

Supplementary Document 17: Detailed Project Economic Analysis

A. Introduction

1. The Horticulture Value Chain Development Project Additional Financing (HVCDP-AF) is a follow-on project to the ongoing Horticulture Value Chain Development Project (HVCDP).¹ HVCDP-AF will supplement the funds provided under HVCDP (\$150 million) by a further \$198 million. As with HVCDP, it will provide finance to a range of enterprises to implement viable subprojects in horticulture production and post-harvest handling, storage and processing. All subproject financing will be demand-driven on the basis of subproject proposals submitted to participating financial institutions (PFIs) by potential subborrowers.² All subprojects, subborrowers and subloans will be required to satisfy HVCDP-AF eligibility criteria. Subproject proposals will include a detailed market assessment and technical and financial analyses in the form of a business plan. PFIs will appraise business plans and determine the terms and conditions of subloans according to their prevailing credit policies and risk strategies and appropriate commercial criteria.³ In this respect, it is not possible to state in advance exactly what types or numbers of subprojects will be financed. Based on the implementation of HVCDP to the end of December 2017, it is expected that subprojects will comprise a blend of production and post-harvest activities, located throughout Uzbekistan.

2. Based on subprojects financed under the ongoing HVCDP, five actual subprojects were selected as representative/indicative horticulture investments that could be financed under HVCDP-AF. These models cover greenhouse production of vegetables, fruit and vegetable drying/processing, cold storage for fruit and vegetables, establishment of a walnut orchard, and field production of a variety of crops using modern agricultural machinery financed by the project. Since investment and access to project funds will be demand driven, the impact on overall production cannot be estimated.

B. Macroeconomic and Horticulture Sector Overview

3. The economy of Uzbekistan has grown consistently in recent years. Over the period 2011–2016 gross domestic product (GDP) grew at an average annual rate of 8%, though annual rates of growth fell from 8.2% in 2012 to 7.8% in 2016. GDP grew from \$46.2 billion in 2011 to \$63.4 billion in 2016.⁴ Growth is expected to be slightly lower in 2017 and 2018 in view of protracted economic weakness in Uzbekistan’s key trading partners, notably Russia, its major trading partner and source of remittances. GDP growth rates are expected to be 7.0% in 2017 and 7.3% in 2018.⁵ Inflation is forecast at 9.5% in 2017 and 10.0% in 2018. Inflationary pressures will come mainly from higher government spending and continued depreciation of the Uzbek sum (UZS) against the US dollar (\$).

4. Uzbekistan has made significant progress in poverty reduction in recent years. According to national poverty line estimates, the proportion of the population living below the poverty line fell

¹ ADB. 2016. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Republic of Uzbekistan for the Horticulture Value Chain Development Project*. Manila.

² HVCDP-AF will be channeled through seven PFIs, whereas HVCDP was channeled through eight PFIs.

³ Eligibility criteria for subprojects to receive HVCDP-AF subloans are presented in the project administration manual (PAM). ADB will review a selection of subloan applications as specified in the PAM.

⁴ Based on GDP in current Uzbek sum (UZS) converted at the average annual exchange rate. Average annual growth in current UZS was 20.4%. Source: ADB. 2017. *Key Indicators for Asia and the Pacific 2017*. Manila.

⁵ ADB. 2017. *Asian Development Outlook 2017*. Manila.

from 27.5% in 2001 to 12.8% in 2016.⁶ This exceeded the government's target, elaborated in the Welfare Improvement Strategy for 2012–2015, which aimed to reduce the national level of low-income people from 17.7% in 2010 to 13.7% by 2015. More recently, between 2011 and 2016, gross national income per capita (based on international dollar purchasing power parity) grew at an annual average rate of 7.4%, from \$4,650 to \$6,640.⁷ Improvements in household incomes resulted from rapid economic growth based on (i) the creation of new small businesses and employment, (ii) large government investments in education, health and infrastructure, (iii) increases in public sector salaries, and (iv) increased remittances. However, the elasticity of poverty reduction to GDP growth remains low, reflecting the historically low level of productivity of agriculture, regional differences in growth, and the rural-urban income gap. As of 2016, 63.5% of the total population of 31.8 million live in rural areas (footnote 7), and 75% of people living below the poverty line reside in rural areas.⁸

5. 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.⁹ 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.

6. GDP in agriculture has grown in line with aggregate GDP, though at a slightly lower rate. Over the period 2011–2016 it grew an average annual rate of 6.8%, ranging from 7.2% in 2012 to 6.0% in 2016. According to the ADO, agriculture is expected to grow by 6.8% in 2017 and 7.1% in 2018, reflecting higher production of fruit and vegetables from major horticulture and agro-processing development programs initiated in 2017, such as HVCDP. 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 34.4% of GDP. This had fallen to 29.5% by 2005 and 17.9% by 2016. A decline in the significance of agriculture was also recorded in respect of employment. In 2000 agriculture accounted for 34.4% of employment. This had fallen to 25.5% in 2009, but then started to increase slightly, reaching only 27.7% in 2016.¹⁰

7. With respect to the structure of agricultural production, there has been a significant shift in recent years (Table 1). Significant increases in area between 2000 and 2016 have been recorded in vegetables (59%) and fruit and berries (37%), while the area under grains increased by 5%. The area under industrial crops, predominantly cotton, fell by 12% over the period.

⁶ On the basis of \$1.90 purchasing power parity criterion. Source: ADB. 2017. *Basic Statistics 2017*. Manila. <https://www.adb.org/sites/default/files/publication/298061/basic-statistics-2017.pdf>.

⁷ World Bank. 2017. <https://data.worldbank.org/country/uzbekistan>.

⁸ United Nations Development Program. 2016. (<http://www.uz.undp.org/content/uzbekistan/en/home/countryinfo/>).

⁹ In 2011, the World Bank re-classified Uzbekistan from a low-income to a lower middle-income country.

¹⁰ ADB. 2017. *Key Indicators for Asia and the Pacific 2017*. Manila.

Table 1 : Area under Main Crop Groups Selected Years (ha)

Crop Group	2000	2005	2010	2016
Grain	1,614.0	1,616.1	1,679.4	1,689.4
Industrial crops (including cotton)	1,512.6	1,518.4	1,417.0	1,333.9
Potato	429.0	290.3	320.4	333.5
Vegetables	129.9	137.7	173.0	206.0
Other crops (gourd, fodder)	92.8	85.0	118.6	143.9
Subtotal	3,778.3	3,647.5	3,708.4	3,706.7
Fruit and berries	204.0	208.2	235.3	279.6
Vineyards	120.0	120.7	127.9	131.2
Total	4,102.3	3,976.4	4,071.6	4,117.5

Source: The State Committee of the Republic of Uzbekistan on Statistics. 2017. *Key Indicators of Agricultural Sector*. Tashkent.

8. The shift in the structure of cropping is more marked with respect to production. The output of grains rose from 4.1 million tons in 2000 to 8.3 million tons in 2016, while the production of cotton remained largely unchanged at around 3.0 million tons over the same period. Significant increases were recorded for vegetables 2.6 million tons in 2000 to 11.3 million tons in 2016, potatoes 0.7 million tons to 3.0 million tons, and fruit 0.8 million tons in 2000 to 3.0 million tons in 2016. In addition to the increases in area sown, production increases resulted from large increases in crop yield (Table 2). With the exception of cotton, which recorded an increase in yield of 7.3% between 2000 and 2016, the yield of all crops increased by over 35.0%.

Table 2: Crop Yields Selected Years (tons per ha)

Crop Group	2000	2010	2016	Increase 2000–2016 (%)
Grain and legumes	2.82	4.42	4.50	59.6
Cotton	2.18	2.54	2.34	7.3
Potato	12.93	19.49	22.51	74.1
Vegetables	18.38	25.25	27.11	47.5
Gourd	13.24	19.26	20.94	58.2
Fruit and berries	5.69	9.26	13.41	35.7
Grapes	6.31	9.08	14.19	124.9

Source: The State Committee of the Republic of Uzbekistan on Statistics. 2017. *Key Indicators of Agricultural Sector*. Tashkent.

9. 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%. Meanwhile, the combined share of fruits and vegetables (including potatoes) increased from 5.2% to 10.6%. The structure of agricultural exports is also 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. The share of cotton in total exports fell from 27.5% in 2000 to 5.1% in 2016. By contrast, the share of food products in exports has risen, from 5.4% in 2000 to 8.5% in 2016. Data for 2016 indicate that the share of cotton continued to fall (to 7.4%) while the share

of food products rose to 11.9%.¹¹ For fruit and vegetables, exports grew from \$68.7 million in 2000 to \$1.45 billion in 2016. This equates 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 period. As of 2016, therefore, the share of fruit and vegetables in the value of exports exceeded that of cotton.

10. A focus of the government's economic strategy is to restructure and modernize agriculture, a key feature of which is more intensive production and improved access to modern agricultural technology. Agricultural labor is increasingly scarce as people migrate to urban centers for jobs in the more lucrative industrial and service sectors. In response, the government aims to continue to widen access to credit to facilitate investment in improved technology at both production and post-harvest levels.

C. Project Rationale

11. In recent years the government has implemented a number of policies within the agriculture sector as a whole that have addressed key issues, such as farm restructuring and the introduction of private usufruct rights on former cooperative and state land. This and other privatization initiatives resulted in the formation of private farms and an increase in the number of households in agriculture which together are now responsible for much of the recent growth in agricultural output. This has been accompanied by diversification in cropping patterns away from traditional cotton and wheat crops to higher value fruit and vegetable crops. However, in spite of impressive increases in yields for certain crops, agriculture continues to be characterized by low productivity and remains labor intensive. Government policy in respect of the fruit and vegetable sector is to facilitate private-sector, market-driven development. The most recent policy initiative in the sector was implemented under a government resolution that established a state procurement system for fruit and vegetables.¹² Details of the implementation of the resolution are limited but it is intended that procurement of fruit and vegetable products for delivery to processors and for storage to ensure adequate off-season supply for consumers will be entrusted to Uzbekozikovkatholding, and responsibility for the export of fresh fruit and vegetables will be given to Uzagroexport, a government agency established for the purpose.

12. Such positive developments in government policy in the sector have led to the emergence of a network of enterprises engaged in activities both upstream and downstream of production. This includes input supply enterprises engaged in the supply (including the importation) of seeds, fertilizers and agrochemicals more appropriate to fruit and vegetable production whereas traditional, largely state-controlled input supply remains focused on supporting cotton and wheat production. The introduction of a large number of new private farmers provided a significant demand impetus to the development of this network of private sector input suppliers. The supply of other services has yet to develop as effectively. Access to appropriate farm machinery, either farmer-owned or through contract services, is limited by functional obsolescence of the existing farm machinery fleet, which remains geared to serving cotton and wheat production. There is a need for improved access to machinery appropriate to fruit and vegetable production. On- and off-farm storage and transport infrastructure is rudimentary and inappropriate for the handling of perishable fruit and vegetable crops. This results in significant post-harvest losses, ranging from 25% to 30%, for more perishable crops in transit from farm to consumer. In the processing subsector, there is a high level of demand for Uzbek products in international markets. However,

¹¹ Ministry of Foreign Economic Relations, Investment and Trade (www.mfer.uz).

¹² Resolution 2520 of 12 April 2016.

processors face problems in obtaining (i) sufficient quantities of raw material, (ii) processing-specific product varieties (that reduce processing costs and/or wastage), and (iii) technology that enables them to both maintain product quality to standards required by more lucrative European markets (and increasingly sophisticated markets of the Commonwealth of Independent States [CIS]) and add greater value by processing to finished rather than semi-finished product.

