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A Comparative Assessment of the Milk Hauling Sector in the US and Argentina

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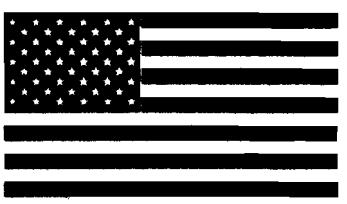

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PREFACE

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ABSTRACT

Milk is a highly perishable, voluminous commodity which is often produced by farms scattered around large areas. As such, assembly and transportation become a critical stage for quality preservation and cost-related efficiency.

In the U.S., milk assembly has developed to become almost an independent, albeit coordinated, step along the value-added chain. Processors are not usually involved in milk hauling logistics. Milk prices are quoted at processors' plants, leaving the producers responsible for paying transportation and other functions needed to deliver the raw product. In Argentina, milk prices are quoted at the farm gate, and processors are responsible for the logistics and direct payment for milk assembly. A search for more efficiency in milk assembly has recently started because of increases in pressures on dairy processors to sell additional production in international markets. Reductions in costs and increases in efficiency are basic to any competitive strategy in a non-subsidized environment, but serious constraints to both objectives are posed by inadequate infrastructure.

Despite environmental differences, the present situation of the Argentine milk hauling sector resembles that of the U.S. in past decades. Without losing sight of the specific characteristics of each system, the following comparison between the U.S. and Argentine hauling sector's attempts to highlight present levels of development achieved by each of them. Based on the maturity of the U.S. system, the direction and dimension of changes ahead for the Argentina system will be projected.

Key Words: * Milk Hauling * Procurement * Structure * Efficiency * Competitiveness *

A COMPARATIVE ASSESSMENT OF THE MILK HAULING SECTOR IN THE US AND ARGENTINA

Edith Depetris de Guiguet and James Edward Pratt

Introduction

Globalization, deregulation and trade agreements are impacting some protected sectors, like dairy. As economies continue to open, capital flows to and agribusiness corporations settle in countries where prospective conditions for agrifood exports and profits appear favorable. Companies with marketing expertise and management experience look for opportunities to take advantage of any potential competitive edge. General Agreements on Tariffs and Trade (GATT) results, on the other hand, are expected to open up some niches for dairy products.

Domestic as well as international competitiveness is becoming the issue for businesses' survival in many countries. That is the case for Argentine dairies, where milk production is increasing at an unprecedented rate while domestic consumption already peaked at a historical high. Additional output needs to be marketed to and beyond the countries participating in the Southern Common Market (Mercosur).

Though the U.S. dairy situation appears to be actually somewhat more stable in the context of the North America Free Trade Agreement (NAFTA), increased imports resulting from GATT may expose the sector to additional competition from world dairy markets. Firms' competitive advantages may be attributed to several sources. Of utmost importance are efficiency gains which result in cost advantages. Efficiencies in dairies are not only derived from production and manufacturing processes, but from all activities involved along the channel from producer to consumer. Milk is a highly perishable, bulky commodity produced by farms which are often scattered around large areas. As such, assembly and transportation become a critical factor for quality preservation and cost-related efficiencies.

In the U.S., milk assembly has developed to become an almost independent, albeit coordinated, step along the value-added chain. Processors are not usually involved in milk hauling logistics. Milk prices are quoted at processors' plants, leaving the producers responsible for organizing and paying for transportation and other functions needed to deliver the raw milk.

In Argentina, milk prices are quoted at the farm gate, and processors are responsible for the logistics and direct payment for milk assembly. Producers do not know the hauling costs involved, though they enter into processors' calculations when deciding what prices to pay for the milk. Viewed from another perspective, producers often implicitly share hauling costs on an average basis, that is, independent of their location, volume shipped, and number of daily stops.

A search for more efficiency in milk assembly has recently started because of increases in milk production. Dairy processors are beginning to look to the international market to sell increased output. Reductions in costs and increases in efficiency are basic to any competitive strategy in a non-subsidized environment, but serious constraints to both objectives are posed by inadequate infrastructure.

