

LOW - TECHNOLOGY INDUSTRIES AND REGIONAL INNOVATION SYSTEMS: THE SALMON INDUSTRY IN CHILE

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ABSTRACT

Results show that the worldwide competitiveness of the low-tech Salmon Industry in the Los Lagos region has not developed the principal factors permitting the consolidation of a Regional Innovation System (RIS). On the contrary we identify important gaps in terms of the regional conditions such as “networking”, “knowledge creation and diffusion”, among others, capable to stimulate the innovation behavior of salmon firms.

Keywords: Salmon Industry, Innovation, Los Lagos Region, Regional Innovation System.

JEL Classification: Q22, O31, R11, R58.

1. INTRODUCTION

Despite the important recent efforts and policies to increase Chilean productive advantages in order to capture new opportunities in a knowledge based economy (Eyzaguirre, *et al.*, 2005; Benavente & Price, 2014), most of the Gross Domestic Product (GDP) incomes are still provided by resource based industries. Specifically, salmon industry has become an important source of regional incomes and the engine of regional economic growth, contributing in 2014 to almost 30% of total regional GDP of the “Los Lagos” region and 3.5% of national GDP.

In 2015, despite of important industrial crises mainly related to environmental problems (such as Infectious Salmon Anemia (ISA)) that have diminished the production and competitiveness of salmon firms, Chile still maintain its position as the world’s second largest producer with around 30% of global output after Norway that accounted for 50% of total production.

In order to analyze if the development of a competitive low technology activity such as salmon industry has been capable to generate a Regional Innovation System (RIS), it is important to understand, from the vision of regional key actors, to what extent the evolution of the salmon industry has generated and also used structural regional conditions to foster innovation activities based on regional norms and culture that arise from an specific economic regional specialization. In that context, it is analyzed if innovation behavior of salmon industry has systematically take advantages of regional externalities, knowledge creation and diffusion, networking activities and support and interaction with regional institutions.

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2. THEORETICAL FRAMEWORK

The evolutionary approach has changed the neoclassic geography perspective to a more social, institutional and cultural economic geography approach (Boschma and Frenken, 2006). The theoretical and empirical debate about concepts of competitiveness and innovation such as “Innovation Systems” (Lundvall, 2007) and “Regional Science” allowed the apparition of the concept “Regional Innovation Systems” (RIS), that it is understood as the institutional infrastructure that support the innovation of the productive structure in a region (Asheim & Gertler, 2005). It is configured in a region, a social system where innovations occurred as the result of interactions between economic actors within an open system (Asheim & Isaksen, 2000; Isaksen, 2001; Evangelista, *et al.*, 2002; Cooke, 2003; Andersson & Karlsson, 2004; Asheim & Coenen, 2004; Bracayk, *et al.*, 2004; Doloreux & Parto, 2005).

Those regional complex systems can be fed back through a mechanism of new knowledge production, based on accumulated local knowledge and learning process (Hudson, 1999). The dimension of this system arises from the members of the regional networks that make it up: large and small firms, industry, entrepreneurs, educational institutions, R&D laboratories, members of trade and a government structure (Storper, 1995). In this context, the necessity to understand regional features taking into account the location of firms, networking, informal business systems, lower transaction costs, generation and dissemination of information as an input for innovation (Paci & Usai, 2000; Breschi & Malerba, 2005; Fischer, 2006) is stressed. The analysis and interpretations of the new economic geography and the various inputs that have expanded their state of theoretical development (Noronha Vaz & Nijkamp, 2009) have been very important to demonstrate also the importance of territorial external sources of knowledge to innovative firms (Simmie, 2002; Audretsch & Feldman, 2004; Hirose & Yamamoto, 2007; Christ, 2009).

Despite that most of the “emerging” RIS in developing countries are highly featured by important weaknesses in terms of fragmented institutional interactions and learning, the positive role played by RIS policy approach supporting the industry transition from competitiveness based on low cost activities to competitiveness based on innovations is underpinned. RIS may become a specialized hub in a global value chain occupying a specific segment in the global market (Chaminade & Vang, 2006).

3. METHODOLOGY

This research tries to answer the following question: Is it possible that the business development and innovative behavior of a competitive rural industry generates conditions to the promotion of a RIS? In order to answer the question, research has been developed considering analyses and instruments of qualitative methodology (Clark & Fast, 2008). The development of a case study (Yin, 2003) based on the “Los Lagos” region in Chile has also been considered in order to analyse the performance of the salmon industry as the main regional economic activity.