13. Limited access to either equity or debt financing for producers and enterprises throughout the value chain is also a key constraint to development of the sector. The horticulture sector does not receive preferential financing under government programs as in the case of cotton and wheat production. Financial institutions have a largely negative perception of profitability and creditworthiness in agriculture, indicated by a disproportionately low level of credit disbursed in agriculture compared to its contribution to GDP. In the fruit and vegetable sector, this is exacerbated by a lack of acceptable collateral amongst many small-scale producers or collateral with low realizable values amongst agribusiness enterprises. The financing constraint is now being addressed through projects funded by international financial institutions, such as ADB through the HVCDP. In addition, the World Bank is implementing a \$150 million Horticulture Development Project, which includes (i) providing credit lines to PFIs, (ii) improving financial literacy and business-planning skills for horticulture farmers and agribusiness enterprises, (iii) establishing the national network of private growers through training and technical assistance, and (iv) strengthening state research institutes and plant protection services. The International Fund for Agricultural Development is implementing a \$30 million Horticulture Development Project. In spite of this recent injection of financing, there remains a significant demand-supply gap. Within the eight PFIs engaged in HVCDP, agriculture as a whole accounts for between 1.1% and 27.8% of the total portfolio. In terms of the aggregate portfolio of all seven banks, agriculture accounts for 3.3%. This compares with the contribution of agriculture to GDP in 2016 of 17.9%. The share of horticulture in each PFI's portfolio ranges from 0.5% to 10.1%, and in the seven banks; aggregate portfolio 1.1%.

14. The continues expansion of access to horticulture finance faces a number of constraints:

- (i) Limited understanding by farmers and processors of what types of technology are available and their appropriateness to their operations,
- (ii) Limited understanding by farmers and, to a lesser extent, processors, of financial management of their operations and how this relates to farm/enterprise cash flows and debt service capacity. Associated with this is farmers' need to better understand the role of financial institutions and their relationship with them,
- (iii) Continuing state involvement and a general lack of transparency in farm production decision-making and output price setting and marketing coupled with the system of state subsidies for production of what the government regards as strategic crops. While this has mainly affected cotton and wheat production to-date, recent government policy announcements relating to the marketing of horticulture products suggest that it may also spill over into the horticulture subsector. This affects farm profitability in that farmers are required to cultivate crops whose viability is uncertain and are prevented from cultivating crops that offer potentially higher returns. At the broader, economic level, this involves significant cost and unrealized potential.
- (iv) Associated with the state procurement system for cotton and wheat, is the focus of financial resources (credit and leasing) on the production of these two crops to the detriment of other subsectors such as fruit, vegetables and vineyards,
- (v) Limited understanding on the part of financial institutions of the agriculture sector and its specific financing needs, exacerbated by an apparent willingness to make lending decisions without fully taking into account farm/enterprise profitability. Financial institution staff need to better understand how to appraise loan/lease

- applications and supervise loan utilization both to minimize the risk of default and to avoid creating long-term indebtedness,
- (vi) A continuing lack of access to long-term funds which can be used by financial institutions to finance investments with a long gestation period such as orchards or processing that requires a phased development of production and enterprise cash flow,
 - (vii) Weak business environment. Uzbekistan has made significant improvement in a number of areas related to the business environment and in the latest World Bank Doing Business report¹³ it was amongst the top 10 countries that improved across three or more areas in the Doing Business scoring system. However, it is still ranked 74 out of 190 countries in 2017. For “trading across borders”, which is a key criterion for attracting potential foreign partners and/or foreign direct investment and in accessing international horticulture markets, it is ranked 168, lower than in 2016,
 - (viii) Restrictions on trade and foreign exchange that also limit investment potential.

D. Demand Analysis and Comparative Advantage

15. Horticulture production has grown significantly over the last decade. In 2005, production was estimated at 6.6 million tons. By 2016, production had reached 20.0 million tons, representing an average annual growth rate of 11.8%. This has had a marked impact upon average Uzbek food consumption patterns. In the early 2000s, per capita consumption of fruit in Uzbekistan was below that of the average for CIS countries and well below the average for developed countries. According to FAOSTAT data, in 2003, per capita fruit consumption was 30.3 kg per year in Uzbekistan compared with averages of 40.9 kg in the CIS and 87.0 kg in developed countries. The situation with respect to vegetable consumption was better, though at 116.1 kg per capita in 2003, it was below that of both Kazakhstan (131.0 kg) and Kyrgyz Republic (132.6 kg). The growth in supply has resulted in an increase in consumption of fruit and vegetables. Per capita consumption of vegetables doubled from 2003 to 2013, and that of fruit increased by 2.1 times for vine crops (melons, etc.), by 2.4 times for stone fruits, and by 2.6 times for grapes.¹⁴ As a result, the share of fruit and vegetables in the average Uzbek daily energy supply has also increased. In 2002, fruit and vegetables accounted for 1.5% and 3.1% respectively.¹⁵ The respective shares had risen to 1.9% and 3.7% by 2014. This has coincided with an improvement in overall dietary energy supply from 102% of the recommended level in 2002 to 122% of the recommended level (2,350 kcal per capita per day) in 2014. From the nutritional standpoint, Uzbekistan performs well in respect of fruit and vegetables consumption. Variations by region and by income group are likely to exist but data are not available to estimate the extent of such variations. Demand in Uzbekistan will therefore derive partially from population growth, which averaged 1.5% per year between 2000 and 2016, but principally from changing patterns of demand as household incomes rise and consumers demand higher levels of fruit and vegetable quality and safety, and for a higher proportion of processed products. According to Ministry of Agriculture (MOA) data, in 2017, an estimated 81% of fruit and vegetables was consumed fresh, 14% processed, 3% exported and 4% retained for seed.

¹³ World Bank. 2017. *Doing Business 2018 Reforming to Create Jobs*. Washington. (<http://www.doingbusiness.org/~media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB2018-Full-Report.pdf>).

¹⁴ United States Department of Agriculture. Global Agricultural Information Network (GAIN). 2014. *Uzbekistan Fresh Deciduous and Stone Fruits*. (GAIN Report UZ4001). Washington.

¹⁵ Food and Agriculture Organization of the United Nations. 2014. *Food and Nutrition in Numbers 2014*. Rome.

16. While there is likely to be a shift in the pattern rather than significant increase in the volume of domestic demand, the major source of demand is expected to be exports. Growth in the volume, diversity and value of exports was considerable between 2005 and 2015. According to MAWR data, the volume of exports increased by 1.8 times and the value 18-fold over the period. In 2016, Uzbekistan exported 65 types of fruit and vegetable products to 43 countries amounting to 818,500 tons, an increase of 38.3% on 2015.¹⁶ Of this, vegetables accounted for 242,100 tons, fruit for 229,600 tons and grapes for 96,200 tons. According to MAWR estimates, exports are forecast to rise significantly by 2020 (Table 3).

Table 3: Forecast Exports of Horticulture Products (2020)

Item	Volume ('000 ton)		Value (\$ million)		Average Annual Growth Rate (%) ^a
	2015	2020	2015	2020	
Vegetables	286.6	1,212.3	478.7	2,024.6	33.4
Melons	7.7	267.4	5.1	178.0	103.3
Fruit	108.7	383.0	359.0	1,264.9	28.6
Grapes	186.9	326.3	350.0	611.1	11.8
Total	589.9	2,189.1	1,192.8	4,078.6	30.0

^a Average annual growth rates are the same for volume and value, subsuming a constant value per ton in US dollar terms over the period.

Source: Ministry of Agriculture.

17. The average annual growth rates indicated in Table 3 appear ambitious, especially for melons, and actual growth may be expected to be rather lower. However, the average annual rate of growth of exports from 2000 to 2016 was 21%, increasing from \$68.7 million in 2000 to \$1.45 billion in 2016. While this growth was from a low base, it was achieved in spite of government agriculture sector policy that focused on cotton and wheat and effectively constrained horticulture access to land, inputs, machinery, finance, etc. Now that government is actively supporting horticulture development, for instance through export promotion via Uzagroexport and provision of finance from international financial institutions including ADB through HVCDP (and potentially HVCDP-AF), increases in exports of this level may be achievable. It is, nonetheless, indicative of the significance attached to export growth by the government. It is not specified, but much of this growth in exports is expected to be absorbed by Uzbekistan's traditional CIS markets. However, there is also scope for Uzbek horticulture exports in European markets, where fruit and vegetables consumption is relatively low based on recommended nutritional requirements. In only four countries of the World Health Organization (WHO) European Region did fruit and vegetables consumption exceed the WHO recommended level of 400 grams (g) per capita per day in 2011.¹⁷ The mean intake across the region was 386 g per capita per day, comprising 166 g of fruit and 220 g of vegetables. The situation is similar in the 28 countries of the European Union, where average fruit and vegetables consumption in 2013 was 342 g per capita per day, around 85% of the minimum recommended WHO intake.¹⁸ However, accessing European, especially European Union, markets will require improvement in horticulture quality and safety standards and certification systems. In this context, Uzbekistan must improve its performance compared with its major competitors' (China, Iran, Poland, and Turkey) in areas of price, product variety, design, and packaging. This reflects importers' and consumers' preference for (i) consistent and timely supply, (ii) guaranteed quality, (iii) product variety (width and depth of product range), (iv) visual

¹⁶ Source: Uzagroexport ([www. http://uzagroexport.uz/2017/01/05/](http://uzagroexport.uz/2017/01/05/)).

¹⁷ European Food Information Council (EUFIC). 2012. *Fruit and vegetable consumption in Europe – do Europeans get enough?* Brussels. <http://www.eufic.org/article/en/expid/Fruit-vegetable-consumption-Europe/>.

¹⁸ European Fresh Produce Association. 2015. *Freshfel Consumption Monitor*. Brussels. http://www.freshfel.org/asp/what_we_do/consumption_monitor.asp.

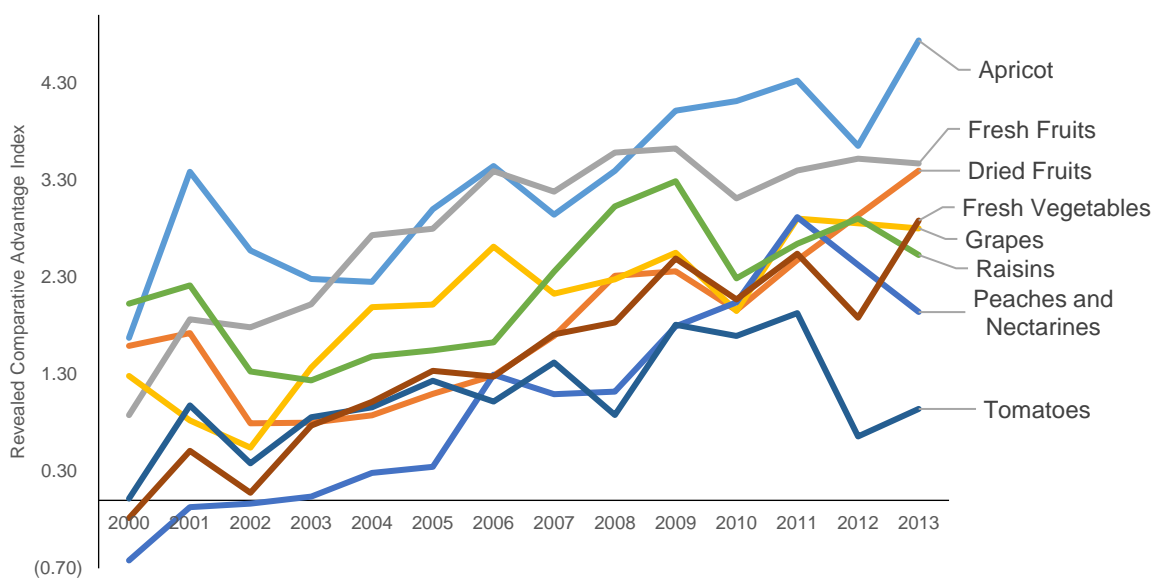
appearance, and (v) price competitiveness (though increasingly, as markets become more sophisticated, price is relatively less important). These factors form the basis of market loyalty between producers/exporters and importers/consumers in destination markets.

