MANAGING AGRICULTURAL OPERATIONS OVERSEAS:

LESSONS FROM THE PAST

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The prospect of trade liberalization at both the regional and global level opens up the possibility of increased agricultural investment in developing countries. Such opportunities can be very appealing to developed-country producers who face high domestic costs, particularly for land and labor. Further, foreign investment could be an extremely positive development in terms of using developed country technical knowledge to increase global food production.

However putting this experience into practice overseas has not always been successful in the past. The history of expatriate investment in developing country agriculture does not offer many encouraging examples. Often overlooked in the literature of both agricultural economics and management, private investment in large-scale agricultural production, mostly undertaken by agribusinesses, has a poor record. Five case studies examined in this paper offer examples of what goes wrong which such investments. Based on the experience of these operations, it is the thesis of this paper that the main adaptation that these projects might have made is in the role of management.
THEORETICAL ISSUES

Within the vast literature on agricultural economics and management, two issues are of particular relevance to this paper. The first is the effect of mechanization on the structure of agriculture, and the second is the existence of transactions costs, in particular with regard to the labor market.

Brewster (1950) observed that the process of mechanization in agriculture is quite different from industry. Mechanization in industry has led to a situation where the machines are stationary while the workers and materials are concentrated essentially under one roof. The concentration of workers allows factories to increase the number of workers without significantly increasing their labor supervision costs. This, combined with the fact that tasks can be performed simultaneously, has resulted in the possibility of significant economies of scale in industrial expansion.

In agriculture, on the other hand, the mechanization process leads to workers and machines becoming ever more mobile as they are able to cover larger and larger areas of land. However most tasks, even though they are done by machine, must still be done sequentially because of the biological cycle of crop and animal production. This does not provide much opportunity for specialization and division of labor, and if workers are dispersed over large areas, supervision costs are dramatically increased, which would not imply gains to be exploited from increasing beyond the level of owner-operator.

Binswanger and Rosenzweig conclude that "monitoring costs in effect set up diseconomies of scale which are not generally offset by the kinds of economies of scale present in much of mass manufacturing" (cited in Klock, 1992, p. 7). In addition, because large-scale
agriculture is such a capital intensive industry, workers have responsibility not only for the job they are doing but for the equipment as well. This further increases the problems of moral hazard.

What Brewster is essentially alluding to is the broader idea of transactions costs, in this case, the costs of hiring and supervising workers which go beyond simply the wages paid. Coase (1990) defines transactions costs as the costs associated with using the market. Where such costs do not exist, economic agents will rely on the market to buy and sell goods and services. Where such costs are high, agents will seek alternatives to the market. In the case of agriculture, one alternative to high transactions costs in the labor market is not to expand beyond the owner-operator level. Another might be to enter into rental or contract arrangements which help to restore the incentives inherent in family level management. In an ideal world, the agents should be indifferent between renting and wage labor, however where transactions costs exist, this is not the case.

The implications of these arguments to this paper are first, that agriculture is fundamentally different from industry in terms of the way it adapts to mechanization. Industry experiences economies of scale, while agriculture, on the whole, does not. Second, in a second-best world where transactions costs exist, management plays a crucial role in structuring the operation and allocating work so as to minimize both transactions costs and efficiency losses from non-market activity.
CASE STUDIES

This paper looks at five post-war projects. The case study method of research, while limited in its ability to provide generalized conclusions, is very useful in trying to explain how and why something happened, and to understand the mechanisms at work. Because of space limitations, the projects will only be summarized briefly here. Further detail will be given in the analysis which follows.

The Tanganyika Groundnut Scheme

The Tanganyika Groundnut Scheme is the classic example of an ill-fated large scale project. It was the British government's answer to the post WW-II edible oils shortage. The scheme was conceived in 1947 by an executive of the United Africa Company, a subsidiary of Unilever. It proposed the mechanized clearing and planting of three million acres in three areas of what was then British Tanganyika, Kenya and northern Rhodesia. Anticipating yields of 1200 lbs/acre to result from the use of mechanization, the scheme's goal was to produce 600,000 tons of peanuts in five years at a cost of £26 million (Samuel, 1947). Two years later, after spending £36 million, clearing 220,000 acres, and producing fewer nuts that were originally used as seed, the scheme was abandoned (Voll, 1980).
Jari

Jari was the largest private agricultural development project in the world, occupying over three million acres in northeastern Brazil. The combined forestry and agricultural operation still exists today, but is now owned by a consortium of Brazilian businessmen who bought it from its founder, Daniel K. Ludwig, in 1982. Ludwig, an American who earned a fortune in shipping, was forced to sell the project because of conflicts with the Brazilian government.

