

## **Full Paper**

### **(Not so) wild management: Contractual arrangement and strategy in alligator production**

**Keywords:** contractual arrangement; alligator production; organizational economics

#### **Introduction**

The aim of this research was to describe the contractual arrangements related to a company of alligator-derived products in Southern Pantanal in Brazil, Caimasul. Traditionally, the animals can be acquired by harvesting, ranching and farming model.

The production of alligator meat and derivatives is quite recent. The start of activities of the company Caimasul dates to 2017, located in the city of Corumbá, in the state of Mato Grosso do Sul. Before that, only another large organization was active in Brazil, Coocrijapan, Cooperative of Alligator Breeders of the Pantanal, located in the city of Cáceres/MT, which ended its activities. There are also about 10 other smaller establishments dedicated to the slaughter of alligators in the country, with low expression.

The study object, the company Caimasul, is the sector's largest in the country, with a slaughter capacity of 600 animals per day. It produces alligator meat (Caiman specie) for domestic and foreign markets. In 2019 the main meat importers were countries of Asia, but now, 2021, the main product, the leather (or skin), is imported by countries like Mexico and Italy.

In the domestic market, the main buying states are the follow: São Paulo, Goiás, Paraná, Rio Grande do Sul, Espírito Santo, Rio Grande do Norte, Santa Catarina, Minas Gerais and Mato Grosso do Sul. In addition to meat, the company handle with leather to the domestic market too and has its own sale of some handcrafted items made from leather and other products that mention these animals including taxidermy.

Even being the biggest slaughterhouse for this product in Brazil, Caimasul cannot attend the demands of the foreign market, especially in China. However, given the number of animals available in Brazil, which is estimated, the company could be the largest in the world in the sector, but today the company occupies the 53rd position.

Although alligator meat has a very high value in the domestic market, located above chicken, pork or cattle, and there is great external demand (in 2019, only China

sought to acquire 40,000 kilos and currently the company's production can reach around 10 thousand kilos), the company operates below demand due to the lack of resources for investments in the expansion of its plant in the city. Banks and investor agents have not yet shown interest in the sector, funding resources or partnerships for investment in the company.

Both the potential of the internal and external market and the contractual arrangement of the company, which will be presented throughout this paper, attracted the attention of the present authors.

### **Research problem and objectives**

Traditionally, there are three main ways to acquire the alligators for production of derived products: by harvesting, ranching and farming model. In the first, alligators are captured in the nature. The second one is based on the collection of eggs in nature. The third is the creation in captivity.

Considering that Caimasul is the main company of alligator-derived products in Brazil and that the company chose only two contractual arrangements, based on ranching and farming models, we proposed explore here: Why did the Company chose these contractual arrangements?

The main objective of this research was to explore the contractual arrangements of a (apparently) non-traditional company, but which presents a not so “wild management”, in face of this structured management and the way to deal with its externalities.

### **Theoretical approach**

The theoretical approach is based on organizational economics theory (OE) and transaction cost economics (TCE). Starting to Coase (1937) and Williamson (1996) is possible to understand the firms and transaction costs related to specific assets.

Williamson (1996) highlights different contractual arrangements that can be characterized by vertical integration, markets, or hybrid forms. Each of them involves the presence of risks, such as contractual breaches, and asset specificity. When selecting one of the options, the company is making a trade-off, seeking the most advantageous arrangement for itself, in terms of transaction costs involved.

With regard to asset specificity, Williamson (2012) distinguishes them into four types: (1) location specificity, which basically refers to the location of the company and

its raw materials and resources necessary for production; (2) the specificity of physical assets, related to the physical structure, machinery, movable and immovable assets; (3) the specificity of human capital, translated by work conditions, relationships and necessary knowledge; and (4) dedicated assets, whose investments in them involve the expansion of the plant to serve a specific buyer, which includes negotiation risks and expansion of the contractual relationship.

According to Demsetz (1988) it is important to observe, the length of time of association between the company and the same input owners. It means that short-term contracts can consider both, the spot market exchange or can contemplate the possible continue association between parties. In both, “hold-ups occur when unanticipated events place the contractual relationship outside the self-enforcing range” (Klein, 1996).

