

TAHITIAN BLACK PEARLS: A FAMILY BUSINESS STRATEGY CASE

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CASE DESCRIPTION

The primary subject matter of this case concerns the decision of a small, Pacific Island entrepreneur on how to enter the black pearl market. The issues examined are largely strategic and include Porter's five forces model, value chain analysis, distribution channels, and SWOT analysis. Secondary issues include analysis of the cultural and regulatory environment in which business operates. The case is appropriate for levels three and four. It is designed to be taught in either 1 class hour or 1.5 class hours. Student preparation should take between 2 and 3 hours

CASE SYNOPSIS

Imagine yourself on a beautiful, isolated atoll in French Polynesia. The crystal blue water laps at your toes while you drink milk fresh from the coconut. Children laugh with joy as they play in the warm, tropical waters. Sound nice? Now, imagine that you live on this small island, population 600 and need to make a living.

This case is set in the black pearl industry of French Polynesia. It presents the entrepreneurial choices made by a small pearl producer on the island of Takaroa. Here is the situation. Manea Tuahu has not produced a saleable crop of pearls for two years. Prior to that time, the Tuahu family had cultivated black pearls with revenues of roughly \$200,000. Unfortunately, the division of the proceeds among the various family members had created hard feelings. This disruption of family harmony combined with a disease that entered the lagoon convinced Manea to stop pearl farming and tend to his small general store. Two years later, he is again considering pearl cultivation to enhance his \$6,000 annual income.

As he considers changes in the industry and his own strengths and weaknesses in pearl farming, Manea faces a difficult decision. Should he start producing again? Should he shift to being an industry supplier? Should he use family labor or more skilled, hired labor? How will he sell his pearls in an increasingly competitive market? These and other questions cloud his mind as he goes fishing with his friend, Tehina.

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Careful discussion of this case will provide students with insights into the analytical tools entrepreneurs use in their strategic decision making. If used in the winter, it will also make your students think about quitting school for adventure in warmer climes.

TAHITIAN BLACK PEARLS

Manea Tuahu looked out the window of his roadside store as the rain pelted the small atoll of Takaroa in the Tuamotu archipelago. His daughter, Tiare, was scheduled to arrive in just seven months and he knew it was time to make some final decisions regarding the family black pearl farm. The Tuahu family had given up black pearl farming three years ago in the face of environmental degradation that was causing disease among the cultivated oysters in his family's traditional waters. Prior to that time they had been actively involved in black pearl cultivation for 3 years. Their last crop of pearls in 1998, had yielded some 20,000 grams of saleable pearls resulting in approximately 24,000,000 Pacific French francs (almost \$200,000) in revenue. These funds were used to purchase needed living stores but had also helped to acquire the equipment needed for future pearl farming activities when the disease had left the lagoon.

As he reflected on the past successes of his business and the wealth it had brought to his family, Manea concerned about how that money had changed them. Prior to cultivating pearls, he had survived well on the \$6,000 per income generated from his small store, remittances from family overseas, and various other sources. In addition, the ocean generously provided an abundance of fish and other edible creatures, leaving Manea plenty of time to enjoy his family and friends. He considered himself most fortunate to live in these wonderful islands where there was "always another coconut in the tree and another fish in the ocean" and, hence, no need to overwork one's self in pursuit of accumulating wealth. Certainly, he thought, God must have intended life to be like that – plenty to eat, a loving family, and time to enjoy them both.

Of course, the temptation to make a little extra money was always present. After all, wasn't it good to earn a bit of money to buy a few of the nicer things in life like airplane tickets to visit family who had moved from the island. Certainly, the 1998 pearl harvest had provided some such luxuries. But, they had not come for free. First there was a great deal of hard work involved in the process, and then there were the family issues. There had been hurt feelings among his children over the dispersion of the profits from the last year of production and there were concerns now about what role each child should play. Was it possible, as his daughter Tiare had suggested, that God had brought the disease to the lagoon as a punishment for their unrighteousness, for their greed that had damaged family ties? How could they work together in a way that brought both family and financial success? These questions weighed heavily on his mind as the rain cleared and the heat of the island summer began to beat down upon the atoll.

