

Case Study: Vegetable Dehydration and Processing Factory in Afghanistan

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Abstract

Over twelve hundred Afghan farmers and women involved in sun drying vegetables were contracted to produce and supply selected types of vegetables required by the vegetable dehydration and processing factory in Afghanistan to meet the dried vegetable demand of European buyers. The factory, which is located in Parwan province, is owned by the Parwan Dehydrates Company, which is 60% owned by Development Works Canada (DWC) and 40% owned by the to-be-established Parwan Growers Association. DWC is a for-profit Company and an Implementing Partner of the USAID-funded, Rebuilding Agricultural Markets Program in Afghanistan. The Parwan Growers Association that is being established is comprised of contracted farmers who sell their produce to the Parwan Dehydrates Company and, once the Association is formed and invested in the Company, will share in the profits from the sales of the dehydrated vegetables. After a delayed start-up of the factory, procurement of the vegetables and processing and marketing of the dried vegetables reached about 15 metric tons of dried product per month. With many lessons learned and operating problems solved, an average of 25 metric tons of dried vegetables are planned to be exported to Europe per month over the next twelve months. Once the factory reaches profitable sales of dehydrated vegetables and the farmers in the Association realize a profit from the vertical integration, the dehydrates business is expected to expand and give farmers a long-term, stable income.

Background

The USAID-funded Rebuilding Agricultural Markets Program (RAMP) in Afghanistan focuses on adding value to high-valued crops, including fruits, vegetables, and nuts. Drying fruits and vegetables has been practiced by Afghans for many generations. Moreover, during the last 25 years, European demand for dried fruits and vegetables has subtly, though steadily, climbed while available local European supply has, because of economic reasons, been replaced by imported products. The expanded, international market opportunities for dehydrated vegetables and the development needs in Afghanistan attracted Development Works Canada (DWC), a for-profit, development organization, to pursue USAID funding through RAMP (implemented by Chemonics International, Inc.) to complement its own proposed investment in a vegetable dehydration factory in Parwan province, located adjacent to Kabul.

In February, 2004, DWC signed a subcontract with RAMP to construct and operate a vegetable dehydration factory, develop an expansive farm network producing a wide variety of vegetables, launch a sun-dried tomato industry, establish the Parwan Dehydrates Corporation to manage the project, and market and sell dehydrated vegetable products overseas. This project supported RAMP's priorities, including the

- development of a demand-driven, competitive, sustainable, and profitable agri-business
- demonstration and use of improved techniques to increase agricultural productivity
- development and exploitation of new markets, and
- building of Afghan technical and managerial capacity in agri-business.

Market Opportunity

Over the years, high labor costs in Europe have forced many British, Irish, Spanish, and Polish producers of dried fruits and vegetables to stop production. This has created new processing opportunities for developing rural economies with the appropriate agro-climatic conditions, high production potential, and low operating costs.

Egypt, China, India, and smaller countries are trying to fill the gap, yet are unable to completely satisfy the demand for quality dried products. Each year, demand of some 8,500 tons of dried fruits and vegetables remains unfilled mostly because these producers are too large to effectively re-tool their machinery for comparatively small, 'odd cut' orders, that is, diced and sized vegetables (such as, turnips, spinach, cabbage, courgette, and sun dried tomatoes as pictured) to non-standard dimensions.



Afghanistan's agricultural sector is well positioned to take advantage of this niche market. Its climate is perfectly suited for the cultivation of high-valued vegetables. Its

labor rates are very competitive and rural workforce skilled in crop cultivation. As important is the fact that DWC has expertise with operating experience of a similar dehydrates factory in Kenya that exports dried vegetables to companies in Europe. Unlike the wide-open commodities sector, the European dehydrates import market is nearly a closed shop populated by a handful of major players, who, in turn, control the bulk of the highly diverse, dried fruit/vegetable imports. DWC, being a market-led organization, received expressions of interest from various importing companies before starting the construction of the dehydrates factory.