Primary information was collected from 24 key regional institutions related to salmon industry using a semi-structured interview. A flexible interview guide with open questions was used in order to not limit interviewees in order to reach the best degree of depth in their responses. In this context, an important body of informal and specialized discourse was collected, obtaining deeper information from stakeholders and high leaders of regional institutions linked to the development of salmon industry. This primary information obtained through the use of extensive interviews was studied by content analysis using ATLAS.TI software tool (Strauss y Corbin, 2002).

Figure 1. Regional Interviewed Institutions

<p>Research Institutions</p> <ul style="list-style-type: none"> ○ Instituto Tecnológico del Salmón ○ Asociación de Productores de Salmón ○ Universidad de Los Lagos ○ Universidad Austral ○ Universidad de Chile ○ Consejo Nacional de Ciencia y Tecnología ○ Servicio Nacional de Empleo y Capacitación 	<p>Support Institutions</p> <ul style="list-style-type: none"> ○ Fundación Chile ○ Corporación de Fomento a la Producción ○ Instituto de Fomento Pesquero ○ Ministerio Desarrollo Social ○ Agencia de Promoción
<p>Governance Institutions</p> <ul style="list-style-type: none"> ○ Subsecretaría de Pesca ○ Servicio Nacional de Pesca ○ Ministerio del Trabajo y Previsión Social ○ Ministerio de Medio Ambiente ○ Ministerio de Economía ○ Comité Regional de uso de Borde Costero ○ Gobierno Regional de Los Lagos ○ Ministerio de Salud ○ Directemar 	<p>Regional Municipalities</p> <ul style="list-style-type: none"> ○ Municipalidad de Quemchi ○ Municipalidad de Puerto Montt ○ Municipalidad de Ancud

Main discourses were analyzed through the classification and categorization of specific topics and sub-topics allowing for the finding of correlations among variables considered in the function of research objectives, common speech and key differences about certain points. The analysis of the information collected from interviews was completed with secondary information.

In order to attain a more complete characterization of the salmon industry conditions for the development of a RIS, information was categorized according to the type of institution that was attained. Thus, we arrived at 4 main groups of text: Research, Support, Governance Institutions and Municipalities. Taking this into account it was determined that a set of general codes would be defined for all interviews, but each group would also have their own specific codes to retrieve this differences for further analysis.

4. BRIEF CHARACTERISTICS OF THE SALMON INDUSTRY IN CHILE

Over the last 20 years, the salmon industry, through its dynamism and successful partnerships, has been a consistent driver of national export growth. In 2014, salmon industry exportations reached \$4 billion US generating in the same year 800,000 tons of salmon mainly exported to USA and Japan that make up around 55% of the total market, followed by Brazil and other countries. The salmon industry has provided in the last decade around 40,000 jobs approximately every year.

After many failed attempts to find the right place for its production, has been mainly developed in the Los Lagos Region of the south of Chile, based on the important natural comparative advantages. These advantages are related to ecological and environmental conditions, mainly sea- water conditions and low-cost labor in these regions. An important fishing industry in other regions of the country also provides food for salmon at low

cost. Besides this, macro-economic conditions and trade liberalization in the country has facilitated the arrival of foreign direct investment. This is compounded by a weak legislation regarding safeguards and inspections related mainly to environment protection.

The explosive growth of the Chilean salmon industry has been linked to the capacity to generate scale economies in salmon and feed production, as well as the processing and distribution phases saving costs with the progressive incorporation of new technologies (Asche, 1997 in Olson and Criddle, 2008; SERNAPESCA, 2014). In that context, studying the salmon industry in Chile, Lisuka (2006) stresses that salmon industry has been featured by important innovation initiatives and catching-up efforts to reach global high standards that have allowed it to increase their productivity and competitiveness.

The Salmon industry is featured by an increasing concentration of Chilean and international salmon firm producers by merger/acquisition processes that have reconfigured the map of regional and global actors, regional linkages and the salmon value chain. In 1992 there were 63 salmon firm producers that were reduced to 40 in 1999 (Lisuka, 2006). In the same context, based on IFOP (Instituto de Fomento Pesquero) information, Bjørndal and Aarland (1999) have also noted that the evolution of the Chilean salmon industry will continue towards a significant industry concentration of large companies. In fact, according to other results from Vera (2009), the concentration of salmon processing companies decreased in the period 1994-2008, from 100 to 49 firms. According to SOFOFA, Sociedad de Fomento Fabril de Chile (2010), only eleven large firms in 2010 made up 60% of the total salmon exportations. According to SERNAPESCA (2014), only four firms: Marine Harvest, AquaChile, Mitsubishi, Los Fiordos and Multiexport Foods made up around 50% of the total market in 2014.

