

Forging Linkages in the Commodity Chain: The Case of the Chilean Salmon Farming Industry, 1987-2001

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On an early Sunday morning in late February 2001, we were driving on a dirt road in rural Chiloé.¹ Chiloé is a large island at the top of the archipelago that runs along the southern third of the Chilean coast. We passed two men with backpacks. The driver said “salmon farm workers”. Approximately two kilometres later, we passed by the salmon farm where these two men worked. We do not know how long these two men were travelling, but they would have to climb (we were going downhill) up that dirt road to go home after an eight to twelve hour shift. These workers probably receive the Chilean minimum wage of 105,000 pesos a month - about \$180 American. Cheap labour, a hallmark of the Chilean agro-fruit export sector, is also characteristic of the salmon farming industry. The men may have been able to afford a *collectivas* (collective taxi) in order to go to work, but these vehicles will not travel on this particular road (or on many dirt roads) in Chiloé. These workers probably could not afford an automobile. In addition, at this time, gasoline was over 500 pesos or about 80 cents a litre.

Most of the salmon farming industry is located around Chiloé which has a mild, rainy climate and protected inlets making it ideal for salmon farming. Since the early 1990s, the Chilean salmon farming industry has grown at an exponential rate. By 2010, some observers expect Chile to surpass Norway to become the largest producer and exporter of farmed salmon in the world (Chile 2000). In addition to climatic conditions, cheap labour enables the Chilean industry to offset the transportation costs required to place exports on global markets. As production soared in the 1990s, prices fell. While labour received few benefits outside of immediate employment from the burgeoning Chilean salmon farming industry, foreign and local capital prospered in the 1990s. By the end of the decade, the Norwegians were the main global producers of farmed Atlantic salmon, and were acquiring major Chilean producers of salmon and trout.²

Despite its rapid growth, the Chilean salmon farming industry is inserted in a ‘buyer-driven’ commodity chain. Major distributors and retailers in export markets shape the nature of production. This ‘buyer-driven’ commodity chain has contributed

to economies of scale at the point of production and changes in the ways in which foreign capital has gained access to the industry. Chile's rise as a major salmon farming country is influenced by the availability of cheap labour in an economy still shaped by the neo-liberal prescriptions of the Pinochet dictatorship.

This paper is divided into five sections. First, we discuss the relevance of the global commodity chain literature for the study of agro-food export industries such as farmed Atlantic salmon. This is followed by a review of our methods and data sources. Third, we discuss the rapid rise of Chile's salmon farming industry. The fourth section examines linkages in the salmon commodity chain. These include the concentration in power by wholesalers and retailers at the 'back-end' of the chain, and foreign feed companies' forward integration at the 'front-end' of the chain. We also focus upon the ability of foreign and local capital to forge linkages in the intermediate phases of the chain. This contributes to economies of scale at the points of production and processing, but may be partially offset by the move of smaller local firms to specialised niches in the chain removed from the farming of salmon. We also discuss the impact of the global commodity chain upon the social organisation of labour in grow-out sites and processing plants. The fifth, and final, section discusses the implications of our study for global commodity chain analysis and rural industrialisation in Chile.

Global Commodity Chains and Agro-Export Industries

In a recent shift in world systems theory (Gereffi 1994 and 1999; Goldfrank 1994; Bair and Gereffi 2001; Barrientos 2001 and 1997; Gibbon 2001a and 2001b; Kaplinsky and Morris 2002) and in the sociology of agro-food systems (Friedland, Buttel and Rudy 1991; Tovey 1991; McMichael 1995; Skladany and Harris 1995; Banks and Marsden 1997; Goss, Burch and Rickson 2000), researchers are examining the place of various commodities within global commodity chains.

It is difficult to provide an exhaustive account of all dimensions of a given global commodity chain (GCC) (Kaplinsky and Morris 2002). Nevertheless, several attributes of GCC analysis inform this paper: the distinction between 'producer-driven' and 'buyer-driven' chains, the points of economic concentration and influence in these separate GCCs, the nature of governance structures, upgrading by producers of various sizes and the position of wage-labour.

The developing world has shifted away from import substitution industrialisation and domination by vertically-integrated producers. The past two decades witnessed the rise of export-led industrialisation whereby retail giants and brand manufacturers in industrialised countries outsource production to manufacturers in the developing world. This corresponds to a gradual replacement of 'producer-driven' by 'buyer-driven' GCCs in some sectors of the global economy (Gereffi 1999).

The automobile industry is a 'producer-driven' GCC. Manufacturers in the core influence decision-making through licensed automobile dealerships in both core and peripheral capitalist economies. In contrast, the apparels industry is 'buyer-driven'. Merchandising outlets located in the core have concentrated buying power in relation to production outlets dispersed throughout the developing world. These provide low cost products for retail giants and brand name manufacturers in industrialised countries (Gereffi 1999 and 1994).

'Buyer-driven' GCCs dominate the agro-food industry (Barrientos 2001 and 1997; Gibbon 2001a and 2001b; Goldfrank 1994; Kaplinsky 2000). Food producers face growing concentration in supermarket chains. This concentration is also linked to retailers' desire to trace food items to specific farms (Banks and Marsden 1997; Gibbon 2001a).

Retail giants and brand name manufacturers control governance structures, or rules whereby given commodities are produced. In agro-food chains, lead firms and external agencies act as 'drivers' and determine what is known as legislative governance (Humphrey and Schmitz 2001; Kaplinsky and Morris 2002). Producer associations in apparels and agro-food chains act as 'executive governors' by enabling their members to upgrade in order to meet the requirements of lead firms and external agencies. Judicial governance, or the setting of sanctions such as the rejection of final products, can be done by either lead governors or external agencies (such as the FDA in the United States). Gibbon (2001b) notes that in the shift from 'producer-driven' to 'buyer-driven' agro-food chains, quality controls moved from considering merely the final product to concerns over the entire process (cf. Banks and Marsden 1997). The concern by lead firms and external agencies in the farmed salmon GCC is especially pertinent to this paper in that such 'drivers' influence the nature of the entire production process.