Ludwig had planned to establish a pulp and paper processing concern in the Amazon, complete with on-site mills. He also planned to introduce large-scale mechanized agriculture. Both of these objectives were reached by 1981, but at a cost of US$1.1 billion as opposed to the estimated cost of US$300 million. He sold the project for US$230 million, and it has yet to turn a profit even for its new owners. In 1981, it was estimated that the forestry operation could earn positive returns on its post-1979 investment, however the rice operation lost US$70/ha/year (Fearnside and Rankin, 1981).

The Dez Agribusinesses

Four agribusiness operations were established in the Khuzestan province of southwestern Iran between 1968 and 1973. This region had been the site of a major agrarian reform beginning in the 1950s. First, in an effort to improve the region's chronically low productivity though improved irrigation, the World Bank undertook construction of a dam on the Dez river in 1958. Then in 1962, a sweeping national land reform was enacted which broke up the region's large estates. Although not its original intention, one of the main thrusts of the land reform policy became the promotion of large-scale, capital intensive agriculture. Part of the plan included
encouraging agribusiness corporations to establish operations in Iran. By the early 1970s four international business had undertaken operations in the Dez region, but with a decade all were gone, leaving behind US$51 million in debt and cumulative losses of US$1,100 per day (Salmanzadeh and Jones, 1980-81).

The four agribusinesses were:

- **Hashim Narraghi Agro-Industries of Iran and America (Iran-America)**. California's largest private almond grower, Narraghi's Iran-America leased 20,000 hectares in 1968. They planted vegetables, trees, and vine crops native to the area, and did well with them. They also tried cotton, without success.

- **Iran-California** leased 10,000 hectares in 1970. They were also a California company specializing in vegetables and other field crops. They also attempted to raise cotton.

- **Iran-Shellcott**, a joint venture between Shell Oil, the Omran Bank of Iran and Mitchell Cott, Ltd., leased 15,000 hectares in 1971. They intended to grow cotton, but early failures in this area caused them to switch to wheat.

- **International Agro-Business Corporation of Iran** began operations in 1973. This project was managed by Hawaiian Agronomics, an American company which was also responsible for the Haft Tappeh sugar cane plantation on the World Bank project. They tried to reproduce their luck
with sugar cane by planting sugar beets, but were unsuccessful. They then switched to alfalfa, but had problems there as well.

The Philippine Corporate Farming Program

In 1974, the Philippine government responded to a severe shortage of rice by issuing Presidential Decree 49, the Corporate Farming Law. The law required that every financially viable corporation with over 500 employees supply at least enough rice or corn to feed its employees and their families. The companies had several options, they could import the grains, produce themselves, or make arrangements with farmers to produce under contract. The purpose of the program was two-fold: first, to increase food production in the short term, and second, to modernize the farming sector by bringing in the management and technological skills of large corporations.

By the end of 1977, 84 corporate farms existed, "requiring heavy capital investment in land development and equipment; efficiency and productive levels were low, even by Philippine standards (Bray, 1986, p. 192). Many corporate projects also experienced difficulties. In one well-known case, the San Miguel Corporation was forced to abandon its project at Aborlan, Pawalan because of disputes with local farmers (Gintong Butil, 1975). Overall, Tadem (1978) concludes that the farms were unable to meet the requirements of their employees, let alone produce extra for the market.
Hershey's Hummingbird Farm

The Hershey Foods Corporation purchased the 728-hectare Hummingbird Farm in Belize as part of a cocoa improvement plan undertaken in the late 1960s. It had two goals in mind: to make a profit and, at the same time, to prove to cocoa producers worldwide that large-scale cocoa farms employing modern technologies and farming techniques could be economically viable. Most of the world's cocoa is produced on farms of fewer than three hectares, and this, for a variety of reasons, contributes to inconsistency in quality and quantity of output. This was the situation that Hershey was trying to improve when it established its large-scale cocoa farm in 1976.

