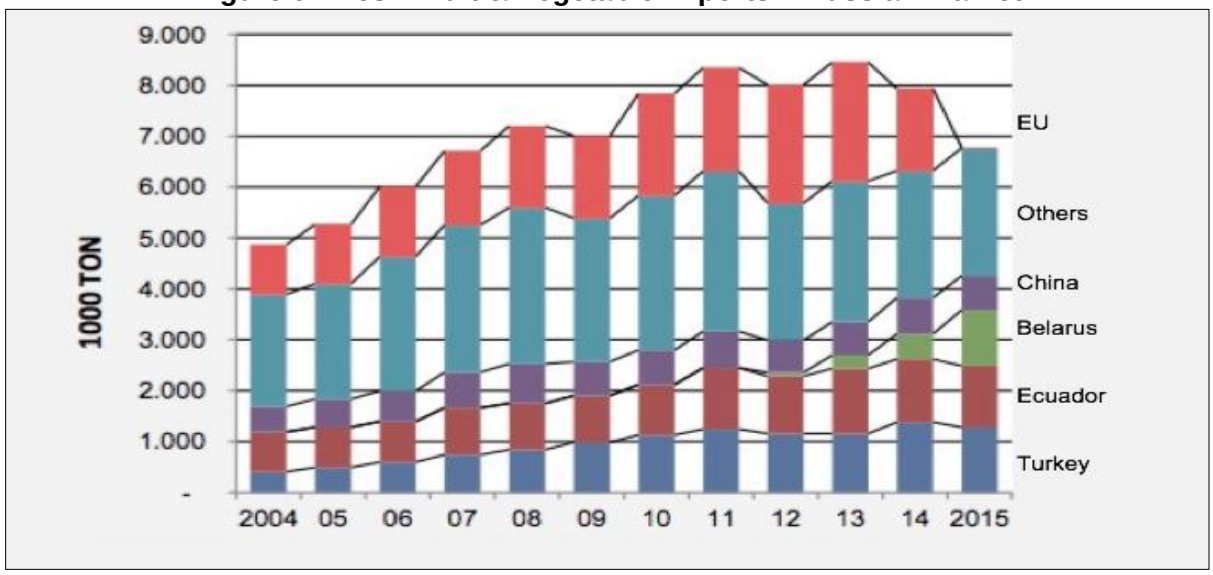
[58] During the fact finding mission for this project, Team Members visited numerous farms and production units and it was only at the very largest of producers (who also owned a processing line) that any real cold storage facility was available for the freshly harvested product.

[59] "Monitoring Agri-Trade Policy: The EU and major world players in Fruit and Vegetables Trade", July 2012, European Commission.

[60] Federal State Statistics Service, Russian Federation.

the Russian market is clear. Peak supply of imported fruit and vegetables was in 2013 when total imports reached a high of 8.4 million tons. Subsequent political issues such as the ban on European Union products to Russia as a result of the Russian annexation of Crimea in 2014, followed by a breakdown in relations with Turkey in 2015 have seen significant suppliers of fresh fruit and vegetable products removed from the market. The consequence has been a significant drop off in imports. This is highlighted in the chart below:

Figure 9: Fresh Fruit & Vegetable Imports – Russian market



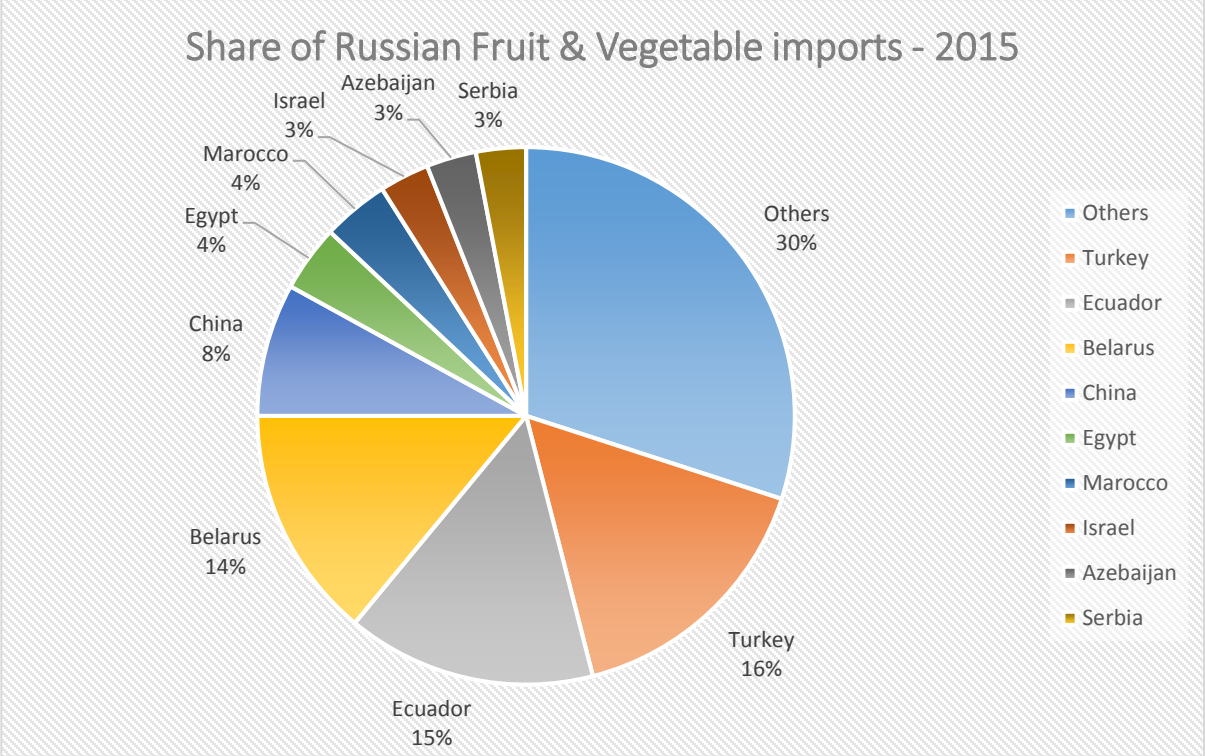
Source: Federal State Statistics Service, Russian Federation.

228. As a consequence, the overall imports into the Russian market have fallen back to a total of only 6.8 million tons in 2015, which is 20% less than at the peak in 2013. Turkey gained from the initial EU export ban with an increase in exports to the Russian market, up from 1.16 million tons in 2013 to 1.38 million tons in 2014, but in 2016, following the ban imposed by Russia on imports from Turkey, there was the loss of a further 1 million tons of fruits and vegetables from the Russian market. With the EU exports peaking at about 2.3 million tons to the Russian market before the export ban, plus the 1 million (probably more) following the ban on Turkish products, the overall shortfall on the Russian market can be estimated at around 3.3 million tons of fresh fruits and vegetables at the start of 2016.

229. In shops and supermarkets across Russia, this situation has certainly manifested itself in the form of empty shelves and a reduced variety of products being available for consumers.

230. While this has not been good news for Russian consumers, it has presented a window of opportunity for others to step in and to fill up the void left in the market. Initially, Turkey was originally a beneficiary of this effect following the EU ban on exports to Russia and the supply situation in 2015 is illustrated by the following figure:

Figure 10: Russian Fruit & Vegetable Imports 2015 (%)



231. Ecuador has seen its position increase, but this is only for the supply of bananas which have supplemented the shortfall in other fruits to a small extent, but the other big winner in the market has been Belarus.

232. **The Rise of Belarus.** Belarus is a neighboring country to Russia, being located in between Russia and parts of the eastern border of the European Union. While it has an agricultural industry, this has suffered even more than the Russian agricultural sector due to lack of investment, coupled with quality and reliability issues so that its major market was primarily internal. This is shown in the fact that Russia imported only around 100,000 tons of fruits and vegetables in 2012 from Belarus, mainly in the form of local cabbage, but also significant products that originated in EU but were then re-exported, but following the imposition of the EU export ban, this export trade from Belarus to Russia has increased at a phenomenal rate–2013 was 340,000 tons, 2014 was 500,000 tons and by 2015 it had reached 1.1 million tons.

233. This rapid rise in exports has not been the result of increased agricultural production in Belarus, rather it can be explained by the sudden development of increasingly significant trade between Lithuania (an EU member) and Belarus – in 2015, the EU exported a total of 1.6 million

tons of fruits and vegetables to Belarus, out of which 1.1 million tons came from Lithuania.[61] Lithuania itself imported 1.3 million tons of fresh fruits and vegetables in the same period, almost all exclusively from EU countries, with The Netherlands being the main supplier (375,000 tons in 2014 and 600,000 tons in 2015). In this case, it is clear that the EU export ban is being undermined by this trade through Belarus. However, consumers in Russia do benefit from this channel.

