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SUCCESSFUL PRACTICES IN VALUE CHAIN DEVELOPMENT

LESSONS EMERGING FROM J.E. AUSTIN ASSOCIATES' EXPERIENCE

microREPORT #143

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INTRODUCTION

The purpose of this paper is to articulate successful practices for the implementation of value chain development projects based on JE Austin Associates' (JAA) practical field experience. For this purpose, JAA examined its recent experience in light of the key elements of the value chain approach articulated by the USAID Microenterprise Development Office through the Accelerated Microenterprise Advancement Project (AMAP). From this review, six key principles emerged for successful value chain development project implementation:

1. Base project designs on good market analysis and direct them toward market opportunity
2. Conduct direct industry benchmarking to identify, design and generate stakeholder buy-in
3. Leverage value chain analysis to empower stakeholders to participate in improving their sector competitiveness through sustainable interventions
4. Maximize impact and outreach through the identification and promotion of replicable business models
5. Enlist the financial system as a partner in implementing proposed solutions
6. Ensure that institutions delivering the proposed solutions appear credible to stakeholders

KEY PRINCIPLES FOR SUCCESSFUL VALUE CHAIN DEVELOPMENT IMPLEMENTATION

BASE PROJECT DESIGNS ON GOOD MARKET ANALYSIS AND DIRECT THEM TOWARD MARKET OPPORTUNITY

While this principle is often repeated in the private sector development literature, its importance makes it worth highlighting once more: good market analysis is essential to the success of initiatives to improve value chain competitiveness. Indeed, JAA's initiatives to develop Pakistan's dairy value chain (see Annex) were ***informed by good market analysis***, which highlighted the opportunity the domestic market offered for milk and many other dairy products segments. Demand was growing at double the rate of supply, and processing and consumption (within specific market segments) of value-added products were growing at high rates from a very low base, presenting an enormous potential.

JAA staff assisted the Dairy Strategy Working Group (Dairy SWOG) in ***building a compelling yet simple investment opportunity based on this market potential in terms that businessmen were able to clearly understand***. This was essential in attracting private investment to the initiatives described below. Moreover, the market opportunity highlighted by the work of the SWOG, attracted investors in other industry sectors to consider dairy. At the time of writing, many of these businesses had already set up farms and/or processing plants or were planning to do so.

Not every segment in a value chain is aware of the market potential and investment opportunity or of specific solutions that can be applied to lift constraints. Thus, ***socializing the opportunity and potential solutions within and among value chain segments*** can be a powerful lever in designing and ultimately attracting investment into the solutions and upgrading possibilities.

In the case of Pakistan dairy, while a few processors were aware of the market potential, the extent of the productivity gap and corresponding upgrading potential at the farm level—on the scale revealed by the Pakistan Dairy Development Company (PDDC) model commercial farm program—were largely unknown. Thus, disseminating information on the market potential among the different value chain segments was essential to the success of the initiatives.

Utilizing Good Market Analysis: Thailand High-Value Agricultural Value Chain

Key to JAA's approach is good market analysis spread throughout the value chain. An example is the Thailand Good Agricultural Practices (GAP) value chain, which is one of the most developed in Southeast Asia. It is known in international markets for the quality of its fresh and processed products.

The Thai high-value agriculture value chain carried out a major program to implement EurepGAP standards in Western Thailand to gain export certification to service its traditional European supermarket business. Exporters analyzed the market and saw the opportunity for growth in four high-value agricultural products: okra, asparagus, baby corn and chili peppers. However, each of these required GAP certification. Exporters realized that without GAP certification, their competitiveness in European markets would gradually fade, as certification was increasingly required by European supermarkets. Growers, however, did not have access to this knowledge. J.E. Austin, as part of the Thailand Competitiveness Initiative, reached out to growers to ensure that they had access to the same information as the exporters. Beginning with 30 farm families, the project ultimately spread the adoption of GAP to 2,000 farmers.

Exporters' access to and analysis of this information was of critical importance; however, of equal importance was their ability to share it with their suppliers. It is interesting to note that GAP certification not only enhanced the value chain's competitive position in the longer term; it also resulted in a short-term 50 percent increase in farmers' bottom lines. .

CONDUCT DIRECT INDUSTRY BENCHMARKING TO IDENTIFY, DESIGN AND GENERATE STAKEHOLDER BUY-IN

PISDAC's assistance to SWOG members to benchmark the dairy sector in Pakistan proved to be a determinant in identifying upgrading opportunities and shaping the nature of the strategic plan and the resulting initiatives and programs. While productivity, efficiency, technology employed, and other elements are frequently benchmarked, it is also important to consider in the benchmarking exercise those solutions that other value chains and industries have implemented to improve their competitiveness. As mentioned before, the low animal productivity identified through benchmarking highlighted the opportunity to upgrade supply at the farm level, triggering the Model Commercial Farm program. However, benchmarking under PISDAC went beyond technical production and marketing criteria to include institutional settings, which led to the creation of the Pakistan Dairy Development Company (PDDC) and inspired the role that the recently created public-private institution could adopt. Additionally, PISDAC facilitated the process such that SWOG members were able to do the benchmarking *directly* through study tours. These tours were very powerful as they allowed SWOG members to see first-hand the dairy industry and potential improvements in a number of countries. Obviously, not all stakeholders could travel, but PISDAC instituted a reporting back mechanism that allowed all participants to share in the SWOG representatives' findings.