Despite environmental differences, the present situation of the Argentine milk hauling sector resembles that of the U.S. in past decades. Without losing sight of the specific characteristics of each system, a comparison between the U.S. and Argentine hauling sectors and some indicators of efficiency will highlight present levels of development achieved by each of them. Based on the maturity of the U.S. system, the direction and dimension of changes ahead for the Argentine system will be projected. The analysis will be based on data available from previous studies. Data for U.S. milk hauling relies on the study conducted by Erba, Pratt and Wasserman (1993) in New York and Pennsylvania. The paper by Depetris de Guiguet (1995) on the central Santa Fe region milkshed provides the data for the Argentine milk haulers.

Theoretical Framework

The theoretical justification for this analysis is borrowed from Porter's works (1985, 1990) on firm performance and competitive advantage. Two major ideas are singled out for their applicability to the milk hauling sector. The first stems from the concept that, to gain or maintain competitiveness, firms must be successful in managing their own internalized value chain as well as the broader value system. The second one is that there are factors within a nation that shape the firms' environment, promoting or impeding the creation of competitive advantages.

Managing the Entire System

According to Porter, two major strategies may lead a firm to gain or maintain competitive advantage over its rivals -lower costs and product differentiation. Although there is some room for differentiation and quality strategies, international competition in dairy products will more likely be achieved on the basis of cost advantages.

Gaining cost advantages requires viewing the firm as an interdependent system connected by linkages. Linkages result when the manner in which an activity is performed impacts the effectiveness of related activities. Overall performance is also dependent on coordination of linked activities. Competitiveness involves, therefore, optimizing linkages and tightening coordination of downstream and upstream activities. This is applicable to activities internalized within the firm as well as others conducted with external agents, or what Porter calls "the value system".

Competitive advantage results from how well a company manages the entire system. Although dairy manufacturers and handlers are the most visible participants in the value-added chain, cost advantages have to be emphasized throughout the entire chain. Procurement strategies as well as distribution strategies contribute to competitive success. Hauling costs, as a vital

component of managing a highly perishable, bulky commodity produced on dispersed farms, cannot be overlooked as a source of competitiveness.

Environmental Factors

Although firms are generally the real competitors in world markets, their success may be hindered or accelerated by several conditions of the national environment. Demand conditions for products or services, existence of related and supporting industries, availability of basic and advanced factors, firms' production strategies, structure, and rivalry interact in a dynamic setting to determine prevailing conditions. All of these are also influenced by government actions.

Firms interact with their environment and design strategies that help them to cope with it. Their strategies may also attempt to alter the environment in their favor. To evaluate firms' potential for success requires observation of their environmental conditions and how they adapt to them.

Policies and the Macroeconomic Environment

Protectionist dairy policies have been implemented in Argentina as well as the U.S., insulating dairy processors, producers, and consumers from the world market. Despite the absence of external competition, domestic pressures to reduce costs have been present in the U.S. industry for many years. Accessibility to loans provided producers and haulers the opportunity to invest in advanced technology and equipment.

In Argentina, chronic inflation and policies designed to keep the urban population's food prices down resulted in low prices to producers and provided disincentives to invest in new technologies. In 1991, a change in policies brought about deregulations in the dairy sector as well as in the economic system. Since January 1995, the Southern Common Market went into effect, allowing freer circulation of milk and dairy products among Argentina, Brasil, Uruguay and Paraguay. As domestic consumption reached a historical high plateau, increased production compelled firms to look for opportunities to export. The overvalued local currency in a stable macroeconomic environment has pushed dairies to gain cost advantages throughout the value chain, including milk assembly and transportation.

The U.S. is also presently in a free trade block (i.e. NAFTA), but dairy trade liberalization is only slowly beginning. However, competition among dairies has been strong in the past, and in some areas, mergers, take-overs and strategic alliances have reshaped the current structure. The milk hauling sector, with its support activities, has evolved in a parallel manner, resulting in fewer but larger firms.

Supply and Demand Conditions

Milk hauling links producers' supply of milk and processors' demand. Major characteristics of either side impact hauling and its efficiency. On the supply side, there is a trend toward concentration, with larger farms and fewer farm numbers, both in the U.S. and Argentina. Nonetheless, the average output per farm is still twice as large in the U.S. as in Argentina. Erba et al. (1994) reported an average of around 3,178 pounds per farm per day in New York State while the sampled average was 1,604 pounds in the Argentina sample.