234. **The Turkish Situation.** Prior to the ban on Turkish products entering the Russian market, Russia accounted for as much as 36% of the entire Turkish export of fruits and vegetables, making it by far the largest single market for the Turkish agriculture sector, making up an amount of around 1.28 million tons, of which grapes and tomatoes are the main products, accounting for up to two thirds of total fruit and vegetable exports. By comparison, the combined EU import of fruits and vegetables from Turkey amounted to around 800,000 tons. It is therefore clear to see why the ban on exports of Turkish products to the Russian market has been short lived and why the two countries have been particularly keen to reopen the flow of goods without too much damage to the market. The Russian and Turkish Presidents met for bilateral discussions in mid-August 2016 and both expressed the desire to re-open borders and to resume trade again. Reports show that the long-term aim is to boost bilateral trade volumes up to a value of $ 100 billion, up from around $ 35 billion before the crisis.[62] Turkish fresh fruit and vegetable products are therefore heading back into the supermarkets and markets of Russia, just in time for the main apple and grape harvest season.

235. **Poland Loses its Share.** The main losers in the various bans on export/import to Russia have been Polish apple producers. While the market has not completely disappeared, the trade volume has fallen from 850,000 tons in 2013 to only 410,000 tons by 2015. Instead, Polish apple producers have increasingly turned to the Southern European countries (Serbia, Romania, and Czech Republic) and the fairly affluent Middle East markets (Egypt, U.A.E. and Saudi Arabia) as replacement outlets.

236. **Other Countries that have Gained** - Other than Belarus, the trade figures indicate that so far there have not been any significant gains in the market by any supplying country with regards to fresh fruits and vegetables for the Russian market. Imports from China and Egypt both showed modest increases, while Serbia and Azerbaijan also increased their exports slightly over previous season.

237. **Traditional Supply Lines.** Traditional suppliers to the Russian market from the old pre-independence days, such as Moldova have actually shown a significant decline in exports of fruits and vegetables in the same period when the European and Turkish bans have been in place. Comments indicate that supermarkets (and consumers) want reliable and uniform products that are well presented and that many of the traditional suppliers from Soviet days are simply not in a position to fulfill this demand with a product that is either reliable or well presented. Logistical problems in moving significant quantities of highly perishable products from such areas have also proven to be difficult to overcome and reflect the unfortunate lack of investment that now prevent the re-establishment of old linkages.

238. **Uzbekistan.** Where does this leave Uzbekistan? In the late spring of 2016, when Russian consumers had greatly reduced choice of fruits and vegetables on their shelves, Russia was keen to open opportunities for exports of a wide range of fruits and vegetables from

[61] Eurostat.
[62] Euronews 09.08.2016, BBC 09.08.2016.

Uzbekistan and other traditional suppliers from the past. Various agreements were reached, and Russia agreed to write off the multimillion dollar debt owed by Uzbekistan while Uzbek agricultural products were specifically named as a key product required to have a long term market presence on the Russian fruit and vegetable markets.[63] Subsequently, the Uzbek Government has been working hard to try and take advantage of the situation and to further develop opportunities for the fruit and vegetable sector of Uzbekistan.

239. The establishment of a new organization by Government[64] – "Uzagroexport" which has been set up with the stated aim of simplifying and expanding trade, particularly of fruits and vegetables is one direct consequence of the new policy approach. A trade exhibition was held in Tashkent, Uzbekistan in early July 2016, organized by the newly formed Uzagroexport and with the aim of highlighting local production to buyers and importers from interested countries. The exhibition was a good showcase for local production and reports suggest that "significant" supply agreements were reached with potential buyers. It remains to be seen if these come to full fruition in the main harvest season, particularly in light of the rule that all exports must now be a three-way contract between the buyer, seller (exporter or farmer) and Uzagroexport and that 100% of the payment for the product must be paid to Uzagroexport before the product is allowed to cross the Uzbek border. With a poor logistical system, the need to transit through neighboring Kazakhstan, a long further onward journey[65] and the current lack of understanding of either the rigorous quality and packing regimes or the need for careful product handling prevalent at the moment amongst most producers in Uzbekistan, then there are many issues that remain to be resolved if the industry is to establish itself as a major force and realize its full potential.

240. The logistical chain needs to be significantly improved to reduce delays, becoming a facilitator of trade, rather than the current system of checks and controls, none of which add value or benefit, rather just delay and result in further reliability issues and loss of product condition and quality. These are things which are all too common in the fresh fruit and vegetable trade and Uzbekistan needs to move quickly to resolve these issues before the window of opportunity in the market closes again as Turkey re-establish itself and boosts its share of the market in Russia.

VIII. UZBEKISTAN – THE NEED TO EXPLORE ALTERNATE MARKETS

241. While the opportunity for increased exports of fruits and vegetables to the Russian market is presently one which needs to be addressed and if well managed can bring significant opportunities, it is also time to perhaps consider the need to diversify the market spread and to identify new market opportunities for Uzbek fresh produce. The newly developed export processing zone at Navoie Airport in the West of Uzbekistan has opened links to a number of other potential markets. Regular flights from this center to Germany, Korea and the United Arab Emirates (Dubai) and the opportunity to work with Korean Airlines and others to develop cargo flights is a significant opening that needs to be developed. Already (during June and July 2016) some exports have been developed by entrepreneurs with high quality (and high value) sweet cherries being exported in trial consignments (100 tons) to South Korea through this facility. The quality of the consignments was high, and the products were well received and there is demand for a significant increase in quantity for the 2017 season (1,000 tons). Similarly, high quality greenhouse tomatoes are also reported to be being shipped by air through this facility in winter

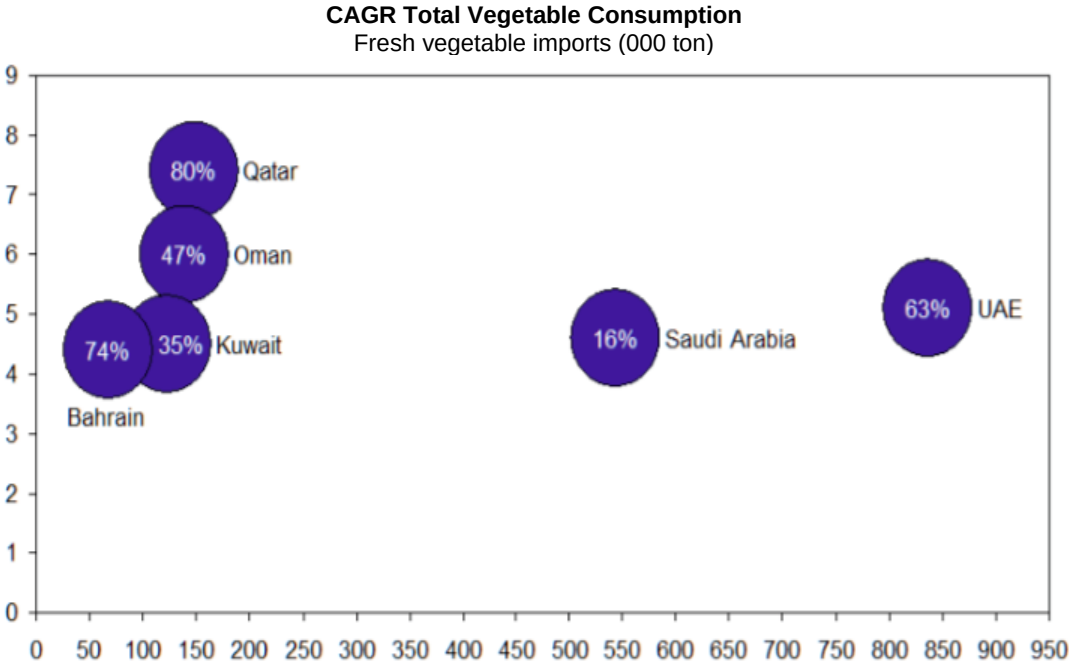
[63] www.themoscowtimes.com/article.php?id=513096

[64] April 7th 2016 - Presidential Decree.