How do firms of various sizes, especially small and medium-sized enterprises (SMEs) from developing countries upgrade and survive in an increasingly globalised world (Kaplinsky and Readman 2001)? SMEs can connect to markets through 'arms-length' arrangements, as part of a cluster of SMEs, through a third party or as part of a multinational corporate network. SMEs can upgrade the efficiency of internal processes, introduce new products, change the mix of their activities by participating in outsourcing arrangements or enter new chains. SMEs are more likely to survive in 'buyer-driven' GCCs whereby manufacturers are dependent on lower cost structures in order to serve industrialised markets. This is where outsourcing enters the picture. As we shall see, as economies of scale became dominant and salmon prices fell on global markets, outsourcing contributed to the emergence of some SMEs in the farmed salmon GCC.

'Buyer-driven' processes impact upon class and gender relations at the point of production (Bair and Gereffi 2001; Barrientos 2001 and 1997). Bair and Gereffi (2001) note that in the Mexican blue jeans manufacturing industry, full-package manufacturers emerged after the signing of the North American Free Trade Agreement (NAFTA). These firms produce low cost garments for American brand name manufacturers and retail giants. However, wages and mobility prospects are better for men than for women. Barrientos (1997) notes similar conditions in the Chilean agro-fruit sector where women dominate casual employment during the short harvesting season. Nevertheless, while largely having poorer prospects than men, women, through piece rates for fruit packing, can earn more than men. The conditions of employment are better in multinational firms with more leverage in the agro-fruit chain than is the case for domestic Chilean firms with more marginal access to export markets. Salmon farming companies are often locked into tight production schedules for dominant export markets. This, as we shall see, has consequences for class and gender relations in the industry.

We test several insights from the GCC literature: Where are the points of

economic concentration and how have these evolved? Second, where are the governance structures in this GCC? Third, what types of 'upgrading' are present in the chain and how does this impact upon salmon production? Finally, what are the consequences of the farmed salmon GCC for labourers employed on grow-out sites and in processing plants? While our evidence points to the relevance of 'buyer-driven' GCC mechanisms for understanding the farmed salmon GCC, this approach has several limitations. These are discussed in our conclusion.

Methods and Data Sources

Our data include interviews, field observations and published secondary materials. In December 2000, information interviews provided the foundation for semi-structured interviews conducted in February 2001. In total, 14 interviews were conducted. The data presented here are part of a multi-stage project on the Chilean aquaculture industry.³

The December 2000 interviews were loosely structured inquiries on the origins, growth and future direction of the Chilean aquaculture industry, and the basis for semi-structured interviews administered in February 2001. The December 2000 interviews were administered to key informants with knowledge of the salmon aquaculture industry. These included officials with the Canadian embassy in Santiago, *Fundacion Chile*, the *Economic Commission for Latin America and the Caribbean* (ECLAC), the *Gobierno Regional de Los Lagos* (Region X), a rural development agency located in Castro, Chiloé and a union organiser based in Castro. These interviews set the context for the 2001 research.

The February 2001 research tested key issues from the GCC literature. Firms were asked to discuss their position in the production, processing and marketing of farmed salmon. Here, we examined forward and backward linkages, and strategies used to counter the power of more influential actors. The firms investigated here were selected in order to provide a representation of foreign and local capital in the grow-out and processing sectors of the industry. Due to resource constraints, it was not possible to investigate a wider cross-section of firms in the farmed salmon GCC.⁴ We administered detailed interviews ranging from 60 to 90 minutes to: a large Norwegian multinational, one of Chile's largest salmon farming operations, a medium-sized Chilean producer and a small-scale Chilean producer. The firms in question represented nearly 20 per cent of the total farmed salmon production in Chile in 2000. Interviews were also conducted with a representative of *Intesal* – the research arm of the *Salmon and Trout Producers Association of Chile* and with a service sector firm that was started by an individual formerly employed by a large Chilean salmon farm.⁵

The February interviews were conducted in English, with the exception of an interview with a production manager of the medium-sized Chilean salmon farming company. This was conducted in Spanish by the second author of this paper. Nevertheless, language proved to be no barrier in that all of the other respondents are fairly fluent in English, which is not uncommon for managers in the global salmon farming industry. Furthermore, the lead author has conducted field work on salmon farming in three other jurisdictions and the issues covered were structured by his interview schedule.

Interviews were supplemented with field observations and published materials. These data include informal discussions in the 'post-interview' stage, as well as observations made by the lead author on the basis of visits to specific communities. Information was checked against available published information such as Chile 2001 (Chile 2000) – the aquaculture compendium for the industry, and other published materials. What follows is a qualitative 'pilot study' of the Chilean salmon farming industry, one that provides the basis for future research on a more comparative dimension.⁶

The Rise of the Chilean Salmon Farming Industry, 1987-2001

Chile has one of the most 'liberalised markets' in Latin America, a process that began under the authoritarian regime of Pinochet (Kurtz 1999). In the 1970s and 1980s, the land reforms of the *Christian Democrats* and *Socialists* were reversed and land became concentrated in the hands of private capital. While the landed elite's power was partially restored, foreign capital entered new areas such as the agro-fruit sector (Loveman 1979; Kurtz 1999).

The agro-fruit export sector contributed to nearly 9 per cent of total exports by 1999 (ECLAC 2001). Shortly after the rise of the agro-food sector, the salmon farming industry developed. By 1999, it contributed less than 2 per cent of the GDP, but over 5 per cent of total export earnings (ECLAC 2001). Salmon farming is concentrated in Region X which had 30 per cent of Chile's seafood processing plants by the early 1990s. One of the provinces in this region – Chiloé – has traditionally been one of the poorest in Chile (Schurman 1996).

Chile's 'liberalised' markets facilitated one of the most aggressive farming experiments of the 20th century. In the late 1980s, European salmon farming firms began experimenting with farmed Atlantic salmon along the Chilean archipelago.⁷ Japanese and American capital received support from *Fundacion Chile*, a private foundation established in 1976 by the Chilean government and the American multinational *ITT*. Its principal objective at the beginning was to aid in the transfer of communication technology to Chile. It facilitated the transfer of aquaculture technology from Scotland and Norway to Chile in 1979 (Interview 02/12/00). Chilean capital from the agro-fruit and fish meal sectors also entered the salmon farming sector where it remains as a dominant player (Berge 2001).

