Agricultural and Food Economics

The Development of the Food and Drink Processing Sector in Northern Ireland

Literature review and preliminary recommendations

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Executive Summary

This review aims to support the development of agri-food strategy in Northern Ireland (NI) by reviewing the available literature and benchmarking. The review focuses on discussing different strategic options for the Northern Ireland food and drink processing sector (NIFDS) by (1) identifying main problems and issues associated with its development, (2) reviewing the mechanisms driving competitiveness at country, industry and firm levels, and (3) discussing possible policy options for NI specifically.

Based on the evidence available in the economic literature and data relevant to NI specifically, the underlying recommendation is that public support should focus on enabling firms to pursue *differentiation* and *cost leadership* strategies. The *differentiation* approach involves claiming a price premium or market share based on providing a unique product or service. *Cost leadership* strategy centres around decreasing costs, so that market share is secured via price competition. Both strategies depend on natural resources, infrastructure and human capital to secure or sustain a comparative advantage, although the emphasis on what resource the advantage is derived from changes with the strategic approach.

Strategy

Cost leadership

The NIFDS has exhibited price and production cost competitiveness in recent times with wholesale prices of major exports below the sustained increase of international prices. The comparative advantage in terms of *cost leadership* potential for NI is likely derived from the relatively inexpensive raw inputs from agriculture and relatively low labour costs. Average production costs of major agricultural products in NI are lower than many competitors in Europe though not globally. The literature suggests that efficiency gains in agriculture may be transferred to the FDS in the form of cheaper inputs so the success of a *cost leadership* strategy in the NIFDS will depend on some degree of compatibility with the future direction of NI agriculture. Relatively low labour costs (about 10% below neighbouring regions) are also beneficial for a labour intensive sector such as the NIFDS.

In terms of market demand, quantities required for food security are increasing at an unprecedented pace and demand for livestock products such as dairy and meat will continue to increase because of income improvements in emerging markets. However, penetration of emerging markets by the NIFDS is far below competing regions and nations. In 2009, only 3% of NIFDS exports were sold outside of the European Union (EU), compared to 35% of FDS exports from the Republic of Ireland (ROI).

Sustaining a competitive advantage based on low costs alone has associated risks. It is subject to numerous external factors such as exchange rates, energy price, regulations and climate change. These challenges will have a fundamental impact on the long-run viability of pursuing a *cost*

leadership strategy in the NIFDS. For example, if sterling appreciated by 30% against the US dollar (and other currencies at the same rate), NI's price competitiveness since later 2009 for butter, a major exporting commodity, would disappear.

Differentiation

Consumer preferences have moved towards safe, healthy, nutritious and sustainable 'green' food, particularly in relatively sophisticated mature markets such as the European Union (EU). The EU, particularly Great Britain (GB) and the Republic of Ireland (ROI), composes the primary market for the NIFDS, and so there is potential to pursue a *differentiation* strategy that caters to changing demand.

Food manufacturing in NI generates a smaller proportion of gross value added (GVA) relative to sales than other regions in the United Kingdom (UK). Relatively low GVA can be explained by low capital inputs (including knowledge capital such as R&D) associated with producing differentiated products and services that command a price premium. A case study comparing the NI and Scotland dairy supply chain indicates that the GVA gap can be as large as 20% and is largely due to Scotland's more differentiated product mix.

The NIFDS has relatively higher output, employment and income multiplier impacts on the regional economy than other economic sectors, suggesting that growth in the NIFDS sector will have a relatively large impact on economic development. Following a *differentiation* strategy in the NIFDS could increase these multiplier effects even further if the resources and inputs required to engage in product development are sourced locally. While the upstream links with agriculture remain important under both *cost leadership* and *differentiation* strategies, there is considerable potential in strengthening downstream links to R&D and services such as marketing if there is an emphasis on differentiating products based on adding additional value such as convenience, quality, nutritional content or sustainable sourcing.

Pathways to success

Innovation

Innovation is a process of creation that results in better or more effective products, processes, services, technologies, or ideas that are readily available to markets, governments, and society. It is proven to be the main driver of economic development and firm competitiveness. Innovation is essential to the pursuit of both *cost leadership* and *differentiation* strategies by creating new markets, adding new value, and reducing the cost of production and services. Many studies in developed countries indicate that the contribution of innovation, including Research and Development (R&D), to economic development can be as high as 70-80%.

Linking the different components of the innovation process (such as R&D uptake by industry) is essential, so can be thought of as an *innovation system*. The main challenge facing innovation systems is a framework appropriate for the structure and competitive strengths of the local economy. In the NIFDS, there are also several sector specific problems. First, innovation investment by

businesses is lower than other manufacturing sectors in output terms. Second, there is no clear vision of industry needs regarding innovation and no effective and practical mechanism to bridge demand and supply. Third, the region is a net importer of technology, and is dominated by small and medium size enterprises (SMEs). Therefore, the *system* aspect, linking different components of the innovation chain is an important issue.

There is anecdotal evidence that the NIFDS is involved in firm innovation but so far no systematic research is available. Literature in this area tends to suggest that successful FDS innovation depends on firm absorptive capacity as well as external factors including information availability. In terms of firm capacity, the skills of the workforce and investment in know-how (particularly in production and engineering departments) are important determinants of successful participation in innovation.

Scale

The academic literature shows that food and drink firms operating at efficient scale of production have a higher survival rate. It is well documented in the literature that larger firms have lower long-run average costs, are more likely to invest in R&D and export products and services. Therefore, achieving economies of scale supports activities that contribute to building competitiveness under both *cost leadership* and *differentiation* approaches.

The NIFDS is dominated by SMEs with over 80% of firms having fewer than 49 employees. The strategies developed for the FDS in Scotland and the ROI both involve increasing scale. Integration is one means to increase scale, and takes many forms such as ownership, cooperative arrangements, or long-term contracts. Mergers and acquisitions (M&A), the most complete form of integration, are a common means to increase scale by combining with competitors (horizontal integration) or suppliers/distributors (vertical integration).

Firms may face barriers to increasing scale including market distortions such as constraints in financial, human capital and labour markets, or, policy such as anti-trust regulation governing mergers and acquisitions (M&A). Recent events in financial markets have restricted the supply of finance available to SMEs in NI, indicated by the drop in the approval rate of applications for a bank loan to SMEs from 92% in 2007 to 65% in 2010. Competition law that seeks to avoid the dominance of single players capable of eroding consumer surplus influences the level of horizontal integration, while food safety standards encourage vertical integration. Research conducted by Bord Bia indicates competition law will limit further mergers amongst retailers in the UK and ROI in the short to medium term.

When firms acquire partial or full ownership of another enterprise internationally it is referred to as foreign direct investment (FDI). Attracting multinational corporations (MNCs) to invest in local enterprises is a means of 'importing' scale by gaining access to additional resources and networks. Establishing 'knowledge clusters' based around specific forms of expertise is a common strategy to encourage inward FDI as is being pursued in the ROI. Enterprise Ireland is coordinating a 'cluster' of expertise focusing on 'gut health' at research institutions to attract collaboration from world players in the dairy products industry such as Probiotic and Danone.

Human capital

In pursuing a *cost leadership* strategy it is important that firms have access to a highly productive labour supply so that the same productivity can be obtained at a lower cost than competitors. *Differentiation* strategy places more emphasis on specialist knowledge, so there is a greater reliance on third and fourth level qualifications.

Compared to Scotland and the UK, NI has a lower proportion of the population with qualifications at all levels. The difference may be in part due to access and uptake of education, or, due to a higher rate of migration in segments of the population with more qualifications. There is also an increasing gap in the percentage of employees receiving job-related training compared to Scotland and the UK.

The available evidence suggests that skills gaps may be an issue for NIFDS companies. One potential explanation is that the attractiveness of the NIFDS is lower than for competing sectors. From the employer perspective, poor confidence in specialist food science, food technology and engineering qualifications is an issue. There are also reports of the existence of high levels of hard to fill job vacancies at the senior management and technical level in NIFDS. This is a typical vicious cycle in the development process whereby low labour productivity reduces value added which in turn restricts firms from employing a highly skilled labour force.

Government has a role in helping to break the cycle by creating an effective system of education and training to supply the agri-food system in NI. The experience of other countries may help to design a solution to the problem. For example, the ROI strategy has taken the approach of linking industry interests and expertise with education at the secondary and tertiary levels. Improved qualification uptake has been combined with apprenticeships to address management and marketing skills, and industry-led R&D has been focused at universities and research institutes to build up research capabilities including postgraduate research training in relevant topics.

Market development

Market development can be divided into two components: accessing new markets and delivering new products. Serving external markets allows for economies of scale to be captured and unit costs to be reduced while new product development facilitate expansion of existing and new markets through *differentiation* by meeting changing consumer demand with unique products.

Publically supported trade offices located in external markets are an important instrument to promote local products, attract FDI and gather market information. Such offices are especially important in the case of NI considering the dominance of SMEs in the NIFDS, the fact that NIFDS exports account for half of total local exports, and that NI is a devolved region with limited formal diplomatic instruments to pursue explicitly NI interests. At present, there are 16 offices maintained by Invest NI representing NI interests in foreign markets, far fewer than maintained by competitors.

A study of SMEs in NI (10% of sample from the NIFDS) indicates that the strongest effect from government marketing and export assistance is observed in smaller firms already engaged in exports with recent or on-going investment in product development. The literature also suggests that in the FDS, large firms with more differentiated products, and that engage in research and development are more likely to expand into international markets either by exporting or integrating by means of outward FDI..

New product development and branding in NI is also fairly limited compared to Scotland and the ROI. The issue of national branding is relevant because a consistent message about local food or drink (e.g. Scotch whiskey) can contribute directly to national competitiveness, and reduce information and marketing costs for the large number of SMEs. Currently, NI holds three Protected Designation of Origin (PDO) products with the EU. There is evidence from France and Spain that PDO and Protected Geographical Indication (PGI) status commands a price premium and functions as a quality guarantee but also incurs higher input costs.

The Northern Ireland Food and Drink Association (NIFDA) suggests that NI may take advantage of claiming British or Irish provenance in the marketing of products, and suggests claiming British provenance is advantageous in GB while associating with an all island Irish brand may also exact a price premium. However, there is no clear indication as to whether such origin labelling commands a premium in markets further afield, and if the relative advantage of a British or Irish association varies across importing regions or products.

Strategy and recommendations

As is the case for other economic sectors, the NIFDS is facing many long-term global and local challenges, such as food security, safety, changing consumption patterns, market segmentation, climate change and energy dependence. An effective strategy will need to mitigate such challenges and approach them as opportunities to provide leadership at the industry and national level. Government support in dealing with these emerging as well as current issues needs to reflect the strategic importance of the NIFDS in regional economic development and stabilisation.

In several areas, including innovation, scale, human capital and market development, government intervention can support NIFDS firms pursuing *differentiation* and *cost leadership* strategies. The prominence of SMEs in the NIFDS means that a primary objective of public support will be to facilitate the pursuit of common interests. The main common interests identified in this review include: (1) linking up an innovation system that facilities incorporating new technologies and products to increase production efficiency and add value to outputs of the sector, (2) reducing the transaction costs of increasing scale when advantageous, (3) bolstering the supply of productive and qualified labour, and (4) adding value to products and additional markets through strategic national branding and market development.

(1) An *innovation system* involves human capital (R&D, education, training, etc.), physical capital (new production process investment, infrastructure, etc.) and social capital (networks). A more flexible system for public sector involvement in innovation activities using incentive-based instruments such as skill trainings and financial assistance to encourage innovation capacity building in the private sector is needed. Recommendations include:

- Linking innovation spending directly to improving *cost leadership* or *differentiation* by improving production efficiencies or developing new products and prioritizing assistance for SMEs with implementation challenges
- Synthesize long-term industry needs and trends in consumer preferences with the innovation system through private-public partnerships in education and R&D
- A potential list of 'technologies to be applied' including the potential efficiency gains, associated costs, and timeline of implementation should be developed through an industry-led public-private partnership and included as an annex to the strategy
- The geographical location and industrial organization of the NIFDS lead to more severe informational shortages than other regions indicating potential advantages of a centralized information dissemination centre (for example, in AFBI library) with government and industry support
- Stronger links between industry-led R&D and local research universities / institutions will provide a 'cluster' of specialist knowledge engaged in supporting new innovative products and processes as well as a supply of specialists engaged with the industries current and future needs.

(2) Economies of scale may be realised through enterprise expansion, cooperation, integration, and mergers in ownership, all facing potential barriers and transaction costs due to access to finance or to regulation. Cooperative agreements facilitated by government may allow local enterprises to gain the scale benefits of a merger in specific areas (e.g. R&D, exports, market research, and technical developments) with lower transaction costs. Potential actions include:

- Orchestrating knowledge clusters partnering industry needs and research institutions to contribute to the attraction of FDI
    - Scottish strategy has listed networking and collaboration (cooperation) as the main instruments while ROI also emphasizes the role of FDI in technology import. These instruments should also be applicable to NI
- Investigate the potential for vertical integration as in the poultry sub-sector to gain scale economies in aquaculture contributing to *cost leadership*
- Determine the potential impact of marketing cooperation across Ireland to compete with Scottish whiskey in emerging markets
- Capital investment is often a key constraint on scale expansion, additional research on the return to capital in the NIFDS and implications for adopting new technology is needed

(3) A priority is to clarify the human capital needs in the NIFDS and adjust the local educational and training systems to meet the current and long run demand, thus contributing to a breaking of the deadlock of low value added and low productivity

- In general, the private-public partnership model and the labour market should play a more central role in reforming our educational and training systems
- Effectiveness of publicly supported training and education in meeting employer needs should be monitored and evaluated
- Management-level training should cover
    - Issues related to a large, low skilled workforce
    - Global business, brand management and marketing

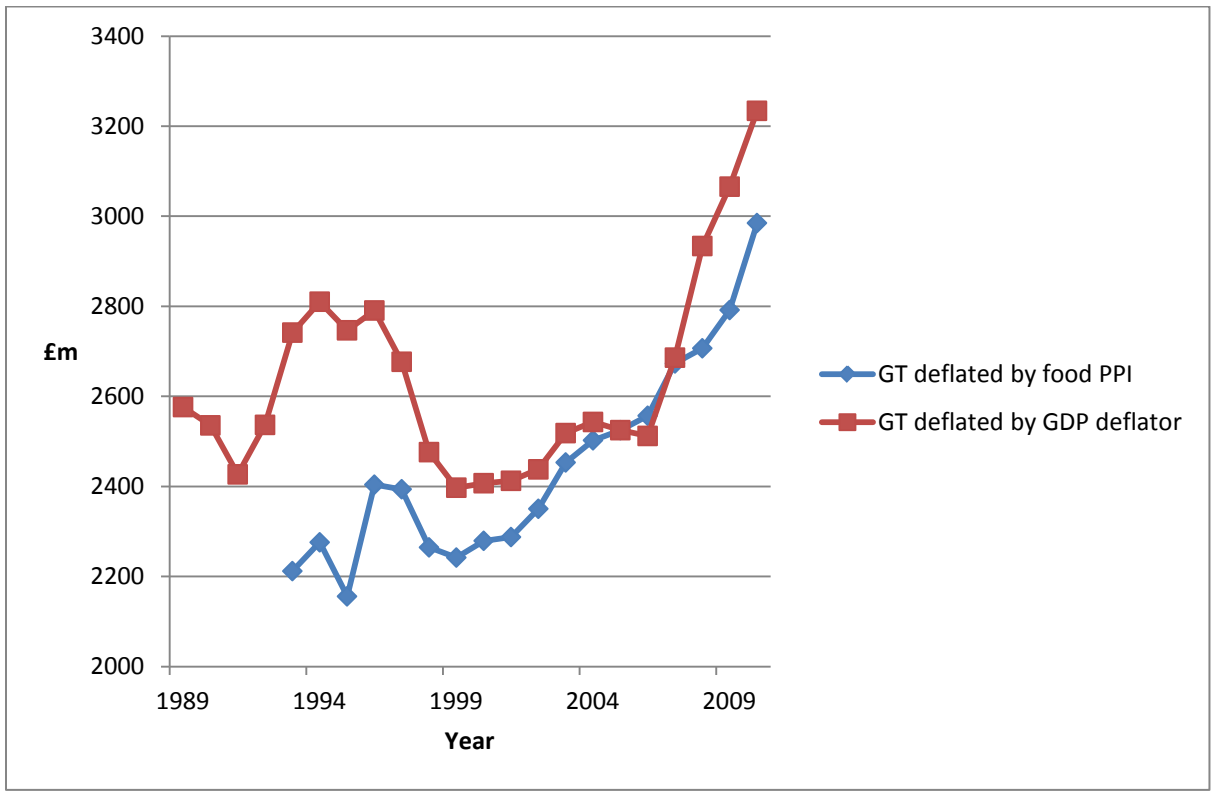
(4) As a country with a devolved government, NI may not have advantage of using diplomatic routes to promote products and services abroad, however as agri-food policy is a devolved matter the NI government can still use other instruments to facilitate market expansion.

- Develop and apply the innovation system to orientate NIFDS firms to enhance competitiveness in traditional and new markets
- Extend support to exporting firms by representing NI interests in foreign markets where major FDS competitors have an established presence, namely: Paris, Hong Kong, and Beijing
- Facilitate formal product of origin designations, including for foods associated with LFAs or other areas where constraints already limit production efficiency improvements so that a price premium may compensate for higher production costs
- Provide strategic direction in terms of informal national branding and the potential advantages across target markets and products

Chapter 1: Background

The food and drink processing sector (FDS) in Northern Ireland (NI) has grown considerably in last 20 years. Figure 1 below illustrates changes in real output deflated by a GDP deflator and food wholesale price index (UK)[1]. The real output of the FDS in NI (NIFDS) increased over the last 5 years, while if deflated using the UK food wholesale price (PPI), the expansion started over ten years ago in 1999 (Figure 1). Based on the PPI deflated trend, during the period between 1999 and 2010, the real output increased by 2.6% per annum.

Figure 1: Real output changes in Northern Ireland's food and drink industry, 1989 to 2010



[1] It is difficult to choose a suitable deflator. GDP deflator is often used as a constant / real price. In essence GDP deflator is quite similar to consumer price index (CPI) which reflects consumer's comparable value (in relation to its base year), though GDP only covers domestically produced products and services. It is therefore NOT a suitable deflator for certain category of products if its price changes greatly deviate from the weighted average and if the purpose of deflation is not relevant to consumption. Measuring growth of food and drink sector unfortunately fits into such a case. Therefore we will choose UK food wholesale price as the main deflator bur still present those of using GDP deflator as a reference.

Changes in output have been accompanied by changes in the relative shares of output by sub-sector[2] (Table 2). In the last twenty years, the beef and sheep meat, and milk and milk products sub-sectors have maintained their dominant role in the industry while poultry has almost doubled its share replacing drinks as the 3rd largest sub-sector.

Table 1: Output distribution (%) of Northern Ireland food and drink sub-sectors[3]

	1990	1995	2000	2005	2010
Animal By-Products	1.2	0.8	1.1	0.7	0.6
Bakeries	8.0	7.6	6.7	7.1	7.4
Beef & Sheepmeat	24.0	23.1	22.8	23.8	25.5
Drinks	14.6	11.8	13.9	10.9	10.1
Eggs	2.3	2.0	1.6	1.2	2.0
Fish	2.7	3.0	3.6	3.1	1.9
Fruit & Vegetables	3.1	4.6	5.9	5.9	5.3
Milk & Milk Products	26.4	27.1	24.3	23.3	23.1
Pigmeat	8.7	8.5	6.9	6.7	6.9
Poultrymeat	8.9	11.5	13.2	17.4	17.1
Total	100.0	100.0	100.0	100.0	100.0

Measured in full-time equivalent (FTE), employment in the NIFDS accounted for approximately 3.4% of employee jobs and 27.8% of total manufacturing employment in 2010 in the region. Contrasting the trend in other economic sectors, employment in the NIFDS increased during the last five years, even in the wake of the financial crisis, and has continued to provide a source of stability for the local economy during the recovery from recession (McDonagh 2012).

