A Competitiveness Analysis of the Polymer and Plastics Industry on the Island of Ireland

InterTradeIreland

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Foreword

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This report provides, for the first time, an analysis of the factors affecting the competitiveness of the polymer and plastics sector on the island of Ireland. The sector is important to the island economy, employing 18,750 people, equivalent to 5.4 per cent of the island's total manufacturing employment. In 2003-2004 it had an annual turnover of £2,081m/€3,008m and currently comprises 283 firms.

This analysis highlights a level of commonality, with respect to business performance, which could be built on to develop a more dynamic all-island sector. Companies North and South share common challenges to maintain competitiveness in an increasingly global marketplace. To date there has been limited North/South interaction within the sector and a lack of awareness of the potential business opportunities to be exploited through collaboration – in areas such as access to markets, suppliers and research partners.

Many of the issues raised as barriers to competitiveness, such as energy costs, skills and training, are common across the island of Ireland. The island accommodates leading edge polymer research institutions and a diverse range of polymer processing firms. The report identifies shared competitive challenges and provides a clear basis for collaborative actions to improve the overall performance of the sector on the island of Ireland.

Inter*Trade*Ireland is working to enhance the global competitiveness of the island economy through the creation of all-island trade and business development networks. Such networks enhance the value of collaboration between businesses, government agencies, trade associations and third level academic institutions, who together can drive improvements in the competitiveness of the island economy. We look forward to working with the polymer and plastics sector to explore how collaborative opportunities can be exploited to create a more dynamic and mutually beneficial all-island industry.

Aidan Gough
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Executive Summary

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Introduction

This report was commissioned by Inter*Trade*Ireland, in association with the Northern Ireland Polymer Association and Plastics Ireland. It is designed to provide an overview of the polymer and plastics sector on the island of Ireland, comprising Ireland[1] and Northern Ireland, assess its competitiveness and make recommendations for improved performance through all-island collaboration.

The study was conducted through 5 work streams:

- A review of global industry trends through a desk-based analysis of key documents and data;
- The construction of a comprehensive profile of the all-island sector by collecting and analysing data on the sector's firms, North and South;
- A benchmarking exercise, using statistical data on key competitor nations, to assess the international competitiveness of the all-island sector;
- A series of consultations with firms, industry experts, and key intermediary bodies to provide qualitative information on the performance of the sector; and finally
- A workshop for industry experts calibrated the findings of the study and helped to develop recommendations to improve competitiveness through increased all-island collaboration.

Global trends

Demand for plastics applications looks set to increase in the medium-to-long term, fuelled by substitution in mature markets like Western Europe, and volume growth in developing markets, such as China.

The price of commodity plastics will remain high as long as global demand increases and while the oil price stays high. This is likely to squeeze margins for the processors unless they can pass on increased costs.

Environmental issues, already a significant factor for the industry, will continue to grow in importance. Environmental regulations are likely to remain a major cost to the industry, while the changing attitudes of consumers may open up new markets for recycled polymer materials.

Energy is a major cost to the industry. The lack of competitive energy pricing in some of the more mature processing countries is a serious obstacle to business competitiveness in the global marketplace.

The all-island sector

The all-island processing sector comprises 283 firms, with a total turnover in 2003-2004 of £2,081m (€3,008m). The sector employs 18,750 people, equivalent to 5.4 per cent of the island's total manufacturing employment.

[1]The term "Ireland" throughout this report refers to the Republic of Ireland.

The polymer and plastics industry on the island of Ireland is a varied one. A number of differences are apparent in terms of markets served and processes used between Ireland and Northern Ireland. There is also a clear difference in scale of activity - a 70/30 split between Ireland and Northern Ireland respectively - which is indicative of the relative size of their respective economies.

Yet, despite these differences, the profile indicates that there is much about the industry that is similar across the island of Ireland. This suggests a level of commonality, in some respects of business performance, which could be built on to develop a more collaborative all-island sector.

Data on exports is not readily available, but the indications are that the sector could do more to improve its exploitation of international markets, especially where there are logistical advantages to the island's location near key European markets, particularly Great Britain.

International benchmarking

The all-island sector compares well in productivity terms to the leading competitor, Germany. It has the characteristics of a mature manufacturing sector, with high and rising labour costs driving a reduction in the overall workforce. Two areas of major concern are the need to maintain pressure on the overall manufacturing cost base and the importance of greater innovation.

The key issues for the sector's cost base are labour and energy. In both of these areas the all-island sector is uncompetitive.

Labour costs are rising and, in the face of these higher costs, it will be vital for the sector to improve its competitiveness through more efficient, automated production processes. High energy costs are predominantly due to the structure of the energy production sector on the island of Ireland, but this should also act as a driver for greater energy efficiency measures within the sector until the wider strategic problem is resolved.

While the all-island sector's labour cost profile suggests that it is a mature manufacturing industry, levels of innovation appear to fall behind other key mature competitors, such as Germany. The performance of the sector here is reflected more broadly in the relatively low levels of innovation and research and development within the all-island economy as a whole.