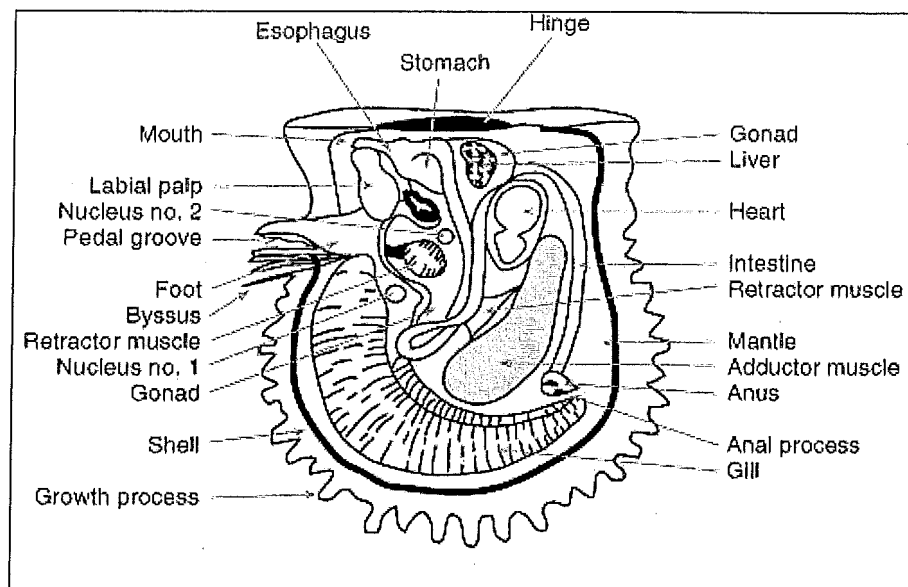
HISTORY OF THE PEARL INDUSTRY

Pearls occur naturally as the result of foreign matter entering the tissue of an oyster and causing irritation. To protect itself from the irritation, the oyster secretes layers of mother of pearl or *nacre* that surround the irritant forming a pearl.

In nature, this process occurs only rarely, perhaps in one out of every ten thousand oysters. As a result, pearls have been highly valued throughout the centuries by the wealthy. They have adorned the crowns of kings and queens throughout Europe, the robes of emperors and empresses in China, and have been turned into jewelry for those with sufficient wealth to enjoy their beauty. Their rarity placed them on par with gemstones such as diamonds and emeralds.

Unlike precious stones, however, nature can easily be assisted in its development of pearls. The first to cultivate pearls were the Japanese. Two separate parties discovered the technology needed to cultivate pearls in the early 1900s, though one would be more successful at commercializing pearl production. Kokichi Mikimoto, a noodle maker's son, and his wife, Ume, formed one of the teams. Tokichi Nishikawa, a government biologist, and his carpenter partner, Tatsuhei Mise, formed the second.

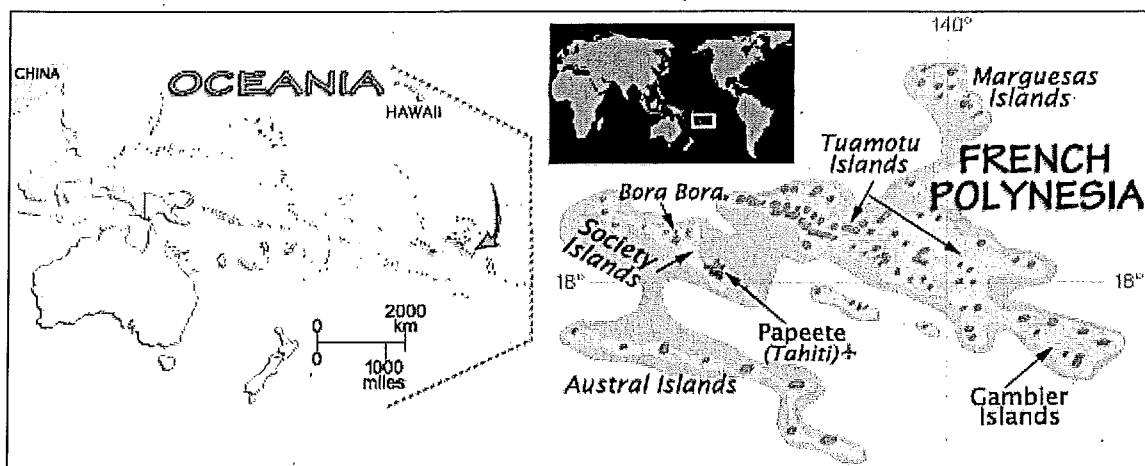
Both groups discovered that a source of irritation could be introduced by inserting a nucleus made of foreign matter into an oyster's gonad (see figure 1). Upon being returned to the sea, the oyster secretes layers of nacre around the nucleus. Over a period of a year and a half, this process results in the creation of a cultivated pearl. The source for the following is Haws and Ellis, 2000.