[65] Six to ten days by road in a truck from the Uzbek border to Moscow.

months at a rate of 40 tons per day to supermarkets, mainly in Northern Russia at this time, but the potential exists for expansion of this trade to other markets. One such example which should be explored is the increasing market for high quality and high-priced products to supply the high end exclusive hotel and catering trade in exotic places such as The Maldives and Seychelles, both of which are currently supplied through Dubai wholesale market from producers in Western Europe, even in winter. Price levels are high, but quality must be very good and very reliable. Uzbekistan with its long production season – winter supplies from Surkhandariya and sweet and high-quality fruits in spring and summer is ideally placed to take advantage of such opportunities if it can improve its logistical base and develop the capacity of producers and handlers of the produce so that they understand the high standards of quality, reliability and traceability that need to be put in place. Early adoption of GlobalGap standards at farm level and HACCP in the value chain are imperative if this trade is to be expanded longer term.

Figure 11: Vegetable Import & Consumption in the Gulf Region - Dependency on Imported Products (%)



Source: Arab Organization for Agricultural Development.

A. Risks

242. Uzbekistan has a wide range of excellent fruits and vegetables that can be of a high quality prior to harvest, but which can deteriorate rapidly in the harvest and post-harvest chains, often reaching market in a very mixed condition. This is quite obvious, even in local Uzbek, shops and supermarkets where the product has only travelled for a day or two after harvest, but quality is already unacceptable.

243. The long sunny days with warm temperatures all contribute to the growth of fruit, and vegetables, with a high sugar content making them sweet and very easy to eat with high organoleptic qualities that consumers constantly demand. The significant risk that needs to be addressed is how to get these products to the end consumer in a ready to eat condition but while maintaining the quality of the fruit freshly picked from the tree or vine.

244. There are a number of significant risks at present that need to be addressed if long term industry development is to be successful and sustainable:

(i) Need for technical training and capacity development throughout the production and market chain
(ii) Rapid increase in production could result in over supply
(iii) Product reliability in the value chain is poor
(iv) Quality is inconsistent
(v) Packaging is poor
(vi) Limited availability of storage
(vii) No cool chain
(viii) Logistical chain is poorly organized
(ix) No traceability or quality system in place for the production and marketing chain (GlobalGap is required for European markets)
(x) Government control discourages entrepreneurial activity (some of the recent decrees mention setting of quotas and state orders, along with subsidized input supply)

B. What Needs to be Done?

245. **Suitable varieties.** Existing varieties produce excellent fruit at harvest, but have a propensity to deteriorate rapidly post-harvest. Handling is currently poor, but more research needs to be done on identifying varieties that will produce good crops in local conditions, but are also more durable and resistant to damage in the value chain.

246. **Planting needs to be in line with Technical Advice.** Significant planting of apples in inappropriate sites, on the plain areas around Tashkent could be storing up trouble for the future. These sites have good soil, but the climate is hot and humid which is really unsuitable for apples. Early fruits from these trees appear to be large in size but have poor storage quality which results in the need to sell at harvest time when process is lowest. Apples and pears need to be planted in higher areas which are more suitable for steady growth and easier management.

247. **Imported trees need Proper Quarantine Inspection.** High levels of imported fruit trees have recently been brought into the country from a number of sources, mainly in Europe. These sources MUST provide proper certification and evidence of quarantine inspection by the relevant authority in the country to prove that these trees are healthy and free of pest and disease. Uzbek quarantine staff need to monitor these trees carefully to see that no new pests or diseases are being imported. Some of the trees also appear to be developing and growing in a different manner from that normally associated with such trees in Europe. The question must be asked is: are these trees suitable for the local climate and do the rootstocks match the vigor of the tree in the local soils and climate – this may appear to be a problem that could become more significant as the trees mature.

248. **Significant need for Qualified & Capable Technical Capacity Development.** Many “new” or “intensive” farms recently established are poorly managed by inexperienced managers and technicians who don’t have the right practical experience. The rush to plant fruit trees on an intensive basis has resulted in many trees not receiving the correct level of care and attention with the result that the trees are rapidly becoming too big, overgrown and out of control making it very difficult to manage. Yields drop off and problems arise with pest and disease. Trees then have a short lifespan, much less than the project 15 to 20 years and the risk to the whole

investment becomes significant. Similar comments can be made about modern greenhouses using intensive production techniques that grossly underperform because of poor technical management.

249. There is a serious need for upgrading of management skills and technical knowledge to be supported by a professional Advisory Service (Agricultural Extension). The current number of really knowledgeable agronomists or horticulturalists is very small.

250. **Need for Improvement in Pest & Disease identification & Control.** Needs to include Integrated Pest Management (IPM) which is almost non-existent for the horticulture industry, unlike the cotton industry in which Uzbekistan has very good experience and reasonable capacity to support the farmers with IPM control products, but capacity for the horticulture industry and the wide range of crops and pests and diseases will also need further support and development. Farmers will also need better training and development in past and disease management and subsequent control using regular crop monitoring the judge thresholds.

251. **Improve Availability of Horticultural Equipment.** Current levels of specialized equipment for field production of horticulture crops is limited. Precision seed drills and planting machines for vegetable crops, inter row cultivators, crop sprayers and specialized harvesting machines for fruits and / or vegetable crops are simply not available at present in Uzbekistan. Nearly all of the available equipment is appropriate for the cotton / wheat subsectors, but is not of a suitable size, sophistication or capacity to match the needs of the current horticulture sector. Even the needs of the small-scale producers (*dekhan* farms) are not being met – there is a significant need for the easy availability of two wheeled tractors along with suitable attachments.

252. **Care in the Harvest Process & Post-Harvest Chain.** At present, most producers in the horticulture sector remain small in size, either being family units (*dekhan* farms) or small-scale businesses, based around the extended family, plus seasonal labor as required. With the market chain in Uzbekistan being poorly developed and most producers marketing their own products either directly to end consumers in local markets, or for fruit crops, selling direct from the orchard to middle men or agents, then the emphasis remains very much on crops being sold and consumed reasonably shortly after market. Products therefore are very close to full maturity when they enter the market chain and this makes them very delicate and in need of careful handling.

253. The whole value chain requires upgrading in terms of knowledge capacity and practice in how to better treat such perishable products so that they reach market and the end consumer in a much better condition. From the basic steps of understanding the length of the likely chain to the end consumer (from one or two days in-country to ten to fourteen days if exported) and matching of appropriate harvesting maturity to likely intended market, to the need for careful handling of the products, use of appropriate packing materials that are clean and provide protection, to the need for keeping and transporting products in clean and sanitary conditions, keeping products cool and out of the hot sun, etc. The whole value chain needs education, training and support with appropriate equipment and other materials that facilitate the process of getting highly fragile living products to market in a good condition.

254. **Increased Storage Capacity and introduce the need for Field Heat Removal.** Managing the temperature of the produce is important for retaining quality and extending the shelf life of the produce, which ultimately drives the preferences of buyers. Produce should be picked at cooler times of the day, kept cool and moved quickly. Pre-cooling chambers and

hydro-coolers are not available for use in Uzbekistan, but must become part of the value chain if a long term sustainable export industry is to be built for high value products. Rapid removal of "field heat" (the stored temperature within the fruit at the time of harvest) shortly after harvest is crucial to extending the life of the product and is a significant contributing factor in ensuring that the product arrives at the (distant) market in good condition.

255. In 2014, following stimulus from Government, investment increased into development of cold storage capacity for fruits and vegetables, both for the supply of products onto the internal markets and also for use to support development of export markets. In 2012, the available capacity was 454,000 tons, which was increased to 588,000 tons by 2014. With the horticulture sector forecast to produce 25 million tons annually of raw fruit and vegetables by 2020,[66] it is clear that the existing capacity of suitable temperature-controlled storage is less than adequate – this existing capacity will enable only 2.3% of the total harvest to be stored.

256. **Grading, Sizing and Packing Equipment.** Supermarkets have been expanding quickly in Russia and this trend is expected to accelerate with Russia's WTO membership and the entry of foreign retailers. Russian supermarkets commanded 20% of the fresh fruit and vegetable market five years ago but that share now stands at around 45%. Experts believe the share will reach 60 to 70 % within a further five years. Supermarket chains in Russia are much more demanding than local Uzbek supermarkets. For most products, they require pre-cooled and properly packed produce of a uniform size, quality and stage of development.

257. To address these issues there is a significant requirement to develop proper pack house facilities in key production areas, linked to appropriate storage capacity. The current situation of hand sorting and packing of produce for both internal and more importantly export markets is both inefficient, but also a slow process and one which often damages the product as it passes through the process. One enterprise in Tashkent[67] has just invested heavily in such a facility because the management team has identified opportunities to develop high quality export markets, for fresh fruits and vegetables, but they are also keen to use the facility to support an extended production season for their vegetable drying line. This facility includes hydro-cooling equipment, blast freezer, grading and packing lines and modern high quality cold storage. This experience needs to be replicated many times across Uzbekistan.