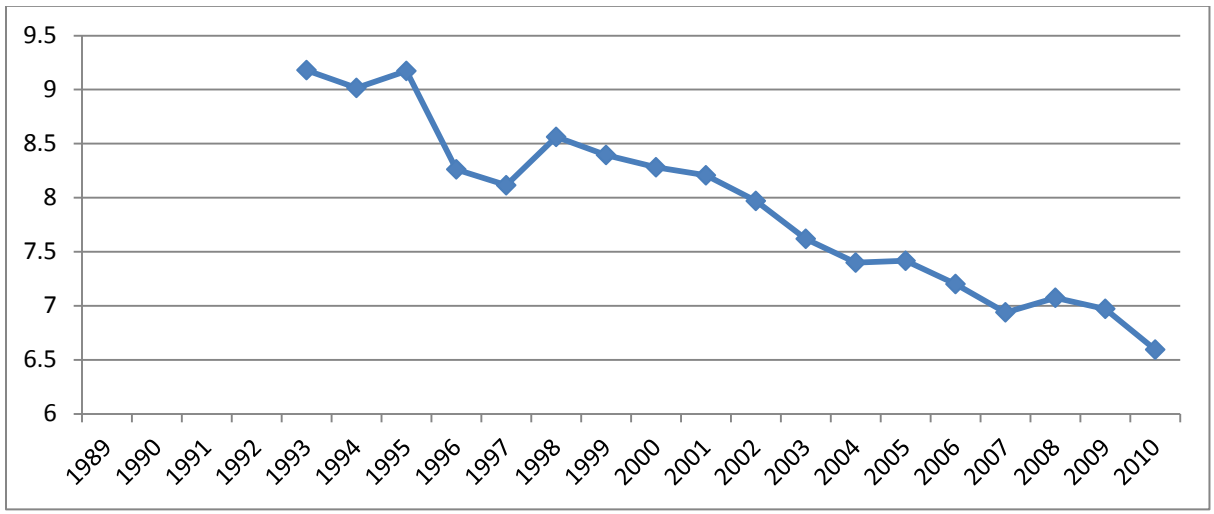
Apart from the increase associated with sector expansion, changes to total employment in the NIFDS in last 20 years are also related to the fall in employment intensity. Employment intensity, measured in terms of persons per £ million (£m) of output (in real terms), has declined

[2] In Northern Ireland, only data available for the FDS are those published by Department of Agricultural and Rural Development (DARD) in its annual publication Size and Performance of Food and Drink Processing Sector (SPFDP). Data in the publication are not fully consistent with the definition of Food and Beverage sector based on Standard Industry Classification (Chapter 15 in 2007 SIC code). There are three major differences between DARD and the traditional SIC definitions. First, the DARD definition only covers those processing activities that change the nature of a raw material destined for human consumption. Thus, businesses involved in animal feedingstuffs manufacture, pet food production, rendering, hide and skin processing and tobacco are not included. Second, most publications in other regions are based on an Annual Business Inquiry (ABI) in the UK and in Ireland while DARD data has combined company registration, ABI and other data sources. Third, in most cases DARD figures only cover those food and drinks processing businesses defined above with turnovers less than £250,000. So caution is needed comparing general FDS data between NI and other regions /countries. However, as some subsector data (for example those for dairy and beef processing) are still comparable.

[3] Calculations are based on DARD figures which are nominal price based and only those food and drinks processing businesses with turnovers less than £250,000 are included.

in the NIFDS from around 9.5 persons/£m in the early 1990s to around 7 persons/£m in recent years (see Fig 2). The trending downwards of employment intensity coincides with increases in the real wage rate and in the substitution of capital for labour in the same period.

Figure 2: Employment-intensity in Northern Ireland food and drink industry (employee/£million[4])



We carried out regression analysis of the NIFDS labour demand (1989 – 2010). This suggests that a 1% increase in sector output boosts sector employment by 0.20%. If the real wage rate or capital investment (in terms of depreciation) is increased 1% then employment will fall by 0.22% and 0.26%, respectively. In terms of elasticity values, the results are of the expected sign, but of lower magnitude than FDS estimations in other countries (Konings and Roodhooft 1997; Slaughter 2001; Cárdenas and Bernal 2003) and in other sectors.

Employment intensity also differs across sub-sectors of the NIFDS. It ranges from 21 persons / £m as in bakeries in 1995 and to 2 persons / £m as in dairy processing in 2010 (Table 2). Measured in constant terms, in the year 1995 there were 6 sub-sectors employing 10 or more persons /£m output and in 2010 only one (bakeries). The magnitude of change in employment intensity over time also varies according to sub-sector with eggs, animal by-products and pigmeat showing a more significant change than others.

Table 2: Changes to employment-intensity in Northern Ireland food and drink industry[5]

	1995	2000	2005	2010	2010 as % of 1995
Animal By-Products	12	12	10	4	35
Bakeries	21	24	17	10	49
Beef & Sheepmeat	5	6	5	3	65

[4] Output for food and drink industry is deflated by the UK food wholesale price index

[5] Own calculations based real output at 2005 prices. As no wholesale price index for each subsector in NI is available, UK food wholesale price index is used as the deflator.

Drinks	6	6	5	3	40
Eggs	9	6	6	2	27
Fish	15	13	10	6	42
Fruit & Vegetables	11	12	12	7	69
Milk & Milk Products	5	5	4	2	47
Pigmeat	12	11	8	4	37
Poultrymeat	15	16	11	7	44
Total	9	9	7	4	50

Table 2 also suggests that changes to employment intensity in the last 20 years are relevant to structural change in the NIFDS. Substitution of capital for labour accompanied by increases in the real wage rate is a common phenomenon in the economic development process. As such, increasing the production share of a sector (growth) will not necessarily increase employment numbers, but does contribute to economic development by increasing capital and wage rates.

Economic development is a key component of modern economic literature and refers to the sustained, concerted actions of policymakers and society that promote the standard of living and economic health of a specific area. In this sense, economic development differs from economic growth which is a phenomenon of rise in national income per capita (Sen 1983). Economists have identified capital accumulation (Solow 1956), human capital (Schultz 1961), technological change (Hicks 1974), social capability (Sen 1980) and market expansions (Smith 1999) as the key drivers of economic growth. These concepts are generally used in the context of national / regional development; however the driving principles are also valid in the case of sector-specific development.

In a market economy, developing a sector in a nation / region will be centred on comparative performance, or so called competitiveness. Competitiveness[6] can be defined in two different ways. The strategic management approach defines competitiveness as a firm's productivity and efficiency while neoclassical economics places emphases on comparative advantages (Dickson 1992). Competitiveness can also be divided into three levels of comparison: national, industry and firm level. For this reason, measuring competitiveness usually combines both strategic management and neoclassical approaches and defines several different indicators to reflect various dimensions of the concept. For example, in measuring national competitiveness, the Irish National Competitiveness Council uses a Competitiveness Pyramid structure to categorize the factors that affect national sustainable growth: business performance, productivity, prices, costs, and labour supply. The framework distinguishes in particular between policy inputs in relation to the business environment, the physical infrastructure and the knowledge infrastructure as the foundation stones of the economy and primary drivers of competitiveness (INCC (Irish

[6] There are still different views on the relevance of competitiveness to the development and its measurement. For example, Krugman Krugman, P. (1994). "Competitiveness: a dangerous obsession." Foreign affairs: 28-44. argued that, national productivity rather than competitiveness is what matters and "the world's leading nations are not, to any important degree, in economic competition with each other.". However, it is commonly agreed that for a small export dependent nation, the competitiveness is the key for the development.

National Competitiveness Council)). The ROI's agri-food strategy Harvest 2020 (DAFF 2010) has used a similar framework.

The national competitiveness concept, however, is somewhat different from that of industry and firm competitiveness. National competitiveness concerns comparative advantages of a nation to another functioning in an international business environment. Compared to large countries such as the United States and China, national competitiveness is particularly important for small open economies such as the ROI and NI, which rely on trade, and typically foreign direct investment (FDI), to provide the scale necessary for productivity increases to improve living standards (Katzenstein 1985; Porter 1990). A comparison of international competitiveness, IMD (2012), has taken account of several factors of economic performance including: the domestic economy, trade, FDI, employment, prices, government efficiency (of public finance, legal, fiscal and societal frameworks), business efficiency (of production and values) and infrastructure (physical, technological, scientific, educational and health and environmental).

Due to differences in political, economic, and other powers internationally, different countries will exert different degrees of influence in the international business environment. For example, a sovereign nation may use bilateral or unilateral trade agreements to promote its own exports but a devolved region such as NI will not have that advantage. Also, large countries will influence prices in the international market but a small nation will only be a price taker. Nevertheless, large and small is a relative concept. New Zealand is a small country but it's large in terms of trade of some commodities such as dairy and lamb products. Therefore, under some conditions small countries can be a big player in international trade.

Industry competitiveness refers to comparisons between different industries in a nation or region. An important factor in determining industry competitiveness is the links to other sectors in the economy. Another area of research relevant to industry competitiveness / comparative advantages is in cluster development. Porter (2000) argues that at the firm level, although the impact of clustering has diminished with globalization, new influences of clusters on competition have taken on growing importance in an increasingly complex, knowledge-based, and dynamic economy, due to the fact that firm networks (even amongst rivals) help to gain competitive advantages in the sale of its products and services, and, that beneficial externalities arise from linkages among firms in a specific geographic region and industry which cannot be captured and fostered by market alone.

Fundamentally, firm competitiveness is the basis of industry and national competitiveness as the latter can be competitive only if the firms are competitive. A competitive firm needs to be operationally efficient, cost effective and quality conscious to win customers, either with lower costs / prices or differentiated products that command premium prices. Therefore, the competitiveness of the firm or the sector will depend on relative prices and costs of the firm / sector to its competitors.

Michael Porter (1990) argues that a firm's advantages fall into one of two categories: cost advantages or differentiation. Therefore, an industry or a firm can adopt one of three generic competitive strategies: *cost leadership*, *differentiation* or *focus*. A *cost leadership* strategy gains comparative advantages or market share via lower production and marketing costs, through lower cost sourcing and vertical integration. *Differentiation* strategy targets unique attributes of products and services that are valued by customers so that the industry or firm can charge a premium price. The *focus* strategy concentrates on a narrow segment via either cost advantages or market differentiation. Treacy and Wiersema (1997) further modified the three strategies into three value disciplines: operational excellence, product leadership, and customer intimacy. In contrast to Porter's single strategy argument, they found that most of the empirical research indicates that companies pursuing both *differentiation* and *cost leadership* strategies may be more successful than companies pursuing only one strategy. On the one hand, a *cost leadership* strategy alone is likely to end up in a price war that can shrink the producer surplus. On the other hand, *differentiation* affords attaching a price premium, however there will still be competition between other premium products available, so competitive pricing will still be important for securing market share. Therefore, it is easy to see how *cost leadership* and *differentiation* strategies can be complementary.

There is evidence of this finding, as in recent years, more companies are choosing a strategic mix to achieve market leadership. These patterns consist in simultaneous cost leadership, superior customer service and product leadership.

Cost leadership is different from price leadership. A company could be the lowest cost producer, yet not offer the lowest-priced products or services. If so, that company would have higher than average profitability. However, cost leader companies do compete on price and are very effective at such a form of competition, having a low cost structure and management

Cost leadership is often a business strategy adopted for a mature industry such as food processing. It achieves the competitive advantage through lowering cost of operation in the industry. It's often driven by company efficiency, size, scale, scope and cumulative experience (learning curve) and cluster development. For small business, a *cost leadership* strategy aims to exploit scale of production, well defined scope and other economies (e.g. a good purchasing approach), producing highly standardized products, using high technology (Reid and Hall 1994).

Northern Ireland's national competitiveness

To a certain extent, market access is an important indicator of relative competitiveness. In order to penetrate markets, both *cost leadership* for price competition and product *differentiation* to meet consumer demands in the market are needed. The growth of the NIFDS over the past two decades has been largely related to the expansion of sales outside NI (also referred to as external sales or local exports as sales to other parts of the UK are included. The percentage of external

sales in total sales increased from 56% in 1990 to 70% in 2009, a steady growth over the period in almost all sectors except for the egg and fish processing sub-sectors (see Table 3).

Table 3: External sales as a percentage of total sales by food and drink sub-sector in Northern Ireland

	1990	1995	2000	2005	2009
Animal By-Products	86.3	82.8	82.5	85.6	90.3
Bakeries	8.1	12.8	25.2	31.9	40.1
Beef & Sheepmeat	78.4	66.5	51.0	62.4	80.4
Drinks	38.1	21.2	31.7	53.0	58.3
Eggs	59.1	72.5	76.7	82.0	59.9
Fish	76.3	68.4	77.5	69.5	77.7
Fruit & Vegetables	56.4	49.7	59.0	58.7	61.7
Milk & Milk Products	53.7	61.1	64.2	70.3	69.4
Pigmeat	56.8	52.6	52.8	56.5	60.4
Poultrymeat	58.7	61.5	68.9	80.4	80.8
Total	55.6	53.4	54.5	64.2	70.0

Of NIFDS sales to external markets, the traditional market of GB and ROI continues to be dominant with its share of NIFDS sales increasing from 40% in 1990 to 60% in 2009 (Table 4). However, sales to outside of the EU from NI have remained at a very low level (2-4%), indicating very little penetration of the emerging market. Neighbouring regions are making more headway in terms of exporting to new markets. In Scotland, total sales from the FDS in 2011 were approximately £9 billion, about half of which (£4.5b) were exported (compared to 28% from NI) France, the USA and Spain are the three top export markets for Scotland, and strong growth was achieved in Asia (Scottish Government 2012).

Table 4: Sales by destination of Northern Ireland food and drink industry

	1990	%	1995	%	2000	%	2005	%	2009	%
Northern Ireland	773.9	44	1,033.1	47	979.0	46	904.4	36	1020.9	30
Great Britain	567.8	33	714.2	32	750.4	35	1,022.3	40	1,435.5	42
Republic of Ireland	121.6	7	174.8	8	215.6	10	318.1	13	598.2	18
Other EU	100.3	6	200.9	9	152.1	7	186.9	7	259.3	8
Other Countries	53.3	3	93.0	4	52.0	2	93.3	4	74.0	2
Intervention	128.1	7	0.0	0	0.2	0	0.0	0	9.6	0
Total Sales	**1,745**	**100**	**2,215.9**	**100**	**2,149.3**	**100**	**2,525.0**	**100**	**3,397.5**	**100**
External Sales	971.1	56	1,182.8	53	1,170.3	54	1,620.6	64	2,376.6	70
Export Sales	275.2	16	468.6	21	419.7	20	598.3	24	931.5	27

It is difficult to define future markets without some risk as there are too many uncertainties in the long run. Food Vision 2020 (Irish Department of Agriculture 2011) indicates that 'more positive market prospects in the medium to long term are based on increased global demand for dairy products, a growing shortfall in EU beef supply, economic development and population growth in developing countries and, within the EU and the US, specific demand of an ageing and affluent population'. In one of the background papers to the strategy (Enterprise Ireland 2010), the author argues 'there is a more profound and sustained trend in reduced dairy and beef production in the UK. This reduction in supply in our nearest market represents a significant opportunity for the Irish food and agricultural sector provided we get our cost base right'. In another discussion paper, MAFF(2010) listed growing population, economic recovery, urbanisation and globalisation as the main drivers for the future growth in food demand.

Trade policy also shapes the international trade environment. With agriculture included in the Uruguay Round GATT/WTO negotiations, economic and non-economic trade barriers have been weakened. However, despite some liberalization, international trade of agricultural products is still subject to relatively higher tariffs and other interventions. The international market is still segmented, although in the EU market integration has improved.

Driven by population growth, fast-paced urbanization, increasing incomes in developing countries (particularly in the emerging market) and trade liberalisation, the international market for agri-food products has been reshaped significantly, and this process will continue in the foreseeable future (Reardon and Barrett 2000; Rosegrant, Paisner et al. 2001; Godfray, Beddington et al. 2010). This leads to several important directions to be considered in the

context of improving the position of the NIFDS internationally. First, quantities required for food security are increasing at an unprecedented pace and demand for animal products such as dairy and meat will grow even stronger because of income improvements (Rosen and Shapouri 2008; Tilman, Balzer et al. 2011; Rosegrant, Tokgoz et al. 2012). This will continue to be the main driving force for the NIFDS which is largely specialized in producing dairy and meat products. Second, consumer preferences have moved towards more concerns for safe, healthy, nutritious and sustainable, or, 'green' food (Frazão, Meade et al. 2008; Marlow, Hayes et al. 2009; Mittal 2009; Verbeke, Pérez-Cueto et al. 2010). Third, particularly more mature markets, differentiated rather than low cost products will be the major instrument for market expansion (Sarkar and Costa 2008; James, Rickard et al. 2009; Unnevehr, Eales et al. 2010). Finally, many uncertainties remain in both supply and demand forces associated with agri-food products. Climate change, population growth, the world economy, energy price, and scarcity of land and water resources all may contribute to uncertainties for the market (Lotze-Campen, Müller et al. 2008; Nelson 2009).

A strategy is needed in terms of balancing between low value added and high value added markets. The competitiveness of NI in the traditional GB / EU market has benefited from low transportation costs, low current risk (GB), low trade barriers (EU) and good market integration (ROI). However, as the ROI and Scotland are also targeting the GB market in their strategy, it is expected that competition in the market will be fierce. In most cases, the traditional market is associated with high value added, but does not exclude demand for low value added products providing raw materials for further processing. Therefore, some concrete measures for promoting NI products in the traditional market will be needed. On the other hand, the demand for quality and value added is generally considered to be lower in the emerging market. However, this generalization is not always true as suggested by the exploding demand for Scottish whisky in emerging market such as China. Detailed market orientation including market and product positioning for local products in both traditional and emerging markets is needed to support the long-run development of the sector.

Price

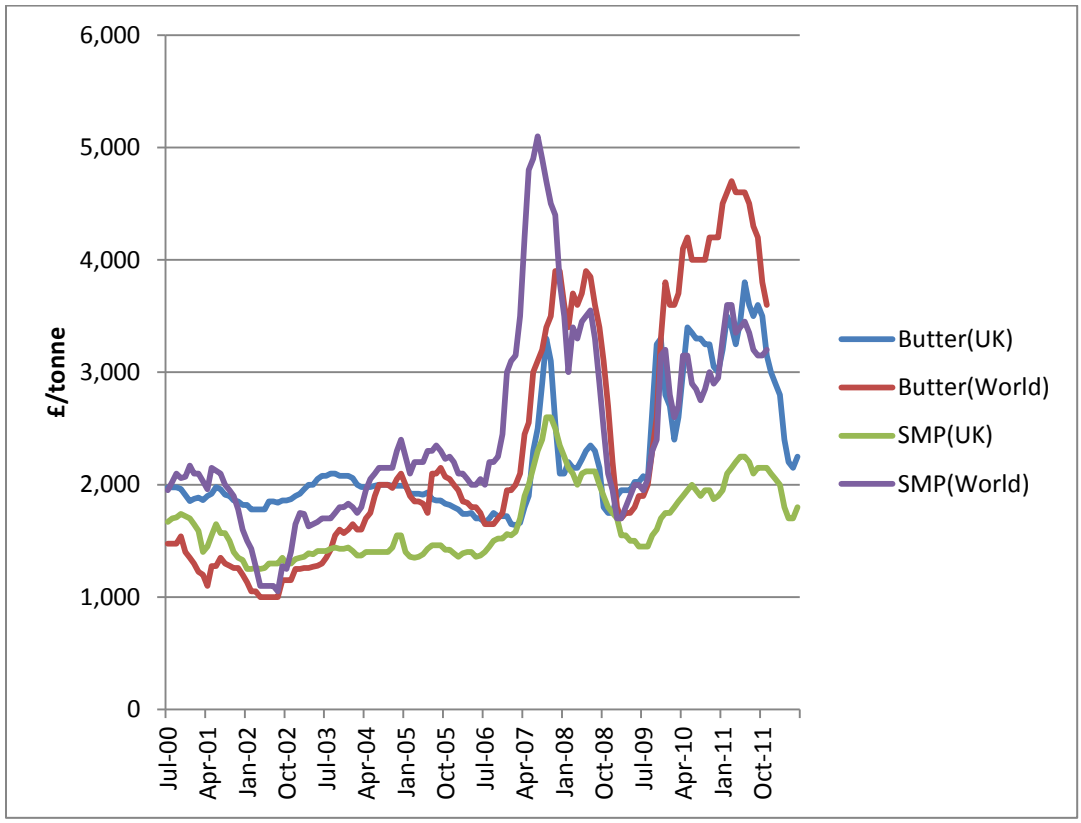
Price plays an important role in the development process, because price structure is relevant to trade opportunity and functions as an incentive mechanism at the firm-level to drive forward the strategic development process at industry and national levels.

NI is a small export dependent region and its prices are subject to those on the world market. In that sense the NI price would be quite similar to those in neighbouring regions such as in the ROI and Scotland. As specific price data for the NIFDS is not available, in this study we may use UK or ROI data to show the historic picture of NIFDS price movements.

Due to the impact of the Common Agricultural Policy (CAP) intervention and export subsidies, for a long time major agri-food prices in the UK have been over the international price, and only after the recent price hikes in the international market has this relationship changed. The UK

price is now below the international market price level, which suggests that we may be able to export without subsidies (Figure 3).

