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ENVIRONMENTAL REGULATION LIMITS GROWTH OPPORTUNITY

A CASE STUDY OF THE IRISH MUSSEL INDUSTRY

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WITH continuing globalisation, there is increased competitive pressure on rural economies especially those rural regions producing commodities for the world market. Identifying and exploiting smaller specialist markets with products that can be produced locally is one strategy for diversifying local economies. In this paper, the recent development of the Irish mussel industry is examined. The development of the industry is set in its national context and a detailed analysis of the supply chain is undertaken. While the Irish industry is small relative to major international players such as China, Thailand and Spain, its development has assisted local economies with limited development opportunities. The mussel industry in Ireland is the largest aquaculture sector in terms of tonnage and second only to salmon in terms of value. The total production volume of mussels in 2004 was 37,315 tonnes. The industry is split into two main production techniques: bottom mussels (naturally growing on the seabed and harvested using special dredging techniques) and rope mussels (cultivated on rope structures in an aquaculture environment). The principle challenge for the Irish mussel industry is environmental regulation. Despite strong demand for the product, growth of the industry is hampered by a difficulty in getting approval for licences and this delays many potential producers from getting involved in production and forces unlicensed producers to cease production. This results in a lower regional output than would otherwise be the case and also results in supply not being able to meet demand. Linked to this are regulations that protect an attractive landscape, these regulations impact on production as many licence applications are refused this has an adverse impact on the amount of mussels produced.

Key Words: Mussel Industry, Supply Chain.

Introduction

With continuing globalisation, there is increased competitive pressure on rural economies especially those rural regions producing commodities for the world market. Identifying and exploiting smaller specialist markets with products that can be produced locally is one strategy for diversifying local economies. In this paper the development of the Irish mussel industry is examined as an example of economic diversification based on local natural resources.

Studies have examined the development of the mussel industry in different locations. The farming of blue mussels was found to be a growing sector for the Norwegian Aquaculture industry. Continued expansion in Norwegian blue mussel farming is expected; prospects are believed to be good. The Norwegian industry benefits from sheltered fjords and very strong demand for the product (Ottesen & Gronhaug, 2004). In Galicia in Northern Spain, the industry has also grown significantly; by year 2005, 205 locally owned mussel platforms producing 10,000 metric tonnes a year. Due to natural limitations, a ban on expansion of the industry introduced in year 2004 (Lindkvist & Antelo, 2007). While develop-

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ments in Galicia presents opportunities for growth and regeneration, the Muros community and in particular actors of the production system have an inability to change from previous evolutionary paths (Lindkvist & Antelo, 2007). The internal institutional contribution to local and regional development is very limited despite significant initiatives at provincial level. This is linked to local passivity and the embeddedness of local production system (Lindkvist & Antelo, 2007) In a study by LaFluer et al, (2005), the economic importance of domestic wild shrimp was emphasised to the regional economy in Terrebonne Parish, Louuisiana. However a study of Chilean salmon farming found few benefits to the local community apart from immediate employment. Social conditions and services had not improved in areas where the industry had developed (Phyne & Mansilla, 2003).

A theme to emerge from studies are the environmental and ecological constraints that influence the sector. A study of Mont-Saint-Michel Bay, France by Mongruel and Thebaud (2006) showed that ecological constraints such as water quality and ecological interactions related to coastal food webs have influenced the overall evolution of blue mussel farming. The mussel faming industry in Germany while it has a notable level of production is very restricted with little opportunity for expansion. This is due to stringent regulations and the extreme difficulty in acquiring new licences. The regulation complexities are examined by Rosenthal and Hilge, (2000) with a focus on the Schleswig-Holstein Wadden Sea. Mussel industry in this area faces increasing regulation and due to further restrictions production may even decline despite a very strong demand for its products.

However, on the other hand, eutrophication of coastal waters can be reduced through mussel farming; this is achieved as the mussels (such as blue mussels) are filter feeding organisms that remove nitrogen while generating seafood, fodder and agricultural fertiliser thereby recycling nutrients from sea to land. A study on the Gullmar Fjord on the Swedish coast showed that the net transport of nitrogen was reduced by 20%. However accumulation of bio-toxins is an impediment to further expansion of mussel farming in Sweden, but new techniques and management strategies may be able to alleviate this (Lindahl et al., 2005).