Project Specifics

DWC decided on locating the factory in Parwan province because security and infrastructural development were generally better there than other regions of Afghanistan, it is a major producing area of vegetables for the Kabul market, there is abundant irrigation resources in the vegetable growing areas, vegetable supplies can easily be imported into the province from other provinces, and dried vegetables can be conveniently shipped by container truck through Pakistan, Turkmenistan, or Iran.



The business plan prepared by DWC in its project proposal indicated that the dehydrates project would be self sufficient, debt-free, and profitable (with a return on investment of about 6%) within three years given the following major assumptions:

- DWC would invest (the first year) in approximately 42% of the local program costs (totaling nearly \$2 million), RAMP would fund 58%. Additional funding in Year 2 and Year 3 would be dependent on the progress of the project in reaching profitability
- Most of the investment from DWC would be for the building, equipment, and machinery, other factory materials, part-salaries/wages of local staff and workers and other infrastructure costs (until the factory operations were profitable)
- Besides the local program costs, RAMP would fund all expatriate salaries, fringe benefits, and allowances. Funding of expatriate salaries, benefits, and allowances would be phased out in Year 2 and 3
- About 1200 farmers (from about 25 Parwan villages) with about 320 hectares for vegetables, suitable irrigation resources, proven expertise in crop production, and

- interest in contract farming and about 400 women involved in sun drying tomatoes would be extended the opportunity to participate in the program
- A research farm would be established to conduct trials for new vegetable varieties and to show farmers best practices
 - Crops known by the farmers would be planted the first year with a few, more lucrative, though less known, vegetables included in the following years
 - Inputs to farmers would be subsidized initially to attract the farmers to contract farm
 - Contracted farmers would be assisted in organizing the Parwan Growers Association
 - Once the farmers in the Parwan Growers Association raised \$55,000 in funds or like assets and the Association achieved the organizational milestones (as determined by a joint Ministry of Agriculture, Animal Husbandry, and Food and RAMP panel) as specified in a Memorandum of Understanding, the Dehydrates Growers Association would receive 40% ownership of the Parwan Dehydrates Company (the ownership document, in the meantime, would be held in trust by the Ministry of Agriculture, Animal Husbandry, and Food)
 - The Parwan Dehydrates Company would be established in year 2 and would include 60% ownership by DWC and 40% ownership by the Growers Association
 - Land would be donated by the Government of Afghanistan with a long-term lease made available to the Parwan Dehydrates Company
 - The factory would be constructed by July 2004 with the first sales by September 2004; sales would reach over 300 metric tons per year by the third year
 - The factory would be facilitated with equipment that is of appropriate technology as field proven in Kenya, India, and Egypt and used to export dried vegetables internationally
 - A small, product testing laboratory would be installed and operated to assure that the shipped products meet the quality requirements of the buyers
 - A 70-meter borehole would be completed to provide clean water to wash the produce
 - Training of counterpart staff to operate the factory and market the dried vegetables would be completed during the third year
 - The European buyers would contract for the factory's dried vegetables in advance of each shipment
 - The factory, once it is operating sustainably and profitably, would be handed over to the Afghan management

Project Developments Related to Linking Farmers to Markets

Since the project started in March 2004, farmers have been effectively linked to markets in the following ways:

- During much of 2005, over 2,000 farmers (roughly 45 farmers weekly) from 25 villages spread through three provinces visited the factory to observe and understand the opportunity provided them for contracting to produce and market their vegetables for the factory. About a quarter of the farmers were transported

by DWC, while the remainder walked or arranged other transport. Invited visitors to the factory included the Governors of Parwan, Kapisa, and Nangahar provinces and the Minister of Agriculture, Animal Husbandry, and Food. Two research farms totaling 2.2 hectares were established and the farms' vegetables and best practices (e.g., row spacing, irrigation methods) observed by visiting farmers. DWC's extension workers followed up with these farmers to determine their interest in contracting