Qualitative issues

The following characteristics were identified as being crucial to the performance of highly competitive firms in the all-island sector:

- Diversification of customers and customer markets to reduce the reliance on a single end-user, thereby improving the chances of business survival in the event of the loss of a contract;
- Regular investment in new machinery to minimise operating costs. Increasing automation reduces labour and energy use, both major costs to the sector;
- A high level of customer service; and

- Product differentiation, for example through the use of proprietary designs or materials, which requires close collaboration between suppliers, customers and research bodies.

Intermediaries made a number of observations on the prospects for future collaboration and industry competitiveness:

- Attention must switch to exploiting markets where cost is less of a comparative advantage, such as highly specialised and niche products;
- The industry must become more internationally-focused, both in terms of customer markets and potentially using the global market to the sector's advantage by outsourcing high volume, low quality and price sensitive work to low cost markets;
- There is significant process and materials science expertise on the island of Ireland, which should provide the research and academic foundations for the industry to increasingly characterise itself as a global centre of excellence. However, collaboration between academic institutes and firms needs to be deeper and wider;
- The industry must consider whether it will have access to a sufficiently well-trained workforce in the future. This will require significant consideration of the industry's skills needs in the medium term; and
- Encouraging firms to take a longer term approach to business planning is an absolute priority if the industry is to improve its competitiveness in the longer term.

The case for all-island collaboration

The benefits of industry collaboration across the island of Ireland cannot be taken for granted. The participation of firms in collaborative activity will only happen if there is a clear business case for doing so. It must be assumed that firms will only engage in greater cross-border activity if they consider it to be in their commercial interests to do so. The public sector has an important role in helping to signpost opportunities and address barriers to cross-border trade and collaboration.

To date, there has been relatively little firm-level interaction between Northern Ireland and Ireland, except where firms have sites in both jurisdictions. There is also a lack of knowledge about the opportunities that might exist on the other side of the border, both in terms of new markets, sourcing supplies and potential collaborative business partners. These deserve further investigation by the sector. In addition, many of the issues raised as problems, such as labour supply, skills and training and energy costs are common across the island of Ireland. The sector is a diverse one, with a lack of direct competition between firms; this will help to encourage collaboration on these common issues, which would benefit from being tackled at the all-island level.

Recommendations

Based on its findings, the study proposes 18 recommendations. These are to:

1 Establish an **all-island forum** to take forward collaboration and develop the other recommendations of this report. The forum should provide clarity, consensus and visibility in the allocation of responsibility for the activities described below.

2 Create an all-island **Foresight Programme** to allow greater consideration of, and planning for, future developments in the industry, its technologies, and key markets. The programme should be led by the private sector, supported by the Higher Education community and by facilitation from the public sector.

3 Improve the **signposting and tailoring of public sector innovation support**, bearing in mind the specific needs of the polymer and plastics industry.

4 Encourage greater **academic collaboration in support of the industry,** especially between key process and materials centres such as Trinity College Dublin and Queen's University Belfast, and firms through technology transfer, spin-outs and the development of intellectual property.

5 Investigate the viability of a **sector-sponsored chair in polymers and plastics** at one of the key higher education institutions on the island of Ireland.

6 Drawing on the experience of the Irish Best Practice Forum, establish an **all-island benchmarking scheme** to improve competitiveness, using evidence from within the sector and drawing where necessary on useful comparisons from other industries.

7 Encourage **inter-governmental co-ordination of energy policy** to increase energy sector competition and thereby reduce costs.

8 Consider ways in which the sector can improve its environmental image while cutting its own energy use through **collaboration with bodies such as the Carbon Trust**.

9 Encourage and co-ordinate government support to provide **all-island trade promotion schemes**, including all-island trade missions.

10 Facilitate wider adoption of **lean manufacturing and automation techniques** throughout the sector's base.

11 Focus on **up-skilling current employees** to meet future customer and market needs.

12 Improve the **marketing of the sector as a positive, rewarding and exciting career choice** through the use of promotional materials, mentors and advocates.

13 Investigate the potential for **the joint and shared recruitment of specialist staff** through collaboration between small firms with mutual skills needs, for example in the field of design or marketing.

14 Conduct a **joint assessment of future skills** needs by the sector skills bodies of Northern Ireland and Ireland. This activity could logically flow as a practical action from the Foresight Programme described at Recommendation 2.

15 Establish the extent to which **all-island labour mobility exists**, and how it may be exploited or encouraged.

16 Establish a **fast track promotion scheme for the sector's high flyers** to encourage the retention of high quality business leaders.

17 Conduct **an all-island survey on levels of industry investment** and attitudes and barriers to increased investment.

18 Prepare a **monitoring and evaluation framework** to underpin the economy, efficiency and effectiveness of the delivery of the activities set out above.

1. Introduction

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Study overview

This report has been commissioned by Inter*Trade*Ireland in conjunction with the Northern Ireland Polymer Association (NIPA) and Plastics Ireland. It is designed to provide an overview of the polymer and plastics sector on the island of Ireland, comprising Ireland[2] and Northern Ireland, assess its competitiveness and make recommendations for improved performance through all-island collaboration.