During the strategy development process, the SWOG undertook a benchmarking study tour to Australia and New Zealand. The SWOG representatives were coordinated by PISDAC experts, which assisted in securing relevant meetings and guiding the group so that they could maximize the learning opportunity. The benchmarking exercise (which included India in a subsequent trip) highlighted among many other things the extensive support and organizational structures that are features in many countries with internationally competitive sectors. As illustrated in the table below, Dairy Australia and Dairy Insight have many research and practical training programs to improve farm economics, gather market intelligence, monitor the regulatory

climate, and so on. Pakistan had no such organization. This led the SWOG to propose and actively support the creation of the PDDC to serve as a public-private platform to promote the competitiveness of the dairy sector; and the SWOG made this a prioritized initiative of its strategy.

Table 1: Benchmarking Exercise Leading to PDDC's Creation

	Australia	New Zealand	India	Pakistan
Institution	**Dairy Australia**	**Dairy Insight**	**National Dairy Development Board**	**?**
Market Intelligence Promotion, Policy/Regulatory Climate	✓	✓	×	×
Identifying and Understanding Markets	✓	✓	✓	×
Improving Farm Economics	✓	✓	✓	×
Value Chain Productivity, Technology Upgrades	✓	✓	✓	×
Training, R&D, Quality	✓	✓	✓	×
Environment	✓	✓	×	×

Beyond allowing for direct, first-hand benchmarking, study tours were widely used in the PISDAC program to identify institutional linkages, technology, practices, potential market contacts and even consultants—who in many cases delivered the technical assistance required by the strategy development process and ensuing initiatives.

LEVERAGE VALUE CHAIN ANALYSIS TO EMPOWER STAKEHOLDERS TO PARTICIPATE IN IMPROVING THEIR SECTOR COMPETITIVENESS THROUGH SUSTAINABLE INTERVENTIONS

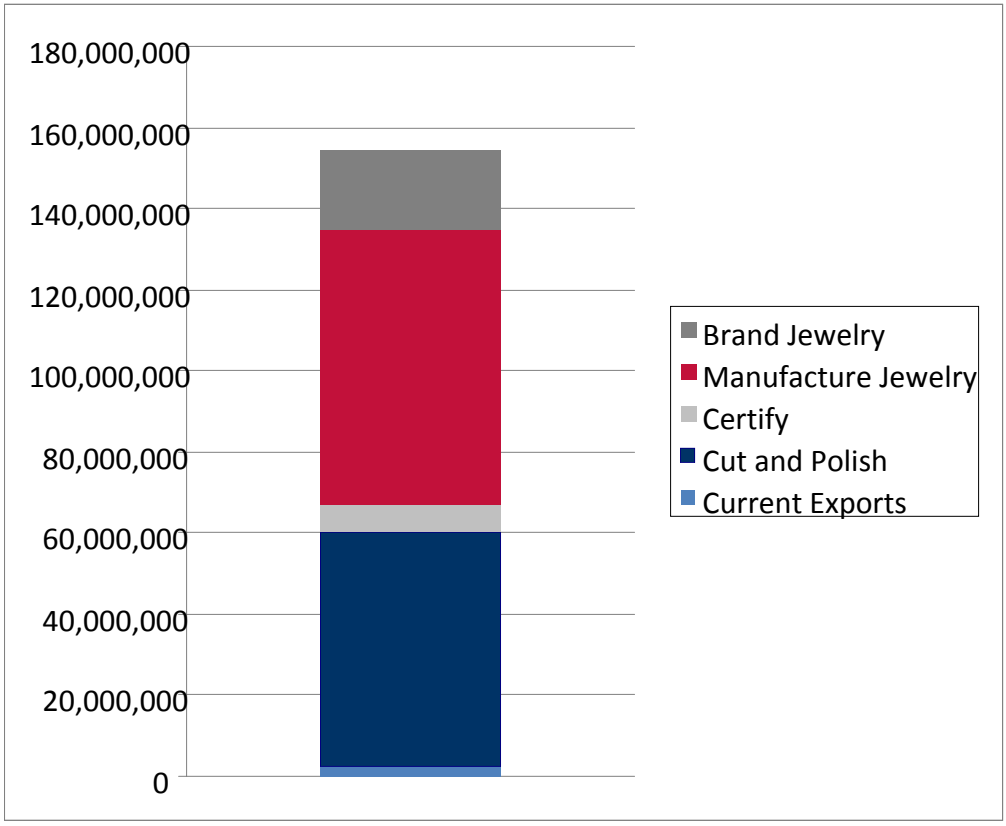
A broad value chain analytical perspective was essential to accelerate the development of the dairy sector in Pakistan. As described earlier, improvements were needed from milk production to storage, transport, processing and public consumption, plus many other associated factors (training, education, marketing, etc.). Moreover, coordination among different segments was needed to ensure that the main objectives were achieved. If, for instance, the production of milk was to increase without a quality-controlled supply channel (cold chain), farmers participating in the program would become disillusioned by being unable to sell and transport the quality product to the processors after making a financial commitment to increase production through the model farm program. Likewise, the prospects of increased yields generated by the model farm program created enough incentive to prompt the processors and other intermediaries to invest in the establishment of cold collection centers (farm cooling tanks). Coordinated efforts that produced a win-win situation were thus required to obtain a strong response from the private sector and farmers for both the model commercial farm and farm cooling tanks programs.