258. **Logistics.** To develop a significant and reliable export business based on the fresh produce industry, particularly one which is targeting far distant markets, the chain of logistics needs to be shortened and tailored to facilitate ease and speed of the whole process. The current situation is poor, from the field to the point of export there are many issues, many of which have already been highlighted above, but add on top of this the very poor road network in rural production areas, lack of refrigerated transport, high level of bureaucracy involved in preparing an export consignment, constant police checks on trucks on the road ways, frequent delays at the border (or closure of the border), etc. all add to the significant risk of a successful export.

259. Government should consider developing specialized export processing zones where all facilities should be under one roof, including exporters, storage, packhouse facilities, quarantine inspection, customs, Uzagroexport, banks, specialized transport companies, etc. so that the whole process is streamlined and potential for time wasting and delay is removed.

[66] According to Presidential Decree: No. PP-2505 dated 5 March 2016.
[67] Golden Dried Fruits / Golden Fresh Fruits.

Consideration should also be given to the streamlining of bureaucracy to support the process, rather than burdening the exporter.

260. **Monitoring of Markets and Investigation of Alternate Markets.** While Uzagroexport is still a newly formed organization, still developing its role under the guidance of government and in consultation with exporters and foreign buyers, there is an opportunity to develop its capability into one other key area that is currently not addressed–namely market information. As a service provider to potential exporters, one significant need of all potential exporters is up to date and trustworthy information on the target market, in terms of seasonality of supply, quantities, likely quality demands, prices, packaging, shipping requirements, etc., etc. Generally, this information is usually very difficult to accumulate and requires much time and energy on the part of the exporter to collect such data which in any case is often unreliable. Uzagroexport has the potential to develop into this role, collecting market data from key export markets and collating it and making it available to exporters as required. The collection of data should be coordinated with the Trade Offices in the Uzbek embassies around the world. Some very efficient and effective examples would be the The Netherlands and also New Zealand who both export large quantities of fresh produce all over the world on a daily basis over an extended season.

261. Spain also has a very efficient and supportive market information systems, working with exporters and research facilities to constantly improve and develop their export potential. The semi-private research facility in Almeria: Technova Agriculture Technology Center is a very impressive site, working with over 120 private companies to ensure that the correct products are grown, prepared, packed, transported, handled and sold to consumers in the best condition. Such a center should be the aim of Government here in Uzbekistan to facilitate and support export trade.

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262. **Export Certification.** The international trade in fresh fruits and vegetables relies on certain universally accepted uniform standards of quality which set out the various organoleptic norms, appearance, cleanliness, packaging and traceability of product origin to facilitate smooth cross border trade without significant disputes occurring. The common trade requirement at present is GlobalGap which certifies that the producer applies acceptable standards of agricultural practice and the produce is therefore reliable and suitable for cross border trade. This system is currently not operating in Uzbekistan and the reliance on the far older and inappropriate “GozStandart” which is a throwback to the Soviet times means that international buyers who look to Uzbekistan to potentially source supplies of fresh fruits and vegetables are discouraged by the possibility of reliability and standardization questions disrupting trade.

263. At present, MOA is examining opportunities to establish GlobalGap or similar certification schemes in Uzbekistan and the upcoming World Bank funded, Horticulture Support Project has ear marked a component to deal with the establishment of such a system at the earliest opportunity within Uzbekistan. Until such a system is operational, international trade in fresh produce will always be difficult for Uzbek producers as questions will always be raised about reliability and traceability which are two key questions that buyers always want to see addressed. If these cannot be satisfactorily resolved, then buyers will only want to pay lower prices for products which are deemed to be a higher risk than “certified” products. Failing to

meet SPS requirements can shut countries out of markets, and slow certification systems can effectively do the same. For these reasons, SPS requirements are seen as a trade hurdle to be cleared and policies are designed with clearing this hurdle in mind. Policies based on this mindset tend to focus on minimal standards set out by governments and international organizations like FAO, OIE, WTO, and WHO. However, it is increasingly the case that supermarkets, fast-food restaurants and other private firms are moving to manage their own liability and reputational risk by instituting their own standards. A common approach for firms or associations of firms is to establish their own guidance on food safety and supply chain management, and subsequently purchase their produce only from sources who abide by those guiding rules. This means that produce compliant with government standards may nonetheless be excluded from important markets. For Uzbekistan, this trend constitutes a significant risk, since current prevailing practices may prove to be inadequate.

C. Recent Developments in Support of Exports

1. Navoie Free Industrial-Economic Zone

264. The up-to-date storage facilities that were put into service in the Navoie Free Industrial-Economic Zone are capable of storing more than 13, 000 tons of fresh fruit and vegetables in a controlled atmosphere storage environment. This produce is then delivered to the markets of Europe and Asia by air with the help of international air transport. The capacities of the Intermodal Logistics Center are used for this purpose, including Navoie International Airport, which is operated by Korean Air, one of the world’s biggest freight carriers.

265. From this site, there are direct flights to Seoul, Moscow, Frankfurt and United Arab Emirates, with options on other flights if required. Cargo rates appear to be very competitive at this time while the companies involved are trying to develop market share. Government may also be providing support.

266. In winter months, there are daily flights to northern Russia carrying high quality tomatoes that have been grown in the modern greenhouses developed around Navoie that benefit from the natural hot water springs in the area for low cost heating source.

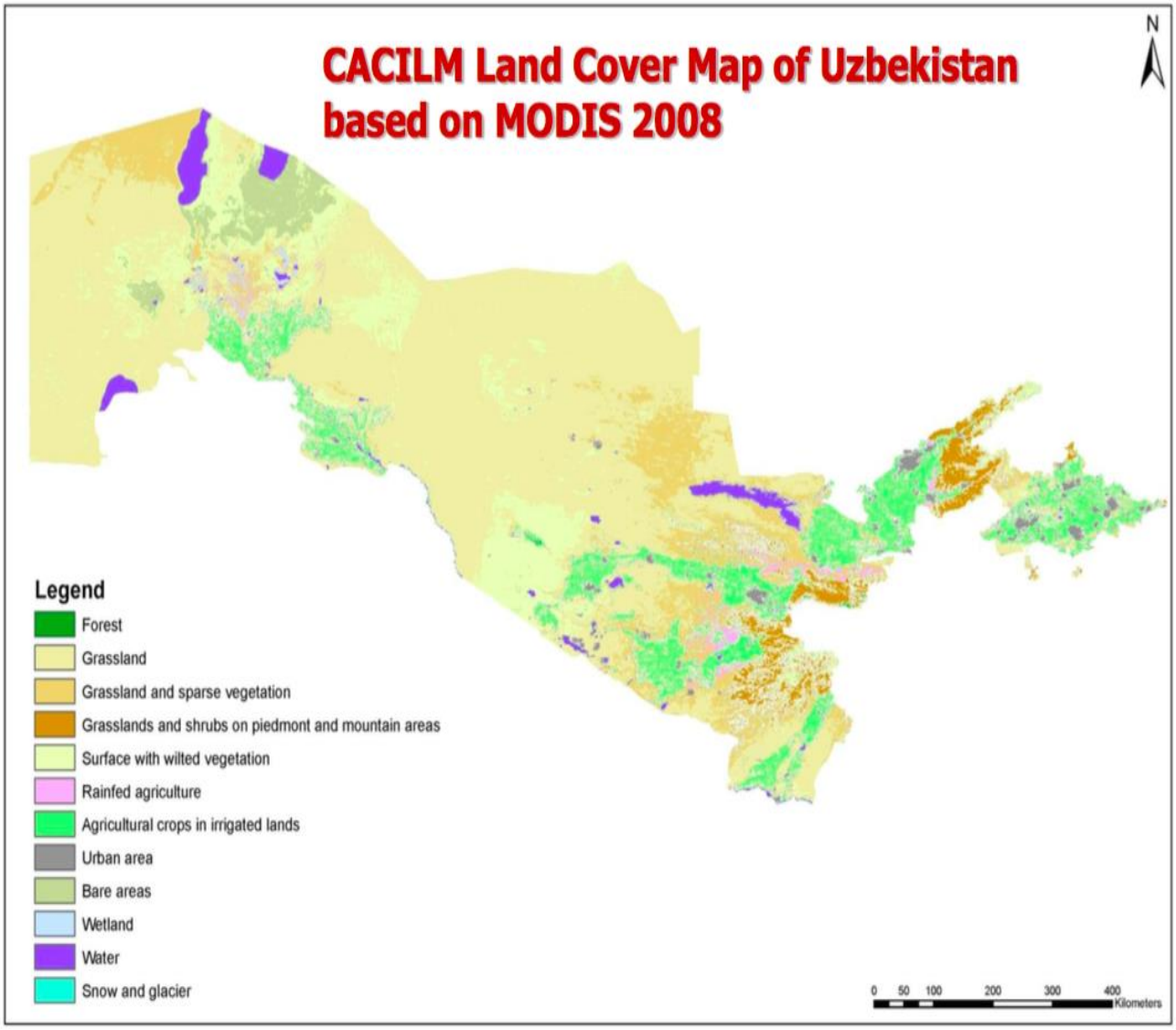
2. Chinese Investment – Bukhara region

267. Investors from China using a loan from the China Eximbank are working with the regional government and the Ministry of Economy of Uzbekistan to invest in a project with a value of about USD 30 million, to set up Bukhara region's largest food transport and logistics center, including four modern refrigerated stores and sorting and packing facilities.