18. Much of the projected increase in exports is for fresh produce, though there is also significant scope for exports of processed produce. In this context, government forecasts foresee the construction or modernization of over 100 processing plants for finished and semi-finished product, with a combined cost of \$461 million by 2020. Meeting this projected demand will require significant investment in the processing subsector. As well as the demand for fruit and vegetable processing facilities, there is an indirect demand for investment in the manufacture of equipment to process, label, and package products. There is high demand for packaging materials, such as cardboard, paper, glass, aluminum foil, and shrink wrap, but these materials are not produced in Uzbekistan. Small-scale processing equipment is in demand and is more affordable for small businesses. Cold storage warehouse equipment is also in high demand. Uzbekistan's food processing industry needs newer technology and equipment related to cooling, processing, packaging and storage to improve the quality and longevity of fruit 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.

19. **Demand for finance.** The World Bank Horticulture Development Project (\$150 million) and ADB's HVCDP (\$154 million) have provided significant funding in recent years. As of December 2017, \$132 million (97.8%) had been disbursed under the World Bank project since it was approved in 2014, and \$151.7 million (98.5%) had been committed under ADB's HVCDP since it became effective in April 2017. In spite of these recent injections, the demand for long-term funding to finance the required type and level of investment in production and processing remains significant. The Rural Restructuring Agency under MAWR estimates the demand for additional investment finance for the 2018–2022 period to be in the range of \$0.8–\$1.0 billion.

20. **Comparative advantage.** Since independence in 1991, Uzbekistan's horticultural exports have largely been confined to Russia and Kazakhstan. Estimates of revealed comparative advantage (RCA) indices for Uzbekistan's main horticultural exports, however, suggest that the country has a comparative advantage with respect to the rest of the world and the potential to penetrate additional markets for its horticultural produce. From 2000 to 2013, Uzbekistan's RCA indices for all exports have generally increased, especially those for apricot, dried fruits, grapes, and fresh vegetables (Figure 1). Significant improvements in RCA occurred after 2002, when there were considerable spikes in RCA for grapes, tomatoes, and fresh vegetables. Furthermore, exports of peaches and nectarines obtained comparative advantage during the same period.

Figure 1: Trends in Uzbekistan's Revealed Comparative Advantage Indices with Respect to the Rest of the World for Selected Horticultural Products, 2000 to 2013



Source: FAOSTAT.

21. On a regional level, Uzbekistan also has comparative advantage in producing apricots, dried and fresh fruits, grapes, and fresh vegetables with respect to other regions of the world (Table 4). However, the country does not have comparative advantage in exporting raisins and tomatoes with respect to other exporters in Western Asia. This is also the case for Central America in terms of tomato production and Southern Europe in terms of the production of peaches and nectarines. Overall, the RCA analysis suggests that Uzbekistan is more specialized in producing horticultural products than producers from the rest of the world, indicating the potential for Uzbekistan to expand its export market.

Table 4: Revealed Comparative Advantage of Uzbekistan's Major Horticultural Exports by Region (average 2000 to 2013)

Region	Major Horticultural Exports															
	Apricot		Dried Fruit		Fresh Fruit		Grapes		Peach and Nectarine		Raisins		Tomato		Fresh Vegetables	
	L	A	L	A	L	A	L	A	L	A	L	A	L	A	L	A
Africa	3.90	49.19	3.02	20.43	2.79	16.33	1.09	2.98	2.17	8.75	2.25	9.49	1.10	3.02	0.65	1.92
Northern America	5.05	156.74	2.25	9.53	4.26	70.53	8.86	71	2.10	8.19	1.94	6.95	1.64	5.14	2.34	10.42
Central America	11.72	123,467.78	3.85	46.97	4.18	65.61	1.88	6.55	5.85	347.37	5.09	163.08	-0.82	0.44	0.27	1.31
South America	6.37	585.92	2.83	17.02	4.08	59.01	1.12	3.06	2.16	8.66	2.32	10.19	6.71	820.90	5.40	221.13
Eastern Asia	7.47	1,750.83	1.46	4.32	2.13	8.39	2.42	11.22	2.99	19.81	3.08	21.81	3.20	24.62	1.42	4.15
Southern Asia	4.70	110.29	1.61	5.00	2.69	14.68	0.93	2.54	4.42	83.12	0.78	2.19	3.23	25.37	1.35	3.85
South-Eastern Asia	10.25	28,146.34	1.37	3.94	1.98	7.21	1.76	5.79	8.36	4269.35	5.87	355.92	4.67	107.21	2.61	13.59
Western Asia	2.23	9.32	2.04	7.67	1.77	5.85	0.54	1.72	1.38	3.98	0.12	0.89	-0.16	0.85	0.87	2.38
Northern Europe	6.26	522.08	2.99	19.90	4.89	133.61	0.81	2.26	3.61	37.07	4.25	70.30	3.50	33.21	3.34	28.26
Southern Europe	2.25	9.48	1.77	5.86	2.90	18.11	1.40	4.07	-0.48	0.62	2.97	19.58	0.28	1.32	1.08	2.95
Western Europe	3.26	26.17	2.41	11.19	3.63	37.65	0.09	1.09	2.44	11.52	3.94	51.41	1.02	2.78	1.99	7.30
Oceania	4.58	97.61	4.61	100.76	5.35	210.17	0.99	2.69	3.26	25.99	4.47	87.13	4.46	86.78	3.70	40.48
World	3.60	36.54	2.13	8.40	3.06	21.39	0.70	2.01	1.56	4.74	2.38	10.77	1.18	3.27	1.80	6.05

A = Actual. If $RCA > 1$ (< 1), then country j has comparative advantage (disadvantage) in producing commodity i, over the reference region or the rest of the world.

L = Logarithmic. If $RCA > 0$ (< 0), then country j has comparative advantage (disadvantage) in producing commodity i, over the reference region or the rest of the world.

Equation for Revealed Comparative Advantage Index:

$$RCA = \ln \left\{ \frac{[x_{ij}/(\sum_{i=1}^n x_{ij})]}{[(\sum_{j=1}^m x_{ij})/(\sum_{j=1}^m \sum_{i=1}^n x_{ij})]} \right\}$$

where: x_{ij} = value of export (in \$) of commodity i by country j; $i = 1, n$ commodities; $j = 1, m$ countries; If $RCA > 0$ (< 0), then country j has comparative advantage (disadvantage) in producing commodity i, over the reference region or the rest of the world.

Source: FAOSTAT.

22. In the case of grape exports, in 2013, the top three importers of grapes were Germany (\$690 million), China (\$515 million), and Canada (\$440 million). These countries are coincidentally Uzbekistan's traditional trading partners for raisins. However, Germany largely imports grapes from the Netherlands and Italy, while China and Canada generally import grapes from the Americas, mainly Chile, USA, and Peru. The RCA analysis indicates that Uzbekistan has the potential to penetrate the markets for grapes in Germany, China, and Canada since it has comparative advantage in the export of grapes with respect to other exporters in Europe and the Americas. Entering these markets depends several other factors relating to international trade, including logistical, political, and environmental considerations.

E. Methodology and Assumptions

1. Without Project Scenario

23. Without investments in farm and agribusiness productivity and efficiency improvements, the horticulture sector is unlikely to realize its potential for national economic growth and employment generation. Upstream of production, while input supply enterprises are emerging, there remains a deficit of inputs appropriate to fruit and vegetable production. The availability of appropriate farm machinery, either owned or rented, is almost non-existent. Without the demand-pull effect of increased farmer incomes and access to finance to invest in such enterprises, their development will be curtailed which will negatively affect the potential to attain increased productivity. Downstream, without continued investment in improved post-harvest handling, storage and transport technologies, losses will continue to be high, product quality will continue to be low, and marketing opportunities will remain limited. In this situation, Uzbek products will both lose market share in domestic markets as consumer incomes rise and they become more discerning, and continue to lose market share in international markets to emerging competitors from the region. This will also affect processing enterprises which will continue to face a lack of raw material and to have to accept raw material inappropriate for processing purposes.

24. On the basis that all subproject investments will be demand driven and cannot be identified in advance, it is not possible to determine a without project situation for such subprojects. For the purpose of the analysis, therefore, indicative subprojects analyzed are assumed to be new ventures and all outputs and benefits assumed to be incremental.

2. Project Benefits

25. The major benefits from the project will derive from growth in the number of modern production units and improvements in on-farm productivity, and an expansion of capacity and increased efficiency in upstream and downstream agribusiness enterprises. Significant benefits will accrue from project investments in private enterprises in the form of greater value added to fruit and vegetable products. Incremental economic returns will derive from improved product-quality and associated price premia from specialized post-harvest storage and handling and product processing. Post-harvest enterprises engaged in marketing, exporting, and processing will contribute to (i) better quality product attracting a price premium in domestic and existing international markets, (ii) better quality product packaging enabling penetration of new export markets where unit values are higher, and (iii) production of a larger volume and range of finished fruit and vegetable products within Uzbekistan rather than exporting part-processed product and re-importing finished product.

26. The level of overall benefits from the project has not been quantified, since all investments financed under the project will be based on demand which cannot be estimated in advance. The

type and number of investments will also depend on the eligibility and creditworthiness of individual subborrowers applying to PFIs for investment credit. In this respect, a set of five investment proposals submitted for financing under HVCDP have been appraised in financial and economic terms. The investment models cover (i) greenhouse production of fruit and vegetables, (ii) cold storage of fruit and vegetables, (iii) fruit and vegetable drying, (iv) establishment of a walnut orchard, and (v) investment in agricultural machinery for field production of vegetables and other crops. It is assumed that if these indicative investments appear viable, then there is clear potential for similar investments to be financed under the project to be viable.

3. Financial and Economic Analysis

27. Financial analysis has been conducted on the basis of estimates of subproject investment and operating inputs and outputs derived from subprojects proposals submitted to PFIs under HVCDP. Financial cash flows for an assumed subproject life of 10 years have been derived from these input and outputs and prevailing market prices for subproject inputs and outputs. Prices are estimated in Uzbek sum (and US dollar for exported products) and are based on actual prices specified in subproject proposals. The analysis has been conducted in constant terms. No changes in real prices of individual input and output items (relative to the general price level) have been considered. Cash flows have been estimated for the subproject before ADB subloan financing, for the subproject after ADB subloan financing, and for the subproject after ADB subloan financing and tax. Subproject financial internal rates of return (FIRRs) have been estimated from the resulting cash flows. ADB subloan financing flows have been based on the terms and conditions (percentage of subproject cost financed by the subloan, subloan maturity, grace period, and interest rate) agreed for subloans between subproject proponents and the PFI concerned. Depending on the nature of each investment's phasing, there is also a need for working capital finance that, it is assumed, will be provided from subborrowers' own resources or from short-term loans provided from PFIs' own funds. Borrowing for working capital has not been factored into the analysis. It has been assumed that all subprojects will be new investments and that no activity is currently taking place in the enterprises concerned. Incremental FIRRs are not, therefore, estimated.

28. Sensitivity analysis based on switching values has been undertaken for each subproject. Switching values for revenues, investment costs and operating costs have been calculated on the FIRR before ADB subloan financing and tax to determine the intrinsic susceptibility of a subproject to adverse movements in revenues and costs, either input/output levels or prices. Switching values indicate the adverse percentage change in revenues and costs that would result in the FIRR falling to the weighted average cost of capital (WACC). A single WACC has been estimated for all subprojects, though slight variations exist in the level of equity financing, rate of interest, etc. between subprojects. On the basis of debt financing of 60.0%¹⁹ of subproject investment cost at an interest rate of 6.0% per year,²⁰ equity financing of 40% at a nominal rate of return on equity (ROE) of 12.0%, a tax rate of 7.5% on profit, and inflation of 2.2% in 2017, the WACC is estimated at 5.8% (Table 5).

¹⁹ The percentage of investment cost financed by subloans in the five subprojects analyzed under HVCDP ranges from 17% to 71%. An indicative level of subloan financing of 60% has been assumed.

²⁰ On the basis of the terms and conditions agreed with the Ministry of Finance for HVCDP, all subloans are denominated in US dollars.