Figure 3: International and UK wholesale prices for dairy products



The recent price advantage illustrated in Figure 3 is partly related to international price spikes started in 2006 and it is also subject to changes in the economic environment, particularly exchange rate fluctuations. The price changes in Figure 3 overlap with recent sterling depreciation.

It's also worth noting that market development can benefit from international trade liberalisation. Trade liberalisation has progressed through preferential trade agreements (PTAs) via both bilateral and unilateral trade negotiations. As the Doha round of WTO negotiations has not progressed much in recent years, more and more countries have moved to bilateral and regional agreements. NI is a part of EU free trade zone with a devolved government. How to use NI's special position in the international trade is something to be further studied.

Value added

The level of value added in NIDFS is lower than the average of manufacturing sector in NI and FDS in neighbouring regions such as ROI and Scotland (Table 5). This suggests that there is potential to increase value added in the NIFDS.

Table 5: Value added contribution of FDS in NI, ROI and Scotland in 2009

	% in total output	Value added	Total Output
NI:			
FDS	17.9	£0.61b	£3.4b
Manufacturing	27.5[2008]		
ROI:			
FDS	26.2	€5.768	€22b
Scotland:			
FDS	41%	£3.69b	£9.0b

These figures cover both food and drink sectors. As the drink sector tends to have relatively higher value added, the proportion of value added in the food sector will be even smaller, and also helps to explain the relatively high percentage of value added contribution from the Scottish FDS due to the large proportion of drinks manufacturing. Figure 4 below illustrates the different composition of food manufacturing value added only in different regions. In 2009, the GVA contribution of the NI food sector only accounted for 17% of the total turnover, a figure lower than all neighbouring regions. The difference could be explained by inefficiencies in scale and/or technology driving up the relative cost of inputs, or, lack of management specialisation, marketing and finance for new product development driving down the value added per unit output.

Figure 4: Manufacture of food products[7] value added, purchases of materials and employment costs as a proportion of turnover, 2009[8]

[7] SIC 2007, 10: Manufacture of food products
[8] Office for National Statistics (2011). Annual Business Survey, Division by country and government office region, 2008-2009.

The diversity of technology across sub-sectors in food and drink production means that regional comparisons benefit greatly from using a smaller unit of analysis. Table 6 provides a breakdown of six sub-sectors to indicate relative differences in output, GVA and employment in NI and Scotland. In terms of output, fruit and vegetables generates over three times the turnover in NI compared to Scotland. Meat and milk production is also more abundant in NI, with turnover equal to 175% and 148% of Scotland's meat and dairy sub-sectors respectively in 2009. Bakeries, drinks and fish in NI only generated 26%, 8%, and 5% of the value in Scotland. Structural differences can also be identified using this simple comparison. There is evidence that the lower proportion of food turnover attributed to GVA in NI compared to Scotland shown in Figure 4 is most pronounced in the meat and dairy sub-sectors, as the proportion of turnover attributed to GVA is 23% and 74% below what would be expected given the difference in turnover as shown in Table 6. Wages and salaries paid in the milk processing sub-sector of NI is 49% lower than expected considering the proportional difference in turnover, where there is a slightly higher proportion of turnover paid as wages and salaries in the other sub-sectors.

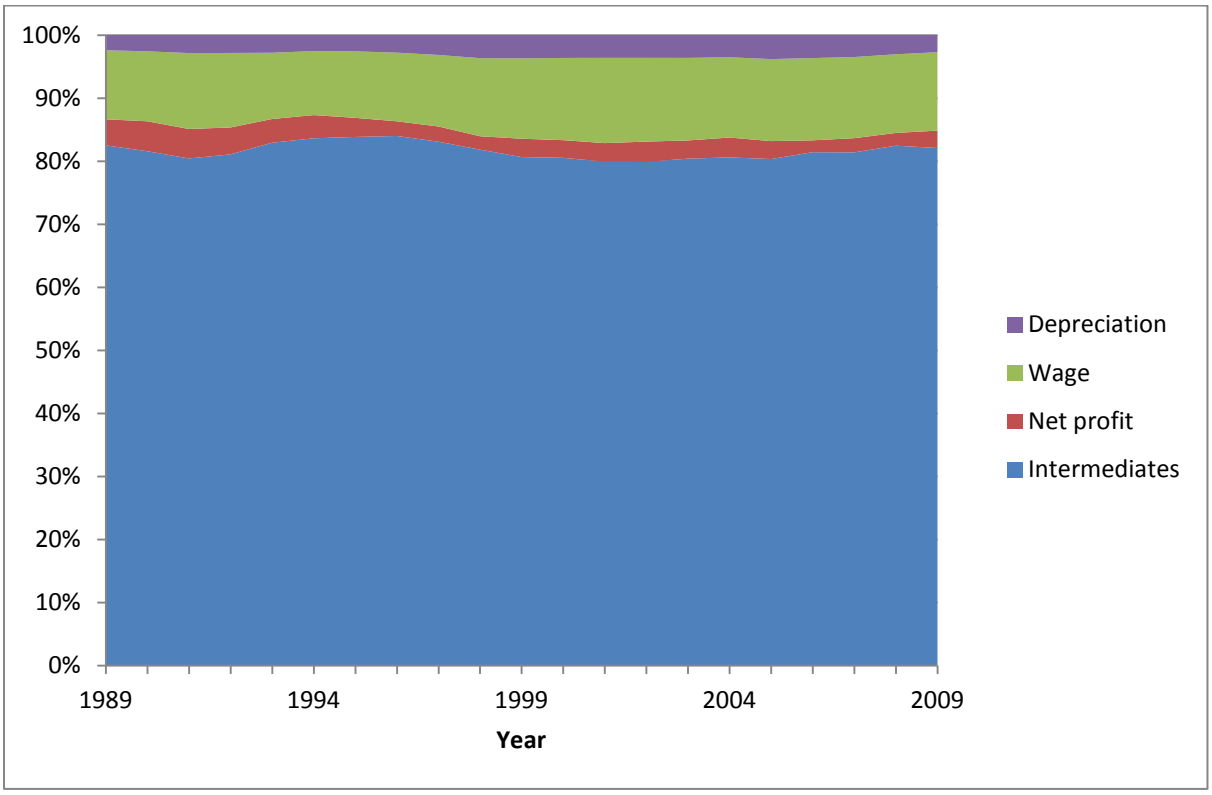
Table 6: Northern Ireland[9] and Scotland[10] food and drink (£million), 2009

	Turnover			Gross Value Added			Wages and salaries		
	Northern Ireland	Scotland	NI as % of Scotland	Northern Ireland	Scotland	NI as % of Scotland	Northern Ireland	Scotland	NI as % of Scotland
Fruit and vegetables / Processing and preserving of fruits and vegetables	182	50	361%	48	13	360% (-1%)	34	8	419% (+58%)
Beef, sheep, pig and poultry meat / Processing and preserving of meat and production of meat products	1,696	968	175%	271	178	152% (-23%)	204	112	183% (+8%
Milk and milk products / Manufacture of dairy	774	524	148%	99	134	74% (-74%)	61	62	99% (-49%)
Bakeries / Manufacture of bakery and farinaceous products	262	1,013	26%	89	417	21% (-5%)	67	197	34% (+8%)
Drinks / Manufacture of beverages	329	4,350	8%	69	2,731	3% (-5%)	38	471	8% (0%)
Fish / Manufacture and preserving of fish, molluscs and crustaceans	69	1,332	5%	15	278	5% (0%)	10	140	7% (+2%)

[9] Department of Agriculture and Rural Development (2011). Time-series data on the size and performance of the Northern Ireland food and drink processing sector, by subsector, 1989 to 2010 (2011 where available) Belfast, Policy and Economics Division.
[10] Office for National Statistics and Scottish Goverment (2012). Scotland: Fishing, Manufacture of Food and Drink SIC codes: 2008-2009.

The structure of value /cost chain of the NIFDS is displayed in Figure 5. The main components of the costs, ordered by share or total output, are; intermediates, wages, depreciation, and net profit. In the major sub-sectors (dairy and meat) intermediates including all raw materials accounted for more than 80% of total output value with the exception of poultrymeat at slightly lower than 80%. The cost reduction potentials for the sector may also be in this order.

Figure 5: Value structure of Northern Ireland food and drink sector



The cost competitiveness of the NIFDS appears to be mainly based on two key factors: grass based agriculture and relatively lower labour costs. The grassland-based system has a strong comparative advantage over cereal / concentrate based feeding systems. Table 7 shows typical cash and full economic costs of different feeding system for the same nutrient level. It is clear that a grass-based system is the basis of competitive milk production, although concentrates also have an important role to play in optimal production systems (Anderson et al. 2012).

Table 7: Drymatter (DM) equivilent cash and full economic costs of feed on Northern Ireland dairy farms[11]

Feed	Utilisable DM yield (tonnes/ha)	Cash cost (£/tonne DM)	Full economic cost
Grazed grass	8.0 (5-10)		77
3-cut silage	11.5 (8-13)	74	120
Fermented whole-crop wheat	11.5 (8-13)	72	122
Forage maize (grown under plastic)	13.7 (7-15)	77	121
Purchased 18% CP dairy concentrate	-	232	236

Although there are drawbacks associated with a grass-based system such as production seasonality that subsequently impact food processing, overall substitution of grasses for cereals / concentrates has greatly reduced the costs of dairy and beef production.

Relatively low labour cost is also regarded as a basis for NI competitiveness. Table 8 shows labour rates in different sectors for different regions in 2009. The NIFDS wage rate in 2009 was lower than wage rates in other sectors and FDS wage rates in other regions in the UK. A relatively low wage rate surely favours NI in certain labour intensive sectors such as the FDS. However, it is also important to note that the low wage rate in NI may have partly to do with having relatively low labour productivity. When labour productivity is low, the sector / company is less likely to pay higher compensation to employees and therefore may have difficulty attracting sufficient talent that could improve the overall productivity. Note that when labour productivity in the sector increases the wage rate is also likely to increase.

[11] Data from Saunders Saunders, A. (2010). Grazing Management, College of Agriculture, Food and Rural Enterprises, Northern Ireland.. Calculation is based on 2009 data

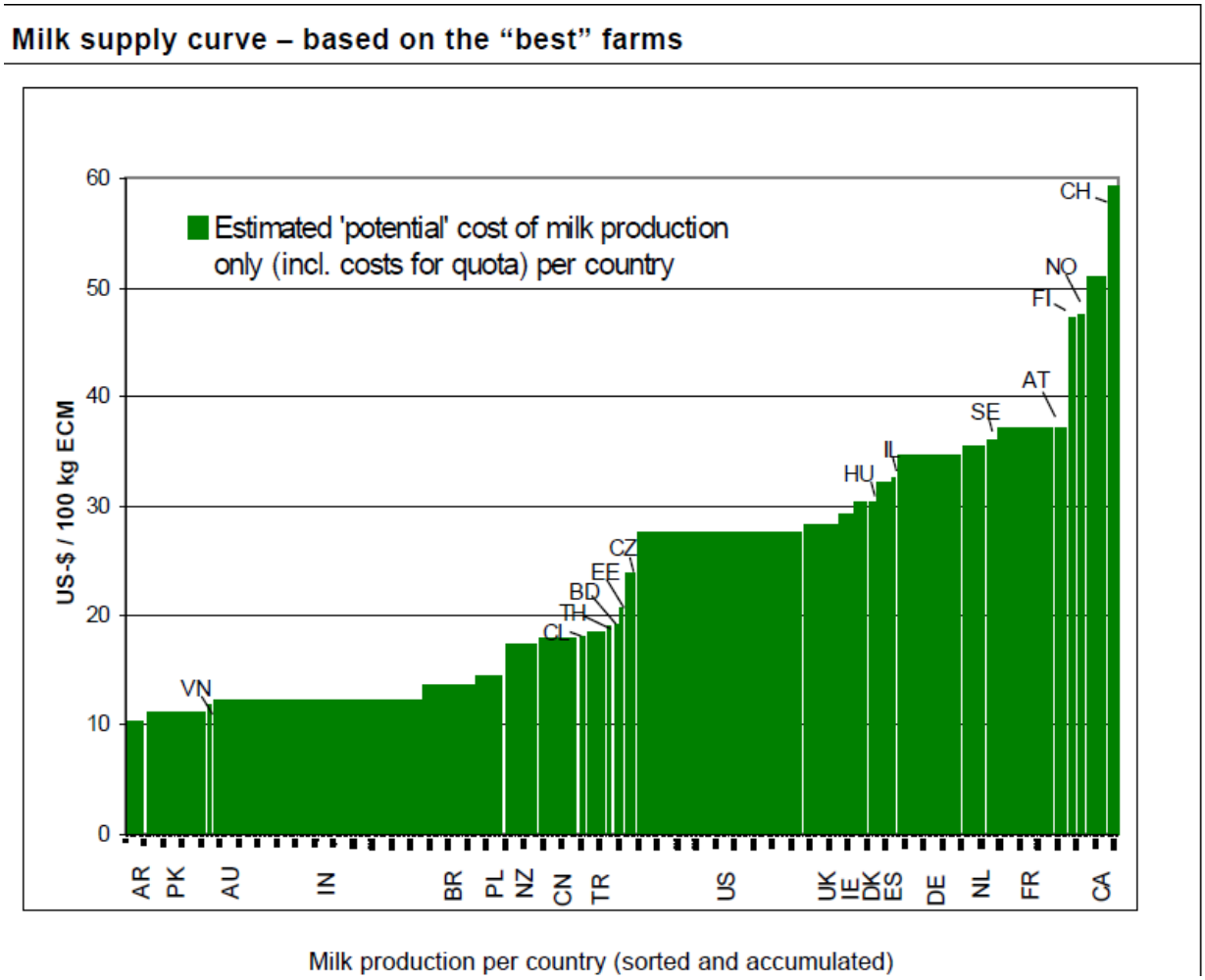
Table 8: Wage rate and labour productivity, Northern Ireland, Scotland and the UK[12]

	Wage rate (£k/year)	Labour productivity (£k/FTE)
Northern Ireland		
All sectors	21.73	46.65
Manufacturing	23.63	54.57
Beverage		58.63
Food	18.35	29.48
Scotland		
All sectors	23.68	51.23
Manufacturing	28.12	64.88
Beverage	27.50	273.08
Food	21.11	40.65
UK		
All sectors	25.01	56.15
Manufacturing	28.01	55.95
Beverage	31.59	
Food	24.53	65.77

It is however important to note that even for the grass based sector such as milk production, NI cost competitiveness is mainly in Europe rather than globally. Cost comparisons between countries are difficult due to the complicated impacts of exchange rate on both input and output prices. Figure 7 shows the production costs of 'best' farms in the major dairy producing countries in which the UK and ROI are included.

[12] Data from the UK labour market survey and Regional Accounts (2009). Labour productivity is calculated in terms of GVA generated in the sector divided by full time equivalent employment (FTEs).

Figure 6: International milk supply curve[13]



Industry competitiveness

Industry competitiveness here refers to a sector competing with other sectors in the national economy for resources (e.g. capital, labour, FDI or government support). Sectors in the national economy may be competing for fixed resources such as government funding. On the other hand, a national or regional government may have a bigger role to play in terms of strategic industry-level development than is possible in the case of international competition. From the industry-level perspective, it is important to understand the linkages between the FDS and other sectors in the national economy so that the impacts of development can be viewed spanning the supply chain and wider economy.

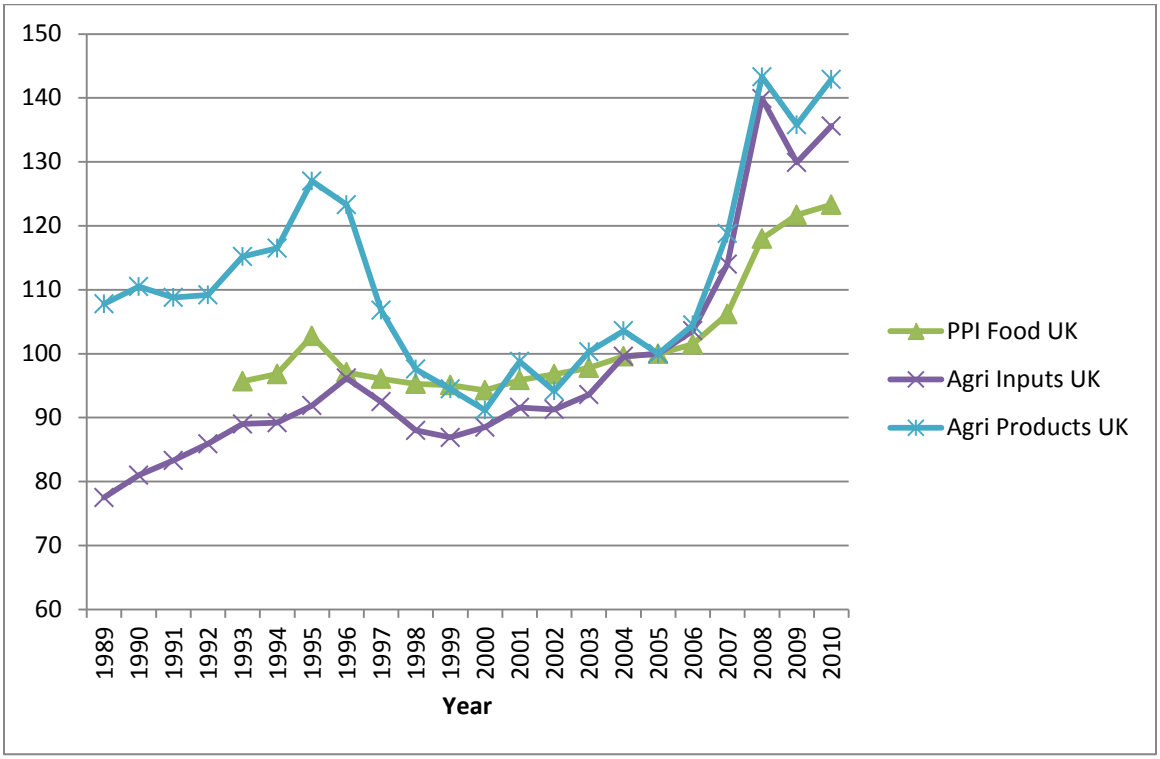
Supply chain refers to the linkages between the FDS and input supply (backward) and the retail sector (forward) in the economy, and involves the distribution of value / margins along the chain.

[13] Figure from Hemme, T., A. Weers, et al. A Global Review - The Supply of Milk and Dairy Products.

Therefore, efficient transactions along the supply chain can be a key source of competitiveness. Gopinath, Roe et al. (1996) suggested that agricultural and food sectors are interdependent and possibly benefited from efficiency gains in each sector. In the US context, efficiency gains from agriculture appear to have had a more significant impact on food competitiveness in the global market than efficiency gains in the processing sector itself. Thus a low cost policy for agriculture is also important to the food processing sector.

Supply chain linkages can also be viewed from a perspective of price transmission. In the UK, food wholesale prices (PPI), prices for agricultural products, and agricultural input prices have largely followed in a similar trend. Agricultural input and output prices have moved closely together, but the pair somewhat independent from the food wholesale price index (Figure 6). The price transmission is largely related to market power, for example evidence of the relative power of the retail sector over the primary production (farm) sector has been found in the pricing of food products in the UK. In one study, Sexton (2000) examined competition in the food supply chain and suggested that the food processing sector did not have sufficient market power in the chain. The conclusion was confirmed by several UK Competition Commission inquiries and other studies. For example, Lloyd, McCorriston et al. (2006) found that while the BSE crisis reduced the consumption and price of beef, beef prices at the retail level declined significantly less than at the producer level, which can be largely explained by the market power of the retail sector during the shock.