Indeed, as the market opportunity (and poverty reduction potential) of the dairy sector became clear to all parties during the PISDAC-assisted industry analysis, it also became clear that dairy development would be unsuccessful

if it was not conducted in an integrated manner. The broad scope of the sector analysis (i.e., at the value chain level) was also essential to allow SWOG members to prioritize and logically sequence the initiatives. It helped stakeholders understand that incentives needed to be in place for farmers to sell their milk in cooling tanks: In this case, processors offered premiums for milk collected in cooling tanks as they passed along expected collection and processing savings. It also allowed stakeholders to understand that there was a need to level the playing field between middlemen in the informal sector and the processors, which led to sales taxes being eliminated in response.

The Sri Lanka gems and jewelry industry provides another example of value chain analysis being used to empower stakeholders to take action and improve their competitiveness. The value chain analysis facilitated by JAA showed that gem certification could increase the final selling price by 20 percent, while cutting and polishing rough stones would yield a 24-fold increase in the selling price (see figure 1 below). The identification of these opportunities prompted stakeholders to elaborate a strategy to improve their competitiveness, including the development of an apex association, known as the Sri Lanka Gem and Jewelry Association, the establishment of a Gem and Jewelry Institute for workforce development in cutting and polishing, and a Gem Laboratory for internationally recognized gem certification.

Figure 1: Value Added at Each Stage of the Gem and Jewelry Industry



MAXIMIZE IMPACT AND OUTREACH THROUGH THE IDENTIFICATION AND PROMOTION OF REPLICABLE BUSINESS MODELS

Often, value chain analysis leads to the identification of "business models" (frequently, intermediation opportunities for further processing the product) that are feasible to replicate many times throughout the sector,

offering the opportunity to maximize the developmental impact and outreach of donor programs. When these opportunities are identified, it is advisable to promote enough replication to demonstrate the financial viability of the business model, thus reducing reduce the risk for others to continue replicating them. The basic model can be improved upon by the individual beneficiaries.

In the 20 years prior to the SWOG-inspired PDDC Farm Cooling Tank program, only 2,000 cooling tanks had been installed by processors throughout Pakistan, and as discussed, the lack of a cold chain was severely constraining the development of the dairy sector in Pakistan. This was insufficient to demonstrate the viability of the technology because reliable milk supply was not guaranteed. This situation changed because of increased prospects of more milk due to productivity improvements, and the fact that farmers were now willing to sell their milk at farm cooling tanks while processors were also encouraged to invest. Thus, the SWOG prioritized the farm cooling tanks initiative, setting an original target of 2,150 over a three-year period. The approach aimed to facilitate the development of enough demonstration projects to reduce the risk to others to invest, thus increasing the likelihood of replication by other emerging entrepreneurs, including middlemen previously operating in the informal sector. At the time of writing, the program had successfully facilitated the replication of this business model 1,000 times, and as the prospects of further replication without the use of PDDC's resources[1] increased, the institution was evaluating the possibility of shifting resources to other programs.

It should be noted that the basic replicable business model (in this case, milk collection through the installation of a farm cooling tank) frequently offers opportunities to be scaled up by emerging entrepreneurs. In this case, once the milk collection operation is successful, the entrepreneur could invest in processing capabilities, improving the profitability and labor intake of operations.

In the wood furniture value chain, the PISDAC project also identified an intermediation opportunity feasible to replicate widely, leading to increased impact and outreach. Of about 8,000 wood manufacturers in Pakistan, less than 1 percent use properly dried wood, which is essential to sustain business activity in the sector. Indeed, the moisture content of wood upon cutting ranges from 50-80 percent, which must be lowered through drying to 8-12 percent to be accepted in quality export markets. When furniture is produced without using properly kiln-dried wood, the resulting furniture item moisture content is high and uneven, resulting in expansion and contraction of different parts of the item under changing temperatures, causing the joints to crack. Even in the domestic market, this occurrence often results in retuned pieces of furniture and disgruntled customers. Thus, kiln drying is an absolute necessity to bring the moisture content down to an appropriate and uniform level and produce quality furniture. While Pakistani small furniture manufacturers know the benefits of drying wood, the prevailing practice (known as "seasoning") consists of leaving out wood in the open to be dried by the sun for as long as two years. While the sun might in fact reduce the moisture content, the moisture content retained is neither low nor uniform enough to prevent quality problems.