The Hershey project was a technical success, increasing yields to three times the Belizean national average. However the project was not successful commercially. It was begun when cocoa prices were at an all time high, and they have been declining ever since. Therefore the farm has not been able to cover its high cost and, according to Hershey's director of Agribusiness B.K. Matlick, was to be sold in 1992 (Matlick, 1992, personal communication).

WHAT WENT WRONG?

Despite their diversity, the projects all faced two major problems with their management structure. First, all were managed by corporations or individuals who were not on-site during much of the production cycle. Second, they expected to operate in the new location in much the same manner as they operated at home, whether that meant using US-style farming equipment and methods, or relying on a top-down, industrial management style.
With regard to the first issue, an operation which is an overseas expansion will frequently face the problem of over-extended management capabilities. With headquarters located in one place and operations located in another, communication problems are bound to arise. Managerial proximity, as suggested by Brewster, is particularly important in agriculture. This physical and intellectual distance was a major factor in the failure of the Tanganyika Groundnut scheme and the Dez projects in particular.

Success in a multi-location operation requires, first, that accurate information be conveyed from the field to the managers, and, second, that the managers accept and act upon the reports. In the case of the Tanganyika Groundnut Scheme, neither of these conditions was met. The project began with a great deal of publicity and optimism about the ability of mechanization to overcome all obstacles. When problems began to arise, the on-site managers were reluctant to report them to London. For example, the land clearing goal set in April was 50,000 acres by the end of the first year. The project began in April, cleared a thousand acres by June and just over six thousand by August. Nonetheless, an August cable to London read "we have every reason to hope that 50,000 acres would be cleared by year's end" (Wood, 1950, p. 85).

When the on-site managers finally did acknowledge that the goals were somewhat unrealistic, the Food Minister in London chose not to accept the information. The problem was attributed to inexperience and the first year's goals transferred to the second year without questioning the essential soundness of the plan. Even as late as the spring of 1949, two years into the scheme, the food minister was still suggesting that, due to a rise in the price of groundnuts, "our scheme.. will be far more needed and far more profitable than was originally estimated" (Wood, 1950, p. 215).
Failure to be flexible with regard the plan was also a problem for the Dez agribusinesses. These projects too expected quick results from the replacement of traditional farming methods with advanced technology. When things didn't work out, the plans' implementers rather than the plans themselves were blamed. Further, the directors began taking on more decision-making power, which led to even more unrealistic policies. As noted earlier, every one of the Dez projects tried to grow cotton. It had been determined 20 years earlier that cotton could not be grown profitably in the region because of disease problems, but this information was not transmitted to the project designers, and as a result not only did they proceed with their cotton plans, but they failed even to hire entomologists in case problems arose. No project had success with cotton, and International's losses on the crop proved fatal.

This brings up the second problem faced by the agribusinesses, that is, inflexibility with regard to methods of operation and failure to recognize that what worked at home might not work in a new environment. This is true both of technology and management structure.

In terms of agricultural practices, most of the companies based their projected success on the fact that fully mechanized projects were inherently superior to traditional farming methods and that their introduction would therefore result in rapid increases in production. A cornerstone of every project was the introduction of the most advanced technologies available. To none did it occur that state of the art technologies that worked in California might not be appropriate for the African bush or the Brazilian rainforest. As a result every project lost thousands of dollars in broken equipment, lost production and wasted time.

One classic example of this problem was with the Dez businesses. In light of the problems they would face with equipment operation and maintenance and access to spare parts, it has been
determined that the projects would have been better off had they used only two kinds of tractors, one for tillage and one for planting. In reality, by 1977 the agribusinesses had twenty-one models of tractors from eight different manufacturers. It was virtually impossible to maintain a spare parts inventory for this equipment located 15,000 kilometers from parts factories and without experienced mechanics. International could keep only a quarter of its tractors operating (Strohl, 1985a).

The Jari project experienced this problem initially in its forestry operation. Attempting to clear the forest with bulldozers led to thousands of dollars in equipment breakage and soil structure damage from the weight of the machines (Strohl, 1983). As a result, they switched to a more labor intensive method with chainsaws. Similar problems were experienced in harvesting and as a result, the harvesting process now resembles a "typical southern small-tract pulpwood plantation" (Hornick et al., 1984, p. 665). Raintree summarizes, "I believe in low inputs and intensive labor... I think that labor is easier to get than spare parts for tractors" (Briscoe, 1984, p. 69). This was not the opinion of the rice operation managers. That operation was extremely capital intensive--six airplanes, 42 combines--and as a result it was commercially unviable even though technically feasible.