In this context, despite the important trend of concentration and the vertical integration of Salmon TNCs producers, the salmon industry is still featured by the intense utilization of forward or backward linkages. According to Olson and Criddle (2008) over half of all firms of the salmon industry have market interactions toward market or supply direction in all phases of the productive process, especially small and medium firms that provide different products and services such as feed, equipment for the hatching and processing phases, pharmaceutical inputs, logistics and transport, and packaging, etc. (Maggi, 2002).

It is important to stress that salmon industry conformation, currently featured by vertically and horizontally integrated TNCs, has been an evolved process that was initially featured by the apparition of isolated and independent firms in all phases of the salmon productive process (Olson and Criddle, 2008). In this context, the salmon industry has been conformed following a bottom-up evolution lead by regional firms (Felzensztein, *et al.* 2010). It is also recognized that public and private efforts and coordination initiatives have allowed the generation of a well know Chilean brand in international markets of salmon production (Perez-Aleman, 2005).

5. RESULTS: REGIONAL CONDITIONS TO PROMOTE INNOVATION

In order to respond empirically if the salmon industry has been able to generate and developed the main factors for the emergence a RIS, the following information provide important inputs and evidence related to four specific variables; interaction behaviour of salmon industry with regional institutions, networking and associativity, innovation initiatives of salmon firms and knowledge creation and diffusion. It is important to note that the following analysis has been developed considering the differences, particularities and similarities of each of the institution groups.

5.1 Interaction among Regional Institutions and Salmon Industry

- *“Firms interact with institutions based on necessity of legal or technical approval”* -

Institutions of Governance, Support, Research and Municipalities declared that the relation that they personally, their department and the institution had with the firms and with the salmon industry, was in general none or indirect. Governance institutions claimed to have a narrow lane by which they communicate with the firms and the salmon industry as a whole, and that it is basically in one respect only: the delivery of control regulation information towards the industry and the receiving of approval solicitations from the firms. In some cases, it was declared that even when the firms do not meet the minimum standards for justifying their practices, it is the Governance Institution that provides the backup information or arguments for the approval of their need.

There is no active participation of the firms in the planning of control programs and regulations, nor are there proposals, but in some cases only a negotiation table, where the governance institution tries to come to an agreement on some regulations from the firms that are consistently pulling to reduce regulations on production, extraction and waste management.

According to the statements, Research Institutions have two ways of relating to the salmon industry: by generation of knowledge and by generation of human capital, and in both cases the industry does not participate directly or actively. In turn the research institutions themselves try to establish some relation with the development of the industry by focusing on the production of useful knowledge or appropriate human capital formation.

From the Support Institutions, it was declared that the salmon industry firms do not participate frequently in the foment programs. Mostly because it is a resourceful industry that does not see the use of public funding, and also because the resources delivered from these institutions aim largely to the small and medium sized local firms of different emerging industry, such as the service providers for the salmon industry and others.

The municipalities’ view is not only critical towards the lack of involvement of the firms with the region and its institutions, but also in regards to the negative impact that the industry has socially, economically and environmentally on the region. They stated that the salmon industry firms only communicate with municipalities when they need political support from the local counsel or when they need low skill workers. In addition, they considered it to have a huge negative impact on the region, in different aspects.

Governance’s and Support’s view of the salmon industry could be represented as follows:

Figure 2. Governance view of Salmon Industry



Source: Own Elaboration

Figure 3. Governance view of Salmon Industry



Source: Own Elaboration

Across the interviews, the salmon industry was strongly associated with the words “arrogant”, “isolated” “high and negative impact”, all of these accounting for an image that can only be an obstacle for the trust and collaboration needed for a RIS conformation based on the high competitive of the salmon industry.