## **Methodology**

The chosen methodology is inspired by the model proposed by Ménard et al. (2014). The qualitative research was used, with descriptive approach, investigating a case study. The analysis comprehends (1) the sector presentation and the companies of this sector; (2) Characterization of the sector, describing the institutional and competitive environment, to contextualize roles of the game and market structure of the firm; (3) Characterization of the firm, focusing competitive strategy and main ways to obtain the alligators; (4) Main motivations to the chosen governance structure by the company. The data was collected by non-participant observation, documental data and in-depth interview conducted with company employees.

## **Results analysis**

### **Industry characterization**

To contribute to the proposed objectives, this section aims to discuss the market for alligator products in the world, the context of the alligator in environment, its representation in the Pantanal area and its production model.

The worldwide alligator market offers a variety of products such as bones, carvings, meat, eggs, live animals, but mainly skin (leather) and skin pieces. The species that have been used for industrial processing are *Alligator mississippiensis*, *Alligator sinensis*, *Alligatoridae* spp., *Caiman crocodilus apaporiensis*, *Caiman crocodilus crocodilus*, *Caiman crocodilus fuscus*, *Caiman crocodilus yacare*, *Caiman latirostris*,

Caiman spp., *Melanosuchus niger*, *Paleosuchus palpebrosus* and *Paleosuchus trigonatus* (Convention on International Trade in Endangered Species of Wild Fauna and Flora [CITES], 2021).

According to the CITES database (2021), in 2020 43,118 bodies, 20 live animals, 595,623 pieces of skin and 246,555 skins were exported. In 2019, 26,651 bodies, 1527 live animals, 1,130,778 pieces of skin and 646,800 skins were exported. The meat market is still not very expressive when compared to the skin, from 2017 to 2019, 92 tons were exported. The main meat exporter is the United States and the main importers are Hong Kong and China. Brazil exported 18,189 skins between 2017-2020, mainly to Europe and Japan, and 2,816 clothes and products were made with skin in the same period, with its main suppliers being Europe, Japan and the USA.

The transactions that evolve these products must assume environmental responsibilities, being important the care in the management of the production or storage of animals in the environment, considering that they are endangered species (CITES, 2021).

In the Pantanal, the studied region, the predation of animals in the wild almost put the population of alligators in the Pantanal region at risk, these animals were seen as enemies of the riverside population, especially fishermen, because they are the main predators of fish. These animals were hunted for the sale of their meat and skin in a predatory manner, without any environmental control (Mourão, Campos, Coutinho, Abercrombie, 1996; Zucco & Tomás, 2004).

A solution to this environmental problem was the breeding and controlled slaughter of these animals through slaughterhouses. In the Pantanal region there are only one company in current activity: Caimasul, the largest alligator slaughterhouse in Brazil in number of animals, with a slaughter capacity of 600 animals per day. It produces alligator meat for the domestic market in the country, and its main leather importers are Mexico and Italy, and companies like Gabbana, Gucci and Hermes. Even though it is the largest slaughterhouse for this product in Brazil, it cannot meet the demands of the foreign market.

Alligator production is carried out in three ways, "Harvest", in which the animal is collected directly from nature, with or without control of the alligator population (Piran, 2010). "Ranching", with the collection of eggs in the nests directly extracted in the natural environment and subsequent incubation in incubators (Shirley & Elsey, 2015). In the case of Caimasul, it has the participation of the surrounding community. And the third,

"Farming", which is the total production in captivity (Gomes & Phillippi, 2018; Fernandes, 2011), characterized by a vertical integration model. In this captive production model, the females are kept in a "maternity system". However, the Ranching model has higher production.

Concerning to the models presented, it is possible to analyze their impact on the environment, using a gradual scale that goes from greater impact and the need for greater environmental management, to the least impact, although it is still necessary to pay attention to the activities to minimize impact the environment. The Harvest model receive greatest concern among them, the animals are taken directly from native areas to be traded, so the control of alligator populations is necessary to maintain an ecological balance (Joanen, Merchant, Griffith, Linscombe, & Guidry, 2021; Piran, 2010). Moyle (2013) investigated this case and founded that the Harvest model, when covered by public legislation, protects and monitors populations and contributes to environmental preservation.

In the Ranching model, the egg collection needs to be controlled to not harm the birth of new alligators. The collection needs to be carried out with as little impact as possible to not alter original characteristics of the nest, if that happens, the female needs to change posture location. In addition, it is expected an ability of collectors to store eggs properly and to promote better hatch rates (Elsey & Trosclair, 2008). The Farming model has the lowest ecological impact as it is fully controlled in the industry, although waste management is necessary in order to not contaminate the ecological system surrounding the plant.