Changes in technology are often not the only adaptation needed. The very structure of the enterprise must also be adapted. In the case of Jari this meant reformulation of the labor policy. The project originally intended to operate like a US industrial operation with full-time wage workers. It even attempted to duplicate company towns in the Amazon, building roads, schools, hospitals and other infrastructure to accommodate the workers and their families. The problem was that the native workers were not looking for this type of employment. They flocked to the
project to earn money, but after obtaining some desired amount, they returned to their villages. By 1980, the project had a labor force turn over rate of 200 percent per year, exacerbated by the high costs of training workers for technical jobs (McIntyre, 1980). As a result, the company changed its labor policy, removing the incentives for full-time employment and replacing them with a work force based on short-term performance contracts.

One of the main problems all the Dez agribusiness faced was land preparation. The job was much greater than the companies had anticipated, and they responded either by preparing all their land poorly, or properly preparing only a portion. Iran-California did the latter, and as a result prepared only 4000 of its 10000 hectares. It then sublet some of the remaining land to local melon growers. Iran-California provided land and water and the local farmers provided labor, capital and marketing. This arrangement was highly successful and eventually several thousand hectares were farmed this way. Iran-America made a similar adaptation in a small part of its operation, selling grapes while they were still on the vine. This relieved them of the responsibility of harvesting and distribution, during which they had previously suffered from much damage and theft (Strohl, 1985).

Perhaps the clearest example of what these projects were essentially doing is found in the Philippines program. The successful operations seem to be those which opted to contract with local farmers for their production. Mercalo and the Philippine Commercial and Industrial Bank, "linked up with 660 farmers, the former providing the capital and the technology, the latter furnishing the land and labor. Because of improved technology, the farmers increased their yield from 40-50 sacks of rice to 80-110 sacks of rice per hectare" (Farming Today, 1975, p. 35).
POSSIBLE ALTERNATIVES

Expansion of Family Farming Overseas

In light of the above experiences, several options have promise for future investment. The first, which is supported in theory by Brewster, is that there is no incentive for expansion beyond the family level of production. In reality, there are examples of family farmers who have expanded overseas successfully. This could be a possibility for crop farmers who have time to operate other farms in the winter.

Evidence on this phenomenon is limited, but one Minnesota farmer who, with his brothers, has farmed in Paraguay and Jamaica thinks that it is more common than people think. "You'd be surprised how many Americans are farming in these remote areas" said Guy Ewald of Waldorf, Minnesota (Ewald, 1992, personal communication).

These individual farmers have the same motivation for expansion as the agribusinesses, in particular cheap land. And their farms overseas can resemble the agribusinesses more than they do thousand acre family farms in the midwestern United States. For example, at peak season the Ewalds employ 350 people in Jamaica. Yet these operations retain the hands-on management style of smaller farms. On the Ewald farm in Jamaica, hands-on management means that at least one of the brothers is on site from November until April. Guy Ewald stresses the importance of remaining open to new ideas and always trying to find ways to do things better. Special plots on the farm are devoted solely to crop experimentation, trying to grow new crops and to find ways of bringing existing crops up to export standards. Regarding soil fertility, Ewald says that "anything will grow in the tropical soils. Fertilizer is available for infertility problems. Diseases and insects are bigger problems, but can be solved by good management."
Like the corporate projects, individual farmers also experience problems with their mechanical equipment. When the Ewalds bought the farm, it came complete with equipment. This posed somewhat of a problem since the tractors, which came originally from the U.S., Spain and France, were not standardized and could not use the same parts. Maintenance costs are potentially very high since spare parts all have to be imported. Planning two to three months in advance is required to keep them low. In cases of emergencies the brothers send parts by Federal Express or carry them personally in suitcases. "Most people wouldn't put up with these problems," they say. Therein, however, lies the opportunity for individual operators like the Ewalds.

Overall, the Ewalds return from farming in Jamaica is considerably greater than from farming in the U.S.; costs are lower and revenues, higher. The main obstacle to expansion, as they see it, is risk, both ecological and political, which is much higher overseas. This is quite a contrast from the view of some of the directors of large corporate projects who did not see risk as a serious factor at all. They didn't see how their enterprises could fail.