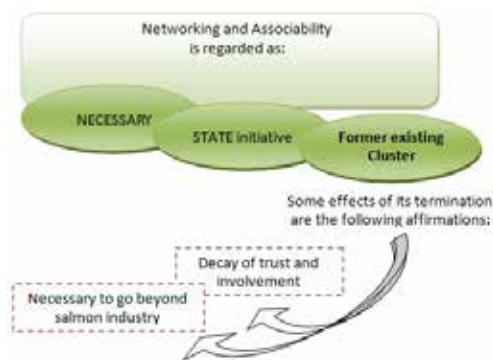
On the other hand, a conflicting view was found in some institutions. The Regional Bureau of the Ministry of Economy (SEREMI Economía), the National Fishing Service (SERNAPESCA), and the Sub-secretary of Fishing (Subsecretaría de Pesca), had a slightly more positive image of the salmon industry.

5.2 Networking, Coordination and Cooperation

It was stated from the institution’s perspective that Salmon industry performed isolated within the region. In that context, considering not only the current display for networking encouraged by the salmon industry, but also any disposition that could potentially become or contribute to the generation of networks to develop a RIS, we found both opportunities and challenges within the discourses attained from the institutions interviewed.

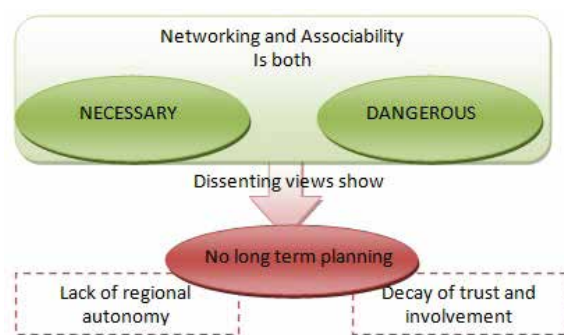
Governance and Support’s view of Networking could be synthesized as follows:

Figure 4. Governance view of Networking



Source: Own Elaboration

Figure 5. Support view of Networking



Source: Own Elaboration

- “Decay of trust and involvement”, “Lost of..”, “Lack of...” -

Firstly, it can be noted that there is a strong association between networking and the past. When asked about collaboration between firms, or any type of coordination between firms and institutions of any kind, more than often past initiatives and former institutions are brought to the table. There is also a recurring reference to the former closeness that different institutions had with local development, especially economically, that now is perceived as being lost.

As examples of networking with the industry, 3 events were brought to the table:

a) Governmental intervention previous to the origin of the industry:

It was noted that in the early 1970’s the central government promoted the opening of university programs to explore the salmon industry in the region. That was interrupted in later governments. This is regarded as a visionary effort to bring regional and national development amid a strong institutional surrounding, a manner of dealing with the local industry that is now considered to be lost.

b) Clean Production Plan:

This was a governmental program led by CORFO (Corporación de Fomento de la Producción) that managed to establish a close relation with firms around waste manage and clean production. This program is referred as one of the few well accomplished instances of

close collaboration in which many firms participated, but it is also considered as an effort that lost its continuity.

c) Former existing salmon cluster:

It was a governmental instance that is remembered as unique in the sense that it involved all of the firms and critical actors in the salmon industry. In some cases, even though it no longer exists, people name it as one of the current spaces for general coordination of institutions with the firms.

A common expression across the interviews is that “the national policy changed”, but there is no clarity towards what, just the shared sense of a loss. This actually means that public policies related to industrial development are not considered as long term policies and they have changed depending on the government administration. During the government administrations of Presidents Eduardo Frei Ruiz-Tagle, Ricardo Lagos and the first administration of Michelle Bachelet (1994 - 2010), an industrial policy was initiated that focused on the promotion of the Regional Clusters based on well-developed and potential economic sectors in a few regions of Chile, such as the fruit industry, mining and the salmon industry. However, this policy changed during the last government administration of President Sebastian Piñera (2010 - 2014) who emphasized the role of market to promote specific sectors of the economy.

In this sense, beyond the absence of a cluster policy in recent years, what could be more critical for the development of a RIS around the salmon industry in the south region of Chile might be the real dispositions of regional actors towards cooperation and organization among firms and institutions.

- “No general orientation”, “Individualistic industry” -

There are dissenting discourses regarding the importance of coordination and association in the development of the region. These conflicting views may be at the root of the sense of disorientation at regional level considering the future of the salmon industry.

In most of the interviews it was stated that firms don't display a strong intention to collaborate or to generate networks within the region, nor between the firms themselves. Accordingly, the existing coordination is assessed as insufficient and inoperative for the most part. In the Support Institutions view, the firms refuse to associate or collaborate, and only after a crisis where they required to relate more with Government Institutions, respecting the “neighbourhoods” program which, according to this perspective, was promoted by a governmental initiative.