Conventional kilns use vacuums and boilers to dry the wood. Kilns guarantee controlled wood moisture content of 8-12 percent. However, technologies such as vacuum kilns are very expensive. Some manufacturers in Pakistan had installed these at an extremely high expense (about $100,000). This cost is too high for nearly all Pakistan manufacturers, and even if they were able to afford them they would go underutilized because of their relatively higher capacity compared to the wood consumption requirements. Solar kilns were identified as an alternative and affordable technology. They dry wood down to the required moisture content levels over a period

[1] Pakistan Dairy Development Corporation (PDDC) was created for the purpose of implementing the Dairy SWOG strategy. As such, this entity administered the nearly $8 million provided by the Government of Pakistan to assist in their efforts. The details through which the private sector had access to the resources are included in Annex.

of two weeks. At about a cost of only $16,000, they are affordable, and their smaller size compared to conventional kilns makes placing them easier.

Owning and operating a solar kiln thus became a viable replicable business model that was promoted by the PISDAC project to enhance the wood furniture value chain. PISDAC and the SWOG prioritized the replication of 80 solar kilns throughout Pakistan. The estimated benefits upon completion are a value added of $2 per wood plank, plus working capital savings (the value of the wood dried in solar kilns would have been tied up in the seasoning practice for up to two years) and employment opportunities for solar kiln operators. Each kiln will serve the wood requirements of five neighboring manufacturers, thus benefiting 400 manufacturing businesses at an initial stage (i.e., before others replicate the model). Further, solar kilns will improve the quantity and quality of available raw material, and as such, the initiative can be expected to have perhaps larger impacts throughout the rest of the value chain, with at least a 50 percent increase in the furniture price. Table 2 below presents a price comparison throughout the wood furniture value chain, converted into cubic feet equivalents.

Table 2: Price Comparison for Wood and Furniture

Item	Price per Cubic Foot or Equivalent (PKR)
Log	700
Plank (post-sawing)	1,000
Kiln-dried plank	1,130
Furniture item local retail (wood not properly dried)*	2,000
Furniture item exported (wood not properly dried)***	3,000
Furniture item local retail (wood properly dried)**	5,650
Furniture item exported (wood properly dried)***	7,910

* Most of this furniture is sold as semi-finished. Because the sellers do not give any guarantee about the quality of the furniture, the sale price is not that high and gives a small mark-up above the average cost.

** Larger retailers and manufacturers with kiln drying facilities can sell the same furniture for larger profit. The smallest return is on chairs and can range from 5-10 times material cost; therefore revenue is determined by overhead costs.

*** Export return is higher. Again without the guarantee of quality, return orders are not expected and overseas re-sellers are hesitant to buy furniture without any concrete guarantees.

The concept of replicable business models can also be illustrated by the example of the Rwanda coffee washing stations, outlined in the text box below.

Replicable Business Models: Rwanda Coffee Washing Stations

JAA's approach to replicable business models is to put entrepreneurship at the forefront, providing a mechanism for private sector-led development that promotes sustainability. This is best demonstrated by JAA's work with the Rwanda coffee washing stations.

Formerly a principal source of foreign exchange for the country, Rwandan coffee production had dropped precipitously since 1992 due to inefficiencies in the coffee value chain, such as the poor health of its coffee trees, lack of wet-milling stations, and low incentives for reinvestment. As growers were not offered higher prices for better-quality beans, they spent little time grading and separating their bean harvests. This led to farmers focusing on other crops with higher margins.

To address these constraints, two USAID projects, Partnership for Enhancing Agriculture in Rwanda through Linkages (PEARL) and Assistance a la Dynamisation de Agribusiness au Rwanda (ADAR) facilitated the opening and equipping of coffee washing stations in Rwanda's top 50 producing districts. ADAR worked with private investors to open 16 washing stations in 2005. Assistance included feasibility studies, business plans, construction planning and supervision, and training in coffee processing. PEARL worked with rural cooperatives to assist in cooperative formation, business planning, washing station construction, processing, cupping, marketing and Fair Trade certification; JAA played a critical role in strategy development.

This assistance provided the platform for a replicable business model adopted for future washing stations. Investment opportunities were created via a loan guarantee program that allowed private investors to construct collection/washing stations and process coffee beans for improved quality. As of January of 2007, the replicable business model provided by the projects had helped to establish 80 functioning stations throughout the country, with a goal of 120 by the end of 2008. In addition to providing an important intermediate role in the coffee value chain, the washing stations have also proven to be platforms for entrepreneurial innovation by developing a business model in which private investors build and operate the stations—thus showing that this was a viable private-sector activity, worthy of investment.

