ec2ce: ARTIFICIAL INTELLIGENCE IN THE AGRIBUSINESS[1]

INTRODUCTION

At the end of September 2018, co-founders Pedro Carrillo and Ricardo Arjona, CEO and COO respectively of the start-up ec2ce[2], had a meeting to define some essential aspects of AGPLATFORM, the new application they hoped to rollout in the coming weeks. The matters they needed to address included issues such as prices and the most effective way to reach the market and drive revenue as quickly as possible.

The previous year had been the first in which they had carried out real marketing activity, and it had marked a turning point in the company's brief history. They had made significant progress in validating the business model, managed to consolidate a small portfolio of repeat clients, and had the support of a group of investors who, together, had contributed over 500,000 EUR. Several consultants specializing in new technologies for agriculture (like *AgTech* or *Smart Farming*) had identified ec2ce as one key player in the sector[3,4], and many funds had shown their interest in considering potential investments in the company.

In the coming weeks, the co-founders would hold several important meetings that could condition the future of ec2ce. At the end of the month, they would meet with two major companies to explore the possibility of signing commercial collaboration agreements that may help them in attracting business over the next few years, although they were not totally convinced of this option. Specifically, one of these companies had shown such strong interest that it was willing to enter into ec2ce's shareholding, intending to secure the possibility of gradually increase its participation up to a hundred percent in the medium-term.

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[1] This is a case of the Research Division of Instituto Internacional San Telmo, Spain. It has been written by Professors Antonio Villafuerte Martin and Bassem Nwelati Artillo, and is intended as a for class discussion only and not to illustrate any judgment on the effective or ineffective management of a specific situation.

[2] As it would be read in English, *easy to see*.
[3] https://www.marketsandmarkets.com/PressReleases/ai-in-agriculture.asp.
[4] *Cultivating AgTech*, CBInsights, March 2017 (www.cbinsights.com/research/agtech-startup-investor-funding-trends/).

Finally, they were meeting with a couple of American investment funds that had accepted a valuation of the company at 10 million EUR for a new round of investment for 2 million EUR[5]. These funds would enable the company to carry out its growth plans for the next 18 months, especially the launch of the AGPLATFORM application, on which so many hopes were placed.

However, nothing was closed yet. The entry of new partners caused various concerns among ec2ce's developers and partners. Depending on when they entered, capital gains could be significantly different: if they entered too soon, ec2ce would miss out on their expected valuation potential. Also, the entry of an unsuitable investor could jeopardize the future of the start-up and the expectations the partners harbored.

In the last meetings of the Board of Directors, they had often discussed possible answers to the following questions, reaching no consensus:

> *"Is this the most appropriate time to let a large investor enter? If so, what should that investor be like? What desirable features would it have? Wouldn't it be better to delay the entry of new investors a little and improve the company's valuation once we consolidate the business model, customers, products, and revenues?"*

Ricardo and Pedro could not delay making other, more operational, decisions that were also critical for the evolution of the business:

> *"How should we accelerate the national and international growth of our company? How to market the new application we are developing to increase our income and benefits as quickly as possible? How to set prices?*

ec2ce

Ricardo[6] and Pedro[7] had met while working at a large, highly diversified multinational company that was listed on the Spanish stock market. Both worked in the bioenergy division and held positions of responsibility as vice-chairmen of their respective businesses. They recalled some details of their time at that multinational:

> *"We entered when the division had only 10 employees. At that time, we felt like entrepreneurs within a multinational. We were given the opportunity to develop*

[5] Financing needs would be covered at 50% through public funds.

[6] Ricardo Arjona was an industrial engineer and doctor with an MBA. He started his career as a project manager in engineering and later focused on the development and launch of new technological products and services. After several professional changes, he became executive vice-chairman at the multinational company where he had met Pedro, leading line from the US with over 300 engineers.

[7] Pedro was a graduate in Physics and held an MBA. He had always worked in the same multinational where he met Ricardo, where he had held positions (ranging from technical to sales jobs) in different divisions. He became *trading* de *commodities* vice chairman in one of the most important divisions of the group, where he was responsible for business operations of over 2,000 million EUR combining purchases and sales.

the division using business criteria as if it were a company in itself. We reached sales of 3.5 billion EUR and were present on three continents. Nevertheless, from a certain moment, we stopped feeling that we were responsible for the business; we felt that it was time to move on to a new stage."

In 2014, with the support of a friend and investment partner, they started the ec2ce project. It was incorporated in Seville (Spain) on January 13th, 2014, with a share capital of 65,000 EUR contributed by the three founders. Pedro joined as executive manager of the business; Ricardo, who had the technological knowledge, joined full time two years later, in May 2016, as COO.

Two elements inspired the ec2ce business idea. First, it was a natural evolution of the doctoral thesis that Ricardo had defended in the 1990s. Ricardo had developed a predictive control system for pomace dryers based on neural[8] networks. Thanks to artificial intelligence and the use of thousands of data, he obtained an algorithm able to anticipate factors that could affect the process, helping to carry out preventive actions to streamline production and avoid undesired situations.

Second, Pedro's main task while trading in raw materials (such as cereal) for the production of biofuels in the multinational's plants in Europe was to reduce the risk associated with the procurement process of raw materials and the sale of the finished products.

The price of commodities in the agri-food sector depends mainly on the supply/demand duality. Critical aspects in structuring supply include cultivated areas, the climate in the region of production, and its phenology[9]. Pedro pointed out: *"It is very hard to predict the yields of a particular crop in each plot and the combination of plots since production depends on many, complex-to-process variables*."

Regarding demand, it was very common to find mismatches between the quantities that the processing industry, the distribution and the rest of the supply chain needed and the supply available at any given time. This often led to breakages of stock or overproduction, which impacted profitability in the entire chain. *"Often, the only tool those of us involved in this activity had was our intuition that we applied to information based on the available data on supply and demand and to third-party reports, which were frequently also subjective,"* Pedro noted.

With these underlying difficulties, Ricardo suggested to Pedro that he apply the knowledge he had acquired in the research for his doctoral thesis to creating predictive

[8] Neural networks are computational mathematical models based on the interconnection of artificial neurons. These neurons operate through mathematical functions, such as addition, solving problems an analogously to the way a biological brain would. A neural network can consist of thousands of artificial neurons with millions of connections to each other. Neural networks require several thousand iteration cycles for training. After this training, some neural networks prove to be excellent problem solvers, while others do not fulfill their goal. Neural networks have the ability to learn.

[9] This is the evolution of a crop in its different stages of development, such as flowering, bearing fruits, falling leaves, ripening, etc.