Of course, the Japanese did not learn the secret of creating cultivated spherical pearls without some preliminary trial and error. In 1896, Mikimoto took the first step towards cultivated pearl production by receiving a patent for producing *mabes*. Mabes are raised lumps within the interior of the oyster shells. In essence, mabes are half pearls embedded in an oyster's shell. While beautiful in their own right, they are of very low value compared with the round pearl developed in later advances.

By 1907, the team of Mise and Nishikawa had taken the critical step of cultivating the whole black pearl sold in stores today. They did so by developing a technique for grafting a nucleus made of foreign matter combined with a strip of epithelial tissue into gonad of a receiving oyster (see figure 1). During this period, Mikimoto had also been actively involved in perfecting grafting techniques to produce the highly valued round pearl, patenting the process in 1916. Even though both parties eventually perfected pearl cultivation, Mikimoto was more active in taking the process to market, a feat that earned him the reputation of being the father of the modern cultivated pearl industry.

It is to the early Japanese pearl cultivation that the modern black pearl industry centered in the islands of French Polynesia, owes its beginnings. While black pearls were noticed by European explorers as early as 1722, when Roggewein passed through the Tuamotus, they were not cultivated until 1968, when a French veterinarian by the name of Dr. Jean-Marie Domard hired Japanese grafters to implant nuclei into 5,000 *pinctada magaretifira*, or black pearl oysters. Three years later, 1,000 beautiful black pearls were harvested. It had become apparent that the same process used by Kikichi Mikimoto to produce white pearls in Japan promised commercial success in the warm waters of French Polynesia.



Pearl production in French Polynesia became a reality in 1972 when over 1500 grams of pearls valued at \$3,663 were produced. By 1999, over 8 million grams of black pearls with a market value of over \$152 million were being produced in the lagoons of coral atolls such as Takaroa and Rangiroa. More recently pearl production had begun in the Cook Islands and was also rumored to be underway in Hawaii. In both of these cases, however, there was some question as to whether the cultivation would succeed due to the specialized lagoon conditions required.

The black pearl industry today is the most important export industry in French Polynesia. It accounts for 54% of all exports from the country, contributing some \$150 million to the economy. This amount was targeted to rise to \$300 million by the year 2006. Other exports include coconut products, oyster shells, vanilla, and shark meat. In terms of the overall economy, pearl cultivation is the second largest source of income behind tourism which generates some 20% of the country's gross domestic product.

By the year 2001, the black pearl industry seemed to have gone into a bit of decline. During the 1970s pearl production had increased an average of one hundred and ninety five percent per year. That figure had dropped to seventy five percent per year during the 1980s and further to thirty three percent per year during the 1990s.

TAHITIAN BLACK PEARL PRODUCTION					
Year	Grams	US Dollar Value	Year	Grams	US Dollar Value
1972	1,563	\$3,663	1986	104,114	\$7,867,621
1973	800	\$24,871	1987	407,620	\$20,463,951
1974	3,891	\$153,815	1988	446,827	\$23,043,465
1975	15,631	\$114,077	1989	608,861	\$32,146,947
1976	6,111	\$169,694	1990	575,007	\$37,752,423
1977	6,128	\$204,155	1991	786,521	\$42,846,059
1978	49,983	\$1,568,609	1992	1,069,126	\$43,524,432
1989	86,092	\$2,030,513	1993	2,113,728	\$75,131,697
1980	28,779	\$1,318,062	1994	2,815,070	\$116,618,884
1981	85,227	\$2,076,519	1995	3,239,745	\$103,465,232
1982	32,310	\$820,816	1996	5,099,585	\$152,410,034
1983	139,888	\$5,102,325	1997	4,787,794	\$136,201,522
1984	112,183	\$2,759,146	1998	6,055,914	\$134,509,574
1985	206,463	\$8,470,062	1999	8,182,184	\$152,533,530

The value of those pearls had experienced a similar trend with two hundred sixty two percent gains during the 1970s, ninety nine percent gains during the 1980s, and twenty percent gains during the 1990s. Even more disturbing was the trend in the price per gram of black pearls. During the

1970s, the price per gram of black pearls rose an average of thirty three percent per year. This number dropped to only nine percent growth per year during the 1980s. Further, the price per gram had actually decreased by nine percent over the last decade.

Given the importance of this industry to French Polynesia, government officials take an active role in seeking to manage its development. Llewellyn Tematahotoa, Minister of Seas and Artisanat indicated that the government seeks to regulate this industry in a number of ways.