In comparative terms, Moyle (2013) shows that the animal husbandry (Farming and Ranching) does not obtain economic advantages (production costs, for example) when compared to Harvest, however, it has collaborated to protect the natural habitat.

Another important aspect about these models is the presence of pathogens that are dangerous to human health, a relevant discussion considering the consumption of alligator meat. Behravesh, Williams and Tauxe (2021) present a discussion on the efficiency of productive control to avoid this problem, assuming that Farming and Raching model are those that enable better control to make safe products available to consumers.

According to Brazilian regulation, the alligator production is supported by Institutions as IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais), in federal sphere, and IMASUL (Environmental Institute of Mato Grosso do Sul), in state sphere. The alligator meat must also receive the SIM certification, that means a municipal

certification based on a federal certification that guarantees the meat is properly to consume.

### **Company Characterization**

The Caimasul company operates its activities since 2017 in the city of Corumbá, in the state of Mato Grosso do Sul, Brazil. Caimasul has a slaughter capacity of 600 animals per day. It produces alligator meat and skin (Caiman specie) for domestic and foreign markets as previously explained.

Considering **location specificity**, the company is located in the Pantanal area, far from the city center, where there is an abundance of Caiman alligators, and another factors: a natural environment conducive to survival, breeding and spawning of the specie; natural environment that can be preserved for the animal breeding purposes; partner private properties where eggs are collected; the presence of people of the community for manpower; and abundance of water needed for production.

Observing the **specificity of physical assets**, the company's plant is large, has adequate space for handling animals, tanks for alligators separated by size, area for preparing feed, equipment for recycling water, slaughter area with all the necessary machinery, in addition to offices, space for handling products and a store.

The handling of alligators requires daily monitoring, although it is not that complex. Feeding the animals is based on the feed produced in the company and water. The risk of contamination by salmonella is one of the few health problems that can occur in this type of production, so cleaning and sanitizing the breeding sites is essential. In addition to the tanks for raising animals separated by size and stage of life, there are also “maternity wards” for females that are raised in captivity, which are about 1000 females and 300 male alligators.

The egg collectors work with smartphones and mobile app granted by the company, which serve to geolocate the nests and collect eggs. The collected eggs are transported by company own transport.

The surrounding community (the collectors) receive training from the company for collection (the eggs, for example, must be delivered to the company in the same position as they are found in the nests), for safety, for the preservation of nests and animals, and for the use of smartphones.

Within the scope of **specificity of human capital**, the company has around 80 contracted employees. And the riverside dwellers who collect the eggs, which are about

50. There is a formal contracting of these riverside dwellers, for a fixed period (egg collection period) and the job contract is also registered by IBAMA for IBAMA's control over who are the people hired by the company for egg collection.

The riverside dwellers receive a payment for each collected egg and the same amount is paid to the owner of the property where the collection was made. These collectors must be local residents in accordance with laws stipulated by IBAMA, which prohibits the hiring of other people for this purpose.

Regarding to **dedicated assets**, the company does not have specific investments for specific clients, but it has the specific assets for the specificity of its product, and it is essential that the businesses comply with current legislation, that is, the general requirements of social, environmental, labor and health standards for sales in external and domestic market.

### **Main motivations for the chosen governance structure**

Considering the three manners to obtain the alligators, the harvesting model, in which the animal is collected directly from nature, with or without control of the alligator population is not a model adopted by Caimasul. Instead of, the company opted by farming and ranching arrangements. The meat of animals captured in the wild can be contaminated, one of the reasons for not using this type of arrangement, in addition to the prohibition by law, lack of control mechanisms over the animal population, including the risk of extinction.

The first one, farming, presupposes the total production in captivity, characterized by a vertical integration model, was more recently adopted by the company, with the maintenance of the females in the maternities. However, the Ranching model has higher production.

The farming system, however, will allow the company to expand animal breeding research, seeking improvements in the quality of meat, leather and reduction in production costs, maintaining a genetic database contributing to the maintenance and conservation of the species.

The second one, ranching, assumes the collection of the eggs in the nests directly extracted in the natural environment and subsequent incubation in incubators. This model has, in this case study, the participation of the surrounding community by a formal contract.