Definition of the sector

The polymer and plastics industry is subject to a number of different definitions and typologies. It is relatively easy to identify the core activities associated with processing polymer and plastics components. However, at the margins, there is a distinct blurring between plastics and other industry sectors. This is due to a number of factors:

- Manufactured products frequently consist of a number of components made from different materials. Many household goods, such as kettles or computers, comprise moulded plastic and electronic parts. There is a danger of either 'double-counting', where plastics products are assembled rather than manufactured by a firm, or 'omission', where a firm traditionally not regarded as a processor (such as an electronics firm with a small processing facility) is not captured at all. As a result, there is no accepted international or national classification scheme that captures the entirety of the industry;
- The application of plastics to products, and indeed the processing techniques and materials used, are subject to rapid change. Definitions therefore tend to be extremely general and not particularly up-to-date. They are helpful for giving an overview of the industry as a whole, but not at any finer level of resolution; and
- Deciding whether a company is to be included or excluded is not a linear exercise. A large company in an end-user sector (e.g. automotive) may have an in-house moulding operation which makes it a 'plastics company', although the percentage of turnover that may be attributed is small. By contrast, a typical 'pure' plastics processor may be a small company contributing a relatively small turnover towards the sub-regional aggregate.

For these reasons, a degree of pragmatism is required in defining the sector, and it is necessary to exercise some value judgements. To provide a structure to the study data obtained, a set of high level classifications has been used, drawing on industry knowledge and expertise to assist in decision-making at the boundaries.

Classification

In this report, the industry's performance and competitiveness are assessed according to 2 key classifications.

[2]The term "Ireland" throughout this report refers to the Republic of Ireland.

Process used

This classifies firms by the primary plastics or polymer process used in manufacturing a product. While it is likely that many firms will use more than 1 process, the categorisation has been made for the primary process in order to simplify data analysis.

All the firms within the sector definition are assessed to be processors. This excludes elements of the supply chain, such as toolmakers, raw materials suppliers and masterbatchers. The primary processes are set out in **Table 1.1** below.

Table 1.1: Main polymer and plastics manufacturing processes

Process used	Explanation
Blown film	Extrusion through a circular die which produces plastic film for use in products such as plastic bags.
Blow moulding	Molten plastic tube is extruded into a mould, into which air is blown to form hollow products such as bottles and other containers.
Compounding	The mixing of polymer with other materials, such as colouring, stabilisers and reinforcement, to provide a compound for further processing.
Composites	A two phase compound, usually a polymer matrix with a high loading of fibre or particulate-reinforcing filler such as glass fibre, carbon fibre, limestone or talc.
Extrusion	Profile extrusion: production of a continuous length of plastic with a uniform profile, heated and under pressure, such as pipes and gutters. Sheet extrusion: similar process to profile extrusion, producing sheets of plastic or polymer, such as food wrapping. Wire coating: plastic insulator over a metal conductor.
Glass Reinforced Plastics (GRP) Moulding	Impregnation of a glass fibre mat with liquid thermosetting polymer. Used for large scale items, such as boat hulls.
Injection moulding	Molten plastic is injected at high pressure into a mould. A fast process designed to produce volume numbers of identical products, such as toys, computer housings and small plastic components for electrical devices.
Rotomoulding	Mould is heated in an oven and rotated to ensure an even coating of the polymer material. Produces road cones and storage tanks, without the need for welding.
Thermoforming	Plastic sheet is heat-softened, then formed into shape using vacuum or air pressure. Used for many packaging products in the food sector, such as yoghurt pots, margarine tubs, microwave and freezer trays.

Source: SQW Ltd/Rapra Technology Ltd

End-user market

This defines firms in terms of the final market for which their product is designed. Again, some processors may supply more than a single end-user market. Trade moulders, for example, are likely to be supplying to a range of different markets.

Again, a single primary end-user market has been used for each firm in order to facilitate data analysis. The key end-user market definitions are set out in **Table 1.2**.

In this report, the polymer and plastics sector on the island of Ireland also includes some firms manufacturing rubber applications. In reality, this means the inclusion of a single large company, Michelin, which has a substantial presence in Northern Ireland.

On the other hand, the report does not cover thermosetting plastics such as glass fibre reinforced polyester (GRP or FRP), used for building boat hulls, large tanks and various transport applications.

Table 1.2: Main end-user markets for the polymer and plastics industry

End-user market	Examples of products
Agriculture/horticulture	Sheeting and twine for agricultural purposes
Automotive/transport	Many car parts, including body panels, interior trim dashboard and increasingly elements of the power-train
Construction/ civil engineering/industrial	Drainage systems, double glazing profiles, guttering, waterproofing membranes, foam insulation
Electrical/electronic	Consumer goods, white goods, TV, computer and telephone components
Household	Bowls, buckets, hairbrushes, toothbrushes
Leisure	Toys, sports equipment
Medical equipment/devices	Drug delivery (catheters), sterile packaging
Packaging	Food trays, wrapping film

Source: SQW Ltd/Rapra Technology Ltd

Methodology

The study has involved 4 main phases of work:

- A **literature review** to determine the main global trends in the polymer and plastics industry, including the latest developments in markets, technologies and materials;
- **Data analysis** of the all-island sector. This has involved the construction of a dataset characterising the all-island sector, beginning with the identification of every individual firm in the sector. Central Statistics Office data and other open source information on the firms were then used to build up a snapshot of the all-island sector as it is currently configured;
- **Interviews** with sector firms, including processors, suppliers and customers, as well as consultations with intermediary bodies; and
- A **workshop** for industry experts, held to examine the emerging messages from the other elements of the study, and to consider the implications for future collaborative action.