First, the government places quality restrictions on the export of black pearls. Pearl quality is determined by a number of elements. These include the thickness of the nacre around the nucleus, the luster, the shape, and the surface quality. Of these four elements, the French Polynesian government seeks to limit the export of pearls with an inferior surface quality. Only those pearls that are judged to be of A, B, or C quality are permitted for export. This means that any pearls with slight indentations, ripples or pock marks over two thirds of the surface are rejected. This percentage decreases to fifty if the marks are deep.

As part of the spring pearl auction, the G.I.E. made the symbolic gesture of dumping hundreds of D or lower quality pearls into the ocean. By returning the inferior quality pearls to the ocean, Minister Tematahotoa hopes to make French Polynesian black pearl the industry standard for beauty and quality. To enhance this effect the government offers certificates of authenticity for pearls sold through approved channels.

In addition to defining quality, the government also places licensing requirements on pearl wholesalers. In order to be a wholesaler in the black pearl industry, a wholesaler must place \$80,000 in a bank as a form of collateral. This has been deemed necessary due to wholesalers in the past having taken possession of pearls without ever rendering payment. This requirement creates greater industry integrity but may also limits the number of indigenous Tahitians who can afford to enter this part of the value chain.

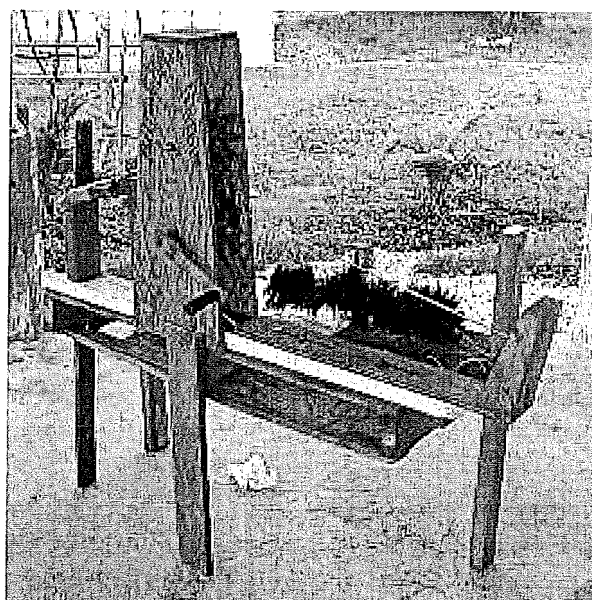
INDUSTRY STRUCTURE

The black pearl that a customer views in the store window and eventually places around her neck, looks very similar to the pearl that M. Tuahu removes from the oyster. It may have been mounted on a gold necklace or attached to other jewelry in some other way but the pearl itself goes through basically no other transformation. Of course, this beautiful pearl will have passed through many hands and changed its value many times prior to being sold to the ultimate customer in Tokyo, Hong Kong or New York.

The pearl cultivation process begins with the collection of small pearl oysters called *spat*. The larva of the oyster swims freely until it is 2 to 3 weeks old. At this time, it attaches itself to some dark surface that provides hidden spaces for protection from predators such as octopi, fish, and Ranellid snails. Those engaged in spat harvesting construct a collector by placing folded polypropylene or dark fabric onto a line. These folds are then bunched together and knotted to

protect the spat from predators. A number of these collectors are then tied to ropes supported by buoys and placed in the ocean. The spat attach themselves to these collectors and begin to grow.

When the spat are large enough to be identified (usually 2-3 cm), they will be cut off the collectors and placed in spat bags which protect them from predators while allowing for their continued growth. After reaching a size of 5-10 cm they are sold to pearl farmers. (Many islanders derive economic benefit from spat collection. The materials used to set and maintain collectors include buoys, ropes and fabric, as well as a boat. While the rewards are not nearly as high as those that accrue to pearl farmers, the cost in both time and money is very low. This means that a spat collector can generate small amounts of income multiple times during the year. Pearl farmers on the other hand will typically have a fairly large capital outlay in the beginning and only see a profit some 18 to 24 months later.)



Construction of a Spat Collector
(Haws and Ellis, 2000)

The farmer then keeps these oysters until they are about the size of an adult's hand or about 13 c.m. At that point they are mature enough to endure the grafting process. The other option is to purchase the oysters at the mature age (roughly 18 months) and begin grafting immediately. The option chosen is determined primarily by how much capital the pearl farmer possesses.