268. The Chinese company Xinjiang Silu Changlong Investment, plan to link the center with the new electrified railway line that will run to the Kyrgyz border and then on into China.

269. In addition, there will be two processing plants, equipped with modern production lines. The first will focus on the processing of fresh produce grown by Uzbek farmers, such as jams, marmalades, preserves, pickles and other products. While the other will be engaged in the processing of meat and milk, producing a wide range of sausage and dairy products. In addition, the Chinese intend to run the plant to produce its own packaging - plastic and cardboard containers and boxes, which will meet all the requirements of the markets of the CIS countries and the European Union.

Annex 1: Land Cover (Land Use) Map – Uzbekistan



Source: GEF/ADB/FAO CACILM SLM–Information System. Uzbekistan.

Annex 2: Administrative Map of Uzbekistan

Source: Nations Online Project 1.

Production Area by Regions

Regions	2005	2010	2011	2012	2013	Variations between 2005-2013
	Thousand Hectare's					**(+;-)**
Uzbekistan total	3647.5	3708.4	3601.6	3628.1	3658.6	11.1
Regions						
Karakalpakstan	238.5	265.7	224.4	254.8	233.4	-5.1
Andijan	230	230.1	230.2	229.6	229.9	-0.1
Bukhara	239.6	242.4	239.7	240.4	240.3	0.7
Djizzak	388.4	390.5	389.7	389.8	394.7	6.3
Kashkadarya	477.6	493	478.9	478.5	494.3	16.7
Navai	102.8	105.9	103.1	99.9	102.4	-0.4
Namangan	220.3	223.9	221.1	221.1	221.9	1.6
Samarkand	379.1	372.8	353.2	331.3	360.3	-18.8
Surkhandarya	278.1	272.3	280.1	280.4	282.9	4.8
Syrdarya	242.6	235.6	222.7	227	229.9	-12.7
Tashkent	339.6	356.6	257.6	360.1	355.6	16
Fergana	289	290.8	290.3	290.1	289.8	0.8
Khorezm	221.9	228.5	210.4	225.1	223.1	1.2

Source: "Agriculture of Uzbekistan" State Committee of Statistics of the Republic Uzbekistan, Tashkent 2014.

Annex 3: Districts (by Region) Specialized in Horticulture Production

№	Region	District	Quantity
1	Republic of Karakalpakstan	Nukus, Beruniy, Turtkul	3
2	Andijan	Andijan, Asaka, Buloqboshi, Khujaobod, Jalakuduk, Oltinkul, Kurgantepa	7
3	Bukhara	Bukhara, Vobkent, Romitan, Gijduvon,	4
4	Djizzakh	Bahmal, Gallaaral, Yangiabad, Jizzakh, Zaamin	5
5	Kashkadarya	Kitab, Shahrisabz, Yakkabag, Karshi, Kasan, Chirikchi	6
6	Navoiy	Navbakhor, Khatirchi	2
7	Namangan	Kasansay, Chartak, Yangikurgan Namangan, Turakurgan, Uchkurgan	6
8	Samarkand	Bulungur, Jambay, Samarkand, Taylak, Urgut, Kattakurgan, Akdarya	7
9	Surkhandarya	Oltinsay, Sariosiyo, Angor, Jarkurgan, Termez	5
10	Syrdarya	Bayavut, Gulistan, Syrdarya	3
11	Tashkent	Bustonlyk, Zangiota, Ahangaran, Parkent, Yangiyul, Kibray, Bekabad, Yukorichirchik, Urtachirchik	9
12	Ferghana	Kuvasay, Oltiarik, Ferghana, Besharik, Uchkuprik, Kuva	6
13	Khorezm	Bogot, Urgench, Khiva	3
	TOTAL		**66**

Source: "Agriculture of Uzbekistan" State Committee of Statistics of the Republic Uzbekistan, Tashkent 2014.

Annex 4: Crop Areas and Crop Pattern on Irrigated Lands in All Farm Types in 1991–2013

Items	1991	1995	2000	2005	2010	2012	2013
Total crops ('000 ha)	**3557**	**3571**	**3467**	**3328**	**3388**	**3356**	**3341.5**
Including:							
Total grains	**531**	**1127**	**1371**	**1339**	**1426**	**1429**	**1405**
Including: Wheat	155	786	1145	1223	1293	1283	1300
Rice	159	166	132	52	69	76	45
Maize	107	53	49	34	28	41	34
Industrial crops	**1756**	**1521**	**1488**	**1501**	**1374**	**1339**	1339
Including: Cotton	1719	1493	1445	1472	1342	1308	1309
Potatoes, Vegetables and Gourds	**286**	**238**	**221**	**219**	**289**	**311**	**316**
Including: Potatoes	40	46	52	50	71	76	78
Vegetables	165	150	130	138	173	184	189
Melons and gourds	75	37	35	30	45	51	48
Total Fodder Crops	**985**	**685**	**387**	**270**	**299**	**277**	**281**
Including: Alfalfa	611	411	197	100	97	94	96
	Crop pattern (%)						
Total crops (%)	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total grains	14.9	**31.6**	**39.5**	**40.2**	**42.1**	**42.6**	**42.1**
Including: Wheat	4.3	22.0	33.0	36.7	38.2	38.2	38.9
Rice	4.5	4.6	3.8	1.6	2.0	2.3	1.3
Maize	3.0	1.5	1.4	1.0	0.8	1.2	1.0
Industrial crops	**49.4**	**42.6**	**42.9**	**45.1**	**40.5**	**39.9**	**40.1**
Including: Cotton	48.3	41.8	41.7	44.2	39.6	39.0	39.2
Potatoes, Vegetables and Gourds	**8.0**	**6.7**	**6.4**	**6.6**	**8.5**	**9.3**	**9.4**
Including: Potatoes	1.1	1.3	1.5	1.5	2.1	2.3	2.3
Vegetables	4.6	4.2	3.7	4.1	5.1	5.5	5.7
Melons and gourds	2.1	1.0	1.0	0.9	1.3	1.5	1.4
Total Fodder Crops	**27.7**	**19.2**	**11.2**	**8.1**	**8.8**	**8.3**	**8.4**
Including: Alfalfa	17.2	11.5	5.7	3.0	2.9	2.8	2.9

Source: State Statistic Committee of the Republic of Uzbekistan.

Annex 5: The Total Area of Cultivated Arable Land by Region '000 ha

All farm types

	2010	2011	2012	2013	2014
Republic of Karakalpakstan	423.6	423.6	419.7	423.4	417.0
Andijan Oblast	203.8	203.8	203.5	203.3	202.7
Bukhara Oblast	200.6	200.6	199.4	200.7	200.8
Djizzak Oblast	486.1	485.4	485.4	483.6	482.9
Kashkadariya Oblast	682.7	680.4	675	679.7	678.9
Navoie Oblast	111.1	111.1	110.2	111.1	110.6
Namangan Oblast	198.2	197.9	196.7	196.2	194.5
Samarkand Oblast	435.9	435.8	435.7	434.9	434.9
Surhandariya	281.6	281.5	271.2	281.1	280.9
Sydariya	251.4	250.9	250.4	250.4	250.3
Tashkent Oblast	340.8	339	335.1	337.2	335.9
Fergana Oblast	249.3	249.2	251	248	247.8
Khorezem	205.4	205.4	205.4	205.3	206.0
Tashkent City	0.5	0.3	0.2	0.4	0.4
Republic of Uzbekistan	**4,071.0**	**4,064.7**	**4,062.5**	**4,055.3**	**4,043.6**

Source: Ministry of Agriculture.