The demand side is made up by handlers, either processing the milk themselves or acting as intermediaries for other processors. A modest proportion of the milk supply is sold as fluid milk in Argentina (18%), with the remaining proportion going to industrial uses. In the U.S. the fluid milk market is larger. In New York State, 40% of milk received from farmers at dairy plants went to fluid sales in 1994 (NYSDAM, p.8).

Dairy Firms Strategies, Structure and Rivalry

There is a trend in the U.S. toward fewer and larger processing plants as managers seek to gain greater economies of scale. Market concentration has grown substantially, with significant acquisitions and mergers in the dairy business. From a total of 171 dairy plants in New York State in 1985, the number is reported to be 93 for 1994 (NYSDAM, p.7). Size of plants also increased. For example, the 70 manufacturing plants in 1985 used 7.96 billion pounds of milk and other dairy products for manufacturing purposes, making an annual average of 113.7 million pounds per plant. For 1994 the average was 140.7 million pounds. The increase is larger for pasteurizing plants. The utilization of milk received at New York plants for fluid sales jumped from an average of 54.4 million pounds per plant in 1985 to 78.3 million pounds per plant in 1994 (NYSDAM, p.8).

However, in the Northeast region, there is still competition for farmers' milk between proprietary and cooperative handlers or between cooperatives. Farms located in the same vicinity may not belong to the same cooperative, and so haulers may pass through the same area to pick up milk for different handlers (Erba et al., 1995).

The structure of milk procurement in Argentina is very fragmented. Procurement is carried out by handlers and processors. Half the country's milk is produced in Santa Fe province, where 134 processors operate 201 plants. In addition, 46 cooperatives assemble milk to deliver to a cooperative federation and private processors. The largest proportion of milk collected (61%) goes to cheese-making, followed by powdered milk (30%), and milk jam (3%).

There are a few large dairy processors and a large number of small ones. Almost 51% of the plants process less than 13.2 thousand pounds per day. In the past, protectionist policies insulated the dairy sector from external competition. Survival and growth in the domestic finished product markets was highly dependent on raw milk supplies.

Industry excess capacity, pronounced in winter months due to a low seasonal production, and farmers' changing shipping destinations were key factors affecting procurement for dairies. The need to secure raw milk prevailed over hauling efficiency considerations. Even when dairies paid for transportation, they did not hesitate to extend their routes to pick up milk from distant small farms. Losses in efficiency at the milk assembly level were necessary to achieve a reasonable capacity utilization to take advantage of economies of scales, and, in some cases, to satisfy customers' demand, and avoid market share losses.

Although rivalry still exists among competing industries, the environment has changed. Procurement of raw milk, while still important, has become less critical for dairies. The steady increase in production and lower seasonal variations has resulted in a strong milk supply which exceeds plants' capacity and diminishes processors' competitive needs. Furthermore, milk imports from other countries can contribute to the supply needed by processors.

Factor Endowment

From the necessary pool of resources, two basic factors are singled out for their impact on competitiveness.

At farm level, milk hauling is affected by farm technologies, and in particular, farm cold storage. When facilities are available to store two days' production, haulers can visit the farm every other day. With smaller tanks, pickups may be needed once a day, and with no tank, pickups are needed at least twice a day. While most US farms are equipped with bulk storage tanks, that is not the case for Argentina. In 1992, only 2% of Santa Fe dairy farms had cold tanks. There is a growing trend toward adoption, and an estimated 22% of farms will be equipped with bulk storage tanks by 1995. Only 15% of farms participating in the study were equipped with cold storage.

Basic to the hauling businesses is the availability of adequate roads. Paved roads afford haulers lower maintenance costs for their vehicles, longer vehicle life expectancies, reduced risk of accidents, higher speeds, and decreased dependence on good weather for travel. Furthermore, paved roads allow for the use of larger vehicles which can reduce the cost per unit of transported volume.

No mention of difficulties concerning road infrastructure has been cited in U.S. studies, although reference to regulations on weight limits has been made (Erba et al., 1995, p. 12). A very different situation faces Argentine haulers. In the area selected, the heart of the central country milkshed, most roads are dirt (68%), with a lower proportion of paved and improved roads (27% and 5%, respectively) (DPV, 1995).