Once the shell is mature enough to be seeded a grafter must be hired to come to the farm and surgically insert the nucleus into the gonad of the oyster. The first graft of an oyster is very

important and can determine whether or not the oyster will be capable of producing high quality, and, thus, high priced, pearls. If the incision is clean the pearl will grow nicely and the tissue will heal without a noticeable scar, thus allowing for future grafts of high quality. If the initial cut is a poor one, the tissue will scar, damaging the pearl subsequent grafts as well. It is not unusual for 80% to 90% of oysters seeded by skilled graffeurs to yield saleable pearls. These numbers may be only 50% for less skilled grafters. As previously mentioned, the most skilled grafters come from Japan, though Chinese and local Polynesian grafters have become increasingly skilled.

Once the graft is completed the nucleus-containing oyster is kept in shallow water for a few days to allow it to heal. The oyster is then placed in deeper water on a system of ropes and buoys that allow the pearls to develop in the correct water temperature.

Unlike larger producers who can provide full time employment to a talented graffeur, small family farmers are usually not able to hire the best grafters due to the small number of oysters they are farming and the need to pay foreign grafters immediately upon provision of the service. As a result, they usually use a local grafter who is willing to work at lower wages or a trained member of the family who may be willing to take more of an equity stake in the business, foregoing current wages for a share of future profits. This saves Manea and other family farmers some money in the short run, but can have negative consequences when the pearls are harvested due to the production of a higher percentage of rejects.

To obtain a high quality pearl Manea needs not only to have an excellent grafter but, also, to hire diligent workers to care for the oysters. The oysters need to live at a specific depth and water temperature to maximize the pearl's growth. In conjunction with proper placement the oysters also require routine maintenance. The oysters must be pulled up, and scrubbed clean of bacteria and corrosive materials every 1-6 months, depending on the amount of contaminants in the lagoon. If the pearls are not regularly cleaned the corrosion can become so thick that it will actually begin to suffocate the oyster and stunt the growth of the pearl. Fortunately for M. Tuahu and many small pearl farmers like him, this cleaning can be done with the help of family and friends who will work for a share of future profits rather than an up-front payment.

Despite the best efforts of the pearl farmers, damage to oysters may still occur if there is overcrowding in the lagoon. Each lagoon has a carrying capacity that when exceeded tends to weaken the oysters and damage the pearl crop. The issues of lagoon rights have become increasingly important as some large producers have leased large amounts of these rights from their owners. This has created, at times, conflict as the existing, small producers feel that they have suffered losses due to disease in the lagoons. The large companies can afford the labor to keep their oysters free from corrosion and fouling while the small farmers may not have the same capability. As a result, large producers are often seen as the enemy of the small producer. Further, such leasing places serious strain on the social fabric of the atolls. These political conflicts are one of the reasons that large producers have not yet been successful leasing water rights in the Takaroan atoll. Though, they continue to try.

Once the pearls are ready to be harvested, some eighteen months after the original graft, the workers must pull up the pearls and take them back to the workshop. At the shop the oysters are carefully opened, the pearl is removed, a new nucleus is placed inside the sac, and the oysters are taken back out to sea to repeat the process. Each oyster can support up to 3 grafts in its lifetime, each with a nucleus larger than that previously implanted. After the third harvest Manea Tuahu will tear open the oyster, remove the pearl, and sell the shells to artisans who create a wide variety of different souvenirs for tourist consumption.

Upon harvesting the pearls, farmer must clean them and then determine how he wishes to sell them. The farmer can choose one of several options. He can send his harvest to a G.I.E. and have his pearls sold in an auction as discussed below. He can sell his pearls to wholesalers, or he can try to sell his pearls directly to local or foreign retailers.

G.I.E – NOT-FOR-PROFIT ORGANIZATIONS OF PEARL PRODUCERS

Amidst the competitive backdrop of the industry and the speculation about new regulations, smaller pearl farmers sought a way to increase their market power. Smaller farmers, like Tuahu, find it extremely difficult to compete against the larger companies and are in danger of being driven out of the industry. Large companies can pay more money to hire more skilled workers, can purchase supplies in bulk and receive discounts, and can attract more buyers by advertising and selling pearls in numbers that the smaller farmers cannot match.