Annex 6: The Total Area of Irrigated Arable Land by Region
'000 ha

	2010	2011	2012	2013	2014
Republic of Karakalpakstan	423.6	423.6	423.6	423.4	417.0
Andijan Oblast	203.8	203.8	203.5	203.3	202.7
Bukhara Oblast	200.6	200.6	200.6	200.7	200.8
Djizzak Oblast	264.5	263.9	263.7	262.6	262.1
Kashkadariya Oblast	424.1	421.8	421.7	421.2	420.4
Navoie Oblast	91.0	91.0	91.0	91.0	90.7
Namangan Oblast	198.2	197.9	197.7	196.2	194.5
Samarkand Oblast	253.9	253.7	253.7	252.7	252.8
Surhandariya	241.7	241.6	241.5	241.2	241.0
Sydariya	251.4	250.9	250.4	250.4	250.3
Tashkent Oblast	305.1	303.6	303.4	302.1	301.7
Fergana Oblast	249.3	249.2	248.8	248.0	247.8
Khorezem	205.4	205.4	205.4	205.3	206.0
Tashkent City	0.5	0.3	0.2	0.4	0.4
Republic of Uzbekistan	**3,313.1**	**3,307.3**	**3,305.2**	**3,298.5**	**3,288.2**

Source: Ministry of Agriculture.

Annex 7: Irrigated Area with Saline Soils by Region, 2010.

Location	Total area	Saline area	Share (%)	Low salinity	Share (%)	Medium salinity	Share (%)	High salinity	Share (%)
The Republic of Karakalpakstan	515.0	401.6	78.0	164.2	31.9	185.0	35.9	52.4	10.2
Andijan	265.9	11.1	4.2	6.3	2.4	4.8	1.8		
Bukhara	274.9	239.0	86.9	159.6	58.1	69.2	25.2	10.2	3.7
Jizzakh	300.0	247.1	82.4	161.3	53.8	79.6	26.5	6.2	2.1
Kashkadarya	514.9	242.8	47.2	182.7	35.5	47.3	9.2	12.8	2.5
Navoiy	131.8	115.0	87.3	89.5	67.9	19.8	15.0	5.7	4.3
Namangan	282.5	26.0	9.2	17.8	6.3	7.2	2.5	1.0	0.3
Samarkand	379.2	6.4	1.7	6.0	1.6	0.4	0.1		
Surkhandarya	321.2	103.4	32.2	70.8	22.0	31.7	9.9	0.9	0.3
Syrdarya	292.8	290.1	99.1	225.2	76.9	60.8	20.8	4.1	1.4
Tashkent	393.3	10.1	2.6	7.8	2.0	2.3	0.6	0.03	0.01
Fergana	365.9	168.4	46.0	124.0	33.9	39.7	10.8	4.7	1.3
Khorezm	265.2	265.2	100.0	141.7	53.4	88	33.2	35.5	13.4
Total	**4,302.6**	**2,126.2**	**49.4**	**1,356.9**	**31.5**	**635.8**	**14.8**	**133.5**	**3.1**

Source: State Committee for Land Resources, Geodesy, Cartography and State Cadastre, Republic of Uzbekistan.

ANNEX 8: Selected Crops Salt Tolerance – FAO Guidelines

Crop			Salt Tolerance Parameters		
Common name	**Botanical name**	**Tolerance based on**	**Threshold (EC_e)**	**Slope**	**Rating**
			dS/m	**% per dS/m**	
Chickpea	*Cicer arietinum* L.	Seed yield	-	-	MS
Corn‡‡	*Zea mays* L.	Ear FW	1.7	12	MS
Cotton	*Gossypium hirsutum* L.	Seed cotton yield	7.7	5.2	T
Soybean	*Glycine max* (L.) Merrrill	Seed yield	5.0	20	MT
Sugar beet	*Beta vulgaris* L.	Storage root	7.0	5.9	T
Sunflower	*Helianthus annuus* L.	Seed yield	4.8	5.0	MT
Wheat	*Triticum aestivum* L.	Grain yield	6.0	7.1	MT
Alfalfa	*Medicago sativa* L.	Shoot DW	2.0	7.3	MS
Rye (forage)	*Secale cereale* L.	Shoot DW	7.6	4.9	T
Ryegrass, perennial	*Lolium perenne* L.	Shoot DW	5.6	7.6	MT
Cabbage	*B. oleracea* L. (Capitata Group)	Head FW	1.8	9.7	MS
Carrot	*Daucus carota* L.	Storage root	1.0	14	S
Cauliflower	*Brassica oleracea* L. (Botrytis Group)		-	-	MS*
Muskmelon	*Cucumis melo L. (Reticulatus Group)*	Fruit yield	1.0	8.4	MS
Onion (bulb)	*Allium cepa L.*	Bulb yield	1.2	16	S
Potato	*Solanum tuberosum L.*	Tuber yield	1.7	12	MS
Tomato	*Lycopersicon lycopersicum (L.)*	Fruit yield	2.5	9.9	MS
Watermelon	*Citrullus lanatus (Thunb.) Matsum. & Nakai*	Fruit yield	-	-	MS*
Almond	*Prunus duclis (Mill.) D.A. Webb*	Shoot growth	1.5	19	S
Apple	*Malus sylvestris Mill.*		-	-	S
Apricot	*Prunus armeniaca L.*	Shoot growth	1.6	24	S
Grape	*Vitis vinifera* L.	Shoot growth	1.5	9.6	MS
Peach	*Prunus persica (L.) Batsch*	Shoot growth, Fruit yield	1.7	21	S

T = Tolerant, MS = Mildly susceptible, S = Susceptible.
Source: "Agriculture of Uzbekistan" State Committee of Statistics of the Republic Uzbekistan, Tashkent 2014.

Annex 9: Farm Restructuring Process 1992 – 2016

	The first wave			The second wave	
Period	**First stage**	**Second stage**	**Third stage**	**First stage**	**Second stage**
Years	**1992-1998**	**1998-2003**	**2003-2007**	**2007 – 2014**	**2015 -**
Goal	Collectivization of state owned farms	Partial decollectivization	Complete decollectivization	Optimization	Optimization
Main transformations	Transformation of *sovkhoz*s into *kolkhoz*s	Transformation of *kolkhoz*s into *Shirkats*; partial transformation of *shirkat*s into private farms	Complete transformation of *shirkat*s into private farms	Enlargement of farm sizes	Reduction in farm size: Horticulture, vineyards, vegetables, melons – 5 ha Wheat + vegetables 10 – 15 ha Effective horticulture farms with agri processing or cold storage 10 ha
Legal format	*Kolkhoz*s, *sovkhoz*s and *dekhan* farms	*Shirkat*s, private farms and *dekhan* farms	Private farms and *dekhan* farms	Private farms and *dekhan* farms	Private farms
Production sectors	Cotton and wheat, partially horticulture	Cotton and wheat	Cotton and wheat	Cotton and wheat, partial horticulture	Cotton, wheat and horticulture
Land tenure	State ownership; permanent and lifetime inheritable possession	Permanent and lifetime inheritable possession; land lease, no right to sale or transfer to other entity	Permanent and lifetime inheritable possession; land lease, no right to sale or transfer to other entity	Permanent and lifetime inheritable possession; land lease, no right to sale or transfer to other entity	As before
Additionally created agents and services		Water user associations; machinery and tractor parks,	Water user associations; machinery and tractor parks,	Water user associations; machinery and tractor parks; logistics centers, Centralized Fruit and vegetable export organization, Farmers Association	"Uzagroexport"– control of fruit and vegetable exports Outline proposals for state procurement and quotas on fruit & vegetable production

Source: "Agriculture of Uzbekistan" State Committee of Statistics of the Republic Uzbekistan, Tashkent 2014.