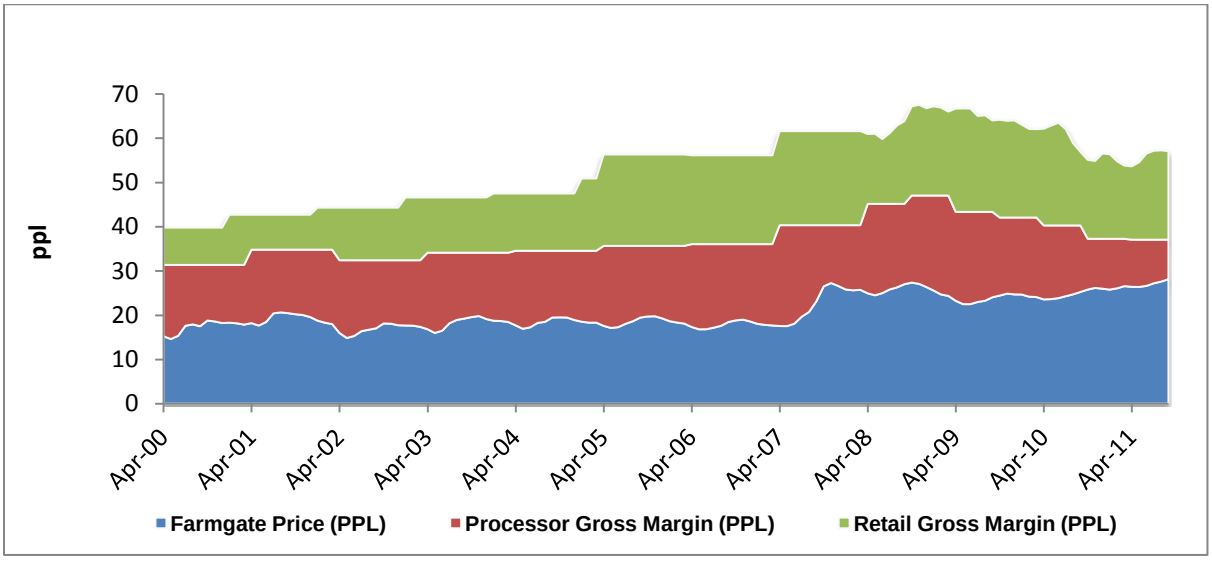
Figure 7: Price changes in the UK (2005 = 100)[14]



Consequently, food processors in the UK are subject to a squeezing of value added from both supermarkets and producers. Figure 7 below displays an example of distribution of margins between the farmgate price, wholesale price and retail price of liquid milk in the UK over the last ten years.

[14] Data from Annual Abstract of Statistics (2010) and Agriculture in the United Kingdom (2011)

Figure 8: UK liquid milk margins, 2000 - 2011[15]



Input-output linkages

As mentioned above, the FDS is linked to the agricultural and other sectors through the supply chain. The agricultural sector supplies the FDS with raw materials to be processed into a form meeting the demand from market. In the process, new value is added along with other intermediate inputs such as packaging materials and capital inputs such as machineries. So, the development process may also involve labour and capital movements from one sector to another. In developing countries, movement from agriculture to processing is more evident as the processing sector is comparatively more efficient / profitable but also more restrictive (technically or institutionally) and the capital market tends to be less developed (Lanjouw and Lanjouw 2001; Gollin, Parente et al. 2002; Huang, Rozelle et al. 2006). In developed countries, labour and capital flows from agriculture to non-agricultural sectors (including the FDS) are also observed, though in many cases it is a slower process involving farm cooperatives engaging in processing or through the capital market (Caselli and Coleman II 2001; Foster and Rosenzweig 2007). In more developed countries capital flow from non-agriculture to agricultural sectors is often achieved through government intervention by means of subsidies to agriculture (Anderson and Martin 2005).

Links between the FDS, agricultural sector, and wider economy can be partly described using an input – output (IO) table or social accounting matrix (SAM) (IO analysis in this paper). In such an analysis, multiplier effects reflect total changes in the region's major economic indicators, such as Gross Value Added (GVA) and employment, stimulated by changes in the levels of economic activity in one sector due for example to investment in the sector or new orders received by the sector. Multiplier effects occur due to input and output linkages in the

[15] Data from DairyCo, 2012.

production process. For example, when demand in the dairy processing sub-sector changes, demand for its inputs e.g. milk, electricity etc. will be affected directly; this is called a direct impact. This in turn will lead to changes in demand of input sectors such as cattle feed production; this is called an indirect impact. These changes in production may also change local household income and subsequently household spending in the local economy; this is called an induced impact. Thus a change in one sector is likely to cause a chain-like multiplier effect throughout the economy. The greater the level of local sourcing of inputs by a sector, the greater the impact of changes in that sector on the overall economy. The relative impact on the regional economy is determined by what is known as the multiplier and the overall outcome is known as the multiplier effect and is an important consideration in regional economic planning and program appraisal.

The FDS has played an important role in local economic development in NI. Due to its close linkages – for example via input sourcing – with other indigenous sectors of the local economy, the NIFDS has higher multiplier effects on output, GVA and local employment than other economic sectors. Based on AFBI estimated multipliers (Wu and Minihan 2011) , for example, a £1m increase in the sector's output will result in an overall increase in regional economic output of £1.91m, £0.54m of GVA and would create 22 full time equivalent (FTE) jobs (Table 9).

Table 9 Multipliers and multiplier effects of economic sectors in NI

	Output	GVA		Employment	
	Multiplier	Effects (£m)	Multiplier	Effects (FTE)	Multiplier
Crops	1.27	0.53	1.34	25.63	1.15
Livestock	1.85	0.54	2.22	35.38	1.24
Fishing	1.54	0.67	1.72	11.64	2.29
Forestry	1.47	0.87	1.38	24.39	1.29
Food	1.91	0.54	2.74	21.56	2.91
Feed	1.30	0.27	2.37	5.42	2.77
Electricity	1.53	0.70	1.61	6.10	3.55
Marketing	1.26	0.64	1.25	18.98	1.18
Others	1.46	0.77	1.45	15.99	1.45

The advantage of using IO analysis is its simplicity, clarity in reasoning and its ability to generate 'big picture' economic outcomes. However, IO analysis requires many assumptions (sometimes not completely realistic). For instance, it is static only representing a snapshot of the economy at a given time and restricting substitution of inputs. Therefore, it is not suitable for long run projections and although the implications of shocks to the wider economy are known (e.g. changes to other sectors final demand and employment), there is no certainty as to whether or not such shocks will occur.

In order to more clearly examine value changes in the supply chain and identify the main problems in the chain, we have carried out a case study comparing NI with the Scottish dairy supply chain. The distribution of value along the dairy supply chain for NI and Scotland in 2007 is reported in Table 10.

Note that data for both regions are product based so non-dairy sector outputs are excluded. Department of Agricultural and Rural Development (DARD) figures are mainly based on enterprises exceeding £250,000 in sales and Scottish figures are based on all enterprises. As the dairy processing sub-sector is dominated by larger firms, the coverage is thought to be quite similar. Some interesting findings are reported below.

1. Compared to Scotland, NI appears to have a larger milk production base (in both milk quota and milk output at the farmgate level), slightly lower milk production costs (excluding labour costs) and larger turnover at processing levels. However, the size of GVA contribution at the processing level of the supply chain in NI is smaller than Scotland, illustrating the low value added problem.
2. In other performance terms, from farm to factory gate, value added for each litre of milk in NI was 36p and that figure in Scotland was 44p. Although Scotland had a higher value added per litre of milk, milk price in NI is higher. This may be due in part to the ownership structure of the NI dairy chain and reflect the strength of the dairy cooperatives.
3. For a smaller milk production base, the Scottish dairy sub-sector has employed more people and created a higher labour productivity measured by value added per full time equivalent employment. Labour productivity in NI and Scotland were respectively £36k and £41k.
4. Intermediate costs (material costs) are much higher in NI processing than Scotland, mainly because of the higher milk price during the year. The milk price difference explains 99% of the differences in the intermediates input costs.
5. A possible explanation for the difference in value added may be the different final product-mix in the two regions. In 2007, 44% of Scottish raw milk was used for liquid milk production and another 45% of raw milk was used for cheese production, while in NI these figures are 16.6% and 23.6%. A large percentage of raw milk was used for butter and powder production, relatively low value added products, and partly (5% in 2007) directly exported to ROI for processing.
6. The product mix issue is known to industry and was discussed as far back as the early nineties in the Davis report (1992). A more interesting question is why this has not been changed despite the fact that industry, policy makers and academics felt this was an important issue for sustainable development of the sector and region.

Results suggest that the NI dairy sector still has significant potential in terms of adding value and efforts are needed to improve the product mix.

Table 10: Dairy supply chain in Northern Ireland and Scotland, 2007[16]

		NI	Scotland
1. Processing level			
Turnover	£m	693.30	554.34
intermediates		610.59	442.75
domestic			247.92
imported			194.83
GVA		82.70	111.59
salary		54.05	94.93
depreciation		13.40	
interest		2.50	
profit		12.75	14.29
Employment		2320	2711
2. Farmgate level			
Milk quota	ML	1851.80	1400.00
Milk price	ppl	22.18	20.50
Milk output	ML	1921.29	1271.00
Market value	£m	427.33	262.90
Farm costs in per £ of output (excluding labour costs)			
total		0.65	0.69
feed		0.25	0.27
fertiliser		0.04	0.04
land and building		0.05	0.10
others		0.31	0.29
3. Performance			
Milk value added	ppl	0.36	0.44
labour productivity	£k/FTE	35.66	41.16

Firm competitiveness

Firm-level competitiveness is the fundamental basis for increasing competitiveness at the industry and national-level. The public sphere has the potential to help or hinder competitiveness at the firm level. Although some regulation is essential, national strategy should seek not to hinder the market where it works effectively and to compensate when markets fail to efficiently meet the needs of the society. In this sense, government can influence whether the

[16]NI processing data are derived from Size and Performance of NI Food and Drinks sector and Statistical Review of NI agriculture and Scottish data are from its IO table (2007). Farm costs for NI are from Farm Business surveys and those for Scotland are from Economic Report on Scottish Agriculture (2009 Edition).

business environment is favourable or unfavourable. Firm competitiveness involves a combination of assets and processes, where under the given business environment, firms use assets either inherited (natural resources) or created (infrastructure) and processes to transform assets to achieve economic gains from sales to customers. An effective government policy needs to be based on an understanding of firm behaviour. Production efficiency generally describes the extent to which resources are used to full capacity by the firm. Two important features of production efficiency are technical efficiency and scale efficiency. Technical efficiency indicates the ability to combine resources to produce the maximum possible output given the available combination of inputs and firm characteristics, and can be characterised as *entrepreneurial ability* because it relies on decisions as to the level and nature of human capital employed, R&D, innovation and networking to support horizontal and vertical integration (Maudos, Pastor et al. 2008). Similarly scale efficiency, reflecting the choice of the scale of production to achieve the given level of output, is linked to *entrepreneurial ability* in the sense that expectations of future demand shape 'the scale of operation decisions to competitive policy and the market's structure' (Maudos, Pastor et al. 2008). In this study we will focus our review on firm efficiency by examining literature related to the FDS and scale, human capital, market development and innovation.

Chapter 2: Economies of Scale

Based on empirical analysis of food and drink manufacturing firms in Greece, Dimara, Skuras et al. (2008) find that operating at an efficient scale increases the median length of firm survival. It is not surprising as there are several benefits to be gained from scale efficiencies that can lower the average cost of doing business including: purchasing materials in larger quantities, increasing specialisation at the management level, more favourable terms accessing finance, broader distribution of marketing costs, and access to a broader range of technology (Peneder 2003). In a perfectly competitive market marginal cost equals price, so that unit cost reductions achieved due to gains in scale efficiencies contributes to *cost leadership* approaches to developing firm competitiveness.

However, it is possible that 'a small, efficient, highly technical firm that for various reasons operates below the optimal scale and thus suffers scale inefficiency may not be able to change its size due to reasons that are related to financial, human capital or labour market constraints'(Maudos, Pastor et al. 2008). These barriers may be lowered by government intervention by compensating for failures in financial markets, thereby easing the ability of firms to invest in the required factors and inputs to meet the desired scale of production.

Mergers and acquisitions can be used to gain technical and scale efficiency improvements (*horizontal integration*), or secure networks and links to the wider economy along the supply chain (*vertical integration*). Companies can purchase domestically or in foreign markets which is called foreign direct investment (FDI).

Scale in Northern Ireland's food and drink sector

The NIFDS is similar to that of Greece, Scotland, and the ROI in that it is characterised by a large proportion of SMEs. Table 11 compares the structure of food, and table 2-3 of beverage, manufacturing between NI and Scotland. Enterprises, rounded to the nearest five, are divided according to size bands based on either employee number or turnover. In the case of employee number, over 80% of food manufacturing enterprises in both NI and Scotland employ less than 49 full-time employee equivalents (FTE). The definition of small to medium size enterprise (SME) adopted by the European Commission to determine eligibility for many economic development programmes requires less than 250 FTE and a turnover of €50 million or less (European Commission 2012). Of food manufacturing enterprises, only 4% in Scotland, and 2% in NI fail to meet the employment requirement. The highest turnover size band recorded in the data set is £5 million and above (Office for National Statistics 2012) of which 24% of Scottish and 20% of Northern Irish food manufacturing enterprises are assigned in the year 2011.

Table 11: Northern Ireland and Scotland food manufacturing firms by employee and turnover size-band, 2011[17]

	Scotland				Northern Ireland			
No. Employees or Turnover £k	Employment-based		Turnover-based		Employment-based		Turnover-based	
	No. SC firms	% SC firms	No. SC firms	% SC firms	No. NI firms	% NI firms	No. NI firms	% NI firms
0-49	555	84%	70	11%	350	88%	35	9%
50-99	45	7%	70	11%	30	8%	35	9%
100-249	40	6%	110	17%	10	3%	80	20%
250-499	10	2%	90	14%	5	1%	60	15%
500-999	5	1%	80	12%	0	0%	40	10%
1,000 +	5	1%	240	36%	5	1%	150	38%
Total	*660*	*100%*	*660*	100%	*400*	*100%*	*400*	100%

Beverage manufacturing is far more dominant in Scotland, with 125 enterprises compared to only 25 in NI. However, of the VAT and PAYE enterprises registered in 2011, the pattern of size in terms of employee number is very similar with around 80% employing fewer than 50 FTE in both Scotland and NI. Ten percent of Scottish beverage manufacturers are excluded from the formal SME definition due to employment numbers. The highest turnover category reported (£5 million) contains 24% of Scottish beverage manufacturers and 20% of those registered in NI (Table 12).

Table 10: Northern Ireland and Scotland drink manufacturing[18] firms by employee and turnover size-band, 2011[19]

	Scotland				Northern Ireland			
No. Employees or Turnover £k	Employment-based		Turnover-based		Employment-based		Turnover-based	
	No. SC firms	% SC firms	No. SC firms	% SC firms	No. NI firms	% NI firms	No. NI firms	% NI firms
0-49 s	85	81%	15	14%	20	80%	5	20%
50-99	5	5%	15	14%	5	20%	0	0%
100-249	5	5%	20	19%	0	0%	5	20%
250-499	5	5%	5	5%	0	0%	5	20%
500-999	5	5%	10	10%	0	0%	0	0%
1,000 +	0	0%	40	38%	0	0%	10	40%
Total	*105*	*100%*	*105*	*100%*	*25*	*100%*	*25*	*100%*

[17] Office for National Statistics (2012). United Kingdom - Number of VAT and/or PAYE Based Enterprises in 2011
[18] UK SIC 2007 11: Manufacture of beverages
[19] Office for National Statistics (2012). United Kingdom - Number of VAT and/or PAYE Based Enterprises in 2011

Historically, the number of enterprises in each sector tends to decline over time to gain economies of scale. Table 13 shows changes in number of creameries in Ireland in the past century. It is clear that Irish (all island) dairy processing has evolved from a large number of independent creameries at the start of the 20th century to a few large cooperatives and PLCs in recent years while total milk produced in Ireland in the same period has increased at least 4 times.

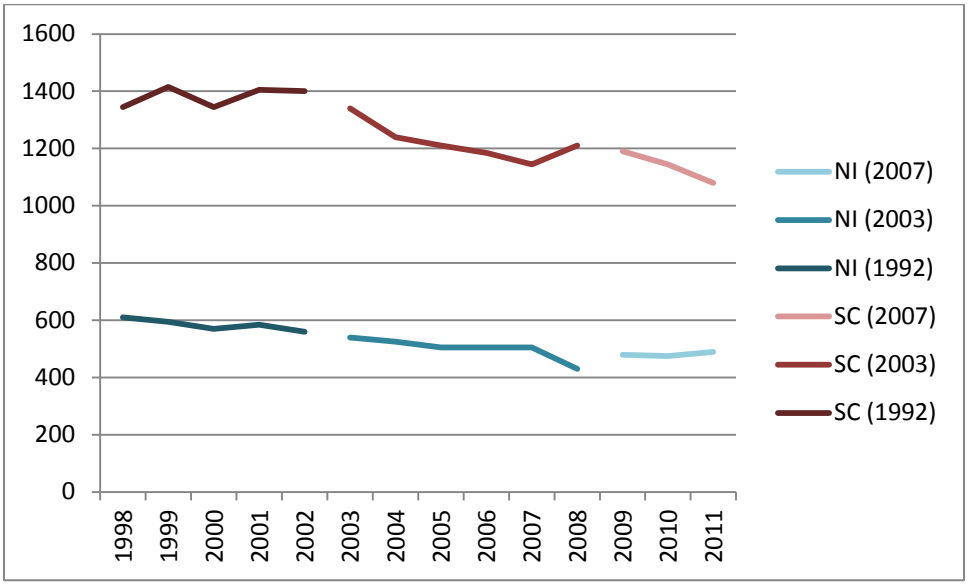
Table 11: Historical organisation of Irish creameries[20]

Year	No. creameries
1906	784
1940	215
1978	46
1990	35
2008	23

The number of food and drink manufacturing businesses has tended to decline in both NI and Scotland from 1998. Figure 8 charts the number of local units reported under the three different standard industrial classification (SIC) systems used in national statistics reporting between 1998 and 2011(Office for National Statistics 2012). The trend during the years 2009 – 2011, however, shows a contrast with Scotland decreasing firm number and NI experiencing a slight increase. The use of SIC 2007 definitions during the three year period allows for the first time to separate food manufacture from beverages in the data series. In the Scottish case, the total decline (rounded to the nearest 5) is 110 local units, 95 of which are in food manufacturing. The 10 additional local units in the NI case during the three years are all attributed to the food manufacturing category.

[20] Data are from a UCC PhD thesis (Quinnlan, 2012)

Figure 9: Number of food and drink manufacturing businesses in Northern Ireland and Scotland, 1998-2011[21]

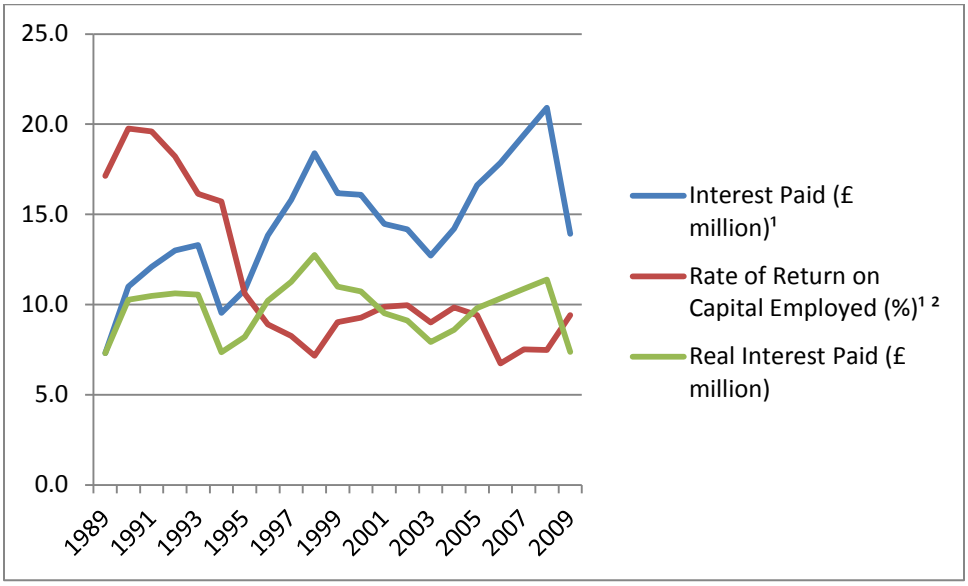


Barriers to increasing scale

Increasing scale at the firm level by means of increasing the quality and/or amount of capital and labour employed requires access to finance. If the supply of finance is restricted firms will face difficulty expanding even if it is economically advantageous. There is evidence to support that access to finance has become increasingly difficult for SMEs in recent years. While the percentage of SMEs in NI applying for finance have remained almost constant between the years 2007 and 2010 (38% and 39% respectively), the rate of successful applications for a bank loan plummeted from 92% to 65% (Department of Finance and Personnel 2011). If finance is available but expensive, this may hinder scale increase from the demand side, as the net return on additional factors employed is diminished. There is evidence that although real interest paid has fluctuated within a bounded range from 1989 to 2009, the rate of return on capital has decreased dramatically during the 1990s.