During the course of this study, over 40 people from the sector, North and South, have been consulted through interviews and/or the workshop processes.

Productivity

In assessing an industry's competitiveness, it is vital that the focus rests on its productivity. Productivity is a key indicator of an economy's competitiveness, and there are 5 main drivers of productivity which are central to improving performance - competition, investment, innovation, skills, and enterprise. The approach of this report is to consider the performance of the sector in overall productivity terms, where the data make it possible, and by the drivers of productivity.

Report structure

The remainder of the report is structured as follows:

- Section 2 provides an overview of global industry trends;
- Section 3 profiles the all-island polymer and plastics sector;
- Section 4 benchmarks the all-island sector with other international competitors;
- Section 5 presents perspectives on the sector from the sector's suppliers, processors, customers and intermediary bodies;
- Section 6 sets out the report's conclusions; and
- Section 7 provides a series of recommendations to inform the development of a collaborative all-island strategy for improving the sector's competitiveness.

At the end of the report are 2 annexes. The first lists the key individuals who were consulted during the study. The second lists the abbreviations for polymer and plastics materials used throughout the report.

2. Review of Global Trends

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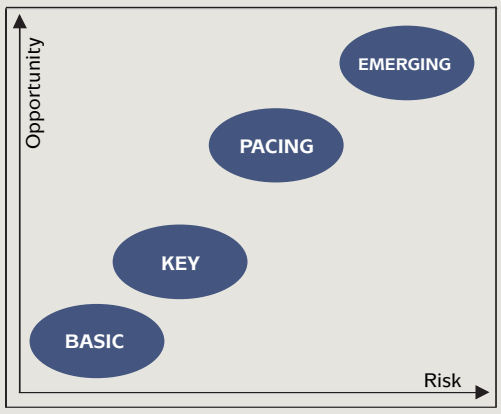
Technology developments

In a previous study of the polymer and plastics industry[3], a typology of technology drivers was developed, which is summarised in **Figure 2.1** below. It seeks to define technologies in 4 broad categories, in terms of their relationship to risk and opportunity of use. The typology remains a useful way of characterising the industry's technologies; its elements are presented in more detail below.

Figure 2.1: Typology of technology drivers for the polymer and plastics industry



Source: SQW Ltd/Rapra Technology Ltd

Basic technologies

These foundation techniques define a company's presence in the plastics sector. They carry no competitive advantage because they are widely practised. As such, firms delivering products using only these technologies will struggle to compete globally. However, there can sometimes be a 'one-stop shop' advantage when further basic technologies are added to a business portfolio. In the case of the polymer and plastics industry, basic technologies would include the use of traditional 'bulk' thermoplastics and basic manufacturing techniques in the standard process technologies of injection moulding or extrusion.

[3] A review of the Plastics Sector in Northern Ireland. 2000, SQW Ltd (with Rapra Technology Ltd)

Key technologies

Key technologies include current and established techniques which are not practised universally. Companies using these technologies are seen as industry leaders and command a higher level of return. Risk is relatively low and competitive opportunity comparatively good, so key technologies are a good bet for a rapid improvement in business differentiation and status. Companies aiming to be industry leaders should be using an appropriate selection of key technologies. For the polymer and plastics industry, key technologies might include the use of plastics reinforced with other materials; the production of food and drink containers using polyethylene terephthalate (PET); and two-shot moulding (production of two components by means of successive moulding processes).

Pacing technologies

These are state-of-the-art, but relatively well-developed technologies, which have been developed beyond the pioneering stage. As a consequence, competitive impact is high. Companies aiming to become industry leaders should be exploring pacing technologies for next-generation opportunities. Examples from the polymer and plastics industry include the increasing 'miniaturisation' of materials manipulation and processes, for example the use of nanocomposites (high performance materials comprising particles of nanometric size) and micromoulding processes (for example, to produce very small medical implants).

Emerging technologies

Emerging technologies encompass cutting-edge developments that are in their commercial infancy and still require a degree of manufacturing pioneering. Opportunity is potentially high but often unproven; risk is also high as a consequence. Industry leaders should keep emerging technologies under review and select 1 or 2 for particular study. Probably no more than 1 might be selected for exploitation in any one business cycle. Shape memory polymer, which takes one form at a given temperature and a different shape when heated, is a current example of a leading-edge material technology from the industry. Another is light-emitting polymer, which is likely to replace cathode ray and LCD displays in some electronic applications.

Table 2.1 and Table 2.2 overleaf provide up-to-date profiles of the global industry's key materials and processes, categorised by these 4 typologies.