Small farmers seek to offset these advantages through G.I.E.s (Groupement d'Interêt Economique / Economic Interest Groups), special non-profit economic interest groups. These organizations seek to aggregate producers for the purpose of promoting Tahitian pearls and their by-products in overseas markets. Four different black pearl G.I.E.s exist in French Polynesia: the G.I.E. Perles de Tahiti, G.I.E. Poe Rava Nui, G.I.E. Tahiti Pearl Producers, and the Professional Pearl Producers' Association, or the SPPP as it is known locally. Each G.I.E. is designed to specialize with different sizes of farms, starting with the 450 micro-familial G.I.E. Poe Rava Nui, then growing to the G.I.E. Tahiti Pearl Producers which consists of 32 small and medium size businesses. The next is the Professional Pearl Producers' Association, which represents 15 of the largest pearl companies in the country, and finally the G.I.E. Perles de Tahiti which is primarily a government and legislative G.I.E.

Although the different G.I.E.'s serve customers of different sizes they have in common the objective of promoting the industry overall. This mission is accomplished by having G.I.E. sponsored auctions where members can come together and sell their harvests. The benefits of these auctions are clear. If more pearls are to be auctioned in one area and at one time more buyers will attend. These auctions reduce transaction costs for buyers thus enhancing demand and increasing profits. In theory the G.I.E. contacts many more potential buyers than the individual farmers could contact on their own then pits them against each other to purchase the harvest. For this service the

G.I.E.'s charges its members a fee of 8% of the selling price. Some 40% of all pearls sold in French Polynesia are sold through G.I.E. auctions.

These auctions should allow small black pearl producers to be on more equal footing with their larger competitors. The reality, however, may be somewhat different. At the sixth auction of the G.I.E. of Tahiti Pearl Producers held at the beginning of 2001, for example, things did not go according to plans. At the close of the day the auction house had only sold 132 of their 169 lots. This left 22% of the pearl farmers' lots unsold. To be more exact, of the 194,800 pearls that were to be auctioned only 130,994 were purchased, and the average price was lower than was expected at 659 CFP (roughly 5 U.S. dollars) per gram. That means this G.I.E. that was designed to help Manea Tuahu sell his harvest sent him, and other small farmers like him, home with 63,806 pearls.

To make matters worse the majority of this year's pearl buyers were local Tahitians. So not only did the G.I.E. not fetch an outstanding price, they did not attract many foreign buyers. The results of this auction were especially damaging for farmers like M. Tuahu because it is one of only a handful of opportunities for him to sell his harvest and bring money home for his family. Unfortunately, small farmers like Manea Tuahu know how to produce pearls, not market them. They have usually grown up on the farms and have never learned how to attract buyers on their own. If the pearls do not sell at the auction, it is not unusual to see the pearl farmers entering various retail outlets throughout Tahiti trying to sell their pearls to local merchants at reduced prices. Similarly, some of the pearl producers also smuggle pearls out of French Polynesia and visit stores in Honolulu with the same objective.

G.I.E. representatives blame these disappointing results on economic problems in Japan, the leading market for Tahitian black pearls, and assure everyone that in future auctions the price and quantity will be higher. These promises, however, inspire little hope and confidence among small farmers given current negative trends in the black pearl industry.

Another challenge for the small farmers may lay not so much in the weakness of the Japanese market as in the activities of the large producers during the auctions. At the reception held the night prior to the auction, it is not uncommon to mingle with buyers who have already spent their pearl budgets. These buyers have been actively courted by large producers one or two days before the auction starts. Without incurring all the costs of sponsoring the event, the large producers meet with those who have come and capture a large part of their purchasing budget prior to the auction. While there is nothing illegal about such behavior, it certainly makes smaller farmers question their ability to compete in the face of such jugular competition.

OTHER SALES METHODS

If a small family farmer chooses not to participate in the G.I.E. auctions or finds that his pearls have failed to sale at the auction, he is left with the options of using wholesalers or approaching local or international retailers directly.

One technique that experienced farmers employ when selling directly to local retailers is to sell their pearls in groups instead of individually. By mixing his high quality pearls with those of lower grades he may be able to command a higher price overall. As previously discussed, pearls are evaluated on a number of different characteristics to determine their value. These criteria include shape, color, diameter, and their smoothness or lack of dents and rings. From a buyer's perspective, when they purchase mixed groups they are buying the pearls they desire, those of a high grade, and receiving the lower grade pearls, for free. They know that some of the pearls in the batch will probably be thrown away or sold for next to nothing.

This bundling technique is commonly practiced in an attempt to increase profits, but it is only one selling strategy. Others seek to sell their pearls individually hoping to obtain higher prices for the best pearls than they might if they were to practice bundling. It is not clear that one approach is superior to the other.