Although Chile had 2,000 tonnes of Pacific salmon in 1987 – there was no production of Atlantic salmon. In 1987 nearly 40 per cent of all egg imports were Atlantic salmon eggs (Mendez et al. 1989). Atlantic salmon eggs from America, Norway and Scotland provided the basis for an industry that would surpass the Pacific industry in the 1990s. While the 24,000 tonnes of Atlantic salmon produced in 1992 represented less than 10 per cent of global production, by 2000 Chile produced approximately 152,000 tonnes or over 17 per cent of global production (see Table 1). This made it second only to Norway. Table 2 shows the dominance Chile has assumed in the farming of Pacific salmon.

As production increased, economic concentration swept through the industry. In 1992, there were 63 companies in Regions X to XII, but only 40 by 1999.⁸ From 1995–2000, 28 companies ceased their activities. By this time, five companies controlled 25 per cent of production. The current economies of scale are attributed to 'natural

tendencies' in the industry and the decline in major export markets (Chile 1999). In contrast, the social democratic industrialisation model for farmed salmon in Norway resulted in 194 geographically dispersed companies (albeit some very large-scale) by 2000 (Directorate of Fisheries 2001).

Table 1: *World cultivation of Atlantic salmon by country, 1992-2000*
(‘000 tonnes and percentages)

Country	1992	2000 (estimate)	% change
Norway	141 (54.1%)	422 (50.1%)	213.5%
United Kingdom	36 (13.8%)	122 (13.8%)	238.9%
Chile	24 (9.2%)	152 (17.2%)	533.3%
Canada	17 (6.5%)	68 (7.7%)	300.0%
Faroe Islands	17 (6.5%)	41 (4.7%)	141.0%
United States	10 (3.8%)	23 (2.6%)	130.0%
Ireland	10 (3.8%)	20 (2.3%)	100.0%
Australia	3 (1.1%)	11 (1.2%)	266.7%
Iceland	3 (1.1%)	3 (0.3%)	0.0%
Total	261 (100%)	882 (100%)	237.9%

Table 2: *World cultivation of Pacific salmon by country, 1992-2000*
(‘000 tonnes and percentages)

Country	1992	2000 (estimate)	% change
Japan	24 (38.7%)	10 (9.0%)	-58.3%
Chile	23 (37.1%)	84 (75.7%)	265.2%
Canada	12 (19.3%)	10 (9.0%)	-16.7%
New Zealand	3 (4.8%)	7 (6.3%)	133.3%
Total	62 (100%)	111 (100%)	79.0%

Tables 1 and 2 are based on the data in 'Table n° 8: Cultivos Mundiales de Salmon Por Paises' (Chile 2000, p. 117)

Linkages in Chile's Farmed Salmon Commodity Chain

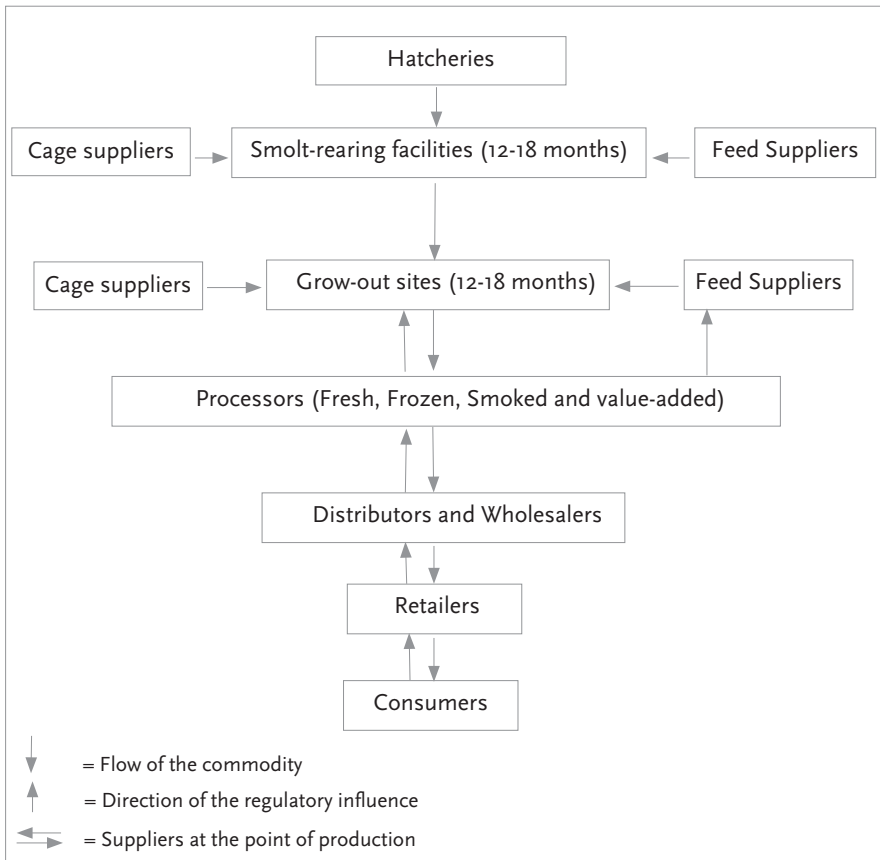
We provide an integrated view of the farmed salmon GCC by focussing upon the back (market), front (feed companies), intermediate (foreign and local producers) and bottom (wage-labour in rural Chile) phases of the chain. The farmed salmon GCC also has characteristics based upon the nature of the commodity, the 'neoliberal' experiment in Chile and historically-derived social relations in the Chilean countryside. We begin with an analysis of the structure of the farmed salmon GCC.