Table 2.1: Material technologies classified by the risk/opportunity categories

Basic
General bulk thermoplastics
Engineering plastics
Unsaturated polyesters and epoxies
Polyurethanes
Fluorocarbons
Key
Reinforced Polyurethanes for reaction injection moulding - automotive, construction, etc.
Glass Reinforced Plastics in form of Sheet Moulding Compounds (SMCs) and Bulk Moulding Compounds (BMCs)
Fibre reinforced Polyamides and Polypropylenes - Auto and Domestic Appliances - injection and blow mouldings
Polyethylene terephthalate (PET) - packaging - carbonated soft drink (CSD) bottles and wide mouth jars
Metallocene polyolefins, particularly polypropylene (PP) - films and mouldings for the packaging market
Engineering Thermoplastics, particularly polycarbonate - Auto lighting/CDs - injection moulding
Master batches for greenhouse and thermal agricultural films
Pacing
Advanced composites - Carbon fibre reinforced mouldings/extrusion - for aerospace, sport and leisure, wind power
Technical textiles
Nanocomposites
Cyclic Polybutylene (PBT) - high temperature processing grades
Polyethylene naphthalate (PEN) - packaging - blends with PET - bottles
Polycyclic aromatic ketones (PAKs) - Construction markets - fluid control - pumps and piping
Cyclo-polyolefins - Medical markets - extrusions and mouldings
Ethylene/styrene interpolymers (ESIs) - medical markets - extrusions and mouldings
Biodegradables & renewable resource polymers
Emerging
Light emitting polymers
Conductive blends and alloys
Natural materials based on industrial biotechnology
Medical materials e.g. for tissue engineering, biomimicking (bioactive)
Nanostructured materials
Shape memory polymers
Self-healing polymers
Fuel cell applications e.g. membranes

Source: SQW Ltd/Rapra Technology Ltd

Table 2.2: Process technologies classified by the risk/opportunity categories

Basic
Polyurethane (PU) foam processing
'Standard' processes (injection moulding, blow moulding, extrusion, rotomoulding, vacuum-forming)
Hand lay-up
Wire coating
Key
Fusible core moulding and vibration welding for precision hollow parts - automotive/domestic appliances
Fluid assisted injection moulding - electronic, electrical, IT markets
Two-shot moulding
Cleanroom operation - medical/pharmaceutical electronic and electrical markets - injection moulding
Stereolithography
Cast iron for large mould manufacture
Injection blow moulding
Pultrusion - reinforced polyesters and epoxies - construction, electrical and electronic, chemical plant markets
Silica coating of films and mouldings - packaging and auto markets
Vacuum metallised films - packaging
Co-extruded films - packaging
Fusion fitting technology for pressure pipes - construction gas/water
Mucell micro-cellular moulding
Moulded interconnect devices - electrical and electronic - injection moulding (= 3D printed circuit boards)
Metal injection moulding/thixomoulding
Pacing
Reaction and reinforced reaction injection moulding (RRIM) of liquid resins, mainly polyurethane (PUs) - Auto and construction markets
Micromoulding
Process modelling
Rapid manufacturing, e.g. continuous 3D printing, fused deposition modelling, laser sintering
Resin transfer moulding (Advanced Composites)
High pressure blow moulding
Emerging
Isotec Composite Flow Moulding (placement of reinforcement via pultrusion for high performance)
Thermoform and Blow (TAB)

Source: SQW Ltd/Rapra Technology Ltd

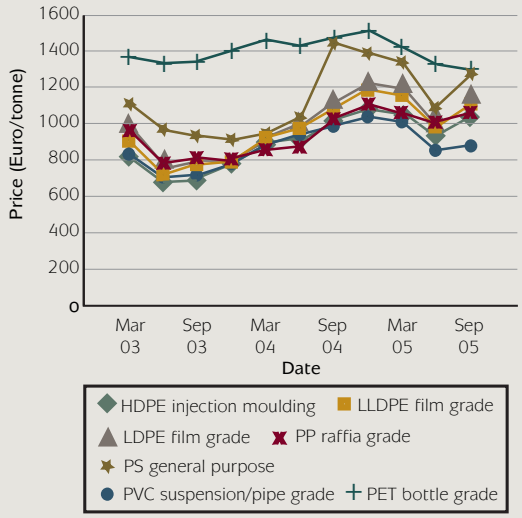
Key market developments

Having explored classes of technology, this sub-section analyses movements in the European and global polymer and plastics market. Because of their wide use in so many applications and markets, it is not easy to find aggregated production and consumption figures for finished plastics products. The focus here is therefore on developments in the commodity plastics market (the raw materials) which help to provide an indication of where changes in the downstream processing sector might be taking place.

Pricing

The commodity plastics market is characterised by a short term volatility in prices, but their steady rise over the longer term. Bulk polymers have always been subject to the cyclical effects of supply and demand that characterise all commodities, and current price rises for these commodity materials are predominantly in response to growing demand in countries such as China and India. Short term shocks can also be caused by the oil price. **Figure 2.2** shows recent price movement for a range of common commodity plastics.

Figure 2.2: Price of selected raw materials, March 2003 - September 2005



Source: European Plastics News[4]

More generally, the commodity plastics industry is consolidating into an ever-smaller number of global conglomerates, which of itself will tend to push prices still higher as competition between suppliers is diminished.

[4] HDPE is high density polyethylene, LLDPE is linear low density polyethylene; LDPE is low density polyethylene; PP is polpropylene; PS is polystyrene; PVC is polyvinyl chloride; and PET is polyethylene terephalate. An explanation of abbreviations is given in Annex B to this report.