The farming represents a safeguard against risks to meet a demand. Despite that the production on captivity is lower than in nature. Because of this, the main arrangement is the ranching.

In the ranching model, it is necessary to carry out a survey of private farms in the region, which will be registered, with authorization from IBAMA, in order to collect eggs from free-living animals. During the selection of these farms, a population survey of the animals in pre-defined areas is carried out. Firstly, a map of the farm is made, and secondly, a map of the areas of the farm that can be managed for this purpose.

Every year an alligator population census is carried out. From 30 to 50 alligators are captured on each farm and a numerical tag is placed on each of the animals, containing weight and measurements. A mobile app developed by Caimasul identifies the animal, the geographic coordinate, takes a photograph and provides the animal with a number, including this whole data in the survey of animals in the region.

All these data become a reference for generating a license for collecting eggs. Only approximately 5% of the production of an area is allowed to be manage. Thus, it is possible to identify: whether the animal population is stable, whether the interferences carried out are being aggressive or not, and the permitted collection quota for each farm is established every year. If the interference is aggressive, that area will not be suitable for collection next year. Afterwards, the animals are recounted and if conditions are better, the area is retaken. This is important because animals need to be healthy and well, otherwise they will not reproduce. The areas need to be very well managed.

Alligator females lay once a year, between late December and late February, about 30 eggs per nest. After laying, the female can be captured, identified with the tag, weighted and measured, and returned to the environment. When animals are recaptured, it is an excellent sign that the area is being well managed. Females can make nests in the same place each year, if the region provides this quality for the nests. The eggs measure on average 5 to 7.5 cm in diameter, weighing 70 to 90g. When the nests are opened, all the eggs need to be collected, due to the variation in temperature, which can damage the eggs that remain.

The riverside dweller, in turn, receives a smartphone, information about the farm's quota and the permitted collection area. The mobile app that makes use of geolocation accurately identifies within 5 meters if it exceeds the allowed area. With the equipment, he takes the photos and, posteriorly, accommodates in a propriate box the eggs in the same position they were in the nest, until the company receives the eggs.



At the company, the eggs go to the incubator and hatch between 70 to 80 days depending on the temperature variation. The efficiency (hatching of all eggs) is 87% in this incubation process. Within 5 to 10 days the animals can already go to the next stages of production and fattening in the tanks.

The riverside dwellers collector receives for each egg collected. At the time of data collection for this research, the payment made was R\$1.50 (about \$0.25) per egg for the riverside dwellers and the farm owner, which guaranteed an average return of R\$6,000.00 to R\$8,000 (about \$1,000.00 to \$1,330.00) monthly for the riverside dwellers.

## **Conclusion**

The conclusions address that the chosen contractual arrangement allows the sustainable use of natural resources and conservancy. From a social and economic point of view, considering that, in the past, the alligator was seen only as a predator for farm animals and cause of fear for farmers and river dwellers, who practiced predatory capture of the animal, today the alligator is no longer a problem, to be a source of income for these people. If, in the past, the riverside dweller received some money for the clandestine sale of the dead animal, today he earns more money with the collection of eggs for Caimasul.

On the one hand, the farming system focuses its contribution to genetics and conservation, on the other hand, the ranching system has social and economic importance. Regarding to the company's hiring of riverside dwellers, it is a two-way street. The temporary hiring of riverside dwellers is legally allowed and encouraged, which is good for them. And the company needs this workforce, which is familiar with the region.

From an environmental point of view, the reuse of water by the company generates a daily treatment of 400 thousand liters of water. Another positive externality for the environment is local preservation, especially for some reasons. If the farm area is not preserved or well managed, the female alligator does not return to lay eggs. In addition, fires, which are common in the region for raising cattle, also scare away female alligators, which is yet another reason to avoid them. There is technology available to investigate the movement dynamics of alligators due to anthropization.

Despite the advance in the consumption of alligator meat in the country, it is still a secondary product of the animal. Leather (or skin) is the product with the highest added

value and the preferred product for export. Investing in dedicated assets may be something to be investigated for the future. The company has the capacity to grow, but it still does not have large investors.

Finally, it is a relatively simple animal to manage, and its culture is embeddedness at the Pantanal, being an animal adapted to the region, more than cattle, inclusive. It is considered that the hybrid contractual arrangement practiced is which, in fact, provides lower transaction costs for the company, formalizing a well-thought-out management for the product and region in question, and “not so wild” as it seems.

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