An Overview of the Farmed Salmon GCC

Figure 1 is a simplified model of the farmed salmon GCC. Farmed salmon originate in hatcheries. Eggs are hatched and the fingerlings are raised in land-based tanks

near the hatchery. Once fingerlings become smolts, they are raised in smolt-rearing facilities in fresh-water cages. After a period of 12-18 months, the smolt are shipped (sometimes by helicopter) to sea-water cages and raised for a further period of 12-18 months. With the developments in feed and medicines in the 1990s, this period is rapidly being reduced to one year. During this grow-out stage, the main operating costs include: feed, cages and labour. In Northern jurisdictions, feed constitutes 40 per cent of costs (Phyne 1999). In Chile, feed constitutes a higher percentage of operating costs, but overall production costs are cheaper (see Heen et al. 1993). Harvested salmon enter processing plants and are prepared by standards set in Japanese and American markets. With the automation of feeding on grow-out sites, labour is increasingly concentrated in processing plants, often on a seasonal basis, giving salmon farming production (as we shall see below) class and gender dynamics comparable to the Chilean agro-fruit industry (see Barrientos 2001 and 1997).

Figure 1: A simplified model of the salmon aquaculture supply chain



Over 80 per cent of the total product enters Japanese and American markets. This diverges considerably from the much lower dependence (around 30 per cent) that

Chilean exports have upon the Japanese and American markets (The Economist 2001). Following the analysis of Humphrey and Schmitz (2001), we assess the 'back-end' of the chain and show how Chilean production is shaped by external agencies and lead firms.

Power at the Back End of the Chain: The Japanese and American Markets

The Japanese place a premium on quality that feeds back into the production process. Most of one large Chilean firm's 1999 production of 7,000 tonnes of rainbow trout product was exported frozen to Japan and purchased by a large supermarket chain. This Japanese firm employs an inspector in Puerto Montt who examines the entire product before it is shipped to Japan (Interview 28/02/01). Also in 1999, a Japanese supermarket chain bought another Chilean firm's entire production of 3,400 tonnes of coho salmon. The final product was inspected during site visits by a representative of this supermarket chain (Interview 25/02/01). This is a perfect example of retail chains acting as lead governors in determining the nature of the process upstream in the chain.

Over 50 per cent of all coho salmon are shipped from November to March. Most coho exports go through a labour-intensive process. The coho is headed and gutted, centre cut, frozen on both sides, thawed, salted in brine, cleaned, portioned by hand and packed. This product represents nearly 95 per cent of all coho exports (Petersen 2000). Given this processing detail and the Japanese concern with quality, it is not surprising that their giant retailers act as lead governors in the chain, and that low labour costs are used for a value-added commodity that is produced in a very short period of time. Since the early 1990s the Japanese decreased their coho production (see Table 2) and increased coho imports from Chile (Chile 1999). This is in line with the recent Japanese trend to source food supplies from distant markets (McMichael 2000).

International standards influence food exports to major importing nations. An example is the Hazard Analysis of Critical Control Points (HACCP). HACCP training is given to technicians, workers in processing plants and salmon farm site managers. This training is performed by *Intesal*, the research arm of the *Salmon and Trout Producers Association of Chile*. (Interview 27/02/01). This is executive governance in that the association facilitates the ability of its members to upgrade in order to meet the requirements of lead governors (cf. Humphrey and Schmitz 2001). There were over 6,000 personnel who undertook training courses from *Intesal* in 2000. These individuals were mostly employed by large-scale Chilean and foreign companies. These courses dealt with aspects such as hygiene and filleting requirements demanded by export markets (Asociacion 2001).

Japanese consumption of Chilean farmed salmon and trout grew by 70 per cent from the mid-1980s until 1998. From 1998 to 1999, the financial crisis in Japan resulted in a 13.5 per cent (from 104,607 to 91,822 tonnes) decline in exports. This downturn was held responsible for the demise of five companies. At this time, there were also concerns with competition from wild sockeye salmon exports from Alaska (Chile 1999).

Whereas frozen products enter the Japanese market, fresh Atlantic salmon largely goes to the American market. One of Chile's largest companies produced 14,000

tonnes of Atlantic salmon in 1999. The firm maintains an office in Miami where it deals directly with 4-5 large food importers (Interview 28/02/01). Another large firm (17,000 tonnes) – recently acquired by a Norwegian multinational – deals with foreign shipping agents that market to American wholesalers. In one case, a shipping agent specifies the type of product needed. This, in turn, influences the nature of processing (Interview 23/02/01). While lead governors in the American market act similar to their Japanese counterparts, an official with *Intesal* stated that fresh salmon exports to the United States also required approval of the FDA (Interview 28/02/01). This is consistent with GCC arguments that external authorities impose demands that are passed down to other actors in the chain (Humphrey and Schmitz 2001). This is accelerating with the growing prominence of food standard setting agencies (Gibbon 2001b; Henson and Loader 2001). The agro-food system has shifted from a process where buyers were merely interested in the final appearance of the product to one where they are now concerned with the entire production and distribution process. Given that the Chilean salmon farming industry emerged during the ascendancy of ‘buyer-driven’ agro-food chains, it is not surprising that it has to meet the dictates of lead governors in the retail and food safety sectors.

Low cost Chilean exports also resulted in dumping claims by American producers. Maine salmon farmers compete directly with Chilean salmon imports along the Eastern seaboard. In 1995 Chilean salmon sold for around \$5 in supermarkets, and some New York restaurants charged \$30 for a meal of salmon, but Chilean producers sold their product for \$1 per pound (Wray 1996). Anti-dumping measures implemented in 1998 resulted in a 20 per cent reduction in exports in 1999. This followed in the wake of a 26 per cent increase in exports in 1998. In 1999, the American *Department of Commerce* revisited the anti-dumping duties for fresh fillet imports. No major changes were made and the 4.57 per cent surtax is low compared to the 26 per cent tariff applied to Norwegian salmon exports to the United States (Chile 2000).

Lower production costs of Chilean salmon gives it leverage in the American market, but the large dependency on this market makes producers vulnerable to sudden downward shifts. This is especially within the context of the influence of a limited number of shippers and wholesalers based in Miami. In this context, foreign capital moved to concentrate its power at the front end of the salmon commodity chain.

Power at the Front End of the Chain: Feed Giants and Forward Integration

In the late 1990s, some Chilean salmon farming companies struggled with their exports to the Japanese market. They turned to feed companies such as *Nutreco* and *Ewos* for feed credits. Feed is the highest operating cost in salmon farming. Some firms could not afford to pay back the feed companies once they disposed of their salmon in the Japanese market. The feed companies took over some salmon farming companies (Interview 04/12/00).