Annex 10: Farms by Number, Size and Category of Use (2016)

Area	Total farm numbers		Type of farm											
			Wheat - Cotton		Vegetables & Melon		Vegetables and Wheat		Horticulture and Grape		Livestock		Other farms	
	Number	Average area in ha	Number	Average area in ha	Number	Average area in ha	Number	Average area in ha	Number	Average area in ha	Number	Average area in ha	Number	Average area in ha
Republic of Karakalpakstan	5,430	52.9	3,682	71.3	321	4.6	326	9.6	514	2.9	377	41.9	210	14.0
Provinces:														
Andijan	15,057	13.8	3,334	50.7	915	3.9	574	9.8	7,737	2.0	471	20.9	2,026	2.5
Bukhara	7,360	28.0	3,731	49.9	138	3.9	-	-	2,795	2.9	626	16.9	70	5.1
Djizzak	12,512	33.5	6,687	56.2	870	3.3	615	5.9	3,227	3.3	817	30.9	296	4.7
Kashkadarya	21,782	24.5	8,744	52.7	1,315	3.4	152	8.3	10,413	2.5	794	49.3	364	3.8
Navoiy	3,748	24.0	1,335	58.9	23	2.2	-	-	1,932	3.4	340	10.9	118	7.3
Namangan	14,001	14.9	3,186	50.6	229	4.6	859	7.5	8,767	3.0	244	25.8	716	10.6
Samarkand	19,466	18.0	4,631	54.4	1,160	4.5	5,180	9.7	7,417	2.8	608	33.6	470	5.5
Surkhandariya	12,209	20.4	3,297	63.8	-	-	-	-	7,878	2.1	814	24.5	220	9.7
Sydarya	6,395	34.9	4,016	49.0	44	4.6	-	-	1,555	4.2	383	25.3	397	25.0
Tashkent	16,925	17.2	3,434	57.5	588	4.5	4,532	9.2	7,307	3.8	682	28.3	382	6.8
Ferghana	16,850	16.0	4,180	52.7	646	3.7	103	10.0	11,005	3.2	353	26.5	563	3.3
Khorezm	8,637	28.1	3,605	56.8	231	5.4	-	-	3,566	2.2	465	32.6	770	17.4
Total	**160,372**	**22.3**	**53,862**	**55.2**	**6,480**	**4.0**	**12,341**	**9.2**	**74,113**	**2.8**	**6,974**	**29.3**	**6,602**	**7.9**

Source: State Statistics Committee of the Republic of Uzbekistan.

Annex 11: Dynamic of the Change in Area and Total Production of Fruit Plantations and Vineyards in the Republic of Uzbekistan 2005–2015.

Year	Fruits & Berries				Grapes			
	In total	Of these, fruiting	Farmers	Dekhan	In total	Of these, fruiting	Farmers	Dekhan
Total area. Thousand ha								
2005	208,2	152,4	34,7	61,4	120,7	99,2	24,3	33,9
2007	216,8	156,9	91,6	66,3	123,9	103,2	82,8	37,6
2010	235,3	184,8	149	75,4	127,9	108,7	85,6	38,5
2011	244,3	193,1	152,7	76,2	127,1	111,5	84,9	38,2
2012	250,9	196	156,4	76,6	126,9	111,1	85,2	38
2013	254,6	201,3	158,9	78	127,8	113,8	85,8	38,2
2005 to 2013 %	122	132	458	127	106	115	353	113
Total production. Thousand ton.								
2005	949,3	-	175,5	566,5	641,6	-	89,8	299,5
2007	1270	-	580,8	663,1	878,9	-	482,8	379,7
2010	1710,3	-	816,4	875,3	987,3	-	556,6	423
2011	1878,8	-	890,3	956,8	1090,2	-	608,0	465,8
2012	2052,8	-	962,1	1052,2	1206,0	-	663,9	522,1
2013	2261,1	-	1049,1	1182,7	1322,1	-	720,7	582,6
2005 to 2013 %	238	-	598	209	206	-	803	195

Source: State Statistics Committee of the Republic of Uzbekistan.

Annex 12: MOA – Plan of Cropping Optimization–2015 to 2020

№	Region	Total irrigated area 2016	Agricultural crops														
			Cotton			Grain crops			Potato			Vegetables			Fruit		
			2015	2020	Change (+,-)	2015	2020	Change (+,-)	2015	2020	Change (+,-)	2015	2020	Change (+,-)	2015	2020	Change (+,-)
1	Republic of Karakalpakstan	415439	94700	87700	-7000	53000	53000	0	4338	5838	1500	10542	12742	2200	5624	6124	500
2	Andijan Oblast	198097	93400	82200	-11200	80200	76200	-4000	6660	9460	2800	18627	25027	6400	29271	30871	1600
3	Bukhara Oblast	200427	109600	99600	-10000	65600	60600	-5000	4439	6839	2400	8251	15351	7100	11792	12992	1200
4	Djizzak Oblast	261235	101800	79300	-22500	106550	101550	-5000	1801	5801	4000	8075	19075	11000	13764	15264	1500
5	Kashkadariya Oblast	420440	160400	142000	-18400	145000	141000	-4000	7428	9728	2300	16087	25787	9700	18972	20772	1800
6	Navoie Oblast	90310	35800	32400	-3400	40600	40600	0	1670	2170	500	3902	5302	1400	5900	5900	0
7	Namangan Oblast	239185	82600	72500	-10100	79000	74000	-5000	6987	9987	3000	14303	21103	6800	27225	28825	1600
8	Samarkand Oblast	250916	91500	75300	-16200	108730	102730	-6000	11688	15888	4200	26867	35167	8300	32318	34318	2000
9	Surhandariya	239838	119600	105300	-14300	98000	93000	-5000	8816	11816	3000	13263	21963	8700	15630	17430	1800
10	Sydariya	248516	110700	88000	-22700	89000	84000	-5000	1946	5746	3800	4291	14391	10100	6081	7681	1600
11	Tashkent Oblast	297944	91500	78100	-13400	122100	116100	-6000	8793	12793	4000	33672	41172	7500	34531	36831	2300
12	Fergana Oblast	247020	100100	87600	-12500	111700	106700	-5000	9673	13773	4100	19323	26323	7000	47734	49534	1800
13	Khorezem	204924	93800	85000	-8800	33200	33200	0	6053	6453	400	14747	19547	4800	13035	13335	300
Total		**3314291**	**1285500**	**1115000**	**-170500**	**1132680**	**1082680**	**-50000**	**80292**	**116292**	**36000**	**191950**	**282950**	**91000**	**261877**	**279877**	**18000**

Source: State Statistics Committee of the Republic of Uzbekistan.

MOA – Plan of Cropping Optimization–2015 to 2020 (continued)

№	Region	Agricultural crops								
		Fodder crops			Oilseed crops			Vineyards		
		2015	2020	Change (+,-)	2015	2020	Change (+,-)	2015	2020	Change (+,-)
1	Republic of Karakalpakstan	20845	21545	700	910	1810	900	1300	2500	1200
2	Andijan Oblast	14000	16600	2600	1080	2180	1100	5500	6200	700
3	Bukhara Oblast	17864	20964	3100	1600	2400	800	10000	10400	400
4	Djizzak Oblast	33783	41583	7800	1420	3020	1600	4900	6500	1600
5	Kashkadariya Oblast	29180	34280	5100	1250	3050	1800	14400	16100	1700
6	Navoie Oblast	10000	11001	1001	770	1270	500	6500	6500	0
7	Namangan Oblast	14000	16100	2100	1370	2170	800	13700	14500	800
8	Samarkand Oblast	55000	61300	6300	900	1600	700	40200	40900	700
9	Surhandariya	10500	14499	3999	1240	2440	1200	16400	17000	600
10	Sydariya	12100	20900	8800	1020	3120	2100	1700	3000	1300
11	Tashkent Oblast	38500	42500	4000	900	1900	1000	19100	19700	600
12	Fergana Oblast	25500	28800	3300	1170	1770	600	7100	7800	700
13	Khorezem	27800	29300	1500	670	1570	900	3000	3900	900
Total		**309072**	**359372**	**50300**	**14300**	**28300**	**14000**	**143800**	**155000**	**11200**

Source: State Statistics Committee of the Republic of Uzbekistan.

Annex 13: Numbers of Farmers Specialized in Horticulture (Fruits & Vegetables)

Area	Before optimization - 1st April 2016		After optimization on 25th May 2016		Difference			
	Number of farmers	Average area in ha	Number of farmers	Average area in ha	Number of farmers		Average area in ha	
					(+;-)	%	(+;-)	%
Republic of Karakalpakstan	333	14.6	321	4.6	-12	-3.6	-10.0	-68.6
Provinces:								
Andijan	504	6.3	915	3.9	411	81.5	-2.4	-38.2
Bukhara	95	4.6	138	3.9	43	45.3	-0.8	-16.2
Djizzak	393	7.3	870	3.3	477	121.4	-4.0	-55.0
Kashkadarya	404	11.1	1,315	3.4	911	225.5	-7.7	-69.3
Navoiy	14	3.4	23	2.2			-1.2	-35.2
Namangan	176	6.0	229	4.6	53	30.1	-1.4	-23.4
Samarkand	734	13.6	1,160	4.5	426	58.0	-9.1	-66.8
Surkhandariya								
Sydarya	38	6.6	44	4.6	6	15.8	-2.0	-30.8
Tashkent	347	7.8	588	4.5	241	69.5	-3.3	-42.2
Ferghana	340	6.9	646	3.7	306	90.0	-3.3	-47.4
Khorezm	111	9.3	231	5.4	120	108.1	-3.9	-41.8
Total	**3,489**	**9.5**	**6,480**	**4.0**	**2,991**	**85.7**	**-5.6**	**-58.4**

Source: State Statistics Committee of the Republic of Uzbekistan.