Environmental factors such as scarcity of farm cold storage and poor road conditions may be cited and offered to explain organizational differences in the milk hauling systems in the U.S. and Argentina. In Argentina, both factors justify the maintenance of reload stations and distant processing plants where milk could be brought and cooled or processed to prevent spoilage.

Though the U.S. had a similar history, reload plants have been largely closed down in many parts of the country and milk moves directly from farms to city milk plants (Erba et al., 1995).

Basic Characteristics of Milk Assembly

Having mentioned the role that hauling has played in both countries, and some environmental factors that influence its competitiveness, this section describes some basic characteristics of the hauling sector and presents some efficiency measures.

1. Contracting versus Integration

Hauling businesses may be operated by the firms involved either in milk handling or processing, or by other specialized parties. Examples of both types can be found in the U.S. and in Argentina. Although it appears the first practice was more common in the U.S. in the past, it is not today. Handlers found the cost of maintaining their own fleets excessive due to high unionized labor costs and there was a perception of unnecessary risk exposure (Erba et al., 1995, p.2). In Argentina, fleets persist for some federated cooperatives whose major function is milk assembly, but not for processing companies. In both countries the most common strategy is to contract with independent haulers.

Government regulations require milk haulers to be licensed by the state in which they operate in the U.S., but no corresponding regulations exist in Argentina.

2. Size of Hauling Businesses

In the U.S., as reload stations began to close down and milk moved directly to city milk plants, the hauling businesses became more specialized. Larger investment requirements and more time on the road lead haulers to search for advantages of size efficiencies (Erba et al., p.2). For example, in New York State in 1993, 29% of haulers operated one vehicle, 56% operated between 2 and 6, 11% between 7 and 12 and 9 % more than 13 vehicles. Concentration is taking place as exemplified by the fact that the single-vehicle milk hauling owners only account for 5% of vehicles operated in New York state, while the 5 largest haulers accounted for 30% of all vehicles (Erba et al., 1995).

For Argentina, in contrast, most haulers were single-vehicle haulers. In the study, the largest contract hauler operated three trucks. Some of the reasons that justify Argentine handlers' strategy were to avoid giving haulers too much bargaining power, disperse risks of failure, and give business opportunities to people where opportunities are not abundant.

3. Haulers and Handlers Relationships

One of the most distinguishing characteristics among the U.S. and Argentine hauling businesses is their relationship with handlers. In the U.S., haulers seem to act much more independently of handlers than in Argentina. Haulers may "own" their route, and shippers may change deliveries should the hauler decide to change dealer. As haulers grow into larger, specialized firms, they may serve several handlers at the same time. Erba et al. found that 53% of haulers provide service to a single milk dealer, 30% serve two and three, and 15% more than three. In Argentina, haulers follow specific instructions from handlers related to every aspect of the hauling business except the mechanical mantenaince of their trucks. As most are individual owners, exclusiveness is the characteristic of most hauler-handler relationships.

4. Equipment Ownership

In the U.S., hauling businesses owned most of the milk hauling equipment. (Erba, p. 7). However, there was a small percentage of equipment that was leased by haulers (3% of vehicles and 1% of trailers). In Argentina, most trucks are owned by the contractors themselves, but the dairies own the bulk tank trailers. This is part of the handlers' strategies to secure control of their "routes".

5. Truck Type and Age

A wide contrast is evident when comparing truck type and age between the two countries. A portion of the difference may be the structure of farm supply and road availability. As already mentioned, in the U.S. there has been a decrease in the number of farms and processing plants with an average size increase of the remaining ones. Because nearly all farms have cold storage capabilities, milk pickups take place daily or every other day for larger output farms. The milk is very often sent directly to distant city milk plants. Under these conditions, tractor-trailers are more appropriate for milk assembly and delivery than single-axle or double-axle vehicles.

The New York-Pennsylvania survey revealed that 46% of haulers used tractors, 41% double-axles, 11% triple-axles, and only 2% single axles vehicles (p.14). The proportion of tractors increased significantly when the final destination was New York City (100%) or cities in other states (88%). Furthermore, a correlation was found between type of vehicle and age, such that as vehicles are replaced, more tractors are bought. Fifty one percent of tractors are less than 5 years old, as are 45% of thri-axles , 36% of two axles and 12% of single axles. The most common makes were Mack (57%), International (15%), Ford (9%) and Freightliner (4%).