Mares Australes, one of Chile’s largest salmon farming companies, was one of the firms taken over by the feed giants (Interview 04/12/00). *Nutreco* acquired it in 1998. *Nutreco* of the Netherlands is the world’s largest fish feed company. In 1999, *Nutreco* also acquired the Chilean operations of the Scottish multinational *Marine*

Harvest. The assets of *Marine Harvest* and *Mares Australes* were merged under the *Marine Harvest* name. In 2000, *Marine Harvest* had 30 production sites (Nutreco 2001) and nearly 10 per cent of the total export value in the Chilean salmon farming industry (calculated from Asociacion 2001). This made it the largest salmon farming company in Chile. *Nutreco* is the largest feed supplier in Chile. It is building a plant near Puerto Montt that will at its peak produce nearly 350,000 tonnes of feed per year; this will be the largest fish feed plant in the world (Jensen 2001).

Ewos also integrated forwards in the salmon farming industry. This firm has been in Chile since 1989 (Ewos 2001). The *Cermaq Group* of Norway acquired *Ewos* in March 2000. With this acquisition, *Cermaq* added to its flour milling concerns. With *Ewos* feed companies in Norway, Scotland, Canada and Chile, *Cermaq* controls 40 per cent of the international salmon feed market. In November 2000, *Cermaq* purchased *Salmones Mainstream*, one of the largest salmon farming companies in Chile (Cermaq 2001).

In 1995, *Ewos* purchased a large domestic manufacturer of fish feed. Although *Nutreco* is building the world's largest fish feed plant; this position is currently held by *Ewos*. Its only plant in Chile produces 130,000 tonnes of feed per year (Ewos Perspective 1998). The recent moves by *Ewos* date back to the difficulties in Japanese market in the late 1990s, and to the declining supply in pelagic stocks as a result of El Niño. In response to these circumstances, an official with *Ewos* noted that "...[w]e need to focus on developing our markets and improving efficiency and cost structure throughout our supply chain in order to survive the difficulties and emerge stronger" (interview). With their Chilean acquisitions, *Nutreco* and *Ewos* became the largest and fifth largest salmon farming companies in the world with 2000 global production at 141,500 and 35,000 tonnes respectively (Berge 2000). This is accompanied by their control of up to 80 per cent of the salmon feed market in Chile (Jensen 2001).

The only feed competitors are *Ecofeed*, a joint venture between *Biomar* – the world's third largest salmon feed company – and two medium-sized Chilean salmon farms, and *Salmofood*, a feed company formed in 1995 by *Invertec*, *Yadran* and *Salmones Aucar* – three Chilean firms. *Salmofood* claims that it has the capacity to produce 140,000 tonnes for both fresh-water and marine sites (Salmofood 2002). This firm represents a case of backward integration in the chain and shows the power of Chilean capital as a major input supplier. Next, we consider the role of foreign and local capital in the middle of the chain.

Getting Squeezed in the Middle of the Chain?: The Role of Foreign and Local Producers

Owners in Chile have never actually been fish farmers, but are the country's traditional upper level of society, and more often than not, the traditional landed aristocracy (Intrafish 2000)

Multinationals that specialise in grow-out sites have also been active in acquiring Chilean firms. A prime example is *Fjord Seafoods* of Norway which acquired *Salmones Tecmar*, Chile's seventh largest exporter of farmed salmon in late 2000 and *Salmoamerica* another large Chilean company. With its Norwegian, Scottish

and Chilean holdings, *Fjord Seafoods* expected to produce 102,000 tonnes of salmon and trout by the end of 2001. This would make it second only to *Nutreco* in world production (Berge 2000). Where does Chilean capital fit into this process?

Six out of the top exporters of farmed salmon products in 2000 were Chilean companies (Salmonicultura 2001). The Chilean companies largely consist of 'old' capital from the agro-export, fisheries, manufacturing and service sectors such as *Multiexport*, *Inverraz*, and *Invertec*. *Multiexport* is owned by the Borda family, which has its origins in banking and mining (Intrafish 2000). *Multiexport* was Chile's third-largest domestically-owned producer of farmed salmon in 2000 with 18,000 tonnes of farmed production (Berge 2001). The firm is a vertically-integrated operation with hatcheries, smolt-rearing facilities, grow-out sites and a processing plant in Puerto Montt (Chile 2000). It also has an office in Miami that deals with major American importers of fresh Atlantic salmon (Interview 28/02/01). In early 2001, *Multiexport* discussed interest in moving into Norway (Intrafish 2001); while this has not occurred in Norway's protected market for salmon concessions, it demonstrates the potential power of Chilean capital.

Inverraz is established in car manufacturing, agriculture, forestry, fisheries, and construction. It also owns *Unimarc Mercados*, one of Chile's largest supermarket chains. (Inverraz 2001). *Salmones Unimarc*, a subsidiary of *Inverraz*, was the ninth largest exporter of farmed salmon in Chile in 2000 (Salmonicultura 2001). *Salmones Unimarc* has 26 smolt rearing and grow-out sites, a feed plant and a processing plant in Chiloé (Chile 2000). *Salmones Unimarc* is integrated in all aspects of the salmon commodity chain - at least within the national market. Although it ships much of its product to Japanese and American markets, the company also sells value-added products such as smoked salmon in its *Unimarc Mercados* chain.

In addition to cultivating salmon and trout, the *Invertec* Group is involved in scallop cultivation and seafood processing. It has nine smolt and grow-out sites (Chile 2000). The latter produced 11,000 tonnes in 2000, and are expected to produce 20,000 tonnes in 2001 (Berge 2000). *Invertec* is a renegade player in the Chilean industry; it is not a member of the *Salmon and Trout Producers Association of Chile* (Interview 04/12/00), and as we shall see below was subject to a strike in late 2000 because it paid workers less than the minimum wage.