If Manea meets with little success in the local retail market, he might choose to sell his pearls to one of the wholesalers that live in Papeete such as Inka of Kaiser-Guines Tahitian Cultured Pearls. Wholesalers like Inka travel to the outer islands to visit with pearl farmers to examine and purchase their pearl. By making on-site visits, they provide convenience to the farmers but, also, offer lower prices.

In the past, there have existed some rather unscrupulous wholesalers who took possession of the pearls and promised payment to the unsuspecting farmers once the pearls had sold. Many producers lost thousands and thousands of dollars when unscrupulous wholesalers left town without making payment. This situation has been remedied by the government that licenses honest wholesalers like Inka and requires an \$80,000 dollar deposit to be held in a local bank as an assurance that payment will be made.

These certified wholesalers are well aware of the market value of the pearls and work hard to assure that they will be able to obtain a profit when they sell these pearls abroad. Inka, for example sells her pearls in Germany to a variety of jewelry retailers. Many of these wholesalers seek large, high quality pearls that will fetch a high price in foreign markets. They may not be as interested in the B grade pearls that compose the largest percentage of pearls produced by small, family farmers. Nonetheless, this outlet for pearls provides a viable though tough market in which to sell one's black pearls. Overall, however, producers like M. Tuahu would prefer to sell directly to retailers to increase selling prices if the demand is present.

If a pearl farmer tries to sell abroad directly (not through a wholesaler) he faces a more complex environment characterized by a number of governmental and competitive constraints. In order to protect the black-pearl market, officials have instituted laws that regulate the quality of pearls that can be exported and the quantity of low-grade pearls that can be sold internationally. By allowing only the best pearls to be sold they can keep the supply down and the price high. Unfortunately for Manea this means that many of his pearls cannot be sold because they do not meet

the minimum requirements set by the government even though the demand may exist in certain markets for lower grade pearls.

Importantly, one should note that these requirements mean that certain of Manea's pearls cannot be sold legally even if a market for those pearls exists. These regulations are currently supported by the larger pearl producing companies because they have the means to hire the best grafters and, as a result, have a much higher ratio of high to poor quality pearls. However, this spells major trouble for Manea who cannot afford to hire a high quality graffeur. Many small farmers do not have the capital to pay professional grafters up front.

Further, the government imposes tariffs exports greater than five pearls. The challenge of facing the export documentation and fees associated with the black pearl industry is daunting to many family producers whose level of formal education may be quite limited.

Additionally, these small producers find themselves at a competitive disadvantage compared to large Pearl Producers like Robert Wan who have a large number of high quality pearls to sell abroad. Spreading the cost of courting foreign buyers in their home markets across a large number of sales allows such large producers to lower their per unit transaction cost. Further, large volume makes them more attractive to foreign buyers with large budgets and pearl needs.

THE TUAHU FAMILY OPERATION

The Tuahu family had been in operation for several years prior to 1999 when the environmental contamination caused problems for their pearl yield. In the last year the family had sold almost \$200,000 worth of pearls mostly in the Japanese market.

Their operation included multiple steps along the value chain. First, they acquired the spat from a commercial vendor and put them on collectors until the oysters reached sufficient size to hold the graft. The grafting was then done by a daughter, Tiare Johnson, who lived in Hawaii. She moved with her family to Takaroa for a period of 4 months to do the grafting at a significant personal sacrifice of income associated with her husband's business and her work. The Johnson family felt, however, that such a sacrifice needed to be made out of a commitment to their parents. This sense of family responsibility runs very high throughout Polynesia. Without ties to the extended family, a Polynesian loses his sense of identity. In fact such familial bonds are so strong, that in many Polynesian island chains, as much as 50% of the economy is derived from repatriation of funds from family members who have moved to Australia, New Zealand, the United States or elsewhere. In addition to this sense of family duty, Tiare and her family expected to share in the profits from the venture that would come eighteen to twenty four months later.

Once the nuclei had been grafted into the pearls, they were taken out into the lagoon by Manea and his family and they were attached to ropes supported by blue and yellow buoys. These ropes were then lowered into the waters of the atoll. The Johnsons returned home to Hawaii and the oysters were cared for by the nutritious South Pacific waters and the patient hands of the family

patriarch along with some local helpers. At harvest time, Tiare and her family returned to remove the pearls and insert the new nuclei so that the second batch could be planted in the lagoon.

Having harvested the pearls, it was time for another part of this international family to take over. Manea's youngest daughter, Vaite, had married a Japanese man while attending college in the United States. The family moved to Japan after graduation and was ideally located to sell pearls to local merchants. Having established ties with several area jewelers, the family was able to sell all of the pearls at substantially higher prices than they would have received in the local market. The operation was a success resulting in a large amount of wealth to be shared among those who did the work.