Table 5: Derivation of the Weighted Average Cost of Capital

Finance Source	Amount	Share (%)	Interest (%)	Tax		Inflation ^b (%)	Inflation Factor
				Rate ^a (%)	Factor		
Subloan	60	60.0	6.0	7.5	0.93	2.2	0.5906
Government	0	0.0	0.0	0.0	1.00	0.0	0.0000
Equity	40	40.0	12.0	0.0	1.00	2.2	0.7991
Total	100	100.0					
WACC (%)	5.80						

WACC = weighted average cost of capital.

Sources:

^a Deloitte. 2016. *International Tax Uzbekistan Highlights 2016*.

<http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-uzbekistanhighlights-2016.pdf>

^b World Bank. <http://pubdocs.worldbank.org/en/318761510952399967/Global-Weekly-111717.pdf>

29. Economic analysis has been conducted on each investment model to assess the potential impact at the broader economic level.²¹ In accordance with the domestic price numeraire used in the analysis, financial prices of traded subproject inputs and outputs have converted into economic prices based on border price equivalent values.²² Nontraded inputs and outputs have been valued at their financial (domestic market) prices. Transfer payments such as taxes and duties and subloans interest payments have been set to zero. The standard conversion factor (SCF) used in the analysis is estimated to be 0.60 (Table 6). Where appropriate, the shadow exchange rate factor (SERF) of 1.66²³ has been applied in estimating economic prices. The application of conversion factors in determining economic prices is indicated in Tables A1 to A6.

²¹ Economic analysis has been undertaken in accordance with ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila.

²² Using the domestic currency at the domestic price level. Input and output prices have been estimated in Uzbek sum and converted to US dollars in cash flows for illustrative purposes.

²³ The SERF is the inverse of the SCF.

Table 6: Derivation of the Standard Conversion Factor

Item	Value (\$ million)
Total Imports (M) 2016 ^a	12,130.70
Total Exports (X) 2016 ^a	12,178.70
Import Duty (70%) ^b	8,491.49
Sales Tax on Imports (20%) ^b	2,426.14
Subsidy on Imports (0%)	0.00
Net Value of Taxes on Imports (Tm)	10,917.63
Export Duty (0%) ^b	-
Export Rebates (43%)	5,236.84
Net Value of Taxes on Exports (Tx)	5,236.84
Exports + Imports	24,309.40
Imports + Tm	23,048.33
Exports - Tx	17,415.54
Standard Conversion Factor (SCF) (M+X / [M+Tm]+[X-Tx])	0.6008
Shadow Exchange Rate Factor (1/SCF)	1.6645

^a ADB. 2017. *Key Indicators for Asia and the Pacific 2017*. Manila.

^b Price Waterhouse Coopers. 2014. *Guide to Doing Business and Investing in Uzbekistan*.

^c United States Department of Agriculture. 2012. *A Report from the Economic Research Service: Economic Policy and Cotton in Uzbekistan*. (CWS-12h-01).

30. Since there are no international reference prices for fruit and vegetables,²⁴ parity prices have been estimated for tradeable outputs on the basis of export prices reported in subproject business plans submitted to PFIs. These prices are considered to adequately reflect the Uzbek reference price for traded outputs. For tradeable inputs used in crop production, such as fertilizers and agrochemicals, economic prices have been estimated on the basis of international reference prices and calculation of import parity prices.²⁵ Parity price estimates for traded outputs and inputs are presented in the appendix, Table A2 to Table A6. Economic prices of imported equipment and materials used in crop production and post-harvest activities have been estimated from prices reported in subproject business plans by multiplying by the SERF.²⁶ Transfer payments including loan interest payments and taxes have been excluded in the estimation of economic prices. Given the technically advanced nature of production and processing implicit in the indicative subprojects, the labor engaged will be predominantly skilled labor. In this respect, no differentiation between skilled and unskilled labor has been made. Given the relative scarcity of and demand for skilled

²⁴ For instance published in the World Bank Commodities Price Data (the Pink Sheet). <http://www.worldbank.org/en/research/commodity-markets>.

²⁵ Subproject business plans do not differentiate fertilizers and agrochemicals. To derive economic prices, a single conversion factor has been calculated from the international reference price for diammonium phosphate (DAP, [Table A6]), as a proxy for all such crop production inputs. The resulting conversion factor is 2.01. The price for DAP is the highest input price reported in the 2017 World Bank Commodities Price Data Pink Sheet (<http://pubdocs.worldbank.org/en/484911509640161927/CMO-Pink-Sheet-November-2017.pdf>). The use of a conversion factor based on DAP will overestimate the economic price of inputs and result in a more conservative EIRR.

²⁶ Equipment costs are based on delivery to the subproject boundary. Multiplying this cost by the SERF will overestimate economic costs by inclusion of domestic handling and transport costs, which under the domestic price numeraire should be included at their financial cost.

labor in rural areas, prevailing market wage rates are assumed to be equal to their economic cost. This will tend to underestimate subproject economic internal rates of return (EIRRs) where there is an element of unskilled labor since the economic cost of unskilled labor is generally lower than the market wage rate.

31. From the resulting economic cash flow an EIRR has been estimated. This has been subjected to sensitivity analysis using switching values to determine the extent to which adverse movements in key subproject variables affect subproject economic viability. In this context, the EIRR has been assessed against the assumed economic opportunity cost of capital (OCC) of 9%.

F. Fruit and Vegetable Greenhouse Production Financial and Economic Analysis

32. The purpose of the subproject is to realize the advantages that greenhouse cultivation in a controlled environment offers over open-field cultivation. The investment also includes refrigeration equipment that will be rented out for fruit and vegetable storage. The combination of greenhouse production and cold storage enables crops to be brought to harvest and marketed earlier in the season and/or in the off-season, thereby attracting higher prices at that time of year. In addition, greenhouse yields are considerably higher and losses lower than under open-field production since it is possible to offset variations in weather conditions and much more effectively control pests and diseases. As a result, product quality, safety and appearance are better, which enables a price premium to be gained even when open-field cultivated product begins to reach the market. Improved quality also facilitates access to export markets. Greenhouse cultivation results in significantly more effective use of water per unit of product. The investment model analyzed is based on the production of tomatoes and tomato seedlings in a 3 has greenhouse but a variety of alternative crops could be cultivated.

1. Subproject Costs

33. The total investment cost of the subproject is estimated at \$3.00 million, comprising \$0.69 million for construction of the greenhouse and associated buildings, and \$2.00 million for greenhouse installations and refrigeration equipment. ADB subloan financing of \$2.00 million (66.6% of total subproject cost) has been assumed for a period of five years with a one-year grace period and an interest rate of 6.0%. At full development, annual operating costs are \$135,210 per year, covering seed, fertilizers, agrochemicals, irrigation, utilities and labor, and annual fixed costs \$25,800 covering permanent staff, marketing, maintenance, etc.

2. Subproject Benefits

34. The greenhouse has a capacity for 400 tons of tomatoes and 200,000 tomato seedlings per year. The capacity of the cold store is 1,575 tons. Production is projected to begin at 85% of capacity in the first year and rise to a maximum of 95% of capacity by year 6, when output will be 380 tons of tomatoes and 190,000 seedlings. Based on unit prices of \$1,550 per ton for tomatoes, \$0.15 per tomato seedling, and \$30 per ton for storage space rental, total revenue at full development is projected to reach \$662,400, of which revenue from tomato sales accounts for 88.9%.

35. Although not quantified in the analysis since the subproject represents a new venture, diversification of production of fruit and vegetables from field cultivation to greenhouse cultivation offers significant water-use efficiency and associated environmental management benefits.

Analysis²⁷ comparing field and greenhouse cultivation of tomatoes, a key crop in Uzbekistan, indicates that while water use increases in absolute terms by 182%, the conversion rate of water use (weight of fruit produced per liter of water used) increases by 519%. Overall, production efficiency is 9.4 times higher in greenhouse cultivation and field cultivation. In Uzbekistan, which faces increasing water shortages, increasing water-use efficiency is a priority.

3. Financial and Economic Returns

36. Annual net profit after tax at full development (following loan repayment) is estimated at \$503,100,²⁸ representing a profit margin on sales of 76.0%, with an ROA of 16.8% and an ROE of 50.2%. The FIRR is estimated at 10.3%, the FIRR after ADB subloan financing at 13.8%, and FIRR after ADB subloan financing and tax at 13.8%. Sensitivity analysis relating to the FIRR before ADB subloan financing and tax indicates that the investment is moderately sensitive to a fall in revenue or an increase in investment, but not sensitive to an increase in operating costs. Revenue could fall by 14.1% before the FIRR fell to the level of the WACC. The switching value for investment cost is 22.4% and for operating costs 61.3%.

37. In the economic analysis of the subproject, tomatoes are traded and the economic price of tomato has been based on the estimated farm-gate export parity price of \$1,550 per ton and a conversion factor of 1.46 estimated on the basis of the export parity price of tomatoes, resulting in an economic price of \$2,260 per ton (Table A1). Tomato seedlings are not traded and no conversion from a financial to an economic price has been made. Fertilizers and agrochemicals are assumed to be traded and their economic price has been derived by multiplying by the conversion factor of 2.01 (footnote 25). The economic cost of greenhouse and refrigeration equipment has been derived by converting their financial cost by the SERF. All other output and inputs are assumed to be nontraded and financial prices/costs have been used in the economic analysis. On the basis of the resulting economic cash flow, an EIRR of 11.4% has been estimated, indicating that the investment is economically viable and above the cut-off rate of 9.0%. Sensitivity analysis indicates that economic viability is relatively sensitive to adverse movements in outputs with a switching value of 8.0%. With increasing penetration into both existing and new export markets, growing demand for Uzbek products mitigate risk if reduced export sales and/or prices. Sensitivity to investment is marginally lower, with a switching value of 10.7%. The economic viability of the subproject is not sensitive to adverse movement in operating and fixed costs for which the switching value is 46.6%.

G. Fruit and Vegetable Drying Financial and Economic Analysis

38. The subproject involved the drying of a variety of fruit and vegetables, including grapes, apricot, peppers, cabbage, and pumpkin, for export. The investment includes buildings, vehicles, pre-production expenses and equipment for fruit and vegetable cleaning, cutting/slicing, drying, and processing/packaging. Processed products are expected to be exported to neighboring countries. Total drying/processing capacity is 17,100 tons of fruit and vegetables, of which dried grapes accounts for 8,000 tons, dried apricots 4,000 tons, and Bulgarian peppers 2,000 tons. While these three products account for over 80% of the product range in the subproject proposal, production can be diverted to other commodities as demand dictates.

²⁷ Smith G. 2017. *Field Vs Glasshouse Tomatoes*. *Practical Hydroponics & Greenhouses*, Issue 94. Australia. (<https://www.hydroponics.com.au/issue-94-field-vs-glasshouse-tomatoes/>)

²⁸ A subproject of this nature would be income tax exempt.

1. Subproject Costs

39. The total investment cost of the subproject is estimated at \$8.18 million. This includes \$2.70 million for buildings and plant and machinery, \$1.38 million for cleaning/drying/processing equipment, and \$4.02 million in pre-production expenses including initial inventory of fruit and vegetables, financial expenses, etc. ADB subloan financing is proposed to cover the cost of the cleaning/drying/processing equipment (\$1.38 million), equivalent to 16.9% of the total cost of investment. The subloan has a term of five years with a one-year grace period and an interest rate of 5.5%. Annual operating costs amount \$12.09 million per year. Of this, \$10.21 million (84.4%) is the cost of supplies of fruit and vegetables for processing. Other operating costs cover additional ingredients used in drying/processing, packaging, production staff, and utilities. Fixed costs, including permanent staff and related expenses, marketing/selling expenses and repairs and maintenance, amount to \$244,600 per year.

2. Subproject Benefits

40. The utilization of drying/processing capacity is expected to be phased over a period of four years, commencing at 70% in the first year after completion of construction/installation and rising to 85% in the fourth year. In practice, capacity utilization may be increased based on demand, assuming adequate supply of raw material. From year 4 onwards, total annual revenue is projected to be \$15.15 million, of which dried grapes accounts for 36%, dried apricots 18% and dried peppers 24%.