From the Research Institutions, it is stated that salmon firms do not even work with each other; they do not plan interventions or studies together in order to prevent risks. Each one responds to the particular and current need that they themselves identify. In agreement with this, support institutions see the salmon as an individualistic industry, oblivious of the importance of guarding the industry as a whole. They also declared that for the most part cooperation initiatives are led by governmental institutions and programs rather than by the industry.

All of these features associated with the salmon industry are regarded as highly problematic for the development of the region and the industry itself; more networking and associate collaboration is viewed as necessary to increase the competitiveness of the industry (diminishing the gap between bigger and smaller firms), and to increase innovation.

On the other hand, Government Institutions that we have identified as a separated set of interviews based on its divergent content (regional bureau of the Ministry of Economy SEREMI Economía, National Fishing Service SERNAPESCA, and Sub-secretary of Fishing Subsecretaría de Pesca) continue to depict a contrasting view.

From their perspective, there is enough dialog and collaboration between the different actors in the region and there has been a significant improvement in respect to previous states of the industry. Accordingly, this evaluation of networking in the industry relates to their manifested notion that networking and associate collaboration is a “complicated matter”, not necessarily desirable, because it has the effect of diminishing competitiveness and productivity. This is the view exerted by the Ministry of Economy and thus it may be at the basis of the conflicting discourses and efforts for networking in the region.

In the theoretical framework, we considered that networking can be also viewed as an obstacle for innovation, in particular when strong path dependencies are at hand; strict rules, institutional memory or collaborative expressions could convert the region into an inflexible system, and work as an obstacle to the creativity and innovation processes and not permit commercialization of new knowledge to solve problems (Cooke, *et al.*, 2007).

In terms of the cluster policy, it can even be argued that with the evolution of the salmon cluster, governance structures have tended to generate quasi-hierarchical market relationships (Maggi, 2002), and thus its dissolution would be a necessary measure for the future development of a RIS in the region.

We thus face a conflict of perspectives where the role of networking is a critical issue. In one, networking and collaboration are pre-requisites for an integrated innovation system and, in the other, they are major obstacles for the necessary flexibility of firms.

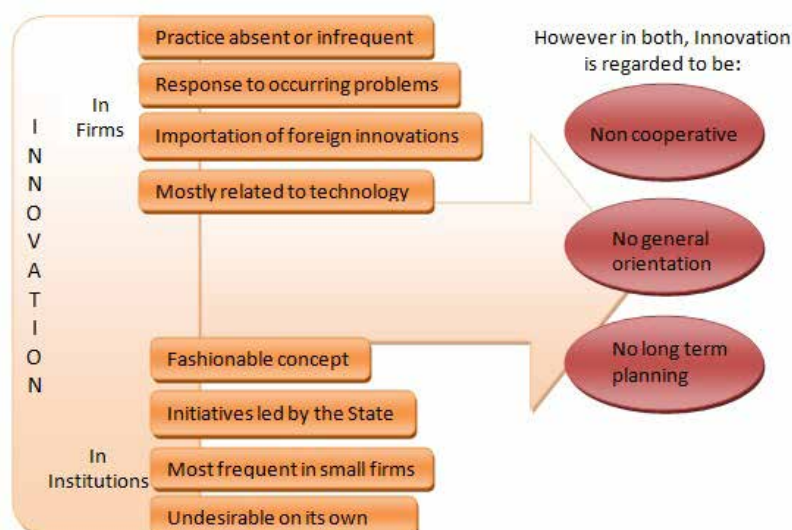
Nonetheless, the existence of a competitive salmon industry can be an opportunity to generate socioeconomic development in terms of the improvements in products, production processes, infrastructure and human resources. And in this sense the absence of a clear alternative indicates a deliberate and conscious decision to abandon such efforts.

5.3 Innovation Behaviour of Salmon Industry

- “Practice absent or infrequent”, “Related to technology”, “Salmon industry is non-innovative” -
 Across most of the interviews the description of innovation and the reference to innovations in particular was rather scant. Innovation as a concept is mostly associated to technology and therefore capital. From that line of thought, as the salmon industry is perceived as a highly productive industry, some sectors declared that it has a lot of innovative capacity and initiative.