Annex 14: Farmers Specialized in Wheat and Vegetables

Area	Before optimization - 1st April 2016		After optimization on 25th May 2016		Difference			
	Number of farmers	Average area in ha	Number of farmers	Average area in ha	Number of farmers		Average area in ha	
					(+;-)	%	(+;-)	%
Republic of Karakalpakstan			326	9.6	326		9.6	
Provinces:								
Andijan	502	14.1	574	9.8	72	14.3	-4.4	-30.8
Bukhara								
Djizzak	327	12.7	615	5.9	288	88.1	-6.7	-53.1
Kashkadarya	133	9.5	152	8.3	19	14.3	-1.2	-12.5
Navoiy								
Namangan	304	40.3	859	7.5	555	182.6	-32.8	-81.4
Samarkand	3,827	18.4	5,180	9.7	1,353	35.4	-8.7	-47.1
Surkhandariya								
Sydarya								
Tashkent	1,317	36.4	4,532	9.2	3,215	244.1	-27.1	-74.6
Ferghana	60	23.5	103	10.0	43	71.7	-13.5	-57.7
Khorezm								
Total	**6,470**	**22.3**	**12,341**	**9.2**	**5,871**	**90.7**	**-13.1**	**-58.9**

Source: State Statistics Committee of the Republic of Uzbekistan.

Annex 15: Farmers Specialized in Horticulture and Grape Production

Area	Before optimization - 1 April 2016		After optimization on 25 May 2016		Difference			
	Number of farmers	Average area in ha	Number of farmers	Average area in ha	Number of farmers		Average area in ha	
					(+;-)	%	(+;-)	%
Republic of Karakalpakstan	290	5.6	514	2.9	224	77.2	-2.7	-47.9
Provinces:								
Andijan	2,395	6.1	7,737	2.0	5,342	223.0	-4.2	-68.1
Bukhara	790	6.8	2,795	2.9	2,005	253.8	-3.9	-56.9
Djizzak	1,429	5.1	3,227	3.3	1,798	125.8	-1.7	-34.4
Kashkadarya	1,934	10.6	10,413	2.5	8,479	438.4	-8.2	-76.7
Navoiy	682	8.5	1,932	3.4	1,250	183.3	-5.1	-59.9
Namangan	3,011	8.9	8,767	3.0	5,756	191.2	-5.8	-65.7
Samarkand	2,379	6.1	7,417	2.8	5,038	211.8	-3.3	-53.9
Surkhandariya	1,777	7.5	7,878	2.1	6,101	343.3	-5.4	-72.1
Sydarya	836	7.7	1,555	4.2	719	86.0	-3.6	-46.2
Tashkent	3,379	8.6	7,307	3.8	3,928	116.2	-4.8	-56.0
Ferghana	4,924	7.2	11,005	3.2	6,081	123.5	-4.0	-55.3
Khorezm	1,180	6.3	3,566	2.2	2,386	202.2	-4.1	-64.5
Total	**25,006**	**7.5**	**74,113**	**2.8**	**49,107**	**196.4**	**-4.7**	**-62.5**

Source: State Statistics Committee of the Republic of Uzbekistan.

Annex 16: Support Services Availability 2016

N	Regions	Total number MTPS	WUAs	Fuel station	Fertilizers stores	Mini Banks	Zoo vet services	Consulting and marketing services	Ag. Product sale stores (Agrofirms)
1	Republic of Karakalpakstan	131	126	68	124	58	128	14	3
2	Andijan	185	105	61	88	59	195	15	15
3	Bukhara	96	131	79	107	5	217	15	12
4	Djizzak	4	116	88	52	39	147	8	18
5	Kashkadarya	184	152	185	171	121	298	46	53
6	Navoiy	2	56	46	36	35	83	4	3
7	Namangan	135	134	32	82	45	142	13	30
8	Samarkand	216	40	65	136	17	434	35	100
9	Surkhandariya	111	149	74	119	55	280	22	19
10	Sydarya	21	107	46	79	27	81	12	8
11	Tashkent	178	148	97	140	23	194	64	60
12	Ferghana	160	127	110	133	61	225	81	22
13	Khorezm	72	113	55	117	27	180	0	16
	Total	**1495**	**1504**	**1006**	**1384**	**572**	**2604**	**329**	**359**

Source: Ministry of Agriculture & Water Resources, Uzbekistan.

Annex 17: Cold Storage Availability 2014

Number of Coldstores

Country and Regions	2012		2014		Built in 2014						In total 2014	
	Number	Volume in '000 Tons	Number	Volume in '000 Tons	Number		Volume in '000 Tons		Money invested - million Soum		Number	Volume in '000 Tons
					Plan	Actual	Plan	Actual	Plan	Actual		
Republic of Karakalpakstan	15	16	23	16	8	7	2	1.5	1885	1262	31	18
Andijan	191	25	201	34	59	58	15	12.7	16,475	11,536	260	47
Bukhara	63	28	73	28	12	11	3	2.4	4,521	2,514	85	30
Djizzak	585	22	432	14	8	8	4	4.1	5,235	5,235	440	18
Kashkadarya	134	36	134	36	19	10	14	8	25,107	15,082	153	44
Navoiy	92	27	94	28	7	7	1	0.9	920	948	101	29
Namangan	45	37	45	37	8	8	7	7	4,470	4,020	53	44
Samarkand	72	60	108	60	39	15	27	13.5	26,692	12,150	147	74
Surkhandarya	108	18	114	26	22	7	16	3.6	14,768	5,245	136	30
Sydarya	31	10	48	13	2	1		0.2	404	60	50	14
Tashkent	110	94	190	82	29	11	18	6.3	26,153	9,177	219	89
Ferghana	158	54	188	52	64	64	34	32.9	40,913	31,270	252	85
Khorezm	239	27	250	24	9	3	2	0.3	3,200	420	259	25
Tashkent City			101	41							101	41
Total in Uzbekistan	1843	454	2001	491	286	210	143	93.4	170743	98919	2287	588

Source: Ministry of Agriculture & Water Resources, Uzbekistan.

Annex 18: Central Asian Regional Economic Cooperation Organization

Annex 19: Government Plan for Development of Horticulture Sector Exports 2016–2020

Target parameters for supply of fresh and processed horticulture products for export
(No. PP-2505 dated 5March 2016)
In thousand tons

Agricultural product	2016	2017	2018	2019	2020
Vegetables	774.0	859.0	959.0	1,075.0	1,212.0
Fruit	245.0	272.0	303.0	340.0	383.0
Grapes	219.0	241.0	265.0	294.0	326.0
Melons and gourds	175.0	193.0	215.0	239.0	268.0
Canned fruit and vegetables	7.9	9.9	12.7	15.5	18.9
Juices and concentrated products	14.5	18.0	23.1	49.3	57.4
TOTAL	**1,436.0**	**1,593.0**	**1,778.0**	**2,013.0**	**2,266.0**
Growth rate (%)	**100%**	**111%**	**112%**	**113%**	**113%**

Source: Ministry of Agriculture & Water Resources, Uzbekistan.

Relevant Presidential Decree's and other recent directives directly impacting upon horticulture sector development issues within the Republic of Uzbekistan

Decrees of the President of the Republic of Uzbekistan

1. PP-1937 dated 13 March 2013 «On further development of viticulture in the Republic for the period 2013-2015»;
2. PP-2460 dated 29 December 2015 «On further reformation and development of the agriculture sector in the period 2016-2020»;
3. PP-2505 dated 5 March 2016 «On measures to further develop the raw material base, expansion in processing of horticulture, meat and dairy products, increasing foodstuffs production and export within 2016-2020»;
4. PP-2515 dated 7 April 2016 «On formation of a specialized foreign trade company to support export of fresh and processed horticulture products «Uzagroexport»»;
5. PP-2517 dated 8 April 2016 «On creation of an association of companies active in storage and processing of horticulture products for export «Uzbekozikovkatzahira»»;
6. PP-2520 dated 12 April 2016 «On measures to enhance the system of procurement and usage of horticulture products, potatoes and melons».

Decisions of the President of the Republic of Uzbekistan

1. R-4636 dated 14 April 2016 «On measures to implementation of investment projects with the participation of funds of international financing institutes in 2016»;
2. R-4647 dated 18 May 2016 «On measures to broaden the scope of financial cooperation with Asian Development Bank and other international financing institutes».

Decrees of the Cabinet of Ministers of the Republic of Uzbekistan

1. PKM-362 dated 15 December 2015 «On optimization of farm sizes»