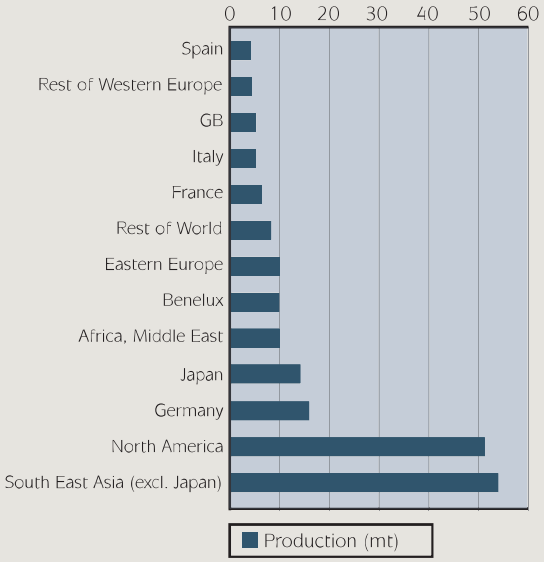
Prices of engineering plastics are less directly affected by the oil price, generally being manufactured in smaller quantities. However, they are still subject to external influences, generally from other industry sectors. For example, the bulk of the nylon that is manufactured worldwide is used in fibre and textile applications, particularly carpets, and hence an upturn in consumption in this area can lead to tight supply and increased prices in the solid plastics materials. Saturated polyesters are similarly influenced by demand for textiles, whereas availability of polycarbonate is dependent upon consumer demand for products such as CDs and DVDs.

Global production and consumption

World commodity plastics production in 2003 amounted to some 202MT (million tonnes). North America and South East Asia (including Japan) comprised the largest producing blocs, representing some 60 per cent of production between them. Western European production accounted for 26 per cent of global production (**Figure 2.3**).

Total global consumption of commodity plastics in 2003 was 176MT. As with production, demand is dominated by North America and South East Asia (63 per cent), with Western Europe accounting for 22 per cent of the total.

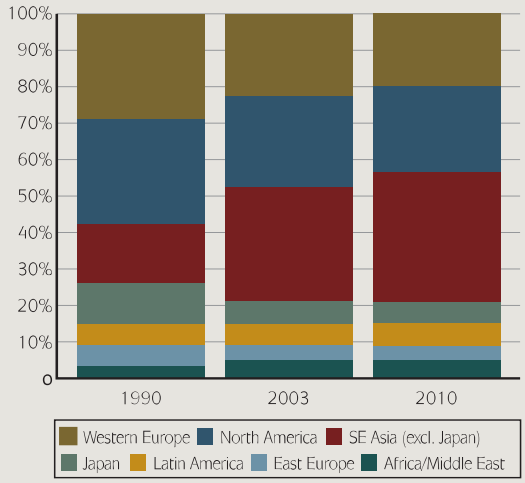
Figure 2.3: Global plastics production, 2003



Source: Plastics Business Data and Charts - Association of German Plastics Manufacturers (VKE), 2004

The Association of German Plastics Manufacturers (VKE) has examined the likely trends in global commodity plastics consumption from 1990 to 2010. The total market is expected to rise from 176MT in 2003 to 250MT in 2010, but with an increasingly large proportion being taken by South East Asia, reflecting the continued economic and industrial growth of China: of the expected increase of 164MT over the 20 year period to 2010, some 55 per cent of that volume increase is due to demand from South East Asia (**Figure 2.4**).

Figure 2.4: Forecast demand for plastic materials by region, 1990-2010



Source: VKE

This global rise in consumption is reflected in per capita consumption of plastics materials (**Table 2.3**). An increase of 32 per cent in per capita consumption is forecast by 2010 compared to 2003, with North America, Western Europe and Japan continuing to have the highest consumption rates.

Table 2.3: Per capita consumption of plastics materials

	1980 (kg)	2003 (kg)	Forecast 2010 (kg)	Increase 2003-2010
Africa/Middle East	3	9	11	22%
East Europe	8.5	15	24	60%
Latin America	7.5	21.5	28	30%
Japan	50	85	105	24%
SE Asia (excl. Japan)	2	16.5	25	52%
North America	45	104	133	28%
Western Europe	40	99	125.5	27%
World	**10**	**28**	**37**	**32%**

Source: VKE

The European market

Overall production of commodity plastics in Europe has risen from 30.5MT in 2002 to an estimated 32.6MT in 2004. This represents a year-on-year growth rate of around 3 per cent (**Table 2.4**). Polystyrene (PS) is the only sector to have seen a decline during the period, while growth in production of high density polyethylene (HDPE), PET and polyvinyl chloride (PVC) has risen above the average growth rate for commodity plastics as a whole.