3. Financial and Economic Returns

41. Annual net profit after tax at full development (following loan repayment) is estimated at \$2.43 million,²⁹ representing a profit margin on sales of 16.0%, with an ROA of 29.7% and an ROE of 35.7%. The FIRR is estimated at 28.8%, the FIRR after ADB subloan financing at 31.8%, and FIRR after ADB subloan financing and tax at 26.4%. Sensitivity analysis relating to the FIRR before ADB subloan financing and tax indicates that the investment is moderately sensitive to a fall in revenue or an increase in operating and fixed costs. If revenue fell by 10.8% or operating and fixed costs rose by 13.2% the FIRR would fall to the level of the WACC. The risks of decreases in revenue or increases in costs could be mitigated by an increase in capacity utilization above the projected 85% used in the analysis. The subproject is not sensitive to increases in investment costs, for which the switching value is over 100%. The investment would generate an estimated \$379,000 per year in tax revenues.

42. All output from the drying/processing subproject is destined for export. Given the wide range of products that the subproject will process, the parity price of a single product has been used to calculate a conversion factor that is used as a proxy to convert financial to economic prices for the full range of products produced. The economic price of dried grape, which accounts for 35.9% of subproject financial revenues, has been used for this purpose (Table A2). The economic prices of fruit and vegetable inputs to the drying process have been estimated using a conversion factor derived from the export parity price of fresh grape (Table A3) as a proxy for all fruit and vegetable inputs. This may overstate the economic cost of such inputs as not all fruit and vegetables purchased for drying are necessarily tradeable, in which case their financial price should be used in the economic analysis. This approach does, however, result in a more

²⁹ Tax is estimated on the basis of the unified tax rate of 5% of turnover, which is discounted by 50% for enterprises which derive at least 30% of their revenue from export sales. The resulting tax rate for the subproject is, therefore, 2.5%.

conservative estimate of the EIRR. The economic cost of cleaning/drying/processing equipment has been derived by converting their financial cost by the SERF. All other output and inputs are assumed to be nontraded and financial prices/costs have been used in the economic analysis. On the basis of the resulting economic cash flow, an EIRR of 57.1% has been estimated, indicating that the investment is economically viable. This reflects the high economic price used for dried products. Sensitivity analysis indicates that the investment is robust with respect to potential adverse changes in revenue and costs. The switching value for revenue is 23.4% and for operating and fixed costs is 34.2%. The switching value for investment cost is over 250%.

H. Fruit and Vegetable Cold Storage Financial and Economic Analysis

43. The subproject is based upon the purchase of fruit and vegetables and storage and sale during off-season periods to ensure a steady flow of produce to national markets and to achieve a premium over peak harvest price levels. The subproject analysis is based on the purchase and storage of four crops, apple (100 tons), grape (50 tons), potato (120 tons), and carrot (100 tons). A variety of additional/alternative crops and volumes could be stored according to demand.

1. Subproject Costs

44. The investment cost of the subproject is relatively low, at \$220,500. This comprises civil works, procurement, installation and testing of refrigeration equipment and pre-production expenses, including initial inventory and financial/legal expenses. The cost of the refrigeration equipment is \$156,200, equal to 71% of the total investment cost. This will be financed by the subloan, which will have a term of 5 years with a grace period of 1 year, and an interest rate of 6.0%.

2. Subproject Benefits

45. Utilization of the storage capacity is projected to rise from 60% in the first year, to 80% in the second year and to a maximum of 95% from the third year onwards. Unit prices per ton for storage range from \$270 for carrots to \$1,380 for grapes. Based on the projected storage of each of the four crops considered in the analysis and their unit storage rates, total revenue at full development is projected to be \$259,900. This may, in practice, vary according to the type of crop stored, storage rates charged, and the level of utilization of storage capacity.

3. Financial and Economic Returns

46. Annual net profit at full development (following loan repayment) is estimated at \$69,600, representing a profit margin on sales of 26.8%, with an ROA of 31.6% and an ROE above 100%.³⁰ The FIRR is estimated at 24.5%, the FIRR after ADB subloan financing at 44.7%, and FIRR after ADB subloan financing and tax at 44.7%. Sensitivity analysis relating to the FIRR before ADB subloan financing and tax indicates that the investment is moderately sensitive to a fall in revenue or an increase in operating costs. Revenue could fall by 14.2% before the FIRR fell to the level of the WACC. The investment is not sensitive to increases in investment cost for which the switching value is 116.6%. It is more sensitive to adverse movement in operating and fixed cost, which have a switching value of 19.4%.

³⁰ The subproject would reportedly be exempt from tax.

47. The subproject provides storage facilities for the local fruit and vegetable producers. As such, the subproject output is not tradeable. The economic cost of refrigeration equipment for the cold store has been derived by converting the financial cost by the SERF. All other output and inputs are assumed to be nontraded and financial prices/costs have been used in the economic analysis. On the basis of the resulting economic cash flow, an EIRR of 14.6% has been estimated, indicating that the investment is economically viable. Sensitivity analysis indicates that economic viability is highly sensitive to adverse movements in outputs or operating and fixed costs with switching value of 5.9% for revenue and 8.1% for operating and fixed costs. The switching value for investment cost is 28.2%.

I. Establishment of Walnut Orchard Financial and Economic Analysis

48. The subproject would establish a 400 ha walnut orchard, which would produce three grades of walnut and sell walnut shells as a by-product. During establishment of the orchard, walnut trees would be intercropped with water melon, pumpkin, garlic and/or similar crops. This would cease once the trees begin to bear fruit, in the third year after establishment. On the basis of 500 trees per ha, the orchard would cover 200,000 trees. Seedlings would be imported from China.

1. Subproject Costs

49. The cost of establishing the walnut orchard is estimated at \$450,000 including land preparation and the cost of imported seedlings (\$500,000). In addition, a tractor, cultivator and walnut processing equipment (pulverizers) would amount to \$270,950. Other investment costs amount to \$250,000, resulting in a total investment cost of \$1.47 million. ADB subloan financing to cover the cost of seedlings and equipment would be \$690,950, equivalent to 47.0% of total investment cost. The loan would be for a period of five years with grace period of two years reflecting the period of orchard establishment. The interest rate on the loan has been assumed at 5.5%. Annual operating costs are estimated at \$105,800 per year, comprising mainly of fertilizers and chemicals, diesel, and harvesting and packing costs. Fixed costs are significantly higher at \$151,800, principally consisting of permanent staff related to management and administration, field production, and walnut processing.

2. Subproject Benefits

50. The orchard is expected to begin to produce fruit in the third year at 10% of the full development level. This would rise to 37.5% in year 4 and to full production (100%) in year 5. At full production, it is projected that the orchard would yield 654 tons of grade "A", 100 tons of grade "B", and 15 tons of grade "C" walnuts. Prices per ton vary significantly, with grade "A" at \$3,500 per ton, grade "B" \$1,250 per ton, and grade "C" \$1,000 per ton. Total annual income at full development is projected to be approximately \$2.43 million from whole walnuts, and \$24,700 from walnut shells and other by-products. During establishment of the orchard, the income from intercropping is estimated at \$379,000 million. This would not be earned from year 4 onwards.

3. Financial and Economic Returns

51. Annual net profit at full development (following loan repayment)³¹ is estimated at \$2.20 million, representing a profit margin on sales of 89.5%, with an ROA and an ROE both above 150%. The FIRR is estimated at 38.3%, the FIRR after ADB subloan financing at 46.7%, and

³¹ The subproject would be exempt from tax.

FIRR after ADB subloan financing and tax at 46.7%. Sensitivity analysis relating to the FIRR before ADB subloan financing and tax indicates that the investment is not sensitive to a fall in revenue or an increase in costs. Revenue could fall by 67.0% before the FIRR fell to the level of the WACC. Switching values for investment and operating and fixed costs are both in excess of 300%. The high values of financial indicators and rates of return reflect the fact that at full development, income from walnuts is significantly higher than the annual operating costs of the orchard and processing costs of harvested walnuts.

52. In the economic analysis, the economic price of walnut is based on the estimated farm-gate export parity price (Table A4). Fertilizers and agrochemicals are assumed to be traded and their economic price has been derived by multiplying by the conversion factor of 2.01 (footnote 25). The economic cost of walnut seedlings and cultivation/processing equipment has been derived by converting their financial cost by the SERF. All other output and inputs are assumed to be nontraded and financial prices/costs have been used in the economic analysis. On the basis of the resulting economic cash flow, an EIRR of 44.1% has been estimated, indicating that the investment is highly economically viable. Sensitivity analysis indicates that economic viability is not sensitive to adverse movements in revenue or investment and operating and fixed costs. The switching value for revenue is 73.3% and the switching values for investment and operating and fixed costs are over 500%.

J. Field Vegetable Production Financial and Economic Analysis

53. The subproject would establish mixed cropping of vegetables, cereals and fodder on an area of 8,000 ha, comprising 5,000 ha in Tashkent Region and 3,000 ha in Surkhandarya Region. Vegetables to be produced include potato (both table and for processing), seed potato, beans, and other vegetables. It is assumed that seed potato, beans and other vegetable production would be for export to neighboring countries (Russia, Kazakhstan, Tajikistan and Turkmenistan), though potential exists both for the sales in the domestic market and for the export of other crops. The subproject investment is principally in the purchase of agricultural machinery for crop cultivation.

1. Subproject Costs

54. The total investment cost of the subproject is estimated at \$17.96 million, consisting principally of the construction of buildings (\$6.59 million), and the purchase of agricultural machinery and equipment (\$10.12 million). ADB subloan financing of \$5.00 million has been assumed for financing 49.4% of the cost of the machinery, equivalent to 27.8% of the total cost of the subproject investment. The subloan would be for a period of 10 years with a three-year grace period reflecting, and an interest rate of 6.0%. Annual crop cultivation costs are estimated at \$20.54 million per year, covering seed, fertilizers, agrochemicals, etc., representing 92.0% of the total annual operating cost of \$22.33 million. Fixed costs of permanent staff, administration, marketing, maintenance, etc. amount to a further \$640,400 at full development.

2. Subproject Benefits

55. Total annual revenue at full development is estimated at \$17.74 million. Of this, revenue from potato, beans and vegetable production amounts to \$14.25 million, equal to 80.3% of the total, with the balance from cereals and fodder crops. Export sales of seed potato, beans and other vegetables amount to \$8.28 million, accounting for 46.7% of total revenue.

3. Financial and Economic Returns

56. Annual net profit after tax³² at full development (following loan repayment) is estimated at \$6.65 million, representing a profit margin on sales of 37.5%, with an ROA of 37.0% and an ROE of 51.3%. The FIRR is estimated at 28.3%, the FIRR after ADB subloan financing at 35.8%, and FIRR after ADB subloan financing and tax at 33.3%. Sensitivity analysis relating to the FIRR before ADB subloan financing and tax indicates that the investment is not sensitive to a fall in revenue or an increase in either investment or operating and fixed costs. Revenue could fall by 25.7% before the FIRR fell to the level of the WACC. The switching value for investment is above 150%, and for operating and fixed costs is 44.8%. The investment would generate an estimated \$443,500 per year in tax revenues.

57. The subproject produces a variety of crops, predominantly potato and other vegetables. For the economic analysis, the export parity price of potato (Table A5), has been used a proxy for tradeable outputs. Fertilizers and agrochemicals are assumed to be traded and their economic price has been derived by multiplying by the conversion factor of 2.01 (footnote 25). The economic cost of cultivation field equipment has been derived by converting their financial cost by the SERF. All other output and inputs are assumed to be nontraded and financial prices/costs have been used in the economic analysis. On the basis of the resulting economic cash flow, an EIRR of 10.9% has been estimated. This exceeds the ADB cut-off for economic viability of 9.0 %, but suggests that more detailed analysis, notably of crop production parameters, would be required for such subprojects. Sensitivity analysis indicates a high degree of sensitivity to adverse changes, with switching values of 3.0% for revenue, 9.4% for investment costs, and 4.6% for operating and fixed costs.

K. Summary

58. A summary of the financial and economic analysis for each investment is in Table 7.³³

³² Estimated at 2.5% of revenue (footnote 29).