Also, in a study on the impact of mussel suspension culture on the seabird and seal community in Bantry Bay, County Cork, Ireland showed that mussel suspension culture does not appear to have any significant impact on the abundance of seabirds or common seals. In fact increased abundance of certain seabird species was observed possibly linked to safe perching platforms provided by the culture floats and other factors (Roycroft, et al., 2004).

In a study of the obstacles and possibilities governing the accessibility to coastal waters for large scale mussel farming in the northern part of the Swedish coast, alternative approaches to addressing the problem are discussed. This study highlights the difference between the "Continental" and Nordic perspective on the right to land and water in a coastal zone and discusses the legal regulations that affect the right to use land and water in large scale mussel farming (Sterner, 2005).

Material and Methods

A comprehensive, detailed questionnaire was completed with key informants at each stage of the supply chain. The questionnaire was designed to derive information at the producer level, intermediary actor level (processor and distributor level) and the consumer level[1].

At producer level, the following information was derived using the questionnaire: a general description of the supply chain; information on labour and intellectual capital; information on production output; external effects such as environmental impacts; external factors such as environmental preconditions; legislation; non-market influences on decision making; economic, social and environmental sustainability; mussel farmer livelihood diversification strategy; reasons for past changes in production (production input and production output were examined as were effects of past changes on the environment and the rural economy; future possible changes in production were also examined.

1 France is easily the largest market for Irish rope mussels. In France, about 50% of mussels are sold to households (via retailers) and 50% are sold to public households such as restaurants, hotels, schoolds, prisons, hospitals etc. This is the case for all mussels in general. In the specific case of Irish rope mussels, the mussels are mainly sold to the catering industry. Very few are sold to retailers. Therefore, it was impossible to construct a picture of a typical retailer of Irish rope mussels in France.

The categories of information derived were similar for the intermediary actors (processor and distributor). The following information was derived at consumer level: a general profile of the consumer, demand for the product (including average purchasing price per unit and average consumption per consumer per annum); price and income elasticity; external factors including influences on the end-consumer for choosing the product; past demand changes and future demand options.

At the producer and processor stages, the key informants who completed the detailed questionnaire were the Research Director and Manager of the Marine Research Centre, Bantry, Co. Cork and the Regional Development Officer with Bord Iascaigh Mhara. (Irish Fisheries Board). At the distributor and consumer levels, the Market Advisor for Bord Iascaigh Mhara (BIM) Paris was the key informant.

Secondary sources of information were used to cross-check some of the figures and statistics quoted. These secondary sources included:

1. Review of the Irish Rope Mussel Industry. A report jointly commissioned by Bord Iascaigh Mhara and Enterprise Ireland.
2. Steering a New Course. Strategy for a Restructured, Sustainable and Profitable Irish Seafood Industry 2007-2013.
3. Production and Employment Survey 2003 for Mussel Production.
4. Status of Irish Aquaculture 2005.An information Report on Irish Aquaculture. Marine Institute, Bord Iascaigh Mhara and Taigh Mara Teo.

The Irish Mussel Industry in a Global Context

While the Irish mussel industry has experienced significant growth in the past decade, it is a minor player in a global context. World mussel production was 2 million tonnes in 2004; farmed mussels accounted for 90% of world production. Countries producing mussels can be ranked into three groupings based on 2004 data; those producing greater than 100,000 tonnes, those producing 60-100,00 tonnes and those producing 20-50,000 tonnes. China, Thailand and Spain are in the first tier. China dominates world mussel production accounting for 35% or 720,000 tonnes of total world production in 2004. Thailand and Spain are also very significant producers, accounting for 28% of world production. The second tier of mussel producing countries includes Denmark, New Zealand, Chile, Italy, France and the Netherlands; together these countries produce 24% of world mussel production. Irish mussel production falls into the third tier (20-50,000 tonnes) of counties which also includes UK, Greece, Korea and Canada (DAFF, 2008).