The most frequent associations around innovation can be diagrammed as follows:

Figure 6. Frequent Associations around Innovation



Source: Own Elaboration

Innovation is mainly associated with access to technology and in that regard both the Regional bureau of the Ministry of Economy (SEREMI Economía) and the National Fishing Service (SERNAPESCA) have a positive vision of the salmon industry. However, the most extended view across all institutions considered is that the salmon industry is far from innovative and lacks the real intention to ever become one.

Support institutions are blunt in declaring that the Chilean salmon industry is not innovative. It does not participate in the governmental programs, and it has neither long term nor a profound vision of innovation. It just innovates by force of the market or natural crisis demands.

From universities innovation is seen as a foreign and far concept for the firms, mainly because it is thought that their prime concern is to generate incomes. In this regard the relation to knowledge is also submitted to this immediate need and thus relegated in importance. It is stated that firms are comfortable with being an extracting industry as long as it reports economic revenues in the short term.

- *“Smaller and medium size firms”* -

However, it is recognized that smaller firms which are not salmon producing but mostly provide services to the industry, tend to be more innovative because they are more flexible and also are more compelled to be.

Research institutions note that within firms, the smaller and medium sizes are regarded as the most interested on innovation, as well as the ones that have more relation with universities, backing up research and soliciting information.

- *“Undesirable on its own”, “Fashionable concept”* and *“No general orientation”* -

In terms of the place of innovation within the interviewed institutions, we can observe that it is also a foreign and limited notion. As it is associated mostly with technology, Governance Institutions and Municipalities assign innovation to firms and the industry as their responsibility and concern, having almost no relevance for their own fields of work (such as community, health, employment, and even environment). In fact, when asked for their own institution's awareness of innovation in the region, most of them stated that they do not care for innovation.

Some Governance Institutions showed concern about the innovations of the industry in terms of checking if it has an impact on the environment, but no further involvement was declared.

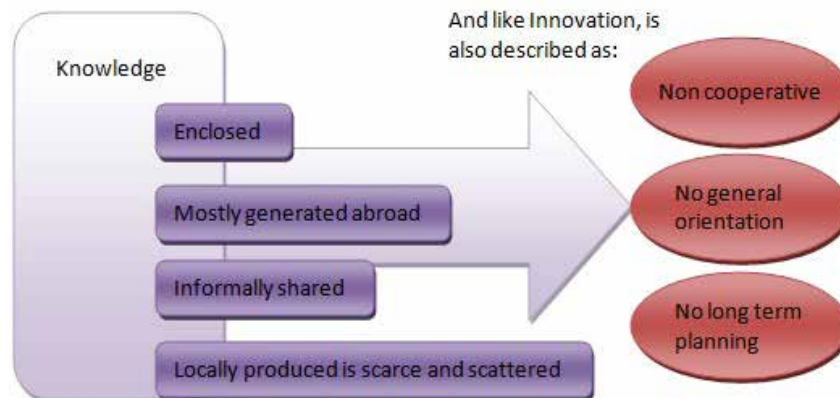
From Research and Support Institutions it was recognized that innovation in the region is very rudimentary and that it is mainly a fashionable concept. It is known to be a promoted concept from different institutions, even though public funding, but it has not had a previously determined a regional and coordinate course of action, nor is it overseen in its execution, and ultimately every firm and institution defines what constitutes innovation or not.

5.4 Knowledge Creation and Diffusion

As it was developed earlier, knowledge is a crucial factor in the formation of a RIS. Whether it is derived from practice or theoretical exploration, the exercise of reflexivity applied to local endeavours is a permanent injection of movement on the dynamics of a RIS. The openness of firms and institutions -involved in the development of a region- to receive and share knowledge is commonly regarded as a core condition for innovation dynamics.

Most associated terms for Knowledge:

Figure 7. Associated Terms for Knowledge



Source: Own Elaboration

- "Enclosed" and "Generated abroad" -

In the interviews conducted in the Los Lagos region, knowledge was not frequently associated with innovation nor with the development of the industry. In coherence with the relegated place that innovation showed, knowledge was perceived mostly as enclosed, whether in firms or in universities, and primarily attained from abroad.

From governance and support institutions it was stated that bigger firms generate their own knowledge or get it from abroad, and that it always remains enclosed; they do not share it with their peers from the local industry. This relates to what was mentioned earlier in the theoretical framework about the effect of the multinational character of the locally based firms of the industry. It's been noted that they may reduce institutional and collaborative R&D networks because they tend to generate internal R&D (UN, 2006).