ENLIST THE FINANCIAL SYSTEM AS A PARTNER IN IMPLEMENTING PROPOSED SOLUTIONS

As mentioned before, the Pakistan Dairy Development Company partnered with existing commercial banks to roll out the model commercial farm and farm cooling tank programs. Program participants applied first to PDDC, which assessed the technical viability of the applicant business plan (i.e., whether enough milk be available for the cooling tank to run at an efficient capacity, among other criteria). Once the applicant obtained technical approval from PDDC, the bank was in a position to properly assess risk. These partnerships, beyond being essential to obtain the resources allowing the implementation of activities designed to integrate and develop the value chain, can expose the banks to credit-deserving but underserved sectors, as it is the case of dairy in Pakistan. Thus, PDDC hopes that the banking relationships established under the programs will continue beyond them, alleviating the access to finance constraint to the sector's competitiveness.

ENSURE THAT INSTITUTIONS DELIVERING THE PROPOSED SOLUTIONS APPEAR CREDIBLE TO STAKEHOLDERS

A frequently overlooked element of success in implementing activities leading to value chain integration and development is the credibility among the beneficiaries and other stakeholders of the institutions delivering those solutions. It is important to take this into account before assigning and/or delegating this role. For example, while some dairy business associations existed in Pakistan for years, none had the necessary credibility to act as an effective public-private interlocutor and as a technical authority in the sector. Indeed, Pakistan Dairy Development Company earned legitimacy through its technical capacity in the field and the broad regional and value chain representativeness of the membership of its Board of Directors. Since its creation, PDDC has improved, refined, administered, implemented and augmented the SWOG's original portfolio of strategic initiatives. The institution secured funds to continue its operation after PISDAC's close-out and is an important element in the sustainability of PISDAC's interventions in the dairy sector.

Ideally, an institution with the requisite credibility already exists and project interventions can be implemented through or in close concert with it. In the Thai GAP case referred to above, for example, an institution with the necessary credibility already existed and was instrumental in supporting the exporters in adopting GAP standards. While exporters lacked the outreach capabilities to organize GAP trainings for 2,000 farmers themselves (and to some extent, mistrust existed between exporters and farmers), they approached Kasetsart University to provide the required technical assistance.

ANNEX: EXAMPLE OF J.E. AUSTIN APPROACH—IMPROVING THE DAIRY VALUE CHAIN IN PAKISTAN

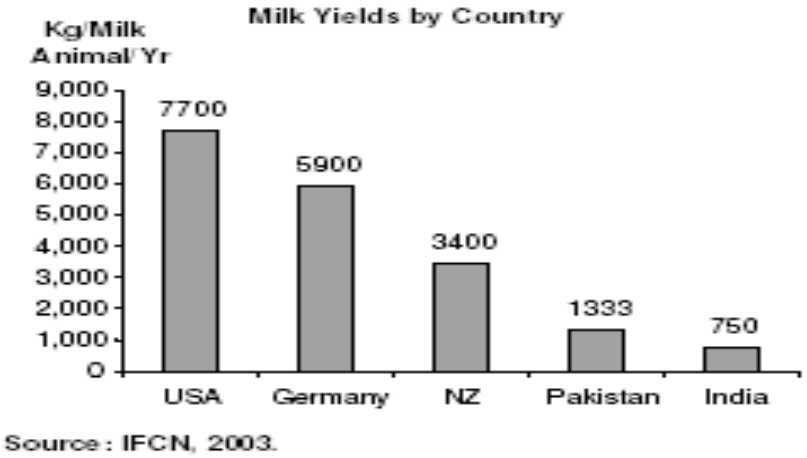
To illustrate these key elements, a brief account of the processes and outcomes of the Pakistan Initiative for Strategic Development and Competitiveness program to develop the value chain in the dairy sector are described below.

Through the USAID-funded PISDAC, JAA facilitated the integration and development of the dairy sector, promoting value chain integration through three key interventions: the model farm program, the farm cooling tank program and the creation of a public-private partnership to facilitate the implementation of a strategic plan developed for the sector. During the life of PISDAC, these prioritized programs reached their ambitious targets, benefiting more than 35,000 stakeholders throughout the value chain.

The dairy sector accounts for about 28 percent of agricultural gross domestic product in Pakistan, with an estimated 30-35 million farmers engaged in raising livestock. Despite the importance of dairy to the Pakistan economy, the industry suffers from low productivity and other supply constraints, distribution inefficiencies, and market distortions. While domestic demand is growing and increased consumption is likely, supply is not keeping pace. Only an estimated 45 percent of production actually reaches the market, and the country is a net importer of milk and dairy products.

About 70 percent of dairy farmers in Pakistan are smallholding farmers, producing 90 percent of total output. Further, 70 percent maintain herd sizes of less than four animals. Therefore, dairy farming in Pakistan is mostly seen by farmers as a by-product of cropping. Unbalanced animal feed, poor animal hygiene and water availability and lack of new animal breeding methodologies prevail. As a result, Pakistan's huge animal population of 50 million suffers from low productivity compared to global players (see figure 2.)