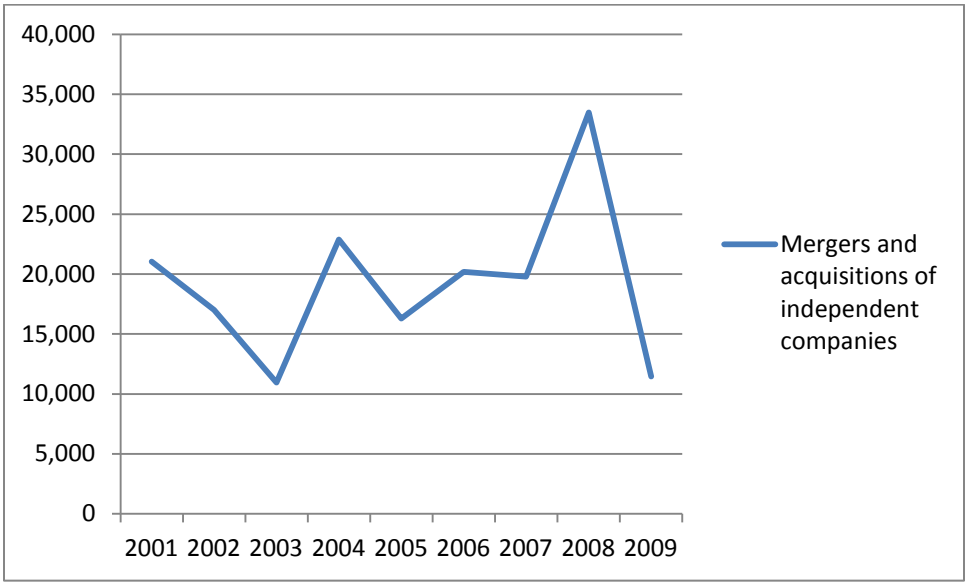
[21] Data from: Inter Departmental Business Register (2011). UK Business: Activity, Size and Location 1998-2011 Office for National Statistics.

Figure 10: Interest paid and rate of return on capital employed, Northern Ireland food and drink sector, 1989 – 2009[22]



The restricted access to finance can create barriers for firms pursuing mergers and acquisitions (M&As) as a means to expand production. Figure 12 illustrates the correlation between severe changes in lending by financial institutions and the value of mergers and acquisitions within the UK by local companies around the year 2008.

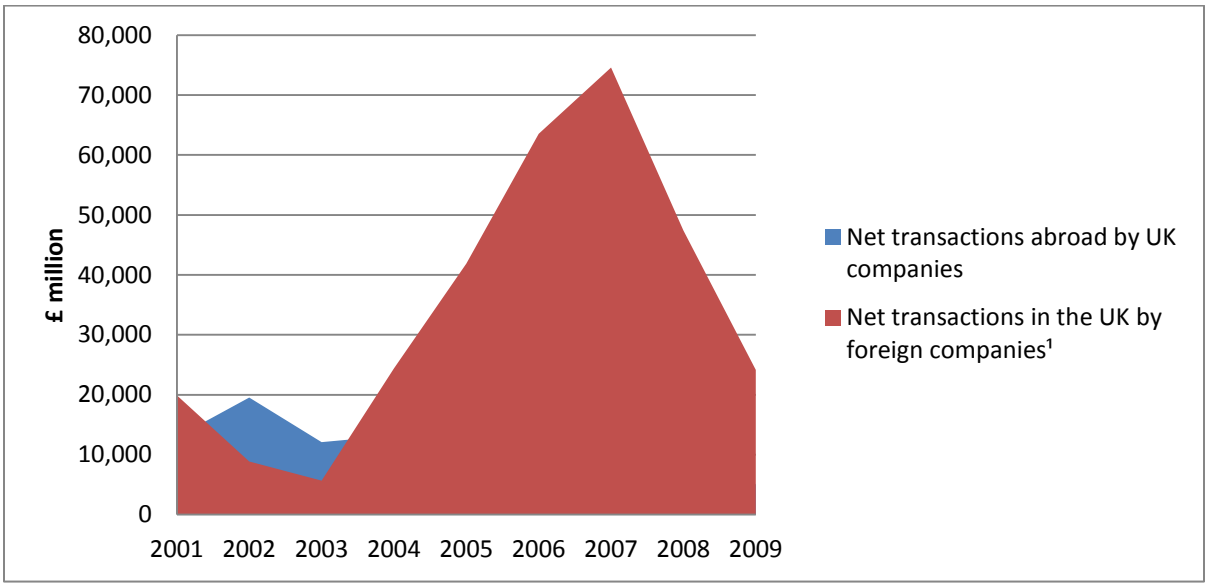
Figure 11: Mergers and acquisitions (£ million) by UK companies in the UK, 2001-2009



[22] Department of Agriculture and Rural Development (2011). Time-series data on the size and performance of the Northern Ireland food and drink processing sector, by subsector, 1989 to 2010 (2011 where available) Belfast, Policy and Economics Division.

The net flow of mergers and acquisitions (in value terms) indicates the UK is the net recipient of FDI via mergers and acquisitions except for during 2002-2003 (see Figure 13).

Figure 12: Net cross-border acquisitions and disposals involving UK companies, 2005-2009[23]



Merger and acquisition data specific to NI are not currently available through national or regional statistics. However, there is evidence of a growth in foreign ownership in NI. The number of externally owned companies operating in Northern Ireland (rounded to the nearest 5) has increased from 670 to 725 over the period 2008 to 2010 (Northern Ireland Statistics and Research Agency 2011).

Firm mergers and acquisitions are subject to UK and EC competition laws and other regulations. Although the *1998 UK Competition Act* has brought competition law more in line with European legislation, the treatment of market dominance has a different emphasis. The EU system evaluates the legality of mergers based solely on market dominance (based on market share) while the UK legislation (similar to the approach taken in Germany, France and the USA) recognises scale efficiency and other potential benefits that may be enjoyed by certain players gaining dominance in a market (Parker 2000). Therefore it is not dominance itself, but the abuse of market dominance that is targeted by regulatory authorities.

Other regulations specific to the FDS such as those ensuring safety and quality, may have a different impact on M&As. In examining factors influencing the successful completion of M&As at the transaction-level, firm-level, and institutional-level, Muehlfeld, Weitzel et al. (2011) found that policy change related to competition is likely to hinder *horizontal integration*, while changing quality and safety policy is likely to impact *vertical integration*.

[23]Data from Office for National Statistics (2010). "Summary of Net Cross-Border Acquisitions and Disposals Involving UK Companies." Includes acquisitions by foreign companies routed through their UK subsidiary companies.

Current policy approaches and evidence

The current approach to easing financial constraints and allowing FDS firms to expand production to a larger scale in NI is by providing programmes administered by Invest NI and the Department of Agriculture and Rural Development (DARD). Firms can apply for a grant covering up to 50% of eligible costs (Agri-food Processing and Marketing Grant), or, private investment is matched up to 45% (Co-Fund NI) thereby easing financial constraints faced by smaller firms. A similar approach is being pursued by the Scottish government. Programmes are made available through the Enterprise Agency and Scotland Food and Drink in order to 'achieve more scale within the food and sector' (RR Donnelley 2009). The strategic plan laid out by the Republic of Ireland (ROI) in 2010 also notes that small and medium-sized enterprises (SMEs) 'with a potential to upscale will be the driving force behind increased employment levels in the sector' and that 'accelerating the growth of an optimal number of SMEs to large company size' will be 'highly significant in delivering regional growth and employment creation'(DAFF 2010).

Official reports tracking the impact of the Scottish and ROI strategies on developing the food and drink industry are available. The Scottish report, released in 2010 reports an net increase in combined food and drink GVA, although food processing GVA declined between the years 2006 and 2008 (Scottish Government 2010). However, it is not possible to link this increase to an increase in larger scale enterprises because according to the Scottish report the structure of food and drink enterprises registered in Scotland remained mainly unchanged between the years 2007 and 2010 with 86% of enterprises in the sector small, 12% medium, and 3% large (Scottish Government 2010). However, it is important to note that the definition of enterprise size used to monitor this change in the report is the number of employees. The scale of enterprises may have increased by expanding capital such as machinery or adopting new processes that make the existing employees more productive. There is some evidence to support this explanation as the progress report does find a real increase in GVA per employee in the drink manufacturing sector of £29,326 per employee that counters the decrease in food manufacturing labour productivity for an overall increase of £4,814 per employee for food and drink combined (Scottish Government 2010).

The investment body in the ROI, Enterprise Ireland, has been given the responsibility of targeting the expansion of high-value SMEs. The progress report issued in July 2011 (Department of Agriculture Fisheries and Food 2011) indicates that efforts have been focused on collaboration with multinational companies such as Probiotic setting up in Dundalk and the expansion by Danone in Macroom. The strategy seems to be based on linking R&D taking place at Irish universities and research institutes, establishing a geographic 'cluster' of expertise, and foreign direct investment (FDI). For example, current efforts by Enterprise Ireland link growing expertise in 'gut health' centred at Irish Universities to attract collaboration from companies such as Friesland/Campina, Kerry and Glanbia.

The industry recommendations for policy include SME growth as a topic requiring action (Food and Drink Industry Ireland 2011). The specific suggestions to the ROI government on the topic include (1) the establishment of a SME Forum made up of government and industry representatives to identify the necessary support for target-growth companies, and (2) develop a formal system for SMEs to 'slipstream in the success of larger companies in export markets' (Food and Drink Industry Ireland 2011). The second recommendation is consistent with the government action taken so far, in that larger companies already enjoying benefits of scale are in collaboration with smaller firms, as opposed to increasing the size of SMEs in general.

In Scotland, policy intervention related to M&A activity is focused on the potential market distortions due to the considerable concentration at the retailer-level. The strategy published in 2009 indicates one of the targets set out is to 'work in partnership with the Retailers Forum to examine issues and actions relating to access and affordability of healthy and sustainable foods' (RR Donnelley 2009). The worry being that as retailer concentration increases, consumer choice and value for money may decrease. The progress report tracking changes in Scotland's FDS compares changes in expenditure on food and non-alcoholic beverages as a percentage of household expenditure over 2007-2009. The indicator registers an overall increase in food expenditure percentage, with the most extreme case (1.3%) in the third lowest income decile (Scottish Government 2010). However, there is no isolation of price effects in this measure, and the report identifies that additional contributing factors not controlled for include income changes, habit changes due to education about food and health, and access to larger food stores. Therefore, it is not sufficient to prove a decrease in consumer welfare due to the industrial organisation of retailers in the food supply chain.

The Scottish Food and Drink Federation representing industry interests in policy matters also focuses on market power at the retail-level. In this case the concern is over shifting profit margins in the processing portion of the supply chain to retailers. The policy recommendation by industry is a 'call for the speedy implementation of a Grocery Code Adjudicator (GCA) to oversee the UK wide Grocery Supply Code of Practice' (Scottish Food and Drink Federation 2012). However, research by Bord Bia suggests that from the food and drink retailer perspective, the UK and ROI are merging into a single market (SCB Partners 2011), suggesting such a body may need to extend beyond the UK territory to be effective. The same report indicates competition law will limit further mergers amongst retailers in the UK and Ireland in the short to medium term.

Policy recommendations

Capital investment is an important determinant of scale, in that adopting new innovative equipment and processes can increase productivity, and therefore contribute to increasing overall competitiveness. Employment gains may be indirect, due to an increased demand for locally products and services in other parts of the supply chain.

There are different ways of financing (government, financial institutions, FDIs, etc.) and different ways of firm reorganization (M&As, vertical and horizontal integrations, cluster development). Further research is needed to distinguish the role different financing should play in this process, and identifying where the potentials are located and developing sector specific policies.

Given the current financial situation, the focus of M&As policy may need to be on brokering and perhaps incentivising cooperation and partnership between small and large companies, particularly including MNCs by orchestrating R&D to form knowledge clusters.

Cooperative agreements (facilitated by government) may allow local enterprises to gain scale benefits of a merger in specific areas (e.g. R&D, large contracts, exports) with fewer transaction costs. Large, foreign-owned companies more likely to engage in such activities, and thus enjoy scale advantages, because the potential market expands *e.g. foreign networks* and resources expand *e.g. access to centralised market/technology information*. Therefore, if government is to fill this gap for SMEs, it needs to supply networks to additional markets and an access to specialist knowledge on marketing and technology.

Apart from M&As, both vertical and horizontal cooperation can also be an effective way of exploiting economy of scale. In NI, other sectors suitable for vertical integration may be the fish sector particularly fishery cultivation, as it requires very specific needs on spawn/feed and technology provision so that economies of scale can be gained as in the poultry sector. There may also be potential in terms of horizontal cooperation across the alcoholic drinks market with ROI to promote Irish whiskey and beer particularly in markets with informal cultural ties (e.g. USA) and in emerging markets with proven demand for similar Scottish products.

It is important to stress that scale expansion does not conflict with a long standing policy of encouraging local entrepreneurship in creating new business in the NIFDS, as successful large enterprises begin as small ones.

Chapter 3: Education, skills and training

The public sector is instrumental in shaping the quality of the human capital endowment based on education at all levels from primary to continued professional development and technical training. The effectiveness of on the job training will depend in part on the character of the human capital endowment, or education system. Conversely, the usefulness of education in furthering competitiveness can be improved by industry participation in directing and supporting the development of 'knowledge clusters' linking expertise valued by industry with education.

The value of training can be transferred to both industry and employees. The value to the industry is difficult to measure directly (Patton, Marlow et al. 2000) as productivity gains from the training may exhibit time lags and are dependent on complex interactions (ILO 2008; Sung, Raddon et al. 2008; Johnson, Sawicki et al. 2009). The value of training is most commonly viewed as a series of potential benefits. Sung *et al* (2008) surveyed 380 UK FDS companies; an 'overwhelming majority' of the (human resource/ senior management level) respondents reported observing 'at least some (if not a great deal of) benefit of training for the workers.' The observed benefits can be described as (1) employee development, (2) product quality/productivity improvements and (3) business level benefits.

Training employees has the potential to improve labour productivity (Koike and Inoki 1990; Bassie and McMurrer 2007; ILO 2008; Sung, Raddon et al. 2008). Skills development can be seen as key to effective employee participation in team-working and thus an improved contribution to business productivity. When people acquire skills they make each other more productive as there are knock-on effects in terms of interaction on 'production, innovation, distribution and sales' (Johnson, Sawicki et al. 2009). Comparing very similar circumstances internationally Mason and Wagner (2002) noted that 'more highly trained [German] apprentices were far more productive than their British counterparts who had not had the same level of training.' Similar international observations have been made between the UK and Tokyo (Koike and Inoki 1990). Skills shortages are expected to have many potential impacts (Shury, Vivian et al. 2009) creating higher operating costs and difficulties in meeting customer service objectives, quality standards and new working practices.

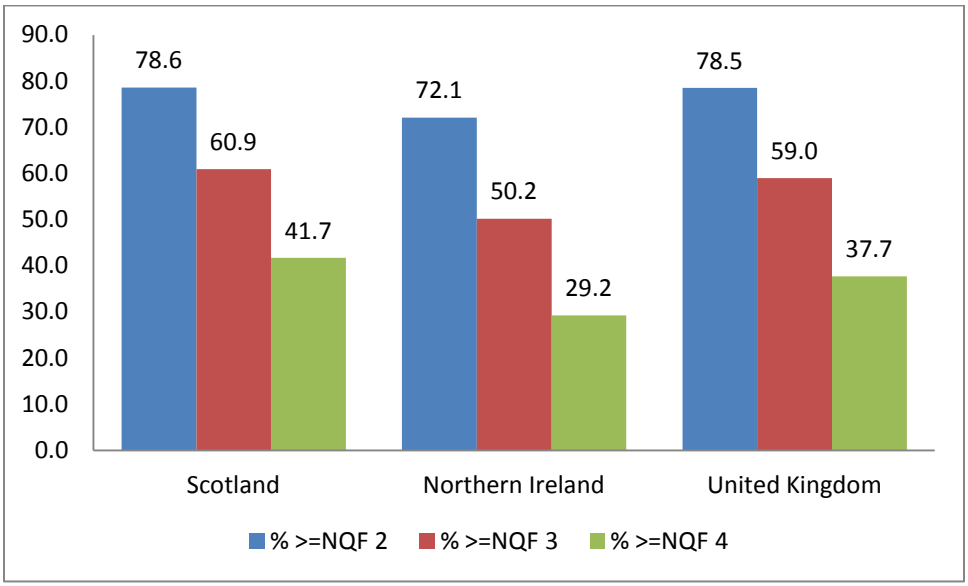
Human capital theory is based on the idea that expenditure on training and education should be seen as an investment with a predicted rate of return and therefore seen as vital to an organisation's choices (Johnson, Sawicki et al. 2009). Empirical investigations define several variables such as 'improving an individual's overall competence and technical skill levels' (Sung *et al.* 2008) and 'access to education' measurable by observing training records and course attendance. Other variables are less straightforward in terms of metrics 'job/industry attractiveness' (Shury, Vivian et al. 2009; Jack, Anderson et al. 2012; UKCES 2012), 'stability of employment' and 'job satisfaction' (ILO 2008; Edwards, Sengupta et al. 2009) requiring employee level surveying. The general consensus in the literature is that a productivity benefit

can be achieved in two main ways; (a) optimizing the efficiency of current workers, (Felipe and Kumar 2011), and (b) expanding the number of workers (ILO 2005).

Education, skills and training in Northern Ireland's food and drink sector

Compared to Scotland and the UK, NI has a lower proportion of the population with qualifications at all levels (see Figure 12). The most pronounced gap is between NI and Scotland, where an additional 11% of the population have obtained qualifications at the NQF 4 level or above. The difference may be due to market failures in terms of access and uptake of formal education (supply side), or, due to a higher rate of migration in segments of the population with more qualifications (demand side). The qualification levels in the NI workforce are seen to be improving with an increase in the proportion of the workforce with a sub-degree, degree and/or postgraduate qualifications over the last decade (DELNI 2009). Explanations for the change include generational and industrial drift (the replacing of older, less qualified workers with more qualified young people, and, a shift in the share of traditionally low-skilled industries such as agriculture and textiles towards services and high-tech manufacturing).

Figure 13: Educational and vocational attainment, 2011[24]



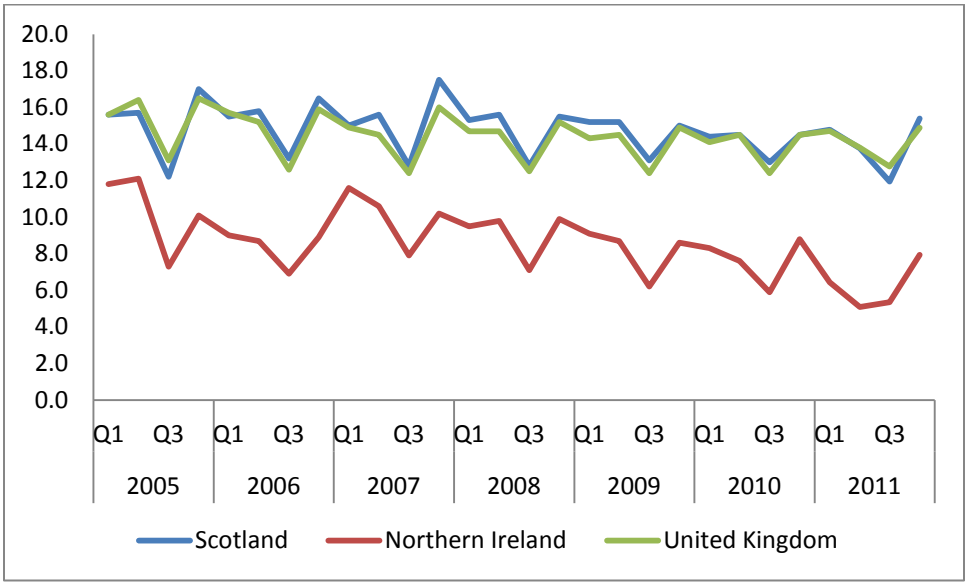
The issue of low qualification remains partly because of the problem of net outmigration of high skilled labour and professionals from NI. This has also been exacerbated by a widening gap in the proportion of employees receiving job-related training compared to Scotland and the UK. The difference was around 4% during 2005, however over time it has widened to about 11% in

[24] Department for Business Innovation and Skills (2012). Educational and Vocational Attainment from the Labour Force Survey, Table D1. Office for National Statistics.

2011 (see Figure 13). As these statistics are economy-wide, the industrial shares of different sectors in each jurisdiction will have an impact.

The supply of workers is only one side of the story in the NI labour market. Compared to neighbouring regions, NI has a long history of a relatively high unemployment rate, and relatively low labour productivity and pay at all qualification levels. The fundamental question is why there are additional failures in the NI market compared to the neighbouring regions?