Irish aquaculture production of 109,299 tonnes in year 2005, shellfish contributes 47,748 tonnes or 44% of the total. Mussel production dominates shellfish production accounting for 80% of all shellfish production in Ireland. Other aspects of shellfish production in Ireland include Oysters, Clams and Scallops. Irish mussel production which totalled 38,265 tonnes in year 2005 (Table 1) can be classified into two types of production; Bottom Mussel production and Rope Mussel production. Bottom Growing involves harvesting naturally growing mussels on the seabed using specialised dredging equipment Rope mussels are grown on special rope structures in an aquaculture environment. In this paper the focus will be on the Rope Mussels, but for overall Irish production, Bottom Grown mussels are more important accounting for 77% of total Irish production in year 2005 compared to 23% for Rope Mussel production (see Table 1).

Rope Mussel production, which originated with experimental trials in Connemara in the West of Ireland in the 1970s grew rapidly in 1990s and the early part of this decade but more recently production growth ceased in year 2005 due to biotoxin closures in the southwest. It is estimated that the closures affected production in year 2005 by approximately 3,000 tonnes.

The main areas of rope mussel cultivation are in the southwest and west coast with some cultivation in the northwest also. Coastal areas such as Roaringwater Bay and Bantry Bay in the southwest, Killary Harbour in the west and Mulroy Bay in the northwest are key sites for the production of rope mussels.

Table 1: Irish Mussel Production (tonnes) 1990-2007

	1990	1992	1994	1996	1998	2000	2002	2004	2006	2007
Rope Mussels	3380	5091	3707	7000	7790	4045	7699	8755	9660	11200
Bottom Mussels	15000	8731	9260	7500	11306	21615	24000	28560	23583	18270
Total	18380	13822	12967	14500	19096	25660	31699	37315	33243	29470
Rope mussel production % of total production	18.3	36.8	28.5	48.2	40.7	15.7	24.2	23.4	29.0	38.0

Source: BIM.

In Ireland, 1,188 hectares of foreshore are licensed for rope mussel production with 128 mussel farms. The average farm size is 9.3 hectares varying from 91.8 to less than 1 hectare (PCW, 2006). Five processing plants process 90% of the harvested Irish rope mussels; the largest is Bantry Bay Seafoods which accounts for more than 50% of total volume processed. Other processors include Fastnet Mussels, Connemara Seafood, Atlanfish and Carrowkeel Seafood (PWC, 2006).

Total employment in the shellfish sector in year 2005 was 748.8 FTEs (Full-time equivalents), while actual number of staff including part-time and casual was 1,225 (BIM 2006). Of this 203.5 (FTEs) are employed in Bottom Grown sector while 180 are employed in Rope Mussel production. (BIM). The main market destination for Rope Mussel production is Ireland with 80% going to processors and the remainder sold on to the fresh market in France. However given the small size of the domestic market, the industry is heavily reliant on exports; France, UK and Italy are main export destinations. In year 2005 the average price for a tonne of Rope Mussels was •762 per tonne but up to •850 can be achieved on the fresh market.

The Study Area

The South West of Ireland is socially, culturally, economically and geographically diverse region of 12,161 km. Its 580,000 inhabitants live across a range of diverse areas – ranging from modern urban settings to small rural towns, isolated farms in mountain areas, islands and peripheral, small villages.

The region has a highly developed, modern, high-technology-based economy, supported by a high-quality environment. Its people enjoy attractive landscapes and a deep cultural heritage. The past decade has witnessed sustained investment in new roads, sanitary services, telecommunications and related infrastructures. Government-led investment programmes continue to prioritise investment in supporting health and educational facilities. The South-West region contributes • 22.298 billion (2002 values) towards the Irish GDP. The harbour area, to the immediate east of Cork city, is home to a large number of pharmaceutical and medical companies.

In the South West, between 1995 and 2004, the total Gross Value Added for the South West tripled from •7544.4mto •23601.6m. The primary sector activities of agriculture, forestry, fishing and hunting fluctuated in terms of total GVA but saw an overall decrease over the 10 year period. As a percentage of the total GVA, agriculture forestry fishing and hunting decreased very significantly from 9.5% of the GVA to just 2.9%. In contrast, industry's contribution to GVA increased from 46.1% •3480.7m to 53.3% •12, 581.1m. The value of the contribution of services increased threefold over the 10 year period (from •3344.8m to •10339.6m). Its percentage contributon fluctuated over the period and saw an overall decrease. These figures illustrate how the economy of the South West of Ireland grew massively between 1995 and 2004. Industry and services account for all of the growth. Agriculture declined in the absolute size of its contribution and declined greatly in terms if its relative importance to the economy.