Figure 2: Low Farm Productivity



Source: IFCN, 2003.

Being a highly perishable commodity produced mostly in the rural environment, milk reaches the urban consumer only with much difficulty and at a high cost. Indeed, lack of refrigeration and transport infrastructure severely constrains milk production and distribution. While milking occurs twice per day, only the morning milk (60 percent of total output) can be distributed and sold. Of the milk that farmers are able to sell, a further 15-19 percent is lost due to fragile infrastructure facilities (lack of proper cooling and transport).

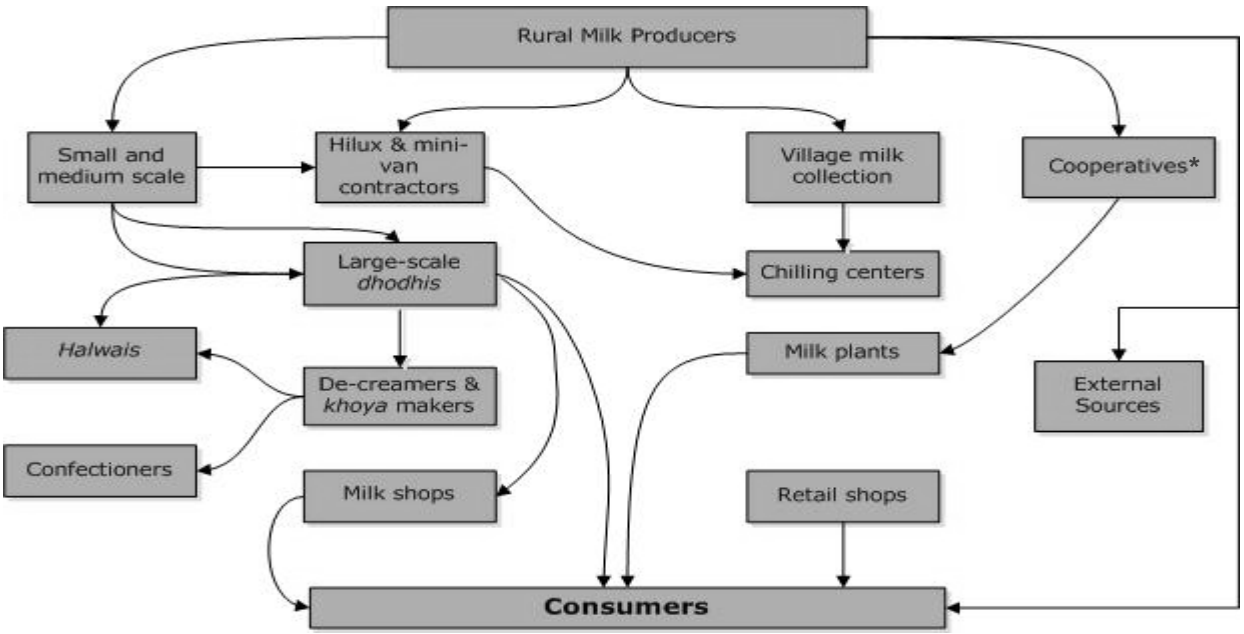
Only 3 percent of total production is processed and marketed through formal channels. For the other 97 percent, an extensive, multilayered distribution system of middlemen has evolved to supply milk produced for immediate consumption. *Katcha dodhies* collect their milk from villages and either sell to the local market or to *pacca dodhies*. *Pacca dodhies* then supply milk to distributors and retailers in urban areas, *gawallas* and dairy processors. The *gawalla* supplies milk directly to urban and rural households.

It is no surprise that the collection and distribution system described results in milk quality and safety significantly below international standards. Milk handling processes in the traditional system are extremely unhygienic and there is no enforcement of standards, resulting in poor quality products. In order to keep milk temporarily fresh, middlemen commonly add ice to the milk, which results in dilution of milk solids by up to 30 percent and often micro contamination due to poor quality water in the ice. Compounding the problem, the middlemen attempt to counter the dilution by adding vegetable oil, whey powder and other ingredients to improve the fat content of the milk. Antibiotics and peroxide are also often used as preservatives. In general, the consumer lacks awareness of milk quality.

Under these conditions, production has not kept pace with consumption as potential supply is not reaching the consumers, and the gap is widening. Demand is estimated to be growing at 7 percent annually, while supply is only able to increase at half that rate. The gap between production and consumption is met through reconstituted milk from imported whole milk powder. Further, Pakistan's per capita milk consumption of 150 kg per year, while high in comparison to other developing countries, is still expected as the economy grows to converge with consumption in the developed world (255 kg per year in the EU and 270 kg in the United States).