In Argentina, milk pickups rely on single-axle vehicles. Larger vehicles are exclusively used for longer distance transportation, from reload to processing plants or interplant movements. Related to age, 32% of trucks were less than 4 years old, 28% between 4 and 9 years and 34 % 18 years old. Older vehicles were used as reserves or for very short routes. The most

popular makes were Ford (77%), followed by Dodge (9%), Mercedes Benz (6%), Fiat and Chevrolet (each near 4%) and Bedford (0.4%).

6. Tanks. Capacity and Age

The growth in tank size and increase in tank age in the U.S. goes hand in hand with age of trucks and final destination of milk. Though tanks tended to be older than trucks, the difference was not significant: twenty seven percent of tanks were less than 5 years old, and single-axle trucks had the oldest tanks on average.

Average capacity of tanks varied with chassis type. Only 1% of the trucks in the survey had an average capacity of less than 2,488 gallons, 24% had an average capacity of 4,266 gallons, 8% 5,113 gallons and 67% a capacity of 6,202 gallons.

In Argentina, trucks need to visit a large number of smaller farms, often on roads in poor condition. Therefore, capacity of tanks cannot be large. On average, 96% of surveyed trucks were equipped with tanks of less than 2,001 gallons. The remaining 4% were about 20% larger. The average age of tanks was 6.4 years.

Efficiency in Milk Hauling

Several efficiency indicators have been calculated for both countries. The measures selected for this paper are: average number of farm stops per day, average pounds of milk hauled per day, and average volume per distance traveled. Altogether, they contribute to understanding the basic differences underlying both systems.

Average Number of Farm Stops per Day

Farm supply characteristics as well as available infrastructure impact the assembly organization, and the efficiency of milk hauling. For example, smaller farmers without cold storage require haulers to make frequent stops, spend considerably more time off the road, and deliver less milk to plants than would larger farms.

In the U.S., the trend is for milk pickups to take place every other day. Even when tanks are not large enough, pickups occur no more than once a day. With larger farms, fewer stops are needed to fill the tank. On average, the largest number of stops per day was made by triple-axle vehicles, with 13 daily stops. Double-axle vehicles averaged 12 stops per day, tractors averaged about 10 stops per day, and single axle trucks with 7 stops per day. The figures represented a significant decrease in average number of daily farm stops compared to a previous survey in 1981. The decrease can be attributed to longer hauls as well as an increase in individual farm milk output.

Dividing the average pounds of milk moved per day by chassis type and the average number of farm stops it is possible to get an aproximation to milk picked up per stop. It corresponds to 7,803 pounds for tri-axles, 4,279 for double-axle, 5,331 for tractors and 3,826 for single-axle chassis.

The picture is vastly different for Argentina. On average, each hauler made a total of 25 stops per day; 13 in the morning and 12 in the afternoon routes. On average, each hauler picked up 1,047 pounds per stop in the morning and 766 pounds in the afternoon.

Average Pounds of Milk Hauled per Day

Besides the number of stops, reduction in costs can be achieved with a fuller utilization of tank capacity and a larger total volume shipped per day.

In the U.S., these indicators are dependent on chassis type. Tri-axles moved the largest amount of milk per day, with an average of 55,402 pounds, followed by tractors, with 52,779 pounds, double-axle with 50,929 pounds, and single-axle with 27,167 pounds. The superiority of tri-axles over tractors was explained by a larger number of loads per day. Tractors have larger capacity but move fewer loads because they are typically used for long distance deliveries, not local deliveries.

In Argentina, the average daily haul was 23,166 pounds per day. On average, each hauler transported 13,544 pounds in the morning and 9,766 pounds in the afternoon. With an average capacity of 16,643 pounds per tank, the figures suggest a low tank utilization. The average of percentages of tank utilization was 82.6% in the morning and 58.6% in the afternoon. A key factor to understand this situation is the strategy haulers use to pick up cooled and non-cooled milk from farmers on the same route. The two types of milk are stored in different tank compartments. Delivery to the plant may be required when one of the compartments is full, and no more "other type" of milk is available on the same route. Improvements are made for cold tank hauls, when more than two loads can be made per day.