- 925 Farmers (with 342 hectares for vegetables) and 315 women (including 24 widows and those with disabled husbands) have been contracted to supply the factory with specific types of vegetables and sun-dried tomatoes, respectfully
- Contracted farmers have been supplied improved seeds (of coriander, courgettes, green beans, tomatoes, leeks, turnips, swede, broccoli, and/or cauliflower), fertilizer, cultivation tools, extension advice on best practices, access to the row planter, and fabricated, steel crates (#12,000) for bringing the vegetables to the factory. A comprehensive planting and harvesting plan from November 2005 to January 2007 is in place that projects over 350 metric tons of dehydrated product during that time
- Contracted women have been supplied sun-drying trays (#8,000), salt, plastic bags, knives, soap and extension advice on best practices
- Contracted farmers have been assisted by DWC in harvesting those crops, such as green beans, that they were not as familiar with. Before the crops are transported to the factory, DWC Field Officers made a field assessment and assigned a preliminary grade to the produce. The produce was then transported to the factory. At the factory, weighing of produce and final grading was done along with the issuance of a factory receipt.
- The factory for processing the farmers' produce was completed and the processing line installed after time delays associated with de-mining (through July 2005), equipment importation, and drilling of the borehole much deeper than originally planned.
- A laboratory for testing the processed products was fully equipped and the factory's laboratory technician was trained in microbiological testing (for e. coli, salmonella, and listeria) at the Central Food Technology Institute in India.



- The procurement and processing of the farmers' vegetables started in June 2005, about one year after the planned start. DWC's first export container was sent 13 months from the time RAMP funds were available to the project.
- Over 90 Afghans have been employed in extension, vegetable drying, processing, and shipping, and other areas in the project. As many as forty-seven women are employed in the processing line during the day shift. Many widows without land were hired to sun dry tomatoes at the factory.



- A team of experts experienced in operating a successful and very similar vegetable dehydration factory in Kenya has been working with the farmers, managing operations at the factory, and training Afghans the technical responsibilities of each job
- All vegetables brought to the factory are
 - Weighed on a 500-kg scale, graded, and assigned lot numbers to facilitate quality control
 - Washed on a rota washer machine to remove soil, stones and other contaminants. Carrots, turnips and other vegetables with skins are peeled.
 - Placed on tables for hand cutting as necessary, or to remove impurities
 - Soaked with static washers before dicing and before solids are removed
 - Cut to the required size by dicers
 - Cleaned by a vibro washer, separated, and starch removed (when necessary, the vegetables are blanched/parboiled before drying)
 - Reduced by tray dryers to 20-25% moisture content



- Monitored by staff when the vegetables are in the open bin dryer to be reduced to the specified final moisture level
 - Sifted to remove oversized and undersized vegetables
 - Rolled along picking and blending belts (with hoppers) where burnt products, extraneous vegetable matter (stalks, weeds, roots, etc.), and other foreign matter are manually picked out
 - Screened for stray metal by metal detectors at the end of the belts
 - Lab tested for bacterial and other contamination
 - Bagged, weighed, heat-sealed, stitched, and prepared for transport.
- Contracted farmers and women have been paid over \$33,000 for more than 455 metric tons of fresh and 4 metric tons of sun-dried tomatoes brought to the factory.
 - Over 44 metric tons of dried vegetables have been produced at the factory with 23 metric tons (valued at \$84,488) already successfully shipped to European buyers
 - A major European importer of dried vegetables visited the factory and was impressed with the international standard equipment and the product quality. He immediately doubled his order for dehydrated vegetables from the factory
 - The DWC management at the factory overcame various difficulties in obtaining containers for shipping the products and other transport and logistics problems and has established an efficient and cost effective shipping regimen. Shipments are taking 2 months to reach their destination
 - The Parwan Dehydrates Company has been established and a business license obtained from the Afghan Investment Support Agency



Successful Practices

Afghan farmers do not know the value-added processing and marketing opportunities that exist for their agricultural products. DWC has from the start of their project appropriately informed the Provincial Governor, the Provincial Ministry of Agriculture, Animal Husbandry, and Food officials, the Head of Cooperatives, and many other provincial stakeholders of the processing and marketing opportunity while making farmers in targeted villages aware of their potential role in producing the right product for

dehydrating and exporting to Europe. The Government has followed though by providing DWC a long-term lease on prime property located on the outskirts of Charikar, the provincial capital, along the main road connecting Parwan province to Kabul and northern provinces. DWC followed a very effective practice of bringing farmers from targeted villages to the factory to understand what vegetables were going to be bought by the factory, how the farmer would have access to the production inputs, what the farmers should expect in yield, how DWC would assist in harvesting and transporting the products to the factory, what the payment terms to the farmer would be, what were the requirements of the European buyers, and how the farmers could organize themselves into an Association that would have the opportunity to invest in the factory.