³³ Financial and economic cash flow statements for the five models are in appendix tables 6-15. A Microsoft Excel file containing detailed analysis of each subproject is available on request.

Table 7: Summary of Key Parameters of Indicative Subproject Investments

Item	Greenhouse and Cold Storage (3 ha)	Fruit and Vegetable Drying (17,100 tons)	Fruit and Vegetable Cold Storage (500 tons)	Walnut Orchard (400 ha)	Field Vegetable Production (8,000 ha)
Total cost of investment (\$)	3,001,056	8,178,001	220,481	1,470,950	17,960,593
Total revenue (\$ per year)	662,388	15,147,000	259,876	2,454,820	17,738,387
Total operating and fixed costs (\$ per year)	159,297	12,339,475	190,310	257,642	9,885,384
Net cash flow after financing and tax (\$ per year)	503,091	2,428,850	69,566	2,197,178	6,652,401
Investment financing requirement (\$)	1,998,760	1,383,000	156,200	690,950	5,000,000
Equity contribution (\$)	1,002,296	6,795,001	64,281	780,000	12,960,593
Profit margin (%)	76.0	16.0	26.8	89.5	37.5
Return on assets (%)	16.8	29.7	31.6	149.4	37.0
Return on equity (%)	50.2	35.7	108.2	281.7	51.3
FIRR (%)	10.3	28.8	24.5	38.3	28.3
FIRR after ADB subloan (%)	13.8	31.8	44.7	46.7	35.8
FIRR after ADB subloan and tax (%)	13.8	26.4	44.7	46.7	33.3
Switching Values (%) on FIRR before ADB subloan and tax					
Revenue	14.1	10.8	14.2	67.0	25.7
Investment cost	22.4	141.6	116.6	525.7	153.2
Operating and fixed cost	61.3	13.2	19.4	329.9	44.8
EIRR (%)	11.4	57.1	14.6	44.1	10.9

EIRR = economic internal rate of return; FIRR = financial economic internal rate of return; n/a = not applicable.

Where appropriate, indicators are based upon full development operation for each enterprise.

Financing requirements based upon assumptions used in financial analysis of each activity.

Profit indicators do not take account of depreciation of fixed assets.

FIRRs and EIRRs estimated on 10-year cash flow.

L. Employment and Social Impact

59. There will be an increase in employment as a result of project investments. The estimated staff requirement for each of the subprojects analyzed is in Table 8.

Table 8: Employment Impact of Indicative Subprojects

Subproject	Production	Administrative	Total
Greenhouse	39	5	44
Fruit and vegetable drying	65	13	78
Cold storage	4	8	12
Walnut orchard ^a			64
Vegetable/crop production	534	17	551

a. Staff not differentiated by category.

60. Employment opportunities created by the project will depend upon the actual distribution of subprojects. Field crop production will provide significant opportunities, some of which may be for unskilled workers. Employment in subprojects based on new/improved technologies will largely be for skilled labor who possess the required technical knowledge and skills. Greenhouse production and fruit and vegetable processing investments will create employment opportunities for women who are frequently engaged on fruit and vegetable processing and packing lines.

61. Since the analysis has been based on indicative models and actual investments under the project will be demand-driven, it is not possible to estimate in advance the overall employment impact of the project, though it is expected to be significant. Equally, it is not yet meaningful to undertake a distribution or a poverty impact analysis for the project.

M. Risks

62. There are a number of potential market and business risks to the attainment of subproject financial viability and overall project economic benefits. These relate to:

- (i) market access and the volume of exports to CIS countries and beyond will be affected by increasing competition from other CIS countries;
- (ii) the delayed introduction of quality standards and certification will delay access to higher-value markets such as the European Union, Middle East, East Asia, etc. Competing fruit and vegetable exporting countries are already in the process of adopting enhanced agricultural practices, such as GlobalGap, and improved sanitary and phytosanitary standards and certification;
- (iii) continued interference in the operation of a free market by the government, for instance in the form of border closures or restrictions on the form of transport allowed to transport exports, may act as a disincentive to the realization of export potential and farm and agribusiness investment;
- (iv) reported unofficial payments for customs clearance, etc. that exporters are required to pay to facilitate free movement of their produce. This may, to some degree, be mitigated for fresh produce by the requirement that all fresh produce be exported through Uzagroexport;
- (v) failure of producers and processors to embrace the need to provide better quality product of international standards to penetrate new, more sophisticated and higher-value markets, including increasingly quality-conscious Uzbek consumers (evidenced by the growth in supermarket outlets);

- (vi) failure of PFIs to (a) identify sufficient lending opportunities for disbursement of the credit line and provision of funds for on-farm and enterprise investment, (b) adequately appraise, supervise and recover loans leading to poor quality loan portfolios thereby undermining banks' ability for future lending;
- (vii) pressure from government agencies to influence subborrower selection and credit decision-making by PFIs;
- (viii) continued constraints in the financial sector above and beyond those associated with the credit line (inspections of customer accounts, cash withdrawal issues, etc.);
- (ix) macroeconomic downturn that leads to a decline in consumer demand for non-staple foods, and increasing interest rates making loans and investments less attractive and viable; and
- (x) continuing general constraints on doing business in Uzbekistan (footnote 13).

63. Impact of increasing competition from other CIS countries on market access and the volume of exports to CIS countries and beyond is a key potential market and business risks to the attainment of subproject financial viability and overall project economic benefits. Mitigation of product quality and market access risks is inherent in the perception of Uzbek fruit and vegetables as being of high quality. Uzbekistan too has begun to initiate GlobalGAP with the assistance of development partners. Further promotion of GAP certification will help to ensure wider market access. In other areas, the government has indicated its willingness to support private sector development in horticulture and facilitate private sector involvement in fruit and vegetables marketing. Having, established Uzagroexport with sole responsibility for consolidation and export of fruit and vegetable products, the government terminated its monopoly and opened fruit and vegetable exports to private entities. Liberalization of foreign currency markets and exchange also signals the government's support for greater commercialization in the financial sector and within the economy as a whole. Continued efforts in this direction with support of development partners will help to address risks.

APPENDICES

Table A1: Export Parity Price – Tomato

Item	Unit	Price
Uzbekistan border FCA	\$/ton	1,550.00
Adjusted border price (adjusted by SERF 1.66)	\$/ton	2,580.03
Border price, Uzbekistan border	\$/ton	2,580.03
Less: Quality adjustment for local product (0%)	- \$/ton	-
Border price, Uzbekistan border, local equivalent	\$/ton	2,580.03
Less: Customs duties (0%) ^a	- \$/ton	-
Less: Handling and other charges (\$220.00 per ton)	\$/ton	(220.00)
Less: Transport costs to border (\$100.00 per ton) ^b	\$/ton	(100.00)
Less: Storage, losses and related costs (0%)	- \$/ton	-
Less: VAT (0%) ^a	- \$/ton	-
Ex-greenhouse export parity price	\$/ton	2,260.03

FCA = free carrier; SERF = shadow exchange rate factor, VAT = value added tax.

a. Exports from are exempt for customs duties and VAT.

b. Estimated on an average distance to border of 100 km and \$1.00 per ton km cost.

Source: Asian Development Bank estimates.

Table A2: Export Parity Price - Dried Grape

Item	%	Unit	Price
Uzbekistan border FCA		\$/ton	800.00
Adjusted border price (adjusted by SERF 1.66)		\$/ton	1,331.63
Border price, Uzbekistan border		\$/ton	1,331.63
Less: Quality adjustment for local product (0.9%)	0.90	\$/ton	(11.98)
Border price, Uzbekistan border, local equivalent		\$/ton	1,319.64
Less: Customs duties (0%) ^a	-	\$/ton	-
Less: Handling and other charges (\$250.00 per ton)		\$/ton	(250.00)
Less: Transport costs to border (\$75.00 per ton) ^b		\$/ton	(75.00)
Less: Processor storage, losses and related costs (0%)	-	\$/ton	-
Less: VAT (0%) ^a	-	\$/ton	-
Ex-enterprise export parity price		\$/ton	994.64

FCA = free carrier; SERF = shadow exchange rate factor, VAT = value added tax.

a. Exports from Uzbekistan are exempt for customs duties and VAT.

b. Estimated on an average distance to border of 100 km and \$0.75 per ton km cost.

Source: Asian Development Bank estimates.

Table A3: Export Parity Price - Fresh Grape

Item	%	Unit	Price
Uzbekistan border FCA (a)		\$/ton	511.88
Adjusted border price (adjusted by SERF 1.66)		\$/ton	852.04
Border price, Uzbekistan border		\$/ton	852.04
Less: Quality adjustment for local product (%)		\$/ton	-
Border price, Uzbekistan border, local equivalent		\$/ton	852.04
Less: Customs duties (%)		\$/ton	-
Less: Handling and other charges (\$220.00 per ton)		\$/ton	(220.00)
Less: Transport costs to border (\$100.00 per ton) b.		\$/ton	(100.00)
Less: Enterprise storage, losses and related costs (%)		\$/ton	-
Ex-enterprise export parity price		\$/ton	532.04

FCA = free carrier; SERF = shadow exchange rate factor, VAT = value added tax.

a. Exports from Uzbekistan are exempt for customs duties and VAT.

b. Estimated on an average distance to border of 100 km and \$1.00 per ton km cost.

Source: Asian Development Bank estimates.

Table A4: Export Parity Price – Walnut

Item	%	Unit	Price
Uzbekistan border FCA (a)		\$/ton	3,500.00
Adjusted border price (adjusted by SERF 1.66)		\$/ton	5,825.88
Border price, Uzbekistan border		\$/ton	5,825.88
Less: Quality adjustment for local product (%)		\$/ton	-
Border price, Uzbekistan border, local equivalent		\$/ton	5,825.88
Less: Customs duties (%)		\$/ton	-
Less: Handling and other charges (\$250.00 per ton)		\$/ton	(250.00)
Less: Transport costs to border (\$75.00 per ton) b.		\$/ton	(75.00)
Less: Enterprise storage, losses and related costs (%)		\$/ton	-
Ex-enterprise export parity price		\$/ton	5,500.88

FCA = free carrier; SERF = shadow exchange rate factor, VAT = value added tax.

a. Exports from Uzbekistan are exempt for customs duties and VAT.

b. Estimated on an average distance to border of 100 km and \$1.00 per ton km cost.

Source: Asian Development Bank estimates.

Table A5: Export Parity Price – Potato

Item	%	Unit	Price
Uzbekistan border FCA (a)		\$/ton	154.86
Adjusted border price (adjusted by SERF 1.66)		\$/ton	257.77
Border price, Uzbekistan border		\$/ton	257.77
Less: Quality adjustment for local product (%)		\$/ton	-
Border price, Uzbekistan border, local equivalent		\$/ton	257.77
Less: Customs duties (%)		\$/ton	-
Less: Handling and other charges (\$100.00 per ton)		\$/ton	(100.00)
Less: Transport costs to border (\$50.00 per ton) b.		\$/ton	(50.00)
Less: Enterprise storage, losses and related costs (%)		\$/ton	-
Ex-enterprise export parity price		\$/ton	107.77

FCA = free carrier; SERF = shadow exchange rate factor, VAT = value added tax.

a. Exports from Uzbekistan are exempt for customs duties and VAT.

b. Estimated on an average distance to border of 100 km and \$0.50 per ton km cost.

Source: Asian Development Bank estimates.