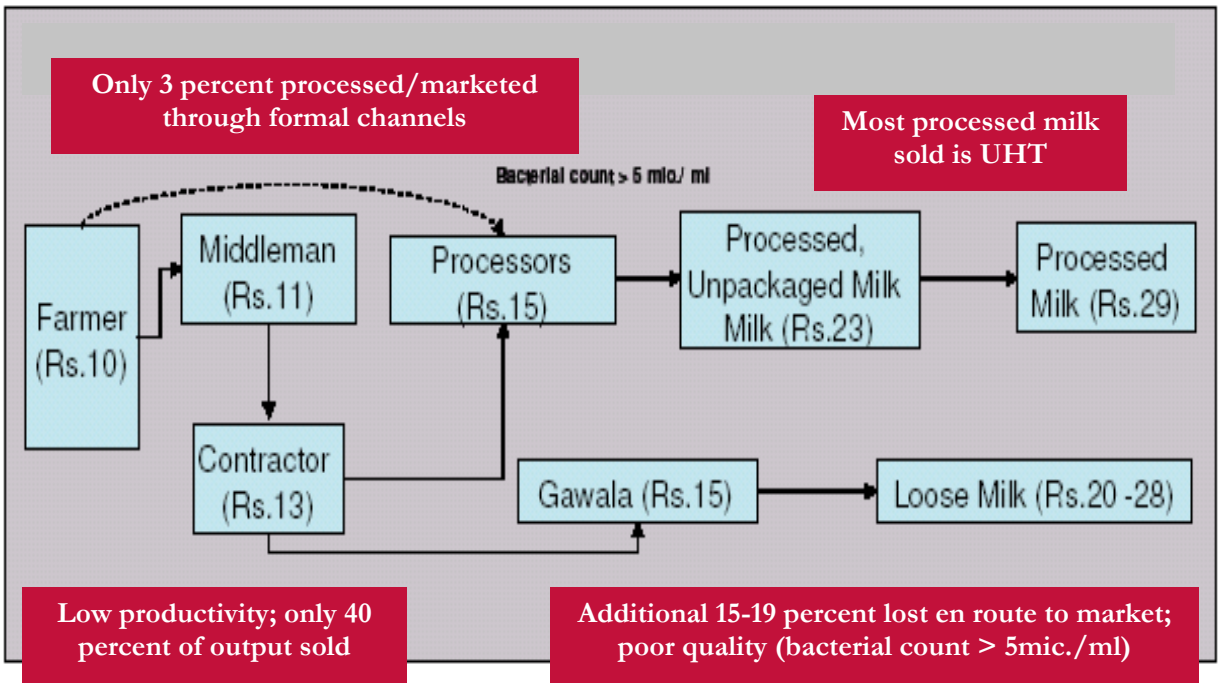
Most dairy distributed and sold in Pakistan is fresh milk. However, processed milk consumption is growing at above 20 percent per year. Of the different types of processed liquid milk, UHT milk in tetra paks are by far the most popular products. Yogurt, butter, cheese and ice cream represent a small proportion of the processed dairy products.

Figure 3: Prevailing Milk Collection and Distribution System



* Successful dairy cooperatives in Pakistan are very rare.

Figure 4: Pakistan Dairy Value Chain



PISDAC engaged initially a small group of private-sector stakeholders who agreed to constitute a Dairy Strategy Working Group to craft and implement a strategy to improve the sector's competitiveness. From the agreement to work in a SWOG, PISDAC's efforts concentrated along four tracks:

1. Assist the sector to complete a set of industry diagnostics to ensure the development of a sound strategic plan
2. Broaden stakeholder participation in the work of the SWOG
3. Facilitate public-private dialogue
4. Assist the SWOG to implement the resulting strategic plan

With PISDAC's technical and logistical assistance, the SWOG began to develop a comprehensive industry analysis to improve the understanding of the sector's constraints and opportunities. The Dairy SWOG membership gradually broadened to include representatives from all value chain segments and institutions that affected value chain operations and performance. SWOG meetings also became more regular. The Dairy SWOG was ultimately composed of 16 farmer organizations and 6 rural support programs (representing a total of 710,000 farmers), 15 processors, 6 NGOs working with farmers, 3 feed providers, the four provincial Livestock and Dairy Development Departments (employing over 11,000 breeding and veterinary services providers), 3 industry associations, 4 equipment manufacturers, 7 universities and 2 business service providers, as well as several government ministries.

About nine months from the beginning of PISDAC's engagement, a complete strategy broadly accepted by all SWOG members was published. To transform the industry and address the constraints preventing it from realizing the sector's potential, the SWOG agreed to raise the productivity of Pakistan's dairy value chain through the following initiatives:

1. Establish model farms to spread new technology and best farming practices
2. Facilitate investments in chilling tanks for purchase and milk collection
3. Investigate modern technologies, systems and underlying seasonal economics
4. Develop new supply pockets in rural areas
5. Actively demonstrate the health and safety problems associated with poor milk quality
6. Raise the capacity of training institutions
7. Improve food safety standards and their enforcement
8. Establish a permanent public-private organization with the responsibility of carrying out the SWOG's Dairy Industry Strategic Plan

SWOG leaders presented this strategy to the Minister for Industries and the Prime Minister. These and subsequent compelling presentations led to an initial commitment of government funds of just under $8 million over five years to support activities leading to the implementation of the SWOG's strategy. As is often the case, the strategy developed constituted a long-term vision (with targets to be achieved in 10-15 years). Thus, the SWOG needed to prioritize initiatives, discuss appropriate sequencing and develop action plans to ensure that the initial public funding commitment (and corresponding private investment) commenced flowing.