**Restructuring Corporate Farming**

Clearly the potential of individual expansion is somewhat limited since most family operations are constrained by time and money. A second alternative is based on the idea of management allocating work within and outside the firm. By incorporating sub-contracting and rental arrangements, firms could avoid the transactions costs of market operation in many developing countries and restore incentives necessary for efficient production. By recognizing where they do and do not have advantages over local methods or producers, they could focus
their efforts and improve their efficiency. One of the main problems faced by the projects described in the case studies was getting bogged down in areas outside their realm of expertise. For example, the Groundnut Scheme's advantage probably lay in distribution but it focussed its efforts on production. MONACA was experienced in marketing but spent most of its time on experimental research. The Dez agribusinesses were skilled in advanced methods of certain types of crop production but spent too much time and money on land preparation, production of unfamiliar crops and post-harvest operations.

Two examples of projects which recognized this role for management were the FMC Corporation tomato operation in Moldavia in the mid-1970s and the Khattara Farm in Egypt. FMC, a California machinery manufacturer, took over management of a tomato growing project in the former Soviet republic of Moldavia. The Moldavians had had no success attaining California-level yields, in spite of the fact that they used California seeds and equipment. As part of its agreement to manage the project, FMC insisted on maintaining full control over the supply of all inputs, including machines, seeds, chemicals, trained workers, technical support, packing and processing facilities, etc.

From the outside, the FMC-run project may not have seemed very different from the Moldavian project. It may even have consisted of almost identical components. However the internal mechanisms at work under FMC management were quite different:

"The proposed FMC project was based on the California system in which the tomato growing, trucking to plant, processing, and retail distribution were done primarily by separate groups, each one of which hoped to make a profit in the transaction. The traditional Soviet system, in contrast, was based on having the necessary materials on hand, irrespective of cost, with little economic incentive involved (Freivalds, 1985, p. 147)."
A second example of an alternative management arrangement is the Khattara project in Egypt, a joint venture between two Japanese companies, the Marubeni Corporation, a trading company, and Kubota, a tractor manufacturer, and the Rain Bird Irrigation Company of the United States. Rain Bird and Kubota provided irrigation and technical services for the entire 3,620 hectare project area, however the land was actually farmed by local farmers in smaller blocks of ten to twenty feddans, or 10.4 to 20.8 acres. The project produces high-value crops using traditional methods. When mechanization was introduced, it was at the minimum level necessary. For example, drip irrigation was used because center-pivot was considered too complicated and maintenance-intensive. Kubota supplied 81-horsepower tractors which were "powerful enough to do the work yet not make the project too mechanized" (Strohl, 1985b, p. 11). According to Tim Young of Rain Bird International, today the project is locally managed. Both Rain Bird and Kubota have small teams of technical personnel on hand to service the equipment (Young, 1992, personal communication).

These examples are essentially different forms of contract farming. This arrangement is widely used in the United States, particularly in the livestock and vegetable industries. It is also used by United Fruit and other companies in their operations in Latin America. Exploitation and domination by the companies have often given the concept of contract farming a negative connotation. However there are many cases in which it has proven to be a satisfactory arrangement for all parties, and it appears from the evidence presented here that it has promise as a method of large-scale crop production in developing countries (Glover, 1983).
CONCLUSION

A liberalized trade environment offers opportunities for expansion of developed-country agriculture overseas. However past experience has shown that there are many pitfalls as well. Many previous large-scale projects suffered from managerial inflexibility regarding adaptation of the projects techniques and structures to meet local conditions. The conclusion of this paper is that responsibility for operational decisions is most efficient when placed at that operational level, not at the corporate level in a headquarters office continents away. This can be achieved by expansion of family farms, which by definition are free from an extensive managerial hierarchy. Another alternative is to decentralize decision making through contractual arrangements, which can allow corporate projects to benefit from individual incentives.
ENDNOTES

1. Background information for this case study comes from Wood (1950) unless otherwise cited.
2. Background information for this case study comes from Strohl (1983) unless otherwise cited.
3. Background information for this case study comes from Strohl (1985a) unless otherwise cited.
4. Background information for this case study comes from Harler (1981) unless otherwise cited.
REFERENCES