Having an identified European market for dehydrated products and DWC, a private company with experience and interest in investing in a dehydrates factory in Afghanistan, were major factors that contributed to the achievements of the project. Moreover, by having an experienced and practical expatriate team (from the Kenya dehydrates factory) assembling and operating the plant, appropriate technology (including a steam boiler and generators) that fits the conditions and constraints in Afghanistan was installed. DWC experts also recognized, once the plant started operating and high volumes of specific vegetable supplies were anticipated, the need for speeding up the preparation process and brought in and installed additional equipment, such as, the bean snipper and screw steam blancher.



By having included research farms in the project design, DWC has built in the capacity for the dehydrates factory to run trials of those types of vegetables best suited for dehydrating besides being able to demonstrate to the farmers vegetable types and production practices that they are not familiar with. For example, many farmers were reluctant to plant celery root, a relatively high-valued crop they are not familiar with, until they saw the results of the research farm's crop.



Transport and logistics arrangements on the shipments to Europe have been relatively efficient but alternative routing and improvements are being explored to maximum cost effectiveness. DWC has been using backhaul containers to keep the cost down. Freight charges for shipping a 20-foot container of dehydrated vegetables from Kabul to the UK (cif) are about \$4,000. It takes about 21 days to ship from Kabul to Karachi and another 28 days for Karachi clearing and shipping to the UK.

Establishing the Parwan Dehydrates Company has provided a more efficient and legally accountable system for incorporating the farmers into the business and allows

DWC an easier, more transparent way of controlling the business and/or exiting the business. It solidifies the independence of the operation to enable it to run and thrive within the developing Afghanistan corporate, taxation, and legal frameworks long after DWC departs. Furthermore, once farmers are invested in the business, the farmers will be more likely to sell their vegetables to the factory.

Lessons Learned

DWC employed extension agents to visit and instruct farmers in targeted villages of the production and marketing opportunities with the dehydrated vegetable factory. After a monetary incentive was provided to the extension agents for each contract signed by a farmer, the number of farmers contracted increased dramatically. However, contracting the farmers and providing them inputs in the initial phase resulted in only about 30% of the farmers selling their vegetables to the factory, forcing the enterprise to buy more expensive produce from the wholesale fresh market to satisfy production capacity, scheduling, and buyer demand. A DWC investigation revealed that many farmers, having received seeds, nutrients, tools and training, simply defaulted on the contract to supply vegetables to the company by selling for slightly higher prices on the wholesale market. Defaulting farmers did not take readily to the principle of having seed and other inputs deducted at a subsidized cost. In effect, farmers did not appreciate that the factory's guaranteed product price and staggered crop cycles would guarantee a much higher, dependable income in the long-run. To develop more certain supply lines, DWC is enhancing its extension program and intensifying its meetings with contracted farmers to link the contract farming to the membership into the Parwan Growers Association to the investment in the Parwan Dehydrates Company. As the dried vegetable production process becomes more efficient and much greater vegetable supplies are brought to the factory, the capacity utilization at the factory is expected to climb to about 40 metric tons per year (about 80% of maximum capacity). The operations of the factory become profitable at about 25 metric tons marketed monthly with revenue of approximately \$50,000/month.