Unfortunately, this was also the start of several problems that made repeating this success much more complicated. First, the Japanese part of the Tuahu family decided that the value they added to the process was proportionally higher than that of the other family members. Since they had the cash in hand, it was easy for them to take their "fair" share and remit the rest to M. Tuahu back home on Takaroa. M. Tuahu used his portion to purchase needed food stores as well as additional supplies and equipment to seed and care for the next batches of oysters.

When it came time to pay the Johnson family, so little money was left over that it in no way compensated them adequately for foregone wages. While the Johnsons certainly understood the opportunity costs of four months grafting work, they had a much more difficult time convincing other family members these were real costs that ought to have been compensated by the business venture. Such abstract ideas as opportunity costs do not make much sense in small island economies dependent on subsistence activities and remittances for the vast majority of their economic activity. Feelings were hurt and it was clear that the venture could not happen in the same way again. A certain degree of mistrust entered the family.

Further, the next few harvests ended up being unproductive due to "pollution" that infected the atoll waters causing the oysters to die prior to reaching the maturity necessary to produce fine black pearls of sellable size. It is unclear what caused the death of the oysters in this particular case. Experienced pearl biologists indicate that these oysters are quite robust and do not generally suffer from disease. If the oyster lines are laying on the ocean floor rather than hanging above it, they can suffocate from a lack of oxygen. Further, oysters that are not cleaned regularly may also experience stunted growth due to parasites that accumulate on their shells.

Another possibility may have been an overpopulation of pearls in the lagoon. As noted in Table 1, the numbers of pearls coming out of French Polynesia during this time period had increased tremendously. The nutrients needed to support the growth of the oysters and pearls occur naturally in the atolls of the Tuamotus. Overcrowding of the waters may, however, limit the amount of these nutrients each oyster receives. Additionally, overcrowding may facilitate the spread of disease among the pearls that find themselves already in a weakened state due to a lack of nutrients.

The French Polynesian government has taken steps to eliminate overpopulation by assigning rights to the lagoons that can be either used by the owners or leased to other parties including the

large pearl producers. These rights are based on traditional family land ownership that fronts the water in question. (Interestingly, some have found it easier to just lease their water rights in order to derive income without assuming the risk of the venture. It is estimated that lagoon rights can be leased at a rate that is roughly equivalent to about 5% of the value of the pearl's produced. Due to the previously mentioned social conflicts over this issue, however, a lagoon rights holder stands somewhere between 0% and 30% chance of leasing his waters to a larger producers. If such an agreement is arranged, however, it is in the interest of the pearl farmer to sign a longer term lease of five to ten years.)

In the final analysis, nobody could really provide a strong scientific logic for the failure of the ensuing harvests. Other pearl farmers had experienced normal harvests from their water concessions in the same lagoon during the same time period. One family member suggested that maybe the family was being punished by a God who perceived that their family relations were not appropriate and for their disobedience to His other commandments. Other family members gave serious heed to this suggestion.

As Takaroan waters had produced many fine pearls during the period of his waters' failures and since that time, M. Tuahu could not help but wonder if it was time to begin producing again. Day after day, he saw the new trucks pass along the coral road fronting his home funded by the profits from pearl farming. He also saw the boat arriving every other week from Tahiti carrying new buoys, motors, boats, and other equipment used in the pearl industry and funded by its proceeds. It was clear that many of his neighbors were making significant profits from this industry and that, mabe, it was time for him to do the same.

Unfortunately, another challenge was weighing heavily on his mind. The marriage of his daughter Vaite, to her Japanese husband had ended in separation. It seems that she was tired of living in Japan and he could not imagine living elsewhere. As a result, they had recently divorced and she and her son had moved back to French Polynesia where she was living with her parents. The conditions of the divorce were significantly difficult that it was not possible to use her former husband as a partner to sell the pearls. Further her contact with the Japanese jewelers had largely been through her husband and were now a bit outdated since she had not been in the business over the last few years. These facts combined with the recent softness of the Japanese market made Manea uncertain as to the family's ability to engage this important market.

These thoughts and others entered Manea's thoughts as he contemplated the future of the family business. Compared to 1998, he calculated that he could harvest 50% more pearls within eighteen months to two years if past trends held. Maybe it was time to make the investment of cash and human resources needed to produce pearls for the international market place. Just then, his good friend Tehina entered the store and invited him to go fishing. These decisions, Manea thought to himself, could certainly wait one more day.