'Old' capital is not the only source of investment. Whereas early investors supplied most of their needs, with the decline in global market prices in the 1990s outsourcing became preferable. This claim was made by a former grow-out site manager with *Marine Harvest* (Interview 04/12/00) and an official that moved out of *Aguas Claras* - a large Chilean salmon farming company, in order to provide net changing services for the industry (Interview 24/02/01).⁹ Outsourcing provides a niche for 'new' capital. One case is *Patagonia Salmon* (Interview 27/02/01). This firm produced 2,500 tonnes of salmon in 2000, but it is moving out of production. It is a prime example of functional upgrading in the GCC (Kaplinsky and Readman 2002).

While *Patagonia Salmon* imports Atlantic salmon eggs from a disease-free facility in Iceland in a partnership with the Icelandic firm *Stofnfiscu*, it is in the area of well boats that the functional upgrading of *Patagonia Salmon* truly emerges. By 2003 salmon farming companies will not be permitted to gut and clean salmon at sea. Salmon must be shipped live to processing facilities on shore. Well boats pump the salmon on board, transport the animals live to a sea cage close to shore

in order to minimise shock, and then pump these into holding facilities on the shore. The salmon are then slaughtered and prepared for the market. A fish meal company provides concrete holding facilities and in return receives the waste free of charge. *Patagonia Salmon* has a contract with a large Chilean salmon farming company for the purposes of shipping live salmon with its well boats (Interview 27/02/01). Thus, *Patagonia Salmon* is developing niches as an input supplier (eggs) and an intermediary between production and processing. In his discussion of chain upgrading, Gereffi (1999, p.52) notes that "... upgrading involves moving from mass production of standardised goods to the flexible production of differentiated merchandise". In the case of *Patagonia Salmon*, we may add that they have moved out of mass production into differentiated merchandise and services.

These data show that the economies of scale in the Chilean salmon farming industry reflects what others have found in the agro-fruit export industry (Barrientos 2001 and 1997). The process of forward integration by feed giants and the increasing concentration of production by foreign and domestic firms show that farmed salmon has characteristics that distinguish it from other 'buyer-driven' chains. These geographically centralised economies of scale diverge from the geographically decentralised manufacturing platforms noted in apparels manufacturing (Gereffi 1999 and 1994; Bair and Gereffi 2001). The largest salmon farming companies in Chile match the export sales of agro-fruit giants such as *Del Monte* and *Chiquita* (ECLAC 2001). Furthermore, whereas the entry costs for manufacturing are low in most 'buyer-driven' chains (Gereffi 1999) this is not the same for farmed salmon. Recent purchases of Chilean firms by *Nutreco* and *Fjord Seafoods* totalled in the hundreds of millions of dollars (Intrafish 2000). Economies of scale rapidly became a necessary requirement for entering the Chilean salmon farming industry.

Outsourcing and product differentiation has provided opportunities for SMEs. As the industry expands to Regions XI and XII, the question is the degree to which SMEs are able to exploit niches not already occupied by feed or grow-out giants. In any event, SMEs in the servicing sector compete with Norwegian multinationals that have a secure presence in the supply sector for farmed salmon in Chile (Intrafish 2000).

Living at the Bottom of the Chain: Class and Gender Dynamics in Chiloé

"Twenty years ago – Chiloé island – lack of employment, alcoholism and a lot of self-employed people. The fisheries – hake has almost disappeared – used to be a common fish. So I am convinced that salmon aquaculture is good for employment for thousands of people who don't have other possibilities. It also reduces the movement of people to big cities. Santiago still has forty per cent of the population. In the last ten years - [there has been] a movement from there [Santiago] to the X Region" (Intesal official 27/02/01).

"Chiloé – since we started improvements in all the region and in this area (town of Chonchi). When I arrived it was difficult to buy paper for the bathroom. The truck came from Santiago once a week to Castro. Today it is an incredible difference – Now with the farms we have cellular phones. We [our firm] have a satellite phone" (Servimar official 24/12/01).

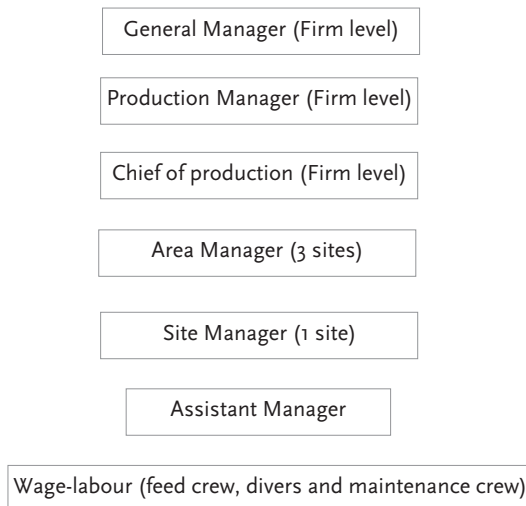
Salmon farming industry officials usually espouse a modernisation thesis when discussing the benefits of the industry for Chiloé. This position has also been

articulated by key players in salmon farming industries in other jurisdictions (see Phyne 1999). A closer examination shows that the benefits in the Chilean salmon farming industry are skewed in favour of those employed in either ownership or key managerial positions.

One of the main limits of GCC analysis is its focus upon industrial dynamics to the exclusion of local-level processes (Barrett et al. 2002). Local-level processes shape the conditions experienced by the workforce and coastal communities in Chiloé. Here, we examine the social organisation of work on grow-out sites and processing plants.

Many of the 230,000 workers employed in the Chilean salmon farming industry (Fundacion Terram 2000) work on grow-out sites and in processing plants. Figure Two depicts the social division of labour on grow-out sites. A common pattern is for positions from general manager to assistant manager to be recruited from outside of Chiloé. An area manager can make between 700,000 to 1 million pesos per month (Barrett et al. 2002). These managers also have responsibilities for processing in addition to marine production. In contrast, wage-labour on grow-out sites tends to be recruited from Chiloé. Barrett et al. (2002) report that wage-labourers on production sites are largely male, but 30 per cent of the labour force is female. Due to the automation of feeding processes in the 1990s, there has been a substantial drop in the number feed workers (Barrett et al. 2002). *Multiexport* employs only 65 workers on its 16 production sites (Interview 28/02/01).