Figure 14: Percentage of employees receiving job related training in last four weeks[25]



The current situation for human capital endowment in the NIFDS, particularly related to quality, is not fully clear. It is clear, however, that the NIFDS makes an important contribution to local employment. In the year 2010 the sector was estimated to be responsible for 20% of private sector employment, employing both high and low skilled workers (Johnson, Sawicki et al. 2009; McGuigan 2010; McDonagh 2012) with the demand for low skilled workers important in the NI context due to the abundant supply of such workers in the region (McGuigan 2010).

The main problem identified in the NIFDS based on various surveys is the imbalance of supply and demand in the labour market. As well as competition from the FDS in other regions of the UK and Europe, the NIFDS also has to compete with other sectors in the domestic labour market. The attractiveness of the FDS appears lower than for competing sectors in NI, partly due to the lower wage rate for similar qualifications and partly to employee's working conditions. It has been reported that the NIFDS ranks 6th lowest in NI based on the average wage for non-management employees rankings out of the 21 industry classifications (NISRA 2011). From the

[25] Department for Business Innovation and Skills (2012). Educational and Vocational Attainment from the National Labour Force Survey, Table D3. Office for National Statistics.

demand side, however, some surveys suggest that employers lack confidence in employing specialist food scientists, food technologists and engineering graduates (UKCES 2011) with three common complaints being (1) the generic nature of courses resulting in them lacking relevance (UKCES 2011), (2) poor communication between service providers and their users (UKCES 2011), and (3) an over-complex, incomprehensible framework (IUSSC 2008).

The imbalance in the local labour market is also reflected in the employment structure. There is evidence that the low skilled workers in the NIFDS are currently adequately equipped to carry out their jobs but have large skill gaps at senior management, marketing and technical levels and quite a high level of unfilled job vacancies, with 10% of NI firms reporting difficulties filling skilled positions despite high unemployment (Edwards, Sengupta et al. 2009; Lloyd and Mayhew 2010; UKCES 2012).

This is a typical vicious cycle in the economic development process: poor human capital does not create high value added, and the low value added restricts firms from employing a highly skilled labour force. Breaking the cycle can increase the quality of the human capital endowment and support development of the NIFDS by (1) encouraging the growth of high value added branches of food and drink manufacturing in NI, (2) reducing the rate at which those obtaining qualifications migrate to other regions to fill higher-skilled vacancies, and, (3) high value added will allow for more high quality labour to be employed.

The coexistence of high skill level unfilled jobs and large amount of low skill level unemployment suggests that the problem of market balance will need to be solved in the wider educational system rather than using on-the-job training. It is possible for government, through the education system, to break the cycle by focusing on the supply-side of the issue. The problems faced by the NIFDS are not unique, and therefore, experience from other countries may be helpful for NI.

Current policy approaches and evidence

Compared with the main competitors, the UK invests 'rather little' in skills and training measures with the resource share devoted to job search support and job-brokering (Meager 2009). Each country in the UK and Ireland has its own policies and regulatory framework for developing the FDS. The clear common theme, is the imperative of improving productivity and competitiveness through the development of the workforce via education and training strategies (National Assembly for Wales 2005; DfES 2006; Craven and Clark 2007; Forfás 2009; The Scottish Government 2009; McDonagh 2012). The English strategy is aimed at both employer 'wants and needs' and in providing learners with 'productive, rewarding and high value employment in a modern economy'. There is a push for extended specialisation in colleges for higher education qualifications as well as more (subsidised) training to be delivered in the workplace.

With productivity as the focus, Scotland aims to expand skills throughout all skill levels with particular reference to manual and vocational skills. The Welsh strategy appears to focus more on employee satisfaction specifically aiming for; 'a Wales where everyone has the skills, motivation and opportunity to obtain good quality jobs that meet their aspirations and abilities, and where employers work with their employees and the public sector agencies to raise skills to the highest possible levels to support high quality jobs in a growing economy'. Wales has made significant efforts to improve access to sector-specific training with future pathways into higher education or work related progression. Despite the employee level focus, provision is employer led and aimed at being specific to employer demand rather than being too generic. The ROI strategy has taken the approach of linking industry interests and expertise with education at the secondary and third levels. Improved qualification uptake has been combined with apprenticeships to address management and marketing skills, and industry-led R&D has been focused at universities to build up research capabilities including postgraduate research training in relevant topics.

The national skills strategy for Ireland (EGFSN 2005) mirrors the reported poor training levels compared to the UK with less than half the number of 25-64 year-olds being engaged in non-formal education and training (in 2002 14% of ROI employees Vs 32.5% in the UK). In the resulting 'generic skills portfolio' attention was set to target;

- Basic/fundamental skills - such as literacy, numeracy, IT literacy;
- People-related skills - such as communication, interpersonal, team-working and customer-service skills;
- Conceptual/thinking skills - such as collecting and organising information, problem-solving, planning and organising, learning-to-learn skills, innovation and creativity skills, systematic thinking.

Similarly, the ROI identifies skills, training and education as uniformly critical throughout the sector and as a basis of their 'Smart' objective. However, a large degree of admitted overlap has raised concerns that the framework may be overly complex and thus discouraging for employers. There is a focus on higher education which again improves the value of human capital, although there is also a need to ensure 'the continued employability of the approximately 30,000 workers (62% of sector employees) who have second-level or lower educational attainment as well as meeting the sector's high-skilled requirements'..

The current skill strategy for Northern Ireland (DELNI 2011a) aims to further increase the proportion of graduates with postgraduate qualifications. There is an aim for the strategy to become more demand-led and so there is hope that the value of these qualifications to businesses will increase as some research has highlighted a questionable relevance of certain qualifications to industry (IUSSC 2008).

The current NI education / training market consists of two important components: (1) those provided by private companies whereby employers, rather than individuals, purchase training

enrolling those lacking desired skills on relevant courses and (2) the public supported educational / training system. Private companies are competing with a subsidized public system. The private market would be superfluous if the public training market were sufficient (IFFL 2009).

At the firm-level there are problems associated with affordability and retention. Affordability concerns in terms of both staff time and actual costs may be one reason for remaining gaps. In 2011, 10% of employers stated they had no money to spend on training (UKCES 2012) compared to responses in 2008 stating the average annual employer investment in training was equivalent to £2,000 per employee and £2,900 per person trained off-the-job (Shury, Vivian et al. 2009). It is often a case that employers are concerned whether a newly trained worker will stay in the enterprise long enough to recover training costs. One study (Becker 1992) draws a key distinction between general skills (useful to a range of employers) and specific skills (which increase the productivity of the worker in their current employment, but do not improve the employability of workers if they are forced to change jobs). For Becker it is more rational for employers to invest in the most specific skills for their workforce. Such problems reduce incentives for employers to invest in training (ILO 2008). Many employers state that these difficulties cause increased strain on the management of existing staff (Shury, Vivian et al. 2009). There could also be inefficiencies in terms of the awareness of / confidence in the support available (UKCES 2011).

Another common finding is that the smaller companies (1-99 employees) are markedly more impacted by skills shortages in terms of their ability to respond to shortages, and the associated financial impacts, as there are fewer staff members to share the increased workload. There is also a lower incidence of recruitment in smaller companies (UKCES 2012). Many employers indicate a general lack of suitable candidates amongst the population such that 52% of applicants lack industry specific technical / practical skills and 47% lacked communication skills (Shury, Vivian et al. 2009). The response to this was generally to either increase job attractiveness (wages, terms of employment, sense of self value to business), or accept lower qualified applicants (CSO 2009; The Scottish Government 2011; UKCES 2011; Jack, Anderson et al. 2012; UKCES 2012). Both of these common 'solutions' bode poorly in terms of competitiveness at all levels and so intervention is necessary especially since recent data highlights a market failure in that there is a huge potential for trainees with 5.7 unemployed per job vacancy in the UK (ONS 2012).

There is limited information available on the FDS specifically. In the aggregated data, public and finance sectors tend to skew data toward higher levels of training (65-93% of employers) whereas transport, leisure and retail industries have a large negative impact on the average values (training ranges from 25-40% of employers in these industries) (CSO 2009). The high percentage of food and drink employers providing training reported may be due to the inclusion of health and safety training questions in surveys and the relatively small sample sizes and self selection/response biases may have an effect (Patton, Marlow et al. 2000).

Policy recommendations

Ensure support for management and marketing skills persists

Based on the evidence for current and likely future skill demands, policies should ensure that support for management and marketing skills persists with an emphasis on managing lower skilled workers to improve their output efficiency.

Encourage SME cooperative networks

In agreement with UKCES (2012), since it is clear that smaller businesses are both impacted more heavily by skills shortages and are less able avail of support, we repeat the case for SME cooperative agreements to aid company survival.

Monitor and maintain training quality

To prevent the concerns that have encroached in other countries' policies, quality must be upheld, this will in turn improve much needed employer and public confidence in the system. Quality monitoring and evaluation will be necessary with an emphasis on future demand continued awareness as the system ages. Confidence can be further improved by targeting support ensuring it is deemed relevant by employers and employees alike.

Policy makers should consider improving employer and public confidence by simplifying the delivery of information and revising the number of routes available on available training and public support.

Chapter 4: Market development

There are several issues related to marketing relevant to forming strategic policy. The term 'marketing' itself is multidimensional and requires clarification. A fairly exhaustive definition of the 'market orientation concept' consists of three dimensions: *culture* in the sense of a business philosophy guiding top management of an organisation; *analysis* that provides the strategic thinking; and *action* which is the commercial arm managing sales and branding (Lambin, Chumpitaz et al. 2007). Although this is framed from the firm-level perspective, the public sector has a role in social marketing, or managing the networks that support the culture, analysis and action in the marketing process.

Market development is an important aspect of bolstering competitiveness and can be thought of as two components: delivering new products and accessing new markets. Serving external markets is of strategic importance because it allows for specialisation based on comparative advantages, and also provides flexibility to expand the scale of competitive activities beyond meeting domestic demand. The additional economies of scale directly contribute to *cost leadership*, and *focus* is achieved by channelling resources into activities competitive in the world market place. There is a role for public institutions in the 'organisation of exchange' or the physical flow of goods between the manufacturing and the consumption sites (Lambin, Chumpitaz et al. 2007). This idea can be broadened further when applied to external markets to include not only physical aspects of transportation, but also the political (e.g. barriers to trade) and cultural (e.g. foreign language) infrastructure connecting producers with external consumers.

The product-side of market development speaks to the strategy of *differentiation* in the sense that unique products gain a competitive advantage by filling changing consumer requirements. In this case, comparative advantage is rooted in the gathering, analysing, and communicating of information between producers and consumers. Market research identifies consumer needs to be filled. The analysis of that information guides research and development in terms of developing viable new products. Then the uniqueness of those products is communicated back to consumers by means of branding. The public role in this process is described as the 'organisation of communication': the flow of information to precede, accompany and follow exchange to ensure meeting supply and demand (Lambin, Chumpitaz et al. 2007). The public engagement aspect can be further specified such that institutions engage market research in cases where there is an undersupply due to small scale issues, or, the potential for free-riding in industry causing a disincentive for firms to finance informational advantages based in national, rather than firm-level, competitiveness.

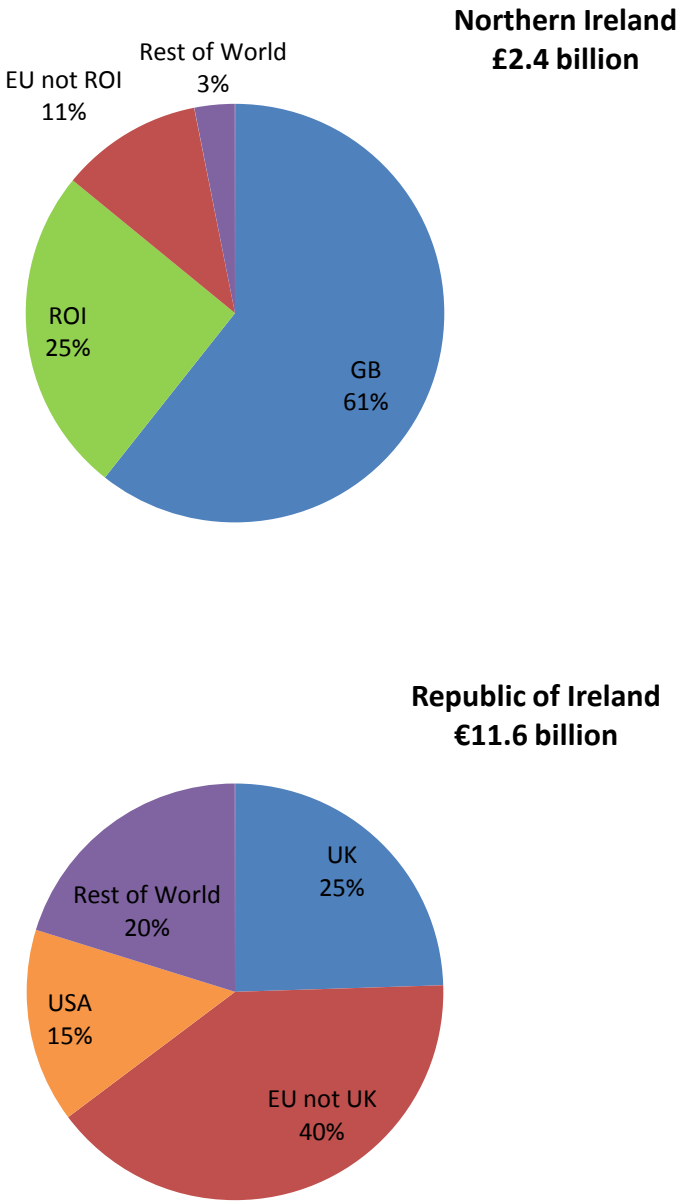
Market development in Northern Ireland's food and drink sector

It is useful to compare food and drink sales between NI and the ROI because both economies share (1) comparative advantages in terms of primary agricultural production, (2) similar transportation costs, (3) policy and regulatory framework based on the EU common market, and

(4) potential access to Irish origin labelling or branding. There are also important differences that will influence market access strategy and success, namely the difference in currency, as well as difference in terms of political institutions.

As outlined in Chapter 1 on the background on the sector, NI exports to emerging markets outside of the EU are relatively small. During the year 2009, 70% of food and drink products were sold externally from NI (Department of Agriculture and Rural Development 2011). Of external sales, 61% were destined for GB, 25% to the ROI, 11% to the remaining EU, and 3% to the rest of the world (see Figure 14). The ROI exported 70% of food and drink manufacturing turnover in the same year (Central Statistics Office 2011). The UK purchased 25% of the value of those exports, the rest of the EU 40%, the USA 15% and the rest of the world 20% (see Figure 14)

Figure 15: External/export sales Northern Ireland[26] and Republic of Ireland[27] by destination, 2009



[26] Data from the Department of Agriculture and Rural Development (2011). Time-series data on the size and performance of the Northern Ireland food and drink processing sector, by subsector, 1989 to 2010 (2011 where available) Belfast, Policy and Economics Division.
[27] Data from Central Statistics Office (2011). Local Units Manufacturing. StatBank Ireland.

Interaction with scale

The breakdown of sales destination by business size (using the number of employees measure) illustrates that during 2010/2011 SMEs in NI contributed a relatively large share of sales to the domestic market and the ROI, but a small share of sales to GB, the rest of the EU, and, the rest of the world compared to large enterprises (Department of Finance and Personnel 2011). The survey of SMEs about the availability of finance suggests 13% of businesses seeking future finance in NI would finance export sales if successful (Department of Finance and Personnel 2011). A similar pattern can be discerned from data available on food and beverage exports from the ROI. While just over half of enterprises are engaged in exporting, they are responsible for over 80% of employment and over 90% of food and beverage manufacturing output (see Table 14).

Table 12: Food and beverage[28] manufacturing and exports summary for the Republic of Ireland, 2009[29]

	Total	which Export	as a percent of total
Manufacturing Local Units (Number)	650	364	56%
Persons Engaged (Number)	37,468	31,265	83%
Gross output (Euro Thousand)	18,003,223	16,596,826	92%
Gross output exported (Euro Thousand)	11,693,875	11,693,875	100%

Nationally supported global networks

It is well established that the ROI has a more global reach in terms of food and drink sales with 35% of the value of export sales outside of the EU, compared to 3% in the NI case as illustrated in Figure 14. It is useful to benchmark the ROI export strategy against current and potential action in NI due to the comparable distance from import markets, and common access to the 'Irish' brand. Important differences are present as well in terms of currency and institutions meriting consideration. New Zealand (NZ) is an interesting case to benchmark against because, similar to NI, about half of external sales are food and drink related with the top two categories being dairy and meat at 21% and 12% of total exports respectively in 2007 (Statistics New Zealand 2012).

A straightforward metric to indicate the level of integration in the global market place of the respective government associated bodies, is to compare the number and location of foreign offices maintained. Publically supported trade offices located in external markets are an important instrument to promote local products, attract FDI and gather market information. Such

[28] Food and beverage defined using the NACE Rev 2 classification of 10 and 11.
[29] Data from Central Statistics Office (2011). Local Units Manufacturing. StatBank Ireland.

offices are especially important in the case of NI considering the dominance of SMEs in the FDS, the fact that food exports account for half of total local exports, and that NI is a devolved region with limited formal diplomatic instruments to pursue explicitly NI interests. Table 15 compares the location of foreign offices maintained by Invest Northern Ireland (INI), Scottish Development International (SDI), Enterprise Ireland (EI), and New Zealand Trade and Enterprise (NZTE).

Table 13: Comparison of office networks available through enterprise agencies

City	Invest Northern Ireland	Scottish Development International	Enterprise Ireland/Bord Bia (+)	New Zealand Trade & Enterprise
Amsterdam, Netherlands	O		✓ +	
Ankara, Turkey	O			✓
Bangkok, Thailand	O			✓
Beijing, China	O	✓	✓	✓
Boston, USA	✓	✓	✓	
Brussels, Belgium	✓		✓	
Budapest, Hungary	O		✓	
Buenos Aires, Argentina	O			✓
Calgary, Canada	O	✓		
Chicago, USA	✓	✓		
Dubai, UAE	✓	✓	✓	✓
Dublin, Ireland	✓			
Dusseldorf, Germany	✓	✓	✓ +	
Glasgow*	O		✓	
Guangzhou, China	O			✓
Hamburg, Germany	O			✓
Ho Chi Minh, Vietnam	O			✓
Hong Kong, China	O	✓	✓	✓
Houston, USA		✓		
Jakarta, Indonesia	O			✓
Jeddah, Saudi Arabia	✓			
Johannesburg, South Africa	O		✓	
Karachi, Pakistan	O			✓
Kuala Lumpur, Malaysia	O			✓
London, UK	✓	✓	✓ +	✓
Los Angeles, USA	O			✓
Madrid, Spain	O		✓ +	✓
Manila, Philippines	O			✓
Melbourne, Australia	O			✓
Mexico City, Mexico	O			✓
Milan, Italy	O		✓ +	✓
Moscow, Russia	O	✓	✓ +	
Mumbai, India	✓	✓		✓
New Delhi, India	O	✓	✓	✓
New York, USA	✓	✓	✓ +	✓
Noumea, New Caledonia	O			✓

Paris, France	O	✓	✓ +	✓
Prague, Czech Republic	O		✓	
Qingdao, China	O			✓
Riyadh, Saudi Arabia	O		✓	
San Jose, USA	✓	✓		
Santiago, Chile	O			✓
Sao Paulo, Brazil	O		✓	✓
Seoul, South Korea	✓	✓	✓	✓
Shanghai, China	✓	✓	✓ +	✓
Shenzhen, China	O			✓
Silicon Valley, USA	O		✓	
Singapore	O	✓	✓	✓
Stockholm	O		✓ +	
Sydney, Australia	O	✓	✓	✓
Taipei, Taiwan-China	✓	✓		✓
Tokyo, Japan	✓	✓	✓	✓
Toronto, Canada	✓	✓	✓	
Vancouver, Canada	O			✓
Warsaw, Poland	O		✓	
Washington DC, USA	O			✓
Total No. offices	**16**	**22**	**29**	**36**

***Closing August 2012**

Red circles indicate offices are available to all three enterprise bodies other than Northern Ireland. Yellow circles indicate the ROI and NZ enterprise agencies have a presence while Northern Ireland does not. Green circles indicate Enterprise Ireland has a presence, but Northern Ireland does not. Purple circles indicate New Zealand Trade & Enterprise has a presence in a city and Northern Ireland does not.