Since many farmers (and women) defaulted on their supply contracts, the schedule for establishing a fully-functioning Parwan Growers Association and allocating equity in the Parwan Dehydrates Company has been pushed back to re-identify and to confirm those farmers' long-term commitment. To get farmers to understand the binding nature of the agreement they have signed and to follow through on their contractual agreements will require more meetings and extension services with the farmers and joint discussions with the Governor and the provincial Ministry of Agriculture. However, until the contracted farmers invest in the factory, the contracting system may only be partially successful. To get the farmers to follow through on their contractual agreements and to form the Parwan Growers' Association that invests in the Parwan Dehydrates Company, a combination of incentives may be needed, including (among other incentives under consideration),

- paying the farmers (before vegetables are harvested) 50% of the value of their vegetables and, with some types of vegetables, paying local harvesting teams to harvest and bring the produce to the factory, and

- in some cases, offering employment in the factory to those farmer families that have contracted to bring their vegetables to the factory.

When the Parwan Growers' Association qualifies for the 40% equity allocation in the Parwan Dehydrates Company and makes the investment, the Association will receive 40% of the profits generated by the Company. However, at this time, the farmers who are contracted to supply the factory do not understand how they can benefit from investing in the Company. Their confidence in and understanding of the investment opportunity will increase with further DWC programmed meetings with contracted farmers.

DWC had problems obtaining duty-free exemption on their first shipment into the United Kingdom. As a result, the shipment was held in demurrage for three weeks until the proper documentation from the Ministry of Commerce in Afghanistan could be obtained and shown to the import authorities in the UK. Since Afghanistan is a preference receiving country in the Generalized System of Preferences, DWC was able to obtain the proper documentation from the Afghan Ministry of Commerce. On all subsequent shipments, DWC has obtained the proper documentation and has had no problem obtaining duty-free exemption on its shipments to the UK. Since most European countries, the United States, Canada, Japan, and various other countries are preference giving countries, DWC should have no problem getting the duty-free exemption on its shipments from Afghanistan to those countries where buyers have been identified.

In the spring of 2005, the unseasonably cold winter in Parwan postponed the ground thaw from late February to late March, thereby delaying the growth of spring crops and a significant delay in the crops being harvested and sold to the factory. To smooth the supply of vegetables to the factory throughout the year, DWC needs to contract with farmers in other provinces (e.g., Helmand and Nangarhar) where there is an earlier and longer growing season. However, this may not be cost effective if prices of early-season vegetables and transport costs are too high for the factory to maintain its profit margin. Instead, the factory may need to buy larger quantities during the low product pricing period and run more shifts during that time to dry and process the vegetables. Since the dried vegetables have a shelf life of approximately six to twelve months, the dried vegetables can be stored until that time when prices are too high for the factory to procure vegetables.

The research trials on vegetables done by DWC represent a small effort relative to what needs to be done. Whether new or existing varieties of vegetables are being grown, the pest and disease control measures, fertilization rates, and other best practices need to be better understood and extended to the farmers.

The high price of oil fuel, the introduction of corporate income taxes in Afghanistan, and rising labor costs have resulted in inflated operating costs to the factory. Ways and means to cut costs and increase the operating margin are being developed.

Maintaining a sanitary environment in the processing area in the factory has been a challenge. More effective methods, such as fans, air barriers, and regular pest control applications have reduced the problems. Continued efforts are being made to make the environment more sanitary.

Looking Forward

The successful practices and the many lessons learned over the past two years have provided the Parwan Dehydrates Company, DWC, and the contracted farmers combined experiences that have solidified the business outlook for vegetable dehydration and processing. The business plan projections and expectations have been adjusted to suit the unique operational environment of Afghanistan, an often insecure area with no corporate law or protection, critically weak infrastructure, and mostly unskilled labor force. Given these adjustments that have been made, the market for dehydrated vegetables that has been identified and secured, and the viable, dehydrates production model that is operating, DWC and Afghan farmers are in a position to expand the dehydrated vegetable operations. In fact, there is general recognition among stakeholders in Afghanistan that, given the competitive conditions existing in Afghanistan for this export business, additional dehydrated vegetable factories should be installed in Afghanistan. In addition, this project has shown that agri-businesses that have the necessary market linkages and have identified buyers can successfully link farmers to these viable markets and increase farmer incomes.