Table A6: Import Parity Price - Diammonium Phosphate (DAP)

Item	%	Unit	Price
fob, port of origin ^a		\$/ton	344.00
Plus: Freight & insurance to Uzbekistan border		\$/ton	20.00
cif, Uzbekistan border		\$/ton	364.00
Adjusted border price (adjusted by SERF 1.66)		\$/ton	605.89
Border price, Uzbekistan border		\$/ton	605.89
Plus: Handling charges and storage costs at border, Uzbekistan border (1%)	1.0	\$/ton	6.06
Plus: Transport, loading, unloading and insurance costs to wholesale market (5%)	5.0	\$/ton	30.60
Price of imported product at local wholesale market		\$/ton	642.55
Less: Quality adjustment for local product (0%)	-	\$/ton	-
Price of local equivalent product at local wholesale market		\$/ton	642.55
Conversion/processing ratio (100%)	100.0	\$/ton	642.55
Plus: Enterprise to market transport and handling b		\$/ton	50.00
Less: Enterprise storage, losses and related costs (0%)	-	\$/ton	-
Enterprise import parity price		\$/ton	692.55

cif = cost, insurance and freight; fob = free on board; SERF = shadow exchange rate factor.

a. DAP (diammonium phosphate), standard size, bulk, spot, f.o.b. US Gulf. Source: World Bank. 2017. Commodities Price Data (The Pink Sheet). Washington DC.

b. Estimated on an average distance to border of 100 km and \$0.50 per ton km cost.

Source: Asian Development Bank estimates.

		0	1	2	3	4	5	6	7	8-10
Director	No/year		2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Chief accountant	No/year		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Supplier	No/year		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Agronomist	No/year		5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Social insurance at 15.0% of staff cost	sum		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Maintenance and spares	sum		1.5	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Marketing expenses	sum		2.8	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Other expenses (banking, legal, admin)	sum		2.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total			20.5	27.3	27.3	27.3	27.3	27.3	27.3	27.3
Total Operating and Fixed Costs			86.4	148.7	152.2	158.7	159.3	159.3	159.3	159.3
Net Cash Flow before Financing		(3,001.1)	506.3	478.8	482.3	482.8	489.1	503.1	503.1	503.1

		0	1	2	3	4	5	6	7	8-10
Director	No/year		2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Chief accountant	No/year		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Supplier	No/year		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Agronomist	No/year		5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Social insurance at 15.0% of staff cost	sum		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Maintenance and spares	sum		2.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Marketing expenses	sum		4.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9
Other expenses (banking, legal, admin)	sum		2.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total			22.4	31.0	31.0	31.0	31.0	31.0	31.0	31.0
Total Operating and Fixed Costs			90.9	157.8	161.3	167.7	168.4	168.4	168.4	168.4
Net Cash Flow before Financing		(4,329.3)	743.2	725.3	731.7	735.0	744.2	763.8	763.8	763.8

Table A9: Fruit and Vegetable Drying Financial Cash Flow (\$ '000)

		0	1	2	3	4	5	6	7	8-10
Outputs										
Dried Bulgarian pepper	ton		2,940.0	3,150.0	3,360.0	3,570.0	3,570.0	3,570.0	3,570.0	3,570.0
Dried cabbage	ton		392.0	420.0	448.0	476.0	476.0	476.0	476.0	476.0
Dried pumpkin	ton		336.0	360.0	384.0	408.0	408.0	408.0	408.0	408.0
Dried zucchini	ton		448.0	480.0	512.0	544.0	544.0	544.0	544.0	544.0
Dried beet	ton		882.0	945.0	1,008.0	1,071.0	1,071.0	1,071.0	1,071.0	1,071.0
Dried dill	ton		280.0	300.0	320.0	340.0	340.0	340.0	340.0	340.0
Dried grape	ton		4,480.0	4,800.0	5,120.0	5,440.0	5,440.0	5,440.0	5,440.0	5,440.0
Dried apricot	ton		2,268.0	2,430.0	2,592.0	2,754.0	2,754.0	2,754.0	2,754.0	2,754.0
Dried fruit mix	ton		448.0	480.0	512.0	544.0	544.0	544.0	544.0	544.0
Total			12,474.0	13,365.0	14,256.0	15,147.0	15,147.0	15,147.0	15,147.0	15,147.0
Inputs										
Investment costs										
Buildings	sum	244.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant and machinery	sum	2,459.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vehicles	sum	71.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other fixed assets	sum	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drying, cleaning, cutting equipment	sum	476.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Processing equipment	sum	907.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pre-production costs	sum	4,019.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total		8,178.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operating costs										
Bulgarian pepper	ton		1,973.3	2,114.3	2,255.2	2,396.2	2,396.2	2,396.2	2,396.2	2,396.2
Cabbage	ton		143.9	154.2	164.5	174.7	174.7	174.7	174.7	174.7
Pumpkin	ton		110.1	118.0	125.9	133.8	133.8	133.8	133.8	133.8
Zucchini	ton		222.4	238.3	254.2	270.1	270.1	270.1	270.1	270.1
Beet	ton		274.4	294.0	313.6	333.2	333.2	333.2	333.2	333.2
Dill	ton		203.2	217.7	232.2	246.7	246.7	246.7	246.7	246.7

		0	1	2	3	4	5	6	7	8-10
Grape	ton		2,924.9	3,133.9	3,342.8	3,551.7	3,551.7	3,551.7	3,551.7	3,551.7
Apricot	ton		2,121.9	2,273.4	2,425.0	2,576.6	2,576.6	2,576.6	2,576.6	2,576.6
Mixed fruit - apricot	ton		148.9	159.5	170.1	180.7	180.7	180.7	180.7	180.7
Mixed fruit - apple	kg		147.5	158.0	168.5	179.1	179.1	179.1	179.1	179.1
Mixed fruit - plums	kg		137.9	147.7	157.5	167.4	167.4	167.4	167.4	167.4
Iodised salt	kg		2.2	2.3	2.5	2.6	2.6	2.6	2.6	2.6
Lake salt	kg		1.9	2.0	2.1	2.3	2.3	2.3	2.3	2.3
Polypropylene bag	No		39.7	42.5	45.3	48.2	48.2	48.2	48.2	48.2
Polyethylene bag	No		21.6	23.1	24.7	26.2	26.2	26.2	26.2	26.2
Polyethylene package	No		14.6	15.7	16.7	17.7	17.7	17.7	17.7	17.7
Corrugated box (390x280x155)	No		0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
Corrugated box (390x280x160)	No		29.6	31.8	33.9	36.0	36.0	36.0	36.0	36.0
Box insert	No		6.7	7.2	7.7	8.2	8.2	8.2	8.2	8.2
Adhesive tape	No		0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Gas	000 m3		300.2	321.7	343.1	364.6	364.6	364.6	364.6	364.6
Electricity	000 kWh		269.2	288.5	307.7	326.9	326.9	326.9	326.9	326.9
Rent of FMC line	sum		14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Other production costs										
7.0% of raw material costs	sum		597.8	640.4	683.1	725.7	725.7	725.7	725.7	725.7
Other operating costs 1.5% of sales	sum		187.1	200.5	213.8	227.2	227.2	227.2	227.2	227.2
Production staff	No/year		31.5	33.8	36.0	38.3	38.3	38.3	38.3	38.3
Auxilliary staff	No/year		23.6	25.3	27.0	28.7	28.7	28.7	28.7	28.7
Support staff	No/year		13.7	14.6	15.6	16.6	16.6	16.6	16.6	16.6
Total			9,963.2	10,673.8	11,384.4	12,094.9	12,094.9	12,094.9	12,094.9	12,094.9
Fixed costs										
Administrative staff	No/year		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Service staff	No/year		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Social insurance at 15.0% of staff cost	sum		13.9	14.7	15.4	16.1	16.1	16.1	16.1	16.1

		0	1	2	3	4	5	6	7	8-10
Maintenance at 10.0% of asset depreciation cost	sum		67.8	67.8	67.8	67.6	65.9	53.0	53.0	53.0
Marketing/selling expenses	sum		109.1	132.5	141.4	150.4	151.5	151.5	151.5	151.5
Equipment lease charges	sum		90.0	42.0	3.4	0.0	0.0	0.0	0.0	0.0
Total			304.9	281.0	252.0	258.1	257.5	244.6	244.6	244.6
Total Operating and Fixed Costs			10,268.1	10,954.8	11,636.4	12,353.0	12,352.5	12,339.5	12,339.5	12,339.5
Net Cash Flow before Financing		(8,178.0)	2,205.9	2,410.2	2,619.6	2,794.0	2,794.5	2,807.5	2,807.5	2,807.5

Table A10: Fruit and Vegetable Drying Economic Cash Flow (\$ '000)

		0	1	2	3	4	5	6	7	8-10
Outputs										
Dried Bulgarian pepper	ton		3,655.3	3,916.4	4,177.5	4,438.6	4,438.6	4,438.6	4,438.6	4,438.6
Dried cabbage	ton		487.4	522.2	557.0	591.8	591.8	591.8	591.8	591.8
Dried pumpkin	ton		417.8	447.6	477.4	507.3	507.3	507.3	507.3	507.3
Dried zucchini	ton		557.0	596.8	636.6	676.4	676.4	676.4	676.4	676.4
Dried beet	ton		1,096.6	1,174.9	1,253.3	1,331.6	1,331.6	1,331.6	1,331.6	1,331.6
Dried dill	ton		348.1	373.0	397.9	422.7	422.7	422.7	422.7	422.7
Dried grape	ton		5,570.0	5,967.9	6,365.7	6,763.6	6,763.6	6,763.6	6,763.6	6,763.6
Dried apricot	ton		2,819.8	3,021.2	3,222.6	3,424.1	3,424.1	3,424.1	3,424.1	3,424.1
Dried fruit mix	ton		557.0	596.8	636.6	676.4	676.4	676.4	676.4	676.4
Total			15,509.0	16,616.8	17,724.6	18,832.3	18,832.3	18,832.3	18,832.3	18,832.3
Inputs										
Investment costs										
Buildings	sum	244.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plant and machinery	sum	2,459.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vehicles	sum	119.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other fixed assets	sum	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drying, cleaning, cutting equipment	sum	792.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Processing equipment	sum	1,509.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pre-production costs	sum	4,019.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total		9,144.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operating costs										
Bulgarian pepper	ton		2,051.0	2,197.5	2,344.0	2,490.5	2,490.5	2,490.5	2,490.5	2,490.5
Cabbage	ton		149.6	160.3	170.9	181.6	181.6	181.6	181.6	181.6
Pumpkin	ton		114.5	122.7	130.8	139.0	139.0	139.0	139.0	139.0
Zucchini	ton		231.2	247.7	264.2	280.7	280.7	280.7	280.7	280.7
Beet	ton		285.2	305.6	325.9	346.3	346.3	346.3	346.3	346.3
Dill	ton		211.2	226.3	241.3	256.4	256.4	256.4	256.4	256.4
Grape	ton		3,040.1	3,257.3	3,474.5	3,691.6	3,691.6	3,691.6	3,691.6	3,691.6

		0	1	2	3	4	5	6	7	8-10
Apricot	ton		2,205.5	2,363.0	2,520.5	2,678.1	2,678.1	2,678.1	2,678.1	2,678.1
Mixed fruit - apricot	ton		154.7	165.8	176.8	187.9	187.9	187.9	187.9	187.9
Mixed fruit - apple	kg		153.3	164.2	175.2	186.1	186.1	186.1	186.1	186.1
Mixed fruit - plums	kg		143.3	153.5	163.8	174.0	174.0	174.0	174.0	174.0
Iodised salt	kg		2.2	2.3	2.5	2.6	2.6	2.6	2.6	2.6
Lake salt	kg		1.9	2.0	2.1	2.3	2.3	2.3	2.3	2.3
Polypropylene bag	No		66.0	70.7	75.5	80.2	80.2	80.2	80.2	80.2
Polyethylene bag	No		36.0	38.5	41.1	43.7	43.7	43.7	43.7	43.7
Polyethylene package	No		24.3	26.1	27.8	29.5	29.5	29.5	29.5	29.5
Corrugated box (390x280x155)	No		0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
Corrugated box (390x280x160)	No		29.6	31.8	33.9	36.0	36.0	36.0	36.0	36.0
Box insert	No		6.7	7.2	7.7	8.2	8.2	8.2	8.2	8.2
Adhesive tape	No		0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Gas	000 m3		300.2	321.7	343.1	364.6	364.6	364.6	364.6	364.6
Electricity	000 kWh		269.2	288.5	307.7	326.9	326.9	326.9	326.9	326.9
Rent of FMC line	sum		14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Other production costs 7.0% of raw material costs	sum		624.5	669.1	713.6	758.1	758.1	758.1	758.1	758.1
Other operating costs 1.5% of sales	sum		232.6	249.3	265.9	282.5	282.5	282.5	282.5	282.5
Production staff	No/year		31.5	33.8	36.0	38.3	38.3	38.3	38.3	38.3
Auxiliary staff	No/year		23.6	25.3	27.0	28.7	28.7	28.7	28.7	28.7
Support staff	No/year		13.7	14.6	15.6	16.6	16.6	16.6	16.6	16.6
Total			10,417.1	11,160.1	11,903.1	12,646.0	12,646.0	12,646.0	12,646.0	12,646.0
Fixed costs										
Administrative staff	No/year		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Service staff	No/year		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Social insurance at 15.0% of staff cost	sum		13.9	14.7	15.4	16.1	16.1	16.1	16.1	16.1