It was retrieved that the few instances of spreading knowledge were the bi-annual fairs, and mostly informal and personal relationships between people from different firms. There is however an interesting case where former firms employees are now working in municipal departments, and were mainly hired for their experience in the salmon industry.

It is admitted as well that the firms do not absorb knowledge generated by the institutions. Only in the previously detailed event in which the firms lack the necessary backup evidence to support certain measures taken, some firms rely on the institution's work.

Now, considering that the salmon industry is a low-tech and therefore a synthetic knowledge based industry, the sharing of locally produced knowledge is of the utmost significance. As was previously exposed, in the case of engineering based knowledge industries, spin-offs, R&D initiatives and university-industry, collaboration is reduced and innovations are mainly the result of experimentation (learning by doing) and the use of specific know-how (Asheim and Coenen, 2004).

This scenario was confirmed also by the perspective recovered from the Research Institutions interviewed. They noted that firms do not go to them to plan any research, but only to ask for specific accomplishments of predefined research objectives. In this sense, they declared to be treated as a private agency that merely sells legally respected approval, which is from time to time needed by the firms. This kind of relationship was also, as it's been described before, common to depict the relation that the industry in general has with all institutions in the region.

- “No general orientation” and “Smaller and medium size firms” -

On the other hand, universities agree that there is not enough access to funding (public and private) for the development of more intensive research in the region, and that the efforts from within the institution are constant. Universities claimed that most of the time knowledge remains enclosed also because there is no follow up on the researches, and this indicates for them that the main concern for different reasons, is not about knowledge and its potential use for the development of the region, but merely about knowledge being produced for the sake of producing it.

It is admitted, though, that collaboration and interest in developing research comes more often from the small and medium size firms that provide services to the salmon industry (and others) than from the salmon firms themselves. They may be the closest ones to collaborate with the development of a knowledge market.

- “Salmon industry does not learn” -

This “enclosure of knowledge” and “lack of oriented knowledge being produced” sensation is also manifested in the view that almost all of the institutions interviewed shared about the salmon industry: being incapable of learning and developing. The salmon industry was often described as a blind one; it keeps repeating the same mistakes, over and over, and deliberately shows no intention to reconsider its path. Therefore, it only changes course when forced to do so, by national regulation or natural crisis.

For the majority of the institutions interviewed, this is not a simple feature of incompetence on the industry’s behalf but a rather essential aspect of the nature of its concerns. They claimed that the salmon industry does not care about its negative impact or the common wellbeing for that matter, and hence, the state should be in charge of that.

There is a strong association between the notion of “enclosed” and the “lack of involvement of a national policy and funding” that could coordinate and orient the generation of knowledge in the region.

6. FINAL REMARKS

From the analysis carried out by this research, results show that the consolidation of the low-tech Salmon Industry in the Los Lagos region has not developed the principal factors that permit the apparition of a RIS (Knowledge generation and diffusion, networking, innovation); on the contrary, regarding a RIS approach to analyse the national and regional innovation policies, the functional organization and the history of the salmon industry in Los Lagos and also the view of the main regional actors, public and private institutions, there are important gaps in terms of the regional conditions to foster innovation in salmon firms. In this case, the business development and innovative behaviour of a competitive rural industry such as the salmon industry has not generated the minimum conditions for the promotion of a RIS (Norhona Vaz, 2011).

In that context, main findings are in the line of research provided by Intarakumnerd and Chaminade (2011) that identify systemic problems that should be surpassed in developing countries to the generation of RIS; infrastructure problems (physic, scientific and network), technological transition problems, lock-in problems, soft (routines, values, etc.) and hard (firms, organizations, etc.) institutions problems, networks problems (linkages), capabilities and learning problems.

Particularly, innovation is considered by regional actors as poorly depicted; centred on the acquiring of technology mainly, but mostly was a void concept, removed from any concrete experience or profound knowledge of its systemic approach. There is however a

shared view among research and support institutions that innovation is needed to reduce the negative impacts of the industry in the region. Although in order to undertake this task, the efforts needed are attributed as a responsibility beyond firms, in the form of public funded knowledge, more regulation, and so on.