Three initiatives were thus prioritized: the model farm program, the farm cooling tank program and the creation of the Pakistan Dairy Development Company. The SWOG agreed that the first step in catalyzing the "White Revolution" (as the strategic plan became known), was to upgrade the supply potential of the dairy value chain, through the delivery of productivity extension services (breeding, feeding, etc.). The logical next step was a private investment program in a quality collection system with increased income for the farmer and better product for processors and consumers. With improved supply, the industry would be able to reorganize the distribution and collection system, and link the farming and collection segments of the value chain with processing, value-added products and eventually export initiatives.

The Pakistan Dairy Development Company was created to serve as a public-private platform to promote the competitiveness of the dairy sector. Since its creation, PDDC has improved, prioritized and augmented the SWOG's original portfolio of strategic initiatives. It has also play a key role in the technical design of several dairy development programs that respond to the strategic orientation set by the SWOG and, importantly, has phased their sequencing to improve their impact and success.

The model farm program aims to demonstrate and spread advanced techniques that increase productivity per animal, regarding feed, watering, vaccinations and record management. An original target of 300 farms was set. Tests conducted by PDDC technicians showed that farm productivity could be increased by 35 percent within 10 days of receiving the assistance under the program, and 50 percent could be expected within a few months. Once farms were selected for the program by PDDC, their applications are forwarded to commercial banks with which the farmers negotiate an interest-free loan to invest in the farm improvement. The interest is covered by PDDC. In the third year, if the practices have been followed, 50 percent of the loan is also covered by PDDC, creating a strong incentive for the farmers to continue implementing good practices. PDDC's technical staff now has 18 technicians dedicated to this initiative.

The third initiative prioritized by the Dairy SWOG was upgrading rural and urban supply chains by facilitating investment in chilling tanks for the purchase and collection of milk, which will increase the quality and supply of milk as well as provide farmers with an outlet (in effect, a market) at which to sell. PDDC has advanced this initiative in what is known as the Model Collection Program or Farm Cooling Tank scheme. The original scheme was aimed at facilitating the installation of an additional 2,150 farm cooling tanks, effectively doubling the number in place in 2006. Under the program, prospective owners/operators make an initial investment of 20

percent of the total cost, and finance the rest through a five-year interest-free loan. The interest is absorbed by PDDC, though unlike the model commercial farm program the private sector must amortize the loan fully. PDDC processes the private-sector applications for the tanks, which are forwarded to collaborating banks to negotiate the loan. .

PDDC has aimed to achieve an annual production of 40 billion liters of milk (from 6.4 billion liters) by the year 2015, create an additional 3 million formal sector jobs across the value chain (see table 3 below) and provide an estimated 350 million rupees (about US $5.8 million) in daily cash-flow to farmers in the sector. This is the expected impact when all 18 dairy development programs inspired by the SWOG strategy are complete. Under the prevailing scenario, the dairy sector was expected to grow 4 percent. The dairy strategic plan developed by the Dairy SWOG and refined by PDDC assumes a 20 percent grow can be achieved—accelerating the growth by a factor of 5.

Table 3: Anticipated Job Creation

Value Chain Segment	2004	2015
Farm	275,000	3,012,929
Quality Collection	4,125	56,492
Transportation	921	12,617
Processing	3,500	24,300
Allied Industries	2,400	16,200
Total Employment	**285,946**	**3,160,538**

Although subject to administrative delays and slower implementation than originally planned, by May 2008, PDDC had achieved half of the original farm cooling tank target and practically achieved the original target calling for the establishment of 300 model farms. The private-sector investment to the farm cooling tank program had reached $7 million, significantly outstripping public-sector investment in the operating costs of the initiative and the interest-free loans. Additionally, large-scale farms (outside the standard PDDC programs) were being developed with the technical expertise created by PDDC, representing an estimated investment of an additional $10 million. Further, with each of the 1,000 cooling tanks installed through the scheme collecting 500 liters per day, the supply of chilled milk in Pakistan had effectively been increased by 500,000 liters per day, allowing processors to add value and, as estimated by PISDAC, supporting an excess of 7,000 direct jobs in collection and processing. Further, and perhaps more important, more than 30,000 farmers had access to markets due to this initiative and were able to sell at better prices. (The improvement in the supply chain reduces milk collection costs as well as processing costs, since higher quality milk is less costly to process. Thus, processors agreed to offer better prices for milk sold at their cooling tanks.)