Development of Supply Chain

The mussel industry in Ireland is the largest aquaculture sector in terms of tonnage and second only to salmon in terms of value. The total production volume of mussels in 2004 was 37,315 tonnes. The industry is split into two main production techniques: bottom mussels (naturally growing on the seabed and harvested using special dredging techniques) and rope mussels (cultivated on rope structures

in an aquaculture environment). The rope mussel sector accounts for about 25% of overall mussel production. The rope mussel sector in Ireland originated in Connemara on the west coast of Ireland in the 1970s with experimental trials and grew rapidly in the 1980s and 1990s. Today, the main area of cultivation is located around the southwest and west coast of Ireland. In 2004, the volume of rope mussels produced was estimated at 8,755 tonnes with a point of sale value of approximately •6.9m. Between 2000 and 2003, the industry experienced growth in both production volume and value. However, in 2004 production levels declined due to prolonged closures caused by biotoxins. This resulted in considerable stock losses.

The main areas of rope mussel production in the South West are: Roaringwater Bay (20+ farms); Dunmanus Bay (3-5 farms); inner Bantry Bay 11-20 farms; Bear Haven (3-5 farms); Ardgroom (5-10 farms); Kilmakillogue (5-10 farms); and Sneem (1-2 farms).

A total of 1,188 hectares of foreshore are currently licensed for rope mussel production, involving 59 entities operating 128 mussel farming licenses. The farms vary in size from 91.8 hectares to less than 1 hectare. The average size of a farm is 9.3 hectares. Based on the annual production of 8,755 tonnes in 2004, the average yield per hectare is 7.4 tonnes. There has been a gradual increase in average tonnage levels between 2000 and 2004 with the number of small scale producers (<50t) declining from 31 to 12 growers, while the number of medium to larger scale producers (>100t) increased from 11 to 28 growers. Overall, however, the number of rope mussel growers, which increased between 2000 and 2003 (from 56 to 66 growers), declined to 59 growers in 2004. (PWC 2006)

Approximately 90% of harvested Irish rope mussels are processed through 5 main independently owned processing plants. Bantry Bay Seafoods which focus only on mussel processing, accounts for more than 50% of the total volume processed in Ireland. Other processors run multi-product operations. The remaining 10% of product is sold through the fresh market. The mussel industry in Ireland is heavily export focused. The main market for rope mussels is France (42%), UK (20%) and Italy (12%). Other markets include Germany, the USA and Japan. The majority of produce is sold to the catering trade (75%), followed by the retail trade (19%) and further processing (6%) (ibid).

Current Structure of the Supply Chain

There are approximately 36 mussel farms in the South West of Ireland. There is an average of 3-4 persons employed per farm. Fifty percent of farms are between 10 to 50 hectares in surface area. The average farm size is 9.3 ha and the average yield per hectare is 7.4 tonnes based on 2004 levels of production (PWC, 2006). The average turnover per farm is •150,000 per annum.

Processor

There are 5 Mussel Processors operating in the South West of Ireland. There is an average of 35 employees employed per processor. Mussels are packaged in packs that range in size from 0.25kg to 5kg.

Distributor

France is the main market for Irish rope mussels (42%) and 75% of all Irish rope mussels in France are distributed to the food catering sector. Mussel are distributed in packs that range in size from 400g to 5kg. There are a total of 20-30 main distributors of mussels in France with 5 main distributors that account for 80% of the distribution of mussels. These larger firms have several thousand employees and have a turnover of several billion euros. The average distributor business size is larger than typical businesses in France.