Figure 2: *The social division of labour on salmon aquaculture grow-out sites*



A labour organiser noted that workers are employed for long hours (up to 12 hours), especially during the key harvesting period from November to March. There are no washroom facilities on cage platforms, and the women complain about cystitis. As a result, there is a high labour turnover for women. Men urinate over the side

(Interview 06/12/00). These observations were also made by an ECLAC official (Interview 01/12/00).

Barrett et al. (2002) estimate that 80 per cent of all plant workers (400-450 per plant) are female. *Multiexport* has 550 processing workers at its Puerto Montt plant and 72 per cent are female (Interview 28/02/01). The concentration of women in low-paying fish processing jobs pre-dates the rise of Chile's salmon farming industry (Schurman 1997). Employment in the fish processing sector is roughly analogous to the agro-fruit export sector (Barrientos 2001 and 1997). In both cases, female workers are largely recruited on a part-time basis in order to process food for export markets.

Farmed salmon exports are maximised from November to March, capitalising on the off-season in American and Japanese markets for farmed and wild salmon sales from North American producers (Heen et al. 1993). Between July 1999 to June 2000, Chile exported 196,743 tonnes of farmed salmon. Over 54 per cent of this total was exported from November 1999 to March 2000. The Japanese market for coho products is crucial during this period. Nearly 90 per cent (55,338 tonnes) of coho and just over 32 per cent of Atlantic salmon (29,869 tonnes) were shipped during this time. Atlantic salmon shipments, largely destined for the American market, have the most balanced monthly export schedule of all farmed production (calculated from Petersen 2000).

Are there consequences of this difference in export shipments for the social organisation of labour in processing plants? Barrett et al. (2002) point to poor working conditions in three Chilean plants: *Unimarc*, *Invertec* and *Yadran*. These plants all produce farmed coho for the Japanese market. In fact, *Unimarc* is the world's largest producer of farmed coho with an estimated production of 8,000 tonnes in 1999 (Intrafish 1999). During November to March there is a 300 to 500 per cent increase in casual workers. Workers at the *Yadran* plant in Quellón work 10 to 12 hour shifts six days a week. Despite the minimum wage, there is a production system in place that allows "... companies to technically pay less and use the incentive system (and thus ensure high production levels) to bring individual salaries up to the minimum wage level" (Barrett et al. 2002, p. 1957). There is a base salary of 65,000 pesos a month. After that workers must meet a base production of 100 tins/person/hour. This manipulation of piece and wage rates ensures that the minimum wage is met.

In the fall of 2000, there was a successful five-day strike at the *Invertec* plant. This plant was not unionised. According to a labour organiser, *Invertec* was paying workers less than the monthly minimum wage. The workers occupied the plant but still fed the salmon in the cages. At one point the Chilean navy was off the coast; yet the strike was successfully resolved by the Governor of Chiloé who ensured that the minimum wage was enforced. The minimum wage is one thing that will be enforced by the central government in Santiago (Interview 06/12/00).

Evidence also points to a high labour turnover in plants. Barret et al. (2002) echo Schurman's (1997) findings that fish processing workers are easily dismissed. One of our respondents notes "... workers can be let go – moments notice with no compensation and be hired back later" (Interview 01/12/00). This is not surprising given the weakness of organised labour in rural Chile in the aftermath of the Pinochet dictatorship (Kurtz 1999; Read 2000). The high turnover of workers was also noted by officials with *Multiexport* and *Patagonia Salmon*. However, these

respondents argued that there are difficulties in maintaining a core workforce. One implication is that workers seek out better working conditions. The official with *Patagonia Salmon* argued that they were able to keep a core of 'faithful workers' (Interview 25/02/01).

Barrett et al.'s (2002) evidence deals with communities with residents employed by Chilean-owned firms that largely process coho for the Japanese market. Hence, the combination of a Chilean landed elite branching into salmon farming, with a history of conflict with wage-labour (see Loveman 1979), and the speed by which coho has to be prepared for Japanese markets may converge in the production of poor working conditions in the 'middle of the chain'.

What is needed is an investigation that also examines the social conditions in plants owned by multinational firms. The labour organiser indicated that the *Mares Australes* plant in Achao is unionised and has better wages (150,000 pesos per month) and working conditions than most other plants in Chiloé. This plant was unionised in 1991 (Interview 06/12/00). A visit to the municipal office in Achao revealed a multiplicity of civic associations. These associations may underscore the ability of a union to emerge. Yet, Barrett et al. (2002) also point to the strength of civic ties in communities whose residents work for the Chilean firms mentioned above. Another consideration may be the fact that *Mares Australes*, now part of the *Nutreco* empire, largely produces Atlantic salmon for the American market. In 1999, *Mares Australes* had 11 Atlantic and 4 Pacific salmon sites (Chile 1999). With *Nutreco's* merger of the operations of *Mares Australes* and *Marine Harvest* in 2000 under the *Marine Harvest* banner, 27 of its 35 sites raised Atlantic salmon largely for the American market (Chile 2000).

As we have seen, the export shipments for Atlantic salmon are spread throughout the year. This entails that year-round employment is not only maximised in grow-out sites (as is the case in general), it also points to the possibility of more permanent employment for female processing workers. If this is the case, then multinational capital in the salmon farming industry may have parallels with its counterparts in the agro-fruit industry (Barrientos 2001 and 1997), and be more amenable to improving wages and working conditions if pressured to do so. However, factors that may underscore such pressure are empirical questions in need of further research.

Discussion and Conclusions

Salmon farming is a further example of export led industrialisation inserted into 'buyer-driven' GCCs. The literature on 'buyer-driven' GCCs has relevance for understanding the dynamics of the Chilean salmon farming industry. The industry is characterised by governance from lead firms and external authorities. Hence, inter-firm linkages are critical to understanding the nature of production. Economic concentration is driven by a number of factors such as the early entry of foreign capital and 'old' domestic capital into the industry, the waves of consolidation that followed the onset of the 1998 crisis in Japan and the scale necessary to meet the requirements of importers in Japan and the United States. In addition, the low wages and poor working conditions in the salmon farming industry are indicative of trends in other 'buyer-driven' GCCs.

