

Active and Associative R+D+I Reshaping the Future of Chilean Salmon Industry

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Editorial

A very dynamic process of transfer and adaptation of technology in the 80's essentially promoted by Foundation Chile was fundamental to trigger the salmon industry in the country. This allowed an effective and successful innovative process that created in a matter of little more than 3 decades a new relevant economic sector in the country, presently producing around 900.000 Ton, representing more than 5 billion dollars exports to more than 70 countries, and involving around 30,000 workers. The initial success rested also on very good environmental conditions for salmon and trout farming, availability of well-qualified local professionals and researchers, crucial raw material, specifically for feed, supplied by fisheries and agro industry from Chile and neighbor countries and a legal framework that stimulated investment in this activity, particularly in Southern remote and poorest zones of the country [1].

However, is not commonly mentioned that the early competitiveness of this novel industry was the result of crucial innovations produced essentially by Foundation Chile, many specialized suppliers that left the initial producer companies and the strategic co financing of CORFO, The Chilean Economic Development Agency. In fact, the salmon fillet bone – free, the pioneer quality certification, local formulation of feed, new therapeutants, vaccines and laboratory tests, sophisticated pontoons, sea cages and fine controlled artificial photoperiod, were among the many innovations that allowed the industry replace imports from other countries and support it until reaching second place as global salmon producer and the first one in trout production. This evolution also built a natural industrial cluster in the south of Chile [2], Where around of a producers nucleus more than 1,500 suppliers have been established as well as universities, advanced research and technological centers, laboratories and fish health and environmental services as well as regulatory and enforcement institutions and NGO's , among others [3].

Crisis and Second Impulse for Innovation

But this evolution was not free of significant problems, particularly regarding fish health and environment quality showing episodes that affected economic results as well as the industry image. The most important one was the ISA Crisis (2007-2009), that provoked changes in regulation, control, good practices, research and R+D+I [4]. In fact, during the last 10 years the salmon industry has shown a general improvement of production based in prudent and controlled growth and a more holistic approach for making decisions in the industry as well as in the government.

In parallel, there have been more collaborative R,D&I efforts within the industry as well as between the industry, the academy and the

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public sector. Although this was something pursued since the beginning of the 90's, specially by the Technological institute of salmon and some Universities, it was finally the impact of the ISA crisis the essential factor to determine a new time of the industry [5].

R+D+I Ecosystem and Collaborative Initiatives

Since the ISA Virus crisis, the innovation ecosystem associated to the salmon industry developed much more actively. On the one hand, R+D+I capacity was reinforced with specialized research centers in genetics, fish health, feed, environmental research and management, sophisticated bioassay units, reference and specialized labs applying last generation technologies and Master and PhD programs in regional universities.

Additionally, scientific and technological projects have been gradually replaced by longer-term programs focused in the principal problems of the industry and pursuing to generate knowledge and solutions in a more holistic approach, being the most remarkable one the Sustainable salmon strategic program [6]. This last one, promoted by CORFO, has included in the governance private, public and academic sectors, to agree about the principal gaps to be solved and the route map to close them in 10 years, orienting CORFO and other public agencies efforts [3]. The industry has emphasized integrated initiatives to solve the principal industry challenges, creating associative projects with the goal of establishing good practices and recommendations in all phases of the value chain, demonstrating very good results and improving sustainable growth.

The companies individually have established R&D divisions, which was not frequent before 2010 and developed internal and external actions to improve their innovation capacities. Some of them yearly organize innovations events and contest. Although, not very systematically, there has been much more interaction between companies

and universities, particularly through professionals that collaborate with academic programs and investigators that develop program and projects in closing proximity with private companies, being a good example the PhD program of the Universidad Austral de Chile - Puerto Montt.

In the last 5 years, taking advantage of the active R+D+I evidenced in the salmon regions, CORFO and regional governments have supported the development of several instruments to strength and sustain the R+D+I trend. Thus, co working spaces, innovation and entrepreneurship accelerators, specialized Incubators, mentoring/training companies, consortium focused in new technologies, venture capital entities are new actors in the base of this rich ecosystem. The southern most regions of Chile, and particularly the Los Lagos region have transformed in leaders of R+D+I in the country under per capita basis.

More recently the innovation based in digital technologies and bioinformatics has demonstrated excellent projections improving feeding control systems, environmental monitoring and forecast, a diversity of submersible remote operated vehicles, complex systems for making decisions on real base data, epidemiological analysis, all kind of robotized equipment for processing plants, and support for genetics sequencing and selection, are just some of the most remarkable lines of progress [7]. It is interesting that several successful new companies have been created associated to this boom.

So, the supplier segment, always crucial in the innovation contribution in the industry, initiates today a new time supporting a much more competitive and sustainable salmon industry towards the future. A good synthesis of this facts is the recently created Aquaculture Innovation Club that gathers technology based companies that wants to reinforce their individual and associative capacities, co - create in areas of mutual interest, establish a potent networking collaboration, and jointly penetrate other markets, taking advantage of their experience. This promising R+D+I ecosystem has the potential to contribute

to solve soon the sanitary challenges that still force high use of therapeutants, use of bodies of water in harmony with their carrying capacity, new technologies to develop efficient and secure offshore and RAS technologies that allowing to diminish pressure inshore and eventual conflicts with other users of the zone.

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