The NZTE has the greatest number with 36 locations, EI has the second with 29, SDI third with 22, and INI has the fewest offices at 16. There are six locations at which all the enterprise agencies examined keep an office except for INI; Beijing, Hong Kong, New Delhi, Paris, Singapore and Sydney (indicated by a red circle in Table 15). A comparison of food and drink exports from NZ and the ROI to China, India, France, Singapore and Australia in the year 2011 in local currency as reported (Central Statistics Office 2011; Statistics New Zealand 2012) and in GBP equivalent based on the average the two yearly reported exchange rates available from the HMRC website ($NZ and € equivalent to 0.481 and 0.858 GBP respectively) is provided in Table 16.

Table 14: Food and drink[30] exports New Zealand and Republic of Ireland, 2011

	New Zealand		Republic of Ireland		Scotland[31]
Location	NZ$000	£000 NZ$ = £0.481	€000	£000 € = £0.858	£000
O France	269,055	129,415	632,850	542,985	580,000
O Netherlands	314,535	151,291	484,812	415,969	-
O Italy	113,099	54,401	333,191	285,878	-
O Spain	114,434	55,043	177,325	152,145	225,000
O Sweden	49,586	23,851	141,685	121,566	-
O Russia	243,229	116,993	127,979	109,806	-
O Hong Kong	399,993	192,396	105,765	90,746	-
O Saudi Arabia	640,247	307,959	98,566	84,570	
O China	3,030,223	1,457,537	80,038	68,673	125,000
O South Africa	69,198	33,284	41,182	35,334	115,000
O Poland	-	-	40,650	34,878	-
O Mexico	373,238	179,527	37,558	32,225	-
O Australia	1,278,519	614,968	30,810	26,435	-
O Czech Republic	-	-	15,744	13,508	-
O Indonesia	585,790	281,765	13,609	11,677	-
O Philippines	618,213	297,361	12,002	10,298	-
O Singapore	476,257	229,080	10,183	8,737	155,000
O Chile		-	752	645	-
O Malaysia	592,953	285,211	-	-	-
O Thailand	482,561	232,112	-	-	-
O Viet Nam	234,879	112,977	-	-	-
O India	98,920	47,580	-	-	-
O New Caledonia	53,347	25,660	-	-	-
O Turkey	35,663	17,154	-	-	-
O Brazil	13,666	6,573	-	-	-

Of the six 'red circle' locations identified, France imports the largest volume of food and drink products from the ROI (€632 million). About half of French imports from ROI are 'meat and meat preparations' (€307 million) followed by 'dairy products and birds eggs' (€130 million) and 'fish, crustaceans, molluscs and preparations thereof' (€119 million). The NZ exports to France in 2011 are largely made up of sheep meat ($NZ 203 million) and the total of food and

[30] New Zealand includes: milk powder; butter and dairy spreads; cheese; whey and milk constituents, casein, fresh milk and cream, buttermilk; sheep meat; frozen beef meat; chilled beef meat; horse meat; edible offal; meat and edible offal not otherwise classified; fat of cattle, sheep, and goats; frozen vegetables; frozen fish; molluscs; crustaceans; fish fillets; sauces; food preparations nec; prepared or preserved crustaceans and molluscs; honey; chocolate; sugars nec; breads, pastry, cakes, and biscuits; malt extract; wine; sweetened water; pet food. Republic of Ireland includes: meat and meat preparations; dairy products and birds eggs; fish, crustaceans, molluscs and preparations thereof; cereals and cereal preparations; vegetables and fruit; sugars, sugar preparations and honey; coffee, tea, cocoa, spices and manufactures thereof; feeding stuff for animals (excluding un-milled cereals); miscellaneous edible products and preparations; and beverages.

[31] Includes all SIC 15 rounded to the nearest £5 million and based on 2010 estimates.

drink exports $NZ 269 million. In GBP equivalents, the year saw approximately £375 million of meat and dairy from the ROI, and £97 million of sheep meat from NZ imported by France in 2011. In the year 2010, it is estimated that Scotland exported £580 million of predominantly whiskey[32] to France (Scottish Goverment 2010). The latest year of data available for NI food and drink exports (2009) reports £259 million of food and drink exported to the EU excluding the remaining UK and ROI (Department of Agriculture and Rural Development 2011).

Amongst the six countries with offices held by all agencies being compared other than INI, China is the most important importer of food and drink products from NZ ($NZ 3 billion) with an additional $NZ 399 million sold in Hong Kong during 2011. Milk powder is the dominant product ($NZ 1.7 billion) followed by butter and dairy spreads ($NZ 214 million), sheep meat ($NZ 193 million), animal offal ($NZ 149 million) and malt extract ($NZ 147 million). Of the six locations identified for comparison (China, India, France, Singapore and Australia) China was the second most important importer of ROI food products after France during 2011. The ROI exported €185 million of food to China in 2011 with the majority headed to Hong Kong (€105 million). Miscellaneous edible products and preparations accounted for €111 million of the imports followed by meat and meat preparations (€44 million), and dairy products and birds eggs (€29 million). In GBP equivalent, approximately £68 million of food products were exported from the ROI to China, compared to £74 million of reported exports by the NI food and drink sector to all countries outside the UK and EU in 2009 (Department of Agriculture and Rural Development 2011). Scotland is estimated to have exported £125 million of mostly whiskey to Taiwan in the year 2010.

Australia is understandably a large market for NZ as a relatively close neighbour, and in 2011 food and drink valued at $NZ 1.2 billion was exported there. The major product exported to Australia was wine ($NZ 355 million), then cheese ($NZ 261 million), followed by food preparations not otherwise classified ($NZ 163 million), bread, pastry, cakes and biscuits ($NZ 110 million), frozen vegetables ($NZ 101 million), chocolate ($NZ 96 million), butter and dairy spreads ($NZ 96 million) and sweetened water ($NZ 93 million). The ROI exported miscellaneous edible products and preparations (€15 million) and beverages (€15 million) to Australia.

Singapore imported $NZ 476 million (approximately £229 million) of mainly milk and dairy products from NZ in 2011. The ROI has a more modest presence in the market, but did export €10 million (approximately £8 million) worth of miscellaneous edible products and preparations to Singapore in 2011. India imported $NZ 98 million worth of mainly milk powder ($NZ 77 million) along with butter and dairy spreads and sugars from NZ, but no food and drink exports from the ROI were significant enough to be recorded as a bilateral transaction with India in

[32] Based on personal communication with Scottish Global Connections Survey team that whiskey responsible for 84% of food and drink manufacturing exports.

2011. There is a history of exports from Scotland, with an estimated £155 million of mainly whiskey reaching Singapore in the year 2010.

After France, the ROI exported the most food and drink to the Netherlands (€484 million), Italy (€333 million), Spain (€177 million) and Sweden (€141 million) in 2011. The dominant product exported to these countries from the ROI is meat and meat preparations. There is an EI office located in all four countries, and also a NZTE located in Italy and Spain. The major product these four countries are importing from NZ is sheep meat, totalling £132 million in GBP equivalent.

There are EI offices located in Saudi Arabia, South Africa, Poland and the Czech Republic. Saudi Arabia is importing miscellaneous edible products and preparations (€86 million), and dairy products (€12 million) from the ROI. Dairy products are the main export from NZ to Saudi Arabia with $NZ 299 million of milk powder and $NZ125 million of butter and dairy spreads traded in 2011. South Africa imported miscellaneous edible products (€19 million), meat and meat preparations (€11 million), and beverages (€10 million) from the ROI in 2011. The food and drink exports from NZ to South Africa were of similar value in 2011 (£33 million compared to £35 million GBP equivalent) and consisted mainly of butter and dairy spreads, edible offal, sheep meat, milk powder and cheese. South Africa imported approximately £115 million of mainly whiskey from Scotland in 2010. Poland and the Czech Republic imported meat and miscellaneous products from the ROI, but had no significant bilateral trade with NZ in 2011.

National branding

The EU agricultural product quality policy allows for three specifications of agricultural farm products, foodstuffs, wine and spirits. Applications may be submitted to designate Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), or Traditional Specialty Guaranteed (TSG) status so that the guarantee of 'authenticity' is easily communicated to consumers, and products under such designations are thus 'differentiated' from competing products. There are three designations in the European system for NI provided in Table 17 below along with the four Irish and twelve Scottish designations. The TSG status is process-based. Therefore TSG designations under the UK may be available to producers in NI.

Table 15: Place of Origin designations from the Republic of Ireland, Northern Ireland, Scotland and traditional processes for the United Kingdom[33]

Irish PDO and PDI product designations
Imokilly Regato
Connemara Hill lamb ; Uain Sléibhe Chonamara
Timoleague Brown Pudding
Clare Island Salmon
Northern Ireland PDO and PGI product designations
Armagh Bramley Apples
New Season Comber Potatoes / Comber Earlies
Lough Neagh Eel
Scottish PDO and PGI product designations
Native Shetland Wool
Shetland Lamb
Orkney beef
Orkney lamb
Orkney Island Cheddar
Traditional Ayrshire Dunlop
Stornoway Black Pudding
Scottish Farmed Salmon
Scotch Lamb
Scotch Beef
Arbroath Smokies
Scottish Wild Salmon
United Kingdom TSG product designations
Traditional Farmfresh Turkey
Watercress
Traditional Pasture Reared Beef
Traditional Bramley Apple Pie Filling
Traditional Grass fed Red Poll beef
Traditionally Farmed Gloucestershire Old Spots Pork

The Northern Ireland Food and Drink Association (NIFDA) publication identifying opportunities for growing the food sector (McDonagh 2012) suggests that NI may take advantage of claiming

[33] Data is from the DOOR database, Agriculture and Rural Development, European Commission accessed on 14 June 2012, http://ec.europa.eu/agriculture/quality/door/list.html.

British or Irish provenance in the marketing of products. The report suggests that claiming British provenance is advantageous in Great Britain, and that associating with an all island Irish brand may also exact a price premium. However, there is no indication as to whether such origin labelling commands a premium in markets further afield, and if the relative advantage of association with the UK or Ireland varies across importing regions.

Current policy approaches and evidence

The literature supports the proposition that the 'adoption of specific national export-promotion programs positively strengthens the firm's export-related resources and capabilities, which in turn are instrumental in developing a sound export marketing strategy' (Leonidou, Palihawadana et al. 2011) There is evidence that government marketing assistance has a strong and positive impact on export performance growth of SMEs in NI based on a data set of high-growth SMEs during the period 1994 to 1999 (Bonner and McGuinness 2007). The study found that the strongest effect was realised when assistance targeted smaller firms already engaged in exports with recent or on-going investment in product development. Food, drink and tobacco manufacturing firms account for 10% of the SMEs in the data set. Survey-based analysis of a random sample of exporting firms in the UK also found a stronger positive link between government assistance and export performance in smaller firms (Leonidou, Palihawadana et al. 2011). The UK study does not compare non-exporting and exporting firms as Bonner and McGuiness (2007) do, but do test for differences related to the degree of export experience. Firms with less experience exporting enjoyed greater benefit than experienced firms from specifically information-related programs, but no difference was evident between the two groups of firms with regards to education/training or trade mobility programs.

The industry associations in Scotland are requesting assistance for small and medium businesses to gain the 'legal, technical or linguistic knowledge to break into overseas markets' (Scottish Food and Drink Federation 2012). The progress report on the Scottish food and drink strategy impact has identified a real increase in food (£187m) and drink (£182m) exports to overseas markets (Scottish Government 2010).

Bord Bia has launched a logistics mentoring service to assist with maximising FDS distribution at the best rates. There is also the Marketplace 2012 programme to improve links between Irish buyers and international markets/buyers. Overall the Irish approach seems to focus on industry partnerships and mentoring rather than government intervention. Bord Bia has been working on developing a co-opetition culture, 'At this stage, 9 projects are live and at different stages of development (in bakery, ingredients, premium dairy, beef, alcohol, pork, horticulture and seafood), 4 have successfully concluded.' (Department of Agriculture Fisheries and Food 2011)

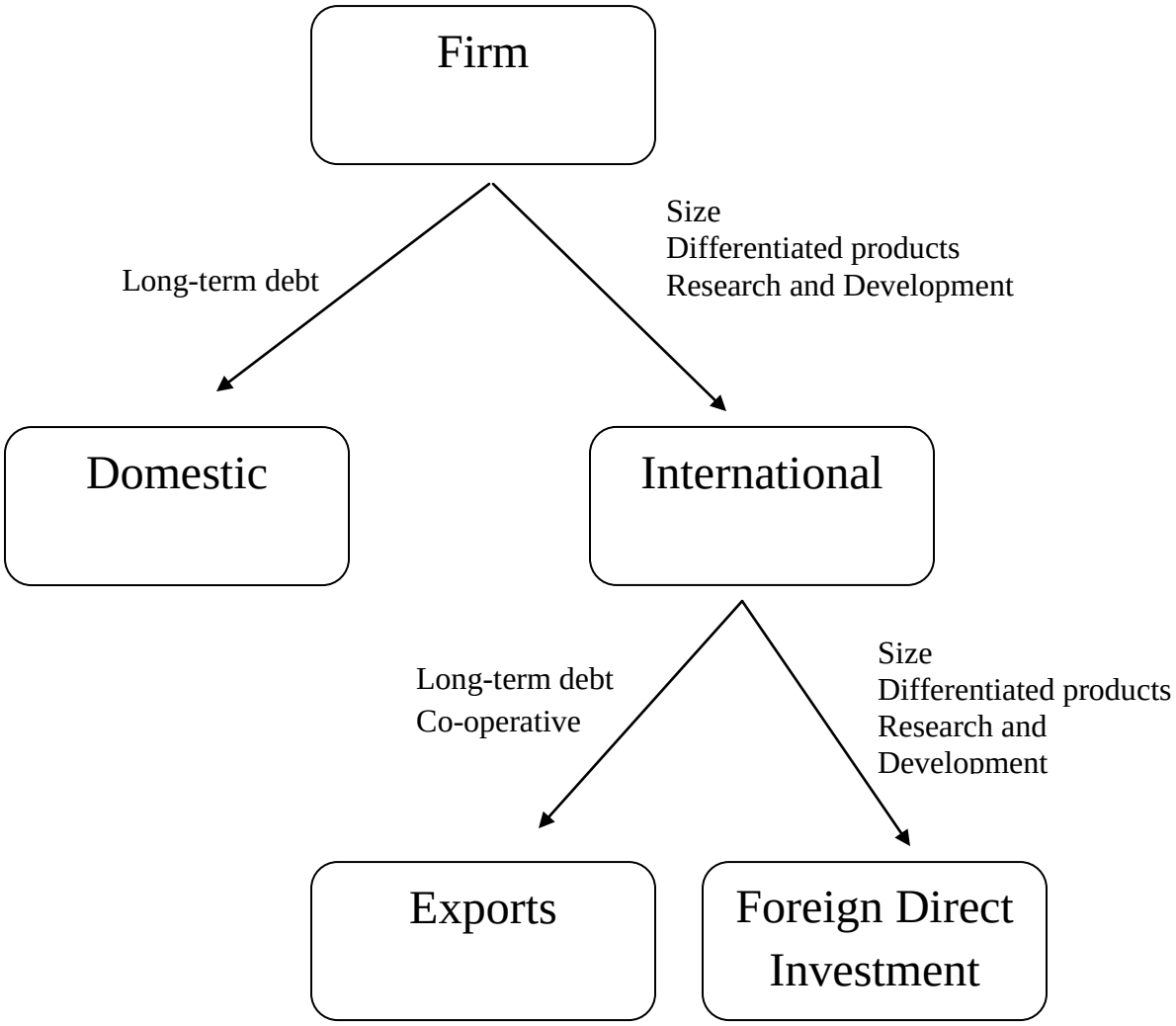
From the industry in the ROI, targets and recommendations for further support have been outlined. The Irish Dairy Board (IDB) is setting a target of 30% of business to come from non-EU markets by 2020. The industry recommendations include: a balanced trade policy that supports increased exports from the FDS, resistance to EU moves to use agriculture and food

access as a bargaining chip in bilateral or multilateral trade deals, and delivering adequate resources to develop new export markets.

The focus of the strategy identified in the strategic plan for the ROI is to generate export led growth in the sector by means of 'a 20% improvement in cost competitiveness relative to that of our trading partners' by industry incorporating existing supports that focus on investment leading to productivity increases (Department of Agriculture Fisheries and Food 2011). The link here being, if economies of scale, skills and training, and R&D are improved to gain international competitiveness then according to Ricardian theory on comparative advantage exports will increase without specific government intervention. There is abundant evidence in the literature that firms with higher productivity are more likely to export.

For example, accessing foreign markets at the firm-level has been empirically tested as a two-stage decision process whereby first a choice to become an international firm is made, and then between exporting (market governance) or foreign direct investment (integration) using data on food and beverage companies worldwide (Goldsmith and Sporleder 1998). The results are summarised in Figure 15 where the rectangles represent the nested choice sets of the firms, and the variables that contribute to the probability of a firm following a particular choice are listed along the arrows. Firms with higher levels of long-term debt are more likely to choose to remain domestic, or if following international expansion to follow the lower-risk and lower-return export strategy over integration (outward FDI). Co-operative associations are no less likely than non-cooperatives to expand internationally, but tend to pursue an export-based strategy. The likelihood that firms engage in the global marketplace as well as the extent of global integration increases with firm size (based on a capital), differentiated products (non-commodities), and R&D expenditure.

Figure 16: Drivers of firm-level participation in foreign markets summarised from Goldsmith and Sporleder (1998)



There is evidence to support the findings based on firm-level bi-lateral trade data from Sweden's food and drink industry in that exporting firms on average had a workforce 20 fold that of non-exporters (size), twice the share of workers with a university degree (research and development), and around 1.5 times the capital-labour ratio (Gullstrand 2011).

There is also evidence that being the recipient of FDI can increase the amount of exports at the firm-level. The foreign ownership of a firm also has a positive and proportional impact on the probability of export participation according to empirical analysis of Thai manufacturing firms (Cole, Elliott et al. 2010). The authors indicate the impact found in Thailand is stronger than for developed economies including the UK, but consistent in terms of directionality. Questions arising from this result are: (1) what is the level of foreign ownership in the NIFDS, is it enough

to merit investigation of such a phenomenon? And (2) a strategy to increase FDI leading to more exports from high FDI firms will have important distributional issues in terms of whether additional profits from firm growth are invested in the region, or if R&D or dividends etc. are exported as well? In this case the host region would not necessarily benefit from the additional exports.

There is conflicting empirical evidence on whether export diversification or specialization supports economic growth. The disagreement could have to do with the stage of overall economic development of the country studied, or, the unit of analysis such that diversification benefits national growth, but local regions should pursue specialization (Naude, Bosker et al. 2010). The authors test the impacts of export diversification and specialization on local economic growth using magisterial district level data on South Africa exports, finding no evidence that diversification supports growth at the local level. Is it appropriate to treat Northern Ireland as a local region within the UK and Europe? Or is the country-level more appropriate. Therefore, additional research in this area, specifically looking at NIFDS exports and product mix can benefit decisions as to how much emphasis to place on *differentiation* strategy.

The perceived benefits of Origin Labelling by surveyed food and drink businesses in Scotland: product attracts a higher price; sales volume increases; advantage over UK and English products; and helps to communicate to target consumer groups (Scottish consumers buying locally, tourists visiting Scotland, overseas consumers/expatriates) (Scottish Goverment 2009). However, 'for some retailers, Scotland and the Scottish market is probably not large enough to warrant a lot of the additional cost/expense required setting up dedicated supply chains' (Scottish Goverment 2009). Therefore, the definition of local in terms of the radial distance (e.g. Northern Irish, Irish, British, or European) may provide a different return on investment, and a balance between consumers' perception of 'local' and sufficient market size may need to be investigated.

In terms of commanding a price premium for domestic products by labelling 'Northern Irish' food products, there may be similar barriers as experienced by many Scottish firms in that the domestic market size does not justify the extra expenditure of dedicated supply chains (Scottish Goverment 2009). Gross domestic household income as reported by the Office of Nations Statistics (ONS) shows Scotland generated £77,182 million in the year 2009, over threefold of the same statistic for NI (Office for National Statistics 2012) indicating the scale of the NI market may create even more inefficiencies for firms when marketing NI provenance to local consumers.

Tourism imports consumers, instead of exporting goods, but essentially is a means of expanding market share. Links between culinary tourism and national/regional branding strategies have become increasingly prevalent amongst smaller countries dependent on tourism (Horng and Tsai 2010). Scotland has identified tourism as a part of the wider FDS development strategy and is determined to 'adopt a co-ordinated and focused approach to Scottish Food and Drink tourism' by developing an integrated food and drink tourism strategy, supporting food and drink tourism

activities such as festivals, and evaluate options to extend the 'Eat Scotland' message (RR Donnelley 2009).