However, in contrast to the arguments that 'buyer-driven' chains are characterised by local ownership at the point of production (see Bair and Gereffi 2001; Gereffi 1999; Kaplinsky and Morris 2001), the Chilean salmon farming industry is almost equally divided between local and foreign capital. In addition, economies of scales were quickly established, thus precluding the ability of many SMEs and larger-scale firms to survive. Furthermore, entry costs are increasingly expensive for salmon farming companies. These costs, coupled with economies of scale, show a divergence from much of the 'buyer-driven' GCC literature on apparels.

Analyses of 'buyer-driven' GCCs need to make a careful distinction between the apparels and agro-food chains, and even different types of agro-food chains. Retailers and brand name companies source apparels from numerous decentralised locations across the planet (Gereffi 1999), but the same is not true for some forms of agro-food production. Climatic and geographical conditions may restrict the number of sources. This is especially true for salmon farming. Chile is the only developing country with substantial supplies of farmed salmon. Most of the production is in the industrialised world. Food retailers in dominant EU, American and Japanese markets source supplies from mostly large-scale companies in Chile to a greater mix of small, medium and large-scale producers in jurisdictions such as Ireland (Phyne 1999), the Faroes (see Apostle et al. 2002) and Norway (Directorate of Fisheries 2001). Thus, while salmon farming is dominated by retail demands, the limits in the number of places where salmon can be cultivated raises the possibilities that 'upgrading' in the chain can occur, especially if salmon producers are able to secure more markets. To that end, Chilean farmers are trying to increase their sales to Latin American and EU markets.

GCC analysis is also criticised for emphasising structural dynamics to the exclusion of local-level processes. Barrett et al. (2002, p. 1964) argue that "... people carry out their lives in families, households and communities. Even if they are salmon farm workers, they are members of wider social groups. These memberships push and pull them in ways that a fragmented focus on individual workers fails to capture". Barrett et al. (2002) point to the types of community resistance used to challenge the poor wages and conditions in the salmon farming industry. They show the resilience of the residents of Chiloé in coping in the midst of a lucrative export-driven industry.

Nevertheless, our GCC analysis shows a diversity of capital in the industry. Research is needed that combines insights from the GCC literature and community sustainability approach (Barrett, et.al. 2002) in investigating the relative impact of 'old' Chilean, 'new' Chilean and foreign capital upon livelihoods in Chiloé. This wider analysis can focus upon the ways in which different forms of capital operate and the responses of community members to these different forms of capital. Globalisation is a multifaceted process, and further research may show different types of 'buyer-driven' chains and working conditions in the Chilean salmon farming industry.

In conclusion, coastal communities in Chiloé receive few benefits from salmon farming outside of immediate employment. Residents of one community have to travel by foot to a larger community for medical needs because a *collectivas* will not travel on the smaller community's dilapidated dirt road (Interview 21/02/02). Adjacent to this community is a large salmon farm that exports to world markets. Officials at the *Gobierno Regional de Los Lagos* (Region X) argue that higher wages will

not be secured in lobbying efforts to the central government; they need data on local conditions to make claims for more tax revenue for needs such as schools, roads and hospitals (Interview 05/12/00). In sociological terms, these funds combined with real wages would contribute to a higher social wage for coastal communities.

The central government collects taxes and redistributes these to Regions, Provinces and Municipalities, but four out of the five richest municipalities are located in and around Santiago (Read 2000). The wealth produced by the Chilean salmon farming industry needs to be met by a greater redistribution of benefits. However, given the retention of 'neo-liberalism' and pursuit of bilateral free trade deals by the current government, it is the resistance by coastal communities in Chiloé that will be at the centre of any redistribution of benefits in the foreseeable future (see Barrett et al. 2002).

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Notes

- ¹ Chiloé is a province in the Los Lagos Region of Chile. It includes the island of Chiloé and the many islands that dot the inner passage that separate Chiloé Island from the Chilean mainland.
- ² The phrase salmon and trout farming will be used to refer to Atlantic and coho salmon, and rainbow trout. If a firm does not farm all of these species, the names for individual species will be noted.
- ³ Other members of the research team conducted focus group interviews with selected aquaculture communities in Chiloé. They are investigating the socioeconomic and cultural impact of industrial aquaculture upon rural Chiloé (see Barrett, et. al. 2002).
- ⁴ The last phase of this multi-stage research project involves a visit to Japan (Spring 2003). Here, we will examine the nature of the market for farmed Chilean salmon. Since Japan is also an emerging market for Norwegian salmon, we will also investigate how Norwegian

firms are constrained by conditions in this market. This will enable us to further map the value chain for farmed salmon.

- 5 We also conducted interviews with the production managers of seaweed and mussel processing facilities. These respondents were selected in order to provide a wider perspective on the Chilean aquaculture industry. In future work, we will compare the socioeconomic and environmental dimensions of the Chilean salmon, seaweed and mussel farming sectors.
- 6 This is comparative research on state, market, firm and community linkages pertaining to aquaculture in Chile, the Faroes and Norway. These are three of the top five producers of farmed Atlantic salmon, and that commodity will serve as the basis for the comparative investigation.
- 7 Chile is not even home to Pacific salmon. The five species of Pacific salmon only exist in the northern third of the Pacific Ocean. Given the limits of farmed salmon production in Europe and restrictions on licences in Norway until the early 1990s (see Holm and Jentoft 1996), Chile and other Pacific jurisdictions such as British Columbia, Canada and Tasmania have proven attractive to international salmon farming capital.
- 8 Along with fewer and larger companies, the number of concessions increased. In 1988, there were 170 salmonid concessions in Regions X to XII (Mendes, et. al. 1988). By 2000, this had increased to 614 (Chile 2000). In addition, although Region X had over 93 per cent of all the concessions in Regions X to XII in 1989, this figure had declined to just over 63 per cent by 2000. Most of the growth from 1989-2000 was in Region XI.
- 9 This individual is part of the ownership and management of three firms. One firm specialises in mooring installations for salmon farms, and another in the removal of salmon farm nets for cleaning. The third firm is preparing for the expansion of farmed salmon production in Region XI by constructing living quarters for production workers. The interviewee notes this is necessary due to the absence of sustained interest by the central government in 'colonising' Region XI. (Interview 24/02/01).

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