It is important to mention that in many cases the comparative advantages of Chile; as the low price of labor and the low level of expenditure relating to the care of the environment, have not pushed firms to innovate systematically in order to increase their low levels of productivity that presents the industry with respect to Norway, its main competition. Thus, there has not been a critical need to generate new marketable knowledge to improve or replace internal factors of production in order to meet production demand

On the other hand, there is a conflicting view on the necessity of networking in the region. As it was exposed throughout the document, contrary to the most commonly shared view across the regional actors, there is an idea that close linkage between firms and other regional institutions is not desirable for the development of the industry.

Therefore, the widespread feeling of abandonment that most institutions expressed in regards of promoting networking seems to be a natural reaction to the actual change in a formally cluster based policy of development for the region. In the region, the need for association and collaboration remains highly regarded and thus, the lack of governmental initiatives to attend to that need is also enormously felt. The memories of former instances of collaboration are proudly and emotionally missed, while the current “freedom of action” is regarded as mere voluntary absence on the state’s behalf.

As it has been exposed and confirmed by the image retrieved from regional actors, the salmon industry, despite its high world competitive, seems to prefer:

- a) To remain as a segregated industry, enclosing a small group of the bigger firms and excluding the rest of the industry (leading to ultimately terminating it),
- b) To remain as an extracting and short term industry, and
- c) To remain isolated from the regions’ institutions and community.

Considering this industry disposition, the perceptions of almost all regional actors, and the support of the national policy (expressed in its current non-interference), one could argue that the salmon industry has disseminated and reinforced the notion that low-tech industries are harmful for the region’s development and thus, deepened the distrust towards big “successful” firms.

However, some conditions or rather pre-dispositions were found favourable for the development of a RIS in the region allocated in smaller entrepreneurship that could be further explored. Smaller and medium size firms in the region were depicted by many institutions as innovative, supportive of knowledge generation in the region and more integrated with the regional institutions. They were identified as mostly service providers, related to the salmon industry but not exclusively.

The effect of the salmon industry may produce market connections, access to new technologies and specialized goods and services. The opportunity for the salmon industry as a strategic economic axe of action is mandatory to guide and promote innovation, business aspects, management and administration of new ventures. There is not another regional economic activity in a better position to lead the installation of a renewed RIS based on a regional cultural mentality focused on innovation and creativity as the motors of the regional development. However, this process will require deep public support, public and also private institutions, industry associations and institutions that provide economic and financial services must be mobilized around this opportunity.

The discussion around the possibility of having a special focus in regional investments cantered in a specialized economic activity or by the contrary supporting a diversified economy is still open. Currently regional policies in Chile are inclined to generate structural

conditions to the development of economic alternatives for mono-productive regions that have been not capable of getting a diversified economy, being exposed to a total crisis in the case that production and exportations could be affected by the reduction of the global lack of market demand.

Therefore, it is necessary to create new forms of development associated with RIS, where entrepreneurial vision and innovation is the critical factor in the territory aimed to generate a business network able to sustain, consolidate and enter into the market under various forms of production.

Undoubtedly, the existence of the salmon industry can promote an early stage of learning and development activities based on this key industry and its requirements consolidating then an economic, social and an institutional platform able to complement and build new economic axes diversifying the regional products and services in a second stage to the consolidation of a RIS.

7. FUTURE RESEARCH

In the present study, we have provided empirical knowledge about the possibility of creating a RIS from regional conditions that have resulted in the development process and consolidation of the cluster of salmon in the region characterized as an activity that requires a low knowledge creation, technology and innovation since its development is based on the efficiency to carry out the production process and the existence of specific natural advantages. Indeed, it is interesting to note that the results of this research suggest the difficulty that this cluster has to create conditions that promote innovation in the region, but nevertheless can be promoted through an efficient RIS policy that emphasizes regional characteristics and specific solutions to overcome major gaps identified.

The salmon industry in this regard should take a new step of development based on sustainability and harmonious development in conjunction with other regional actors and certainly be able to transfer the positive externalities of the industry to the rest of the region and its inhabitants.

In this context, future research should be linked to the generation of public policies capable to improve the main identified gaps and enhance those that are positive for the region and for the promotion of a RIS. Although the present study attempts to shed light on the possibility of generating a RIS considering the advantages that could be the result of the development of a cluster based on the use of natural resources and low creation of new knowledge and innovation, it is necessary to develop new research that allow to main regional stakeholders take advantages of those potential conditions through focused public policies that foster the creation of an environment of regional innovation used by other economic activities in order to boost regional economy, economic growth and social development.

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