Average Volume per Distance Traveled

Interpretation of this indicator is not straight forward because of the different sector organization in each country.

In the U.S., as most milk goes to fluid consumption, it pays producers to send the product from the farm to large urban centers directly. In the Northeast that is precisely the case, targeting New York City in particular. For milk used for manufactured dairy products, processors are usually located near production areas, and haulers do not need to travel long distances.

Hauling data available do not discriminate between fluid and industrial milk, although it does for broad geographical destination. On average, tractors traveled longer distances, 288 miles

per day, carrying a total of 52,779 pounds of milk. Tri-axles traveled 138 miles transporting 55,402 pounds; double-axles 153 miles and 50,929 pounds; and single axle 67 miles with 27,167 pounds. The resulting indices are 183 pounds per mile, 401 pounds, 333 pounds, and 405 pounds respectively.

Tractors' lower pounds per mile need to be assessed in light of the fact that 100% of vehicles going to New York are tractors, as are 88% of vehicles going to out-of-state facilities. In constrast, only 46% of vehicles used to deliver to in state/upstate facilities are tractors. Therefore, while other types of trucks accumulate mileage by delivering more than a load per day, tractors may do so on a single run (Erba et al., p.26)

In the Argentine sample, most milk is used for manufacturing purposes, with plants located in nearby areas. Average distance traveled per hauler day was 111 miles, with a similar half that distance average for morning and afternoon haulers. Average volume per mile was 247 pounds in the morning and 173 pounds in the afternoon shift.

Conclusions

Development of the milk hauling sector in the U.S. has progressed with the technological improvements in other sectors. As farms grew in size and diminished in number, and distance to consumption centers increased, hauling businesses adopted the appropriate equipment. The structure of the hauling business itself is changing as fewer, but larger, firms displace smaller independent truckers.

Problems still persist and some constraints continue to pose limits to efficiency. Government regulations limit load sizes and specify daily maximums for hours of driver service. Issues of co-mingling of milk and route overlap continue to reduce hauling efficiency in some areas. Coordinating with processors to reduce excessive waiting times for unloading and rinsing the tank at the plants is also an important issue that needs to be addressed. Of no less importance is the search for fair and equitable hauling rates (Erba et al., 1995).

In Argentina, the milk hauling sector has come to the attention of processors as they are struggling to improve quality of products and gain efficiencies to become competitive exporters. However, the integrated nature of hauling requires accompanying improvements at other levels.

At the farm level, a key factor for quality preservation as well as hauling efficiency is the generalized adoption of bulk milk cold storage. Fast cooling and storage at the farm delays milk deterioration. As cold milk is directly transfered to an insulated truck tank, surface contact is reduced. Low temperature and less exposure ensure processors a dependable source of consistent quality milk. The impact of cold tank storage brings more than quality advantages. It impacts hauling efficiency reducing the number of required daily farm pickups, allowing greater payloads, more flexibility in timing pickups, as well as more intensive use of available equipment. Furthermore, cooled milk moved in insulated tanks can be delivered to more distant plants,

reducing the need to maintain country receiving stations. Provided producers can get access to some form of financing, widespread adoption of cold storage is expected in the short run.

Another key issue is availability of an improved road network that permits use of larger-sized vehicles regardless of weather conditions. Road improvements are also the target of public and private sector activities. Joint efforts are being made by local and provincial governments, processors, and producers to contribute to upgrade dirt roads. Despite good intentions, a slower advancement is expected because of the large financial requirements.

Processors milk procurement strategies are also expected to be redefined under the current conditions. As milk supplies continue to increase, strategies will focus less on securing procurement and more on quality and cost reduction.

Any rationale for progress in the milk hauling sector cannot leave aside any of the previous issues. As developments take place, there are several other hauling related aspects that need to be addressed by Argentine processors in their search for competitiveness. To mention a few: industry agreements on minimum standards of quality for received milk, pickup measurement procedures, and ways to enforce implementation. Not less important, there is need for recognition of special status for bulk pick-up tank drivers, and in their roles in quality and safety control of a food item. As long as processors make progress in restructuring assembly practices to prevailing conditions, without ignoring the specificities of their own value-added chain, they will contribute toward the objective of achieving competitive success.

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