Consumer

Public households and institutions are the main consumers of rope mussels produced in the South West of Ireland. This is the case for all mussels in general. In the specific case of Irish rope mussels, the mussels are mainly sold to restaurants and the catering industry- hotels, schools, prisons, hospitals, etc. Very few are sold to retailers. The purchasing price per portion of the product ranges between •1.80 and •4.30 (average price of •3). If the price of mussels increases, there would be a minor decrease in the consumption of mussels. The tourism sector has a strong

influence on the consumption of mussels in France as there is a strong consumption in coastal areas. The Food service sector also has a strong influence on the consumption of mussels by sourcing and providing the mussels for consumers.

Interactions with Local Economy and Local Environment

Employment

Thirty percent of the people working on mussel farms are owners. Many mussel farmers are both self-employed and also work for other mussel farmers when they are not tending to their own farms. All mussel farmers have basic agricultural training due to exposure from their parents and peers to agricultural and fishing practices. Many mussel farmers were on-land farmers who saw an opportunity for farming in the sea. Many other mussel farmers were, and still are, fishermen. The overall relevance of mussel farmers with present other gainful employment is medium and accounts for about 50% of all farmers in the supply chain. In terms of other agri-products that mussel farmers are involved in, in-shore fishing is of medium relevance (30% of all mussel farmers), shrimp fishing is of low relevance (10% of all mussel farmers), on-land farming is of medium relevance (about 25% of farmers). Small numbers of mussel farmers are involved in tourism activities such as fishing trips and sight-seeing tours. Others work part-time in the services industry.

The average production costs per unit are about •650 per tonne. Labour accounts for approximately 65% of the total production costs

Farmers are encouraged by other bodies such as Bord Iascaigh Mhara (Irish Fisheies Board) to cooperate with each other and to share technology and knowledge so that they can compete with other countries.

Although mussel farming has large potential as an industry it is still relatively small and in comparison to the massive growth of the Irish economy over the last 10 years, it makes, in a relative sense, a very small contribution to total employment and GVA in the region.

Since 1993, there has been a slight increase in the contribution of production to the total employment in the region. This increase was seen particularly among young employees (aged 15-25 years) employeed from other EU member states and employees from third countries.

Environment

The production of mussels may also promote pests in a small way as mussels are a source of food for starfish. Because of this, mussel farmers are not allowed to locate lines over sand beds. The contribution of agricultural land use to protect cultural heritage is of medium relevance. Mussel farming can enhance biodiversity if well located and can increase the number of seabirds particularly.

The quality of the sea water in which the mussels are produced is extremely important for the Bord Iascaigh Mhara.

Mussels can be produced year-round but some of the bays are shut down at times and harvesting of mussels may be interrupted due to natural hazards such as high levels of biotoxins over the warmer summer months. The excessive level of biotoxins in the water in 2005 effectively halted the harvesting of rope mussels in some of the bays of West Cork and mussels had to be brought in from the outside by the processors. Other special climatic conditions necessary for the production of mussels includes phytoplankton (there is a spring and autumn bloom). Regulations for protecting wild animals, plants and biodiversity are of some relevance (EU Habitats Directive (92/42/EEC) to the production of rope mussels in the region. Regulations on food safety are of very high relevance and adherence to these regulations impacts greatly on mussel harvesting and processing.

Discussion

The Irish mussel industry, while small by international comparison, has emerged as an important sector for some coastal communities over the last two decades. The industry avails local natural re-

sources and provides local employment in areas with limited opportunities for economic development and diversification. Demand for the product is strong and the main limitation for the sector is environmental regulation limiting the possibilities for further growth.

Failure to get approval for licences delays many potential producers from getting involved in production and forces unlicensed producers to cease production. This results in a lower regional output than would otherwise be the case and also results in supply not being able to meet demand. Regulations to protect an attractive landscape impact on production as many licence applications are refused because of this and this has an adverse impact on the amount of mussels produced. Policy changes have had a big impact on the growth of the industry. Laws such as the Shellfish waters act (water quality act 2006 amended) had a big impact. Also, the ever stricter requirements for the issuing of licences has negative impact on the ability of the industry in the South West of Ireland to expand. The industry has the potential to grow and expand in particular the growth of export of fresh mussels. Continued development of the industry can benefit local communities but there is a need for a coordinated response by key stakeholders to work with relevant authorities to address sustainability issues for the sector.

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