The ROI also accepts there is a role for tourism, and that combining different stakeholders to develop a consistent delivery of a positive food experience to tourists is becoming increasingly important. The National Food Tourism Implementation Framework (NFTIF) 'sets out a strategy to capitalise on the growing trend of consumers seeking a food experience as an integral part of their holiday and also to create a unique sense of Irish culture and hospitality which incorporates the quality and value of our food experiences' (Department of Agriculture Fisheries and Food 2011).

The principal objective of the NFTIF was to overcome fragmentation due to the diversity of stakeholders contributing to a lack of coordination (Failte Ireland 2010). The framework identifies two aspects of food tourism for attention: destination marketing (promoting Ireland as 'The Food Island'), and food in tourism (ensuring marketing promises are delivered *via* food-related events, food and service quality, and value for money). This last point is identified as a priority as evidence from a review of visitor perceptions support that price competitiveness is a weak point for the ROI. 'Food costs are cited by 7% of visitors as a disadvantage of an Ireland holiday—the fourth most frequently mentioned complaint by visitors after the high cost of living (25%); weather (17%) and bad roads (10%)' (Failte Ireland 2010). There may be an opportunity here for NI to provide access to 'The Food Island' at lower cost thanks to exchange rate and cost of living advantages.

The total spending on food and drink by UK tourists in Scotland has fallen from £510m to £420m between 2007 and 2009, along with the number of visits (13.1 to 12.5 million) and average spend per visit (£38.93 to £33.6) (Scottish Government 2010). Tourist expenditure on food in drink in the ROI has remained over €2 billion during the period 2005 to 2009 with overseas tourists responsible for around 60% (Failte Ireland 2010). The document on Scottish strategy for developing the FDS indicates that action designed to 'support consumers to eat fresh, seasonal produce and deliver clear, accurate labelling for the country of origin of their food' is to be undertaken (RR Donnelley 2009). The indicator selected in Scotland's tracking of policy impact is the retail sales of Scottish food and drink brands in Great Britain (GB) measured as the change in value of retail sales of Scottish food and drink brands in GB over the period 2007 to 2010 (Scottish Government 2010). The nominal increase reported is 30% from £1,401m to £1,836m, and the real change in value using 2007 as the base year only increased to £1,627m during the year 2009, or, a more modest 16% increase. Although sales of Scottish brands appear to have expanded, the *share* of Scottish food and drink brands contributing to total grocery sales in GB has remained at 2% over the period (Scottish Government 2010). Therefore, the increase is proportionate to grocery sales generally and not necessarily due to greater competitiveness of explicitly Scottish brands.

The strategic document circulated detailing the ROI food and drink policy states that 'Bord Bia and industry should make the optimal use of Ireland's PGIs, and to identifying further designations' (Department of Agriculture Fisheries and Food, Bord Bia et al. 2010). Action on this point according to the progress report issued in July 2011 includes Bord Bia facilitating an application to designate Waterford Bla as PDO/PGI, and, consulting with the Department of Agriculture, Food, and Marine (DAFM) and the TASTE Council on the development of an on-line 'how-to guide' for PDO/PGI applicants (Department of Agriculture Fisheries and Food 2011).

The number of PDO, PGI and TSG designations obtained or in process by country is provided in Table 19. Italy, France and Spain clearly dominate in terms of number of designated food and drink products.

Table 16: Registered, published and applied PGI, PDO and TSG designations from 1996[34]

Country	Registered	Published	Applied	Total	% of total
Italy	242	12	30	284	20.9%
France	190	6	53	249	18.3%
Spain	156	7	35	198	14.5%
Portugal	115	4	17	136	10.0%
Germany	81	8	17	106	7.8%
Greece	95	2	9	106	7.8%
United Kingdom	41	4	15	60	4.4%
Czech Republic	28	0	7	35	2.6%
Poland	33	2	0	35	2.6%
Slovenia	11	6	3	20	1.5%
Belgium	13	0	3	16	1.2%
Austria	14	0	0	14	1.0%
Hungary	10	2	2	14	1.0%
Slovakia	9	1	1	11	0.8%
China	7	3	0	10	0.7%
Finland	8	1	1	10	0.7%
Netherlands	9	0	1	10	0.7%
Denmark	3	3	3	9	0.7%
Sweden	6	1	0	7	0.5%
Lithuania	2	0	4	6	0.4%
Ireland	4	0	1	5	0.4%
Luxembourg	4	0	0	4	0.3%
Thailand	0	1	2	3	0.2%
Cyprus	2	0	0	2	0.1%
India	1	0	1	2	0.1%
Turkey	0	0	2	2	0.1%
Bulgaria	1	0	0	1	0.1%
Colombia	1	0	0	1	0.1%
Romania	1	0	0	1	0.1%
Viet Nam	0	1	0	1	0.1%
Andorra	0	0	1	1	0.1%
Brazil	0	0	1	1	0.1%
Morocco	0	0	1	1	0.1%

A comparison of PDO and non-PDO cheese production (Bouamra-Mechemache and Chaaban 2010) found PDO Brie processors in France are of a smaller scale than non-PDO counterparts, face higher input costs due to higher labour and milk quality requirements, and command a

[34] Data is from the DOOR database, Agriculture and Rural Development, European Commission accessed on 14 June 2012, http://ec.europa.eu/agriculture/quality/door/list.html.

premium price. An important aspect of adopting product designation is illustrated in the study that needs to be recognised, mainly that producers are 'locked-in' to certain ingredients and processes. Product designation creates a barrier to increasing scale if the supply of approved ingredients is limited, as well as to innovation in terms of new techniques or products.

The adoption of product designation, however, can be evaluated in the context of rural development as a mechanism to sustain agriculture in less favoured areas (LFA) where the potential to expand in terms of scale or innovation may already be truncated. In such cases, it is more appropriate to focus on adding value to the output, and the PDO, PGI, and TSG designations are an opportunity to do so by commanding the higher price. This is the motivation behind an investigation into the success of PGI beef in the Navarra region in Spain to penetrate the retail market (Bardaji, Iraizoz et al. 2009). The study is based on a survey of retailers with different characteristics to determine the factors most important to the decision to stock PGI beef. The survey found that PGI beef was much more likely to be sold in non-beef producing areas/cities indicating that the PGI label acts to replace the knowledge about beef-production methods that would be available to those close to where production is taking place. The statistical analysis carried out by Bardaji, Iraizoz et al. (2009) also finds that large-scale stores are more likely to carry PGI beef than traditional butcher shops. This also supports the notion that the PGI label is replacing 'knowledge' about production methods and quality if one accepts the assumption that traditional butchers are perceived to provide a higher quality meat than super-markets. It also appears that super-markets themselves use the PGI label to replace direct knowledge about the production quality, as those without vertical coordination are more likely to supply PGI meat according to the study. However, the strongest motivation for retailers to carry PGI beef according to the study was clearly from the demand-side, and the benefits of providing a differentiated product desired by consumers.

Policy recommendations

Improve international networks in key export markets to support SMEs

Assisting exporters to increase market share abroad is complementary to other recommendations such as increasing scale (small firms may merge with larger firms already exporting to help increase capacity that could trigger an efficiency gain cycle). Offices to broker informational exchange between NIFDS firms and foreign customers and pursue explicitly NI interests should be increased to match competitors. Locations without a NI representative in countries importing considerable food and drink from competitors include Paris, Beijing, and Hong Kong.

Facilitate PDO and PGI designations, particularly in LFAs where constraints already limit production efficiency improvements and a price premium can compensate for higher production costs

In some areas, the supply of raw inputs or production technology may already be limited, therefore obtaining a price premium for traditionally produced and differentiated products can help sustain the rural economy, as well as increase the potential for penetrating large retailers or external markets.

Establish where, and for what products a British or Irish national brand aligns with consumer preferences

National strategy designed to increase export sales beyond regional markets should take into account heterogeneous marketing approaches across target markets. There is also a potential for heterogeneity across food products (e.g. advantages from 'Irish' cheese and 'British' meat in the same market). Obtaining differentiated information based on both location and food product in markets targeted for receiving NI exports may further refine the strategic use of origin labelling. The public funding and organisation of market research in foreign markets to specifically identify any advantages of origin labelling will be able to provide valuable information to smaller firms unable to afford such endeavours, as well as allow for a co-ordination of national and firm-level marketing strategy.

Chapter 5: Innovation

There is no definite consensus in the academic literature on the boundaries of 'innovation' as a concept and so several definitions are currently in use, however, there is consensus amongst policymakers that innovation is essential to economic development. Innovation is regarded by the UK Treasury as one of the major driving forces of economic development along with investment, enterprise, skills and competition. The NI economic development strategy states that improving economic competitiveness via export led growth will be driven by 'innovation, R&D and the skills of our workforce.' (Northern Ireland Executive 2012).

Innovation is the process of creating better or more effective products, processes, services, technologies, or ideas that are readily available to markets, governments, and society. The basis is Research and Development (R&D) which provides the stock of knowledge (including knowledge of man, culture and society), and uses the stock of knowledge to devise new applications. In the development process, an industry requires continuous mass applications of many new technological innovations (either in the form of new products, process, or services) and firms are required to develop new technology, or, rely on strategic alliances, acquisitions or networks to tap into the innovations of others. In this sense, R&D develops ideas, knowledge and skills but only when the new knowledge is applied has the innovation process been completed. It is worth noting that in the literature R&D and innovation are often interchangeable.

The R&D component of innovation has both direct and spillover effects on economic development. Directly, R&D enhances development through new products meeting customer preferences, and improving production efficiency and marketing. There are public good properties associated with R&D as well, meaning it can generate positive externalities as it increases the public stock of knowledge. One study (Griliches 1992) suggests the spillover effects of R&D are potentially a major source of endogenous growth. However, there is a potential problem of undersupply if only the market is used, since firms base the amount of R&D spending on only the direct benefits.

R&D has proven to play a crucial role in agricultural development. A study of United States (US) agriculture between 1948 and 2004 (Fuglie, MacDonald et al. 2007) indicates production was 2.5 times higher in 2004 than 1948 using fewer inputs. During the period 1948–80, almost three-quarters of additional productivity was derived from an increase in inputs per worker, whereas in the 1981–2004 period, two-thirds of additional productivity was derived from growth in total factor productivity (TFP), which is mainly attributed to R&D. Similar conclusions are also found in many other countries (Fan and Pardey 1997; Maxwell, Smith et al. 1998; Alston, Marra et al. 2000; Mullen 2007).

Studies on the contribution of R&D to the FDS are very limited. Gopinath and Roe (2000) computed private and social rates of return to R&D capital in the three vertically linked sectors,

primary agriculture, food processing, and farm machinery in the US. Using a Leontief cost function approach, they found that R&D has significantly reduced variable costs in all three linked sectors and the average private rates of return to R&D for the three sectors are 37.3% (agriculture), 10.2% (food processing) and 22.3% (agricultural machinery). The social rates of return to R&D in food processing and farm machinery are larger than the private rates due to spillover effects. Baldwin et al. (2003) examined adaptation of advanced technology in the food processing sector and the impact on firm productivity and market-share growth. It was found that technologies adopted in the late 1990s were (in order of preference) network communications and processing technologies, process control and packaging, engineering materials handling, pre-processing, and inventory/distribution. The study also determined that (1) larger and foreign owned companies are more likely to use the advanced technology,(2) information and communication technology (ICT) has the highest impact on productivity growth, (3) productivity growth and market share growth are closely linked and, (4), growth in capital intensity has a large and significant effect on productivity growth. Implementation of an aggressive human resource strategy, one that values continuous improvement of the workforce, through training and recruitment, is also associated with higher productivity growth.

Technological spillovers from agriculture to food processing may come about over time because agricultural R&D has tended to result in products of more uniform quality and less perishability as in the case of milk, fruits, and vegetables. For instance, innovations in poultry processing appear to have motivated the development of higher yielding birds of more uniform quality, although some of these spillovers may have been internalized through vertical market contracts. These spillovers to other sectors can manifest as efficiency gains, lowering unit costs.

A combination of forces (technological development, a better understanding between food and human health, and economic development), mean there is increasing demand for the sector to provide safe and high quality food with greater nutrition, better flavour and longer shelf life. It has also generated new demand for technological development. The FDS has benefited from technological advances in other more general scientific and technological areas such as informational sciences and technology, mechanics, biology and chemistry.

Studies on the relationships between research, education and communication investments also suggested that they are complementary and substitutive (Stevens and Jabara 1988). A good educational and communication system will facilitate the innovations in the economy to have research results materialised.

Current state of R&D in Northern Ireland's food and drink sector

In 2010, total R&D investment in NI was £521.4m, approximately 1.2% of GDP in the year, which is lower than that in the Republic (1.77%), the UK national average (1.81%), the EU average (1.9%), the world average (2.0%) and far behind Northern European members Denmark (3.02%), Sweden (3.62%), and Finland (3.87%).

R&D in NI was carried out by three types of institutions: business (66%), higher education (31%) and government (3%). A recent survey of R&D in business (NISRA 2011) suggested that most of business R&D was taking placed in house (94%) and only 6% was purchased from other institutions. The contribution of FDI in terms of advancing firm, industry and national competitiveness is indicated by information that is available locally. Externally owned companies accounted for 68% of business R&D expenditure in 2010, and just looking at manufacturing 80% of R&D expenditure was carried out by externally owned companies (Department of Finance and Personnel 2011). On a per capita basis, R&D spending in NI is above Scotland and Wales, lower than the level in England, and only about half the per capita spend on R&D in the ROI (see Table 20).

Table 17: In-house R&D total and per capita expenditures[35]

	Total R&D spending (£m)	Per capita spending (£)
England	14,877	285
Scotland	622	119
Wales	244	81
NI	324	180
ROI	1,580	353

Of total R&D expenditure in NI in 2010, the majority of R&D was carried out within the Manufacturing sector (71%) with the remaining 29% carried out in the Services & Other industries category. The Food processing sector (including food, beverage and tobacco) accounted for 9% of the spending in manufacturing sector (crudely £21million of spending), which is lower than its share in total manufacturing sales (Table 21).

Table 18: Shares of sub-sector R&D spending and sales in NI manufacturing industry by, 2010[36]

Sector	R&D spending %	total sales%
Food, beverages &tobacco	9	52.1
Chemicals and chemical products	4	1.9
Basic Metals & Fabricated Metal Products, except machinery & equipment	8	4.8
Engineering & Allied Industries	67	8.8
Other Manufacturing	12	32.4
Total	100	100

[35] NISRA (2011). Northern Ireland Research & Development Statistics 2010. Republic of Ireland data from Central Statistics Office and assuming exchange rate of £1 = €1.16.

[36] R&D spending figures from ibid. And shares calculated based on DETI publications.

Innovation policy in the NIFDS is a part of overall policy in the region. A study by Abreu, Grinevich et al. (Abreu, Grinevich et al. 2011) identified that the main challenge for NI innovation policy is to ensure it is appropriate for the structure and competitive strengths of the local economy. The authors argue that a major limitation of many innovation policy initiatives is too much emphasis (in public investment) on the needs of high technology manufacturing – particularly in its R&D. Instead the paper urges the NI government to recognise the importance of fostering wider innovation including those in new products, processes and practices and in all parts of the economy – including the service sector. In other words, specific attentions need to be placed on bridging the gaps between research and the local economy and transforming research results and existing knowledge and skills into products and services, via collaboration by all the actors in the innovation system promoting effective knowledge exchange.

Based on benchmarking the innovation environment (such as markets, regulation and infrastructure and readiness of different players in using technologies), a local science industry panel report (MATRIX (NI Science Industry Panel) 2008) examined issues relevant to NIFDS innovation. First, it indicates that the potential of scientific capacity has not been adequately exploited due to lack of the integration between industry and local scientific capacity. There are two strong local exploitation capacities identified: one in poultry and dairy processing sectors, which is possible to be exploited in short term (2-5 years); and one in veterinary sciences, animal health, plant science, food safety and food nutrition to be exploited in relatively longer term (5-10 years). Therefore the report urges for more collaboration and communication between industry and scientists, and, encourages cooperation between agri-food and outside sectors such as advanced materials, computational sciences, and life sciences. Second, given that NI is a net importer of agri-food knowledge, there is a need for greater focus on gaining access knowledge and sharing it across the sector, via all possible ways including establishment of expert networks. Third, given changing policy environment and market dynamics and targets set by local government for 2020, capacities development in the sector to be focused on 8 areas including food components and ingredients, processing / supply chain excellence, food products and innovation, the consumer of NI foods, food safety and security, build a knowledge based sector, creating viable community energy and developing alternative markets. The main points in that report are also partly echoed in DARD Evidence and Innovation Strategy.

Table 19: Food and drink innovation strategy, Scotland and Republic of Ireland

	Scotland	ROI
Direction	new healthier and sustainable food products	Convergence of three main trends: health and wellness; premium, indulgence and convenience, and the emergence of ethical sustainability considerations
Targets	Meeting challenges of food security and climate change;	Fostering the Smart Green Bio-Economy; Contribute to 20% improvement of cost competitiveness; Providing new food and non-food products;
Approach	Through variety of routes with programming funding to main research providers; Spin-off companies; Connectivity;	Industry-led food research; Double the resources; Prioritise investment in consumer focused innovation and new products; Orientation for emerging market; Bridging research and industry;
Concerns/Results		

Innovation also plays a critical role in both the ROI and Scottish FDS strategies. In the ROI strategy Vision 2020 (DAFF 2010), market research, innovation and new product development are regarded as the key actions for the value added sector (P34). In essence, all three actions fall into the wider innovation category. The Scottish national food and drink policy (Scottish Government 2009) also has underpinned their 'future work through research'.

Yet, innovation requires investment, and patience is necessary to wait out the travails of testing and marketing new products. The R&D investment in the food industry ranks low compared with the R&D investment in other sectors in NI. A key obstacle to innovation is a lack of coordination, so collaboration in earlier stages of new product development could reduce the risks faced by firms. Changing consumer preferences (e.g., health, convenience, pleasure, and ethics) present additional challenges and opportunities for innovators. In addition, food safety issues are critical, especially for trade across borders through complex supply chains. Business risk involves both real and perceived food safety concerns. The government perspective differs from that of the industry because, for the government, facilitating trade is secondary to the safety of consumers. So, reforms to the management of food safety could benefit innovation.

In a competitive market, most firms will have incentives to innovate, but firm characteristics and the business environment will have an impact on innovation. In the literature, questions on the relationship between in house R&D and innovation, and the determinants of innovators are discussed. No consensus has been reached concerning whether in house R&D by an FDS firm will enhance firm innovation. Baldwin and Sabourin (2000) found that although R&D is not a necessary condition for innovation, the probability of introducing an innovation is one-and-a-half times greater for R&D performers than for those without an R&D unit in the Canadian FDS. While in examining the determinants of innovation in small food firms in Europe, Avermaete,

Viaene et al., (2003; 2004) found that a considerable number of innovative firms did not have R&D while some firms with R&D were not involved in innovation.

Of the 177 small food firms surveyed, Avermaete, Viaene et al.(2004) found that more than 70% of firms had been involved in innovation. Both internal capacity and external information are important for supporting the innovation process. A firm's internal capacity for innovation particularly its entrepreneurship, market orientation, firm experience, skills of the workforce, and the firm's investment in know-how, determines the firm's attitude to innovation and performance. External information is important because the reliability and access to information dictates the innovation process. Non-innovators tend to distinguish from innovators as those of low training, low marketing research staff costs, less use of services and external information and limited coverage of training. The authors urge that more attention be drawn to in-house capability rather than R&D activities. On the other hand, some (Baldwin and Sabourin 2000; Baldwin, Sabourin et al. 2004) stress the importance of production and engineering departments in the FDS firms to foster innovation.

Policy recommendations

An innovation system involves human capital (R&D, education, training, etc.), physical capital (new production process investment, infrastructure, etc.) and social capital (networks). A more flexible system for public sector involvement in innovation activities using incentive-based instruments such as skill trainings and financial assistance to encourage innovation capacity building in the private sector is needed. Recommendations include:

- Linking innovation spending directly to improving *cost leadership* or *differentiation* by improving production efficiencies or developing new products and prioritizing assisting SMEs with implementation challenges
- Synthesize long-term industry needs and trends in consumer preferences with the innovation system by private-public partnerships in education and R&D
- A potential list of 'technologies to be applied' including the potential efficiency gains, associated costs, and timeline of implementation should be developed through an industry-led public-private partnership and included as an annex to the strategy
- The geographical location and industrial organization of the NIFDS lead to more severe informational shortages than other regions indicating potential advantages of a centralized information dissemination centre (for example, in AFBI library) with government and industry support
- Stronger links between industry-led R&D and local research universities / institutions will provide a 'cluster' of specialist knowledge engaged in supporting new innovative products and processes as well as a supply of specialists engaged with the industries current and future needs.

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