Table 2.4: European commodity plastics production, 2002-2004

	2002 (million tonnes)	2003 (million tonnes)	2004* (million tonnes)	Increase 02-03	Increase 03-04
HDPE	4.685	4.840	5.055	3.3%	4.4%
LDPE & LLDPE	6.915	7.065	7.105	2.2%	0.6%
PET	1.760	1.855	1.980	5.4%	6.7%
PP	8.080	8.640	8.940	6.9%	3.5%
PS	2.550	2.540	2.510	-0.4%	-1.2%
PVC	6.530	6.700	7.000	2.6%	4.5%
Total	**30.520**	**31.640**	**32.590**	**3.7%**	**3.0%**

Source: Plastics Europe[5]

*NB. Data for 2004 are based upon industry estimates

During the same period, consumption of commodity plastics has also risen - from 30.6MT in 2002 to an estimated 31.6MT in 2004 (**Table 2.5**). Year-on-year growth was just 1-2 per cent, reflecting a relatively static use of commodity plastics by processors in Europe. However, care must be taken when looking at the volume (weight) measure, as the continuous reduction in moulding size (e.g. smaller mobile telephones and computer peripherals), thinner articles, and the reduction in thickness of packaging films, all combine to produce more goods from the same volume (weight). As with production, PS saw a decline in sales over the period, while polypropylene (PP), PET and PVC sales held up better than the sector as a whole.

Table 2.5: European commodity plastics sales, 2002-2004

	2002 (million tonnes)	2003 (million tonnes)	2004* (million tonnes)	Increase 02-03	Increase 03-04
HDPE	5.000	5.010	5.165	0.2%	3.1%
LDPE & LLDPE	7.240	7.210	7.295	-0.4%	1.2%
PET	2.080	2.160	2.210	3.8%	2.3%
PP	7.580	7.750	8.000	2.2%	3.2%
PS	2.390	2.370	2.320	-0.8%	-2.1%
PVC	6.350	6.510	6.655	2.5%	2.2%
Total	**30.640**	**31.010**	**31.645**	**1.2%**	**2.0%**

Source: Plastics Europe*

*NB. Data for 2004 are based upon industry estimates

[5] LDPE is Low Density Polyethylene; LLDPE is Linear Low Density Polyethylene; and PP is Polpropylene.

Western Europe was responsible for 26 per cent of global plastics raw materials production in 2003, while Germany remained the largest producer in Europe, representing 32 per cent of European and 8 per cent of world production.

Germany is also the largest consumer of commodity plastics raw materials in Western Europe, representing some 28 per cent of the region's total (**Table 2.6**). Between them, Ireland and the UK account for 11 per cent of the total. While Ireland only represents 1 per cent of Western European demand, the trend is positive: up 8 per cent between 2001 and 2002. At the same time, plastics raw materials consumption in the UK was relatively static, up just 1.6 per cent over the same period.

Table 2.6: Plastics consumption by main processors in Western Europe

	2002 m tonnes	Trend 01/02	% of total Western Europe consumption*
Belgium	2.080	5.0%	5%
France	4.550	4.2%	12%
Germany	10.870	3.2%	28%
Ireland	0.430	8.0%	1%
Italy	7.020	2.5%	18%
Netherlands	1.760	10.5%	5%
Spain	3.550	9.3%	9%
UK	3.954	1.6%	10%
Western Europe	**38.966**	**3.7%**	**100%**

Source: Plastics Europe

*Not all countries are represented here: these 8 countries account for 88 per cent of Western European consumption

Other market issues

Environmental and energy considerations

Environmental awareness is now part of mainstream political and social thinking. The polymer and plastics industry is exposed to environmental pressures from several angles: the raw material is fossil-fuel based, the energy required in the manufacturing process can be high and there are end of life concerns, such as non-biodegradability.

In addition, manufacturers in Europe must comply with increasingly stringent, and often costly, emissions regulations covering noise, odour and material pollution. The regulatory framework here is complex and changes regularly. This is an increasingly significant burden on processors, and may in part be responsible for some processors relocating out of Europe to countries where regulations are more lax.

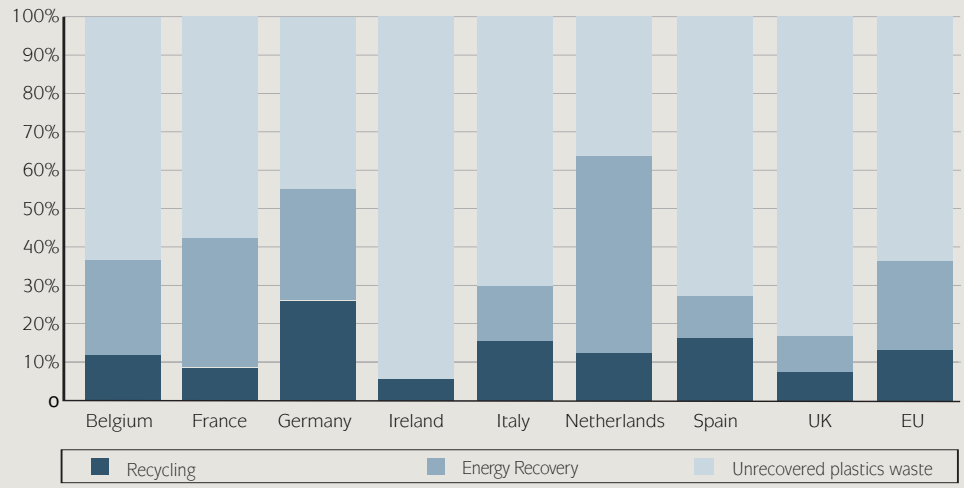
European directives related to the disposal of end-of-life products are leading to changes in the materials processed and also parts design for easy disassembly and recycling. These directives are particularly influencing the packaging, automotive and electrical/electronic sectors. Environmental directives have the effect of minimising use of packaging, on the one hand, but can also grow demand in other plastic applications, promote higher value added products and act as a driver of innovation.