		0	1	2	3	4	5	6	7	8-10
Maintenance at 10.0% of asset depreciation cost	sum		67.8	67.8	67.8	67.6	65.9	53.0	53.0	53.0
Marketing/selling expenses	sum		109.1	132.5	141.4	150.4	151.5	151.5	151.5	151.5
Equipment lease charges	sum		90.0	42.0	3.4	0.0	0.0	0.0	0.0	0.0
Total			304.9	281.0	252.0	258.1	257.5	244.6	244.6	244.6
Total Operating and Fixed Costs			10,722.0	11,441.1	12,155.1	12,904.1	12,903.6	12,890.6	12,890.6	12,890.6
Net Cash Flow before Financing		(9,144.7)	4,787.0	5,175.7	5,569.5	5,928.2	5,928.8	5,941.7	5,941.7	5,941.7

		0	1	2	3	4	5	6	7	8-10
Other expenses	sum		30.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Other establishment expenses	sum		200.0	200.0	200.0	0.0	0.0	0.0	0.0	0.0
Total			321.9	305.8	305.8	105.8	105.8	105.8	105.8	105.8
Fixed costs										
Manager	No/year		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Agronomist	No/year		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Accountant	No/year		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
General staff	No/year		5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Tractor driver	No/year		6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Irrigator	No/year		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Supplier	No/year		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pulverizer operator	No/year		4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Gardener	No/year		10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
Storekeeper	No/year		0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Cook	No/year		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Security guard	No/year		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Social insurance at 15.0% of staff cost	sum		8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Staff food expenses	sum		33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
Bank charges	sum		12.1	14.9	19.8	27.9	53.3	53.3	53.3	53.3
Total			110.7	113.4	118.4	126.5	151.8	151.8	151.8	151.8
Total Operating and Fixed Costs			432.5	419.3	424.2	232.3	257.6	257.6	257.6	257.6
Net Cash Flow before Financing			(1,471.0)	(153.5)	(40.3)	197.8	679.0	2,197.2	2,197.2	2,197.2

		0	1	2	3	4	5	6	7	8-10
Other expenses	sum		30.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Other establishment expenses	sum		200.0	200.0	200.0	0.0	0.0	0.0	0.0	0.0
Total			389.2	373.1	373.1	173.1	173.1	173.1	173.1	173.1
Fixed costs										
Manager	No/year		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Agronomist	No/year		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Accountant	No/year		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
General staff	No/year		5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Tractor driver	No/year		6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Irrigator	No/year		11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Supplier	No/year		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pulverizer operator	No/year		4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Gardener	No/year		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storekeeper	No/year		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cook	No/year		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Security guard	No/year		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Social insurance at 15.0% of staff cost	sum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Staff food expenses	sum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bank charges	sum		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total			35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Operating and Fixed Costs			424.2	408.1	408.1	208.1	208.1	208.1	208.1	208.1
Net Cash Flow before Financing			(1,983.3)	(145.2)	(29.1)	352.8	1,224.1	3,635.9	3,635.9	3,635.9

Table A15: Field Vegetable Production Financial Cash Flow (\$ '000)

		0	1	2	3	4	5	6	7	8	9	10
Outputs												
Table potato	ton		1,220	1,220	1,220	1,415	1,561	1,659	1,707	1,756	1,805	1,854
Seed potato	ton		1,420	1,420	1,420	1,647	1,817	1,931	1,987	2,044	2,101	2,158
Potatoes for processing	ton		2,710	2,710	2,710	3,144	3,469	3,686	3,794	3,902	4,011	4,119
Vegetables	ton		3,329	3,329	3,329	3,862	4,262	4,528	4,661	4,794	4,928	5,061
Wheat	ton		991	991	991	1,150	1,269	1,348	1,388	1,427	1,467	1,506
Beans	ton		697	697	697	808	892	948	976	1,003	1,031	1,059
Forage	ton		503	503	503	584	644	684	705	725	745	765
Cereals	ton		800	800	800	928	1,024	1,088	1,120	1,152	1,184	1,216
Total			11,670	11,670	11,670	13,537	14,938	15,871	16,338	16,805	17,272	17,738
Inputs												
Investment costs												
Buildings	sum	6,591	0	0	0	0	0	0	0	0	0	0
Agricultural machinery	sum	10,116	0	0	0	0	0	0	0	0	0	0
Vehicles	sum	308	0	0	0	0	0	0	0	0	0	0
Office furniture	sum	59	0	0	0	0	0	0	0	0	0	0
Computer equipment	sum	11	0	0	0	0	0	0	0	0	0	0
Other assets	sum	63	0	0	0	0	0	0	0	0	0	0
Pre-production expenses	sum	813	0	0	0	0	0	0	0	0	0	0
Total		17,961	0	0	0	0	0	0	0	0	0	0
Operating costs												
Table potato	ha		1,020	1,020	1,020	1,184	1,306	1,388	1,429	1,469	1,510	1,551
Seed potato	ha		582	582	582	675	744	791	814	838	861	884
Potatoes for processing	ha		1,057	1,057	1,057	1,227	1,354	1,438	1,480	1,523	1,565	1,607
Vegetables	ha		839	839	839	973	1,074	1,141	1,174	1,208	1,241	1,275
Wheat	ha		572	572	572	663	732	778	801	824	846	869
Beans	ha		437	437	437	507	559	594	611	629	646	664
Forage	ha		324	324	324	376	415	441	454	467	480	493
Cereals	ha		304	304	304	352	389	413	425	438	450	462

		0	1	2	3	4	5	6	7	8	9	10
	000											
Electricity	kWh		76	76	76	76	76	76	76	76	76	76
Gas	m3		10	10	10	10	10	10	10	10	10	10
Water	m3		5	5	5	5	5	5	5	5	5	5
Agronomist	No/year		35	35	35	35	35	35	35	35	35	35
Warehouse manager	No/year		7	7	7	7	7	7	7	7	7	7
Foreman	No/year		91	91	91	91	91	91	91	91	91	91
Electrician	No/year		7	7	7	7	7	7	7	7	7	7
Mechanic	No/year		7	7	7	7	7	7	7	7	7	7
Maintenance mechanic	No/year		7	7	7	7	7	7	7	7	7	7
Tractor driver	No/year		156	156	156	156	156	156	156	156	156	156
Vegetable grower	No/year		632	632	632	632	632	632	632	632	632	632
Social insurance at 15.0% of staff cost	sum		142	142	142	142	142	142	142	142	142	142
Transportation at 1.0% of raw material cost	sum		51	51	51	60	66	70	72	74	76	78
Maintenance and repairs at 1.5% of equipment cost	sum		0	0	0	0	0	0	0	0	0	0
Spares at 5.0% of equipment cost	sum		1	1	1	1	1	1	1	1	1	1
Other operating costs at 2.0% of raw material cost	sum		103	103	103	119	131	140	144	148	152	156
Total			6,467	6,467	6,467	7,313	7,948	8,371	8,582	8,794	9,005	9,217
Fixed costs												
Director	No/year		3	3	3	3	3	3	3	3	3	3
Chief accountant	No/year		2	2	2	2	2	2	2	2	2	2
Accountant	No/year		2	2	2	2	2	2	2	2	2	2
Security guard	No/year		17	17	17	17	17	17	17	17	17	17
Cleaner	No/year		5	5	5	5	5	5	5	5	5	5
Social insurance at 15.0% of staff cost	sum		4	4	4	4	4	4	4	4	4	4
Selling expenses at 1.5% of revenue	sum		175	175	175	203	224	238	245	252	259	266

		0	1	2	3	4	5	6	7	8	9	10
Administration expenses at 1.5% of revenue	sum		175	175	175	203	224	238	245	252	259	266
Bank charges	sum		97	97	97	97	97	97	97	97	97	97
Insurance	sum		6	6	6	6	6	6	6	6	6	6
Total			486	486	486	542	584	612	626	640	654	668
Total Operating and Fixed Costs			6,953	6,953	6,953	7,855	8,532	8,983	9,209	9,434	9,660	9,885
Net Cash Flow before Financing		(17,961)	4,717	4,717	4,717	5,682	6,406	6,888	7,129	7,371	7,612	7,853

Table A16: Field Vegetable Production Economic Cash Flow (\$ '000)

		0	1	2	3	4	5	6	7	8	9	10
Outputs												
Table potato	ton		849	849	849	984	1,086	1,154	1,188	1,222	1,256	1,290
Seed potato	ton		1,420	1,420	1,420	1,647	1,817	1,931	1,987	2,044	2,101	2,158
Potatoes for processing	ton		2,710	2,710	2,710	3,144	3,469	3,686	3,794	3,902	4,011	4,119
Vegetables	ton		2,317	2,317	2,317	2,688	2,966	3,151	3,244	3,337	3,429	3,522
Wheat	ton		991	991	991	1,150	1,269	1,348	1,388	1,427	1,467	1,506
Beans	ton		485	485	485	563	621	660	679	698	718	737
Forage	ton		503	503	503	584	644	684	705	725	745	765
Cereals	ton		800	800	800	928	1,024	1,088	1,120	1,152	1,184	1,216
Total			10,075	10,075	10,075	11,687	12,896	13,702	14,105	14,508	14,911	15,314
Inputs												
Investment costs												
Buildings	sum	6,591	0	0	0	0	0	0	0	0	0	0
Agricultural machinery	sum	16,838	0	0	0	0	0	0	0	0	0	0
Vehicles	sum	513	0	0	0	0	0	0	0	0	0	0
Office furniture	sum	59	0	0	0	0	0	0	0	0	0	0
Computer equipment	sum	18	0	0	0	0	0	0	0	0	0	0
Other assets	sum	63	0	0	0	0	0	0	0	0	0	0
Pre-production expenses	sum	813	0	0	0	0	0	0	0	0	0	0
Total		24,895	0	0	0	0	0	0	0	0	0	0
Operating costs												
Table potato	ha		1,020	1,020	1,020	1,184	1,306	1,388	1,429	1,469	1,510	1,551
Seed potato	ha		582	582	582	675	744	791	814	838	861	884
Potatoes for processing	ha		1,057	1,057	1,057	1,227	1,354	1,438	1,480	1,523	1,565	1,607
Vegetables	ha		839	839	839	973	1,074	1,141	1,174	1,208	1,241	1,275
Wheat	ha		572	572	572	663	732	778	801	824	846	869
Beans	ha		437	437	437	507	559	594	611	629	646	664

		0	1	2	3	4	5	6	7	8	9	10
Cleaner	No/year		5	5	5	5	5	5	5	5	5	5
Social insurance at 15.0% of staff cost	sum		4	4	4	4	4	4	4	4	4	4
Selling expenses at 1.5% of revenue	sum		151	151	151	175	193	206	212	218	224	230
Administration expenses at 1.5% of revenue	sum		151	151	151	175	193	206	212	218	224	230
Bank charges	sum		0	0	0	0	0	0	0	0	0	0
Insurance	sum		0	0	0	0	0	0	0	0	0	0
Total			335	335	335	384	420	444	456	468	480	492
Total Operating and Fixed Costs			6,802	6,802	6,802	7,697	8,368	8,815	9,039	9,262	9,486	9,710
Net Cash Flow before Financing		(24,895)	3,273	3,273	3,273	3,990	4,528	4,887	5,066	5,245	5,425	5,604