Despite this increasing environmental and regulatory pressure, both the UK and Ireland are currently poor performers in the fields of recycling and energy recovery (i.e. obtaining energy from waste) compared to their main European competitors (**Figure 2.5**).

This is an issue with implications beyond the sector as a whole, for example in attitudes to the recycling of household waste.

All-electric machines also offer benefits such as cleanliness, due to the absence of hydraulic oils, which make them particularly suited to cleanroom, food-contact and medical moulding situations. However, reinvestment in plant on this scale would be a considerable undertaking, and the financial benefits to individual companies are, as of yet, not clear-cut.

Figure 2.5: Recycling and energy recovery by country, 2002



Source: Plastics Europe

Energy usage in processing operations has an environmental impact in relation to the Kyoto emission targets. The injection moulding industry in Ireland alone is calculated to contribute over 120,000te (tonnes equivalent) of CO_2. By changing all injection moulding machines from hydraulic to electric drive, it has been estimated that 76,000te CO_2, or 7.6 per cent of the National Climate Change Strategy target for reduction, could be attained.[6]

Energy usage is also important in terms of profitability as processors are hit by rapidly increasing energy bills. The British Plastics Federation, for example, has reported that many plastics processing firms in the UK experienced a 100 per cent increase in their energy bills in 2005, with 44 per cent of firms unable to pass on that increase to their customers. Redundancies, reduced investment and the further transfer of manufacturing out of Europe are all anticipated, and there is much current concern related to competition from countries with less regulated energy markets.

[6] Plastics Industry - A contribution towards Ireland's Kyoto targets. - Plastics Ireland 2005

A more realistic approach to minimising the influence of energy costs in the short term lies in energy management, 'good housekeeping', and the adoption of best practice. The Carbon Trust in the UK has estimated that plastics companies can reduce their energy consumption by 15 per cent on average by the adoption of these measures. It is also important to challenge the widespread perception that energy costs are a fixed overhead, and treat them instead as a variable materials cost. Work is currently underway in Europe on a project to establish and disseminate best practice[7], as well as provide processors with energy management tools and information on energy saving technologies.

New polymer materials

Whilst it is now generally accepted that all the major classes of polymer have been discovered, the industry continues to develop and commercialise plastics based on new polymer structures. Most 'new' developments, however, are derived from the existing polymer range - improved quality, special grades, compounds with specific mechanical or electrical properties and blends. Some of these, for instance PC/ABS (polycarbonate/ acrylonitrile butadiene styrene) blends and glass reinforced compounds, have latterly grown quite rapidly on the back of developments in the automotive and electronics industries. There are new initiatives in sustainable and renewable materials, and nanotechnology.

There is intense interest in the use of materials from non-oil resources and recycled plastics, both for economic and environmental reasons. One such development is wood plastic composites, used in products such as fencing and window profiles, which can be manufactured using wood processing scrap and recycled plastic. However, the other main consequence of growing environmental awareness is the pressure to substitute certain widely-used materials and additives in some or all applications. Claims about PVC toxicity have caused a shift to PET for bottles and packaging, and are bringing some medical applications under scrutiny. Phthalate plasticizers and certain flame-retardants have been substituted completely.

Nanotechnology is the other interesting field of material development. Polymer nano-composites, for example, are being used in a rapidly growing number of applications, such as drug delivery systems, lubricants and protective materials (flame retardants, scratch resistant coverings, etc). They demonstrate superior properties such as their strength and resistance to environmental factors (heat, water, ultra-violet), while retaining their ability to be moulded.

[7] www.eurecipe.com

Low-cost competition

The shift of large scale manufacturing to the lower wage economies of Eastern Europe and the Far East has been ongoing for several years and is almost certainly irreversible. The Western European response to this structural shift has been to ensure that local production is focussed on high value-added products and processes. As a consequence, technologies such as multi-shot moulding are important, as they facilitate the manufacture of highly sophisticated components, for example for electronics applications, and can also reduce or eliminate labour-intensive assembly operations.

Some elements of the industry in Europe may be less exposed to competition from lower wage economies than others. The more robust elements include:

- The high-end medical and pharmaceutical sectors, operating with relatively new and efficient plants, which have both a technological edge and proximity to the customer. They will also be afforded some protection from low wage economies, due to the complex manufacturing certification and qualification required by medical licensing authorities that 'locks' them into approved production facilities;
- The packaging industry, which will always tend to remain close to the customers that it serves - for example the manufacture of bottles for the food and drink industry;
- Manufacturers of large civil engineering components and similar bulky items such as pipes and tanks, where it may be impractical or uneconomical to transport long distances; and
- Potential new markets, such as wind energy, where the size of components (e.g. turbine blades) tends to preclude transportation over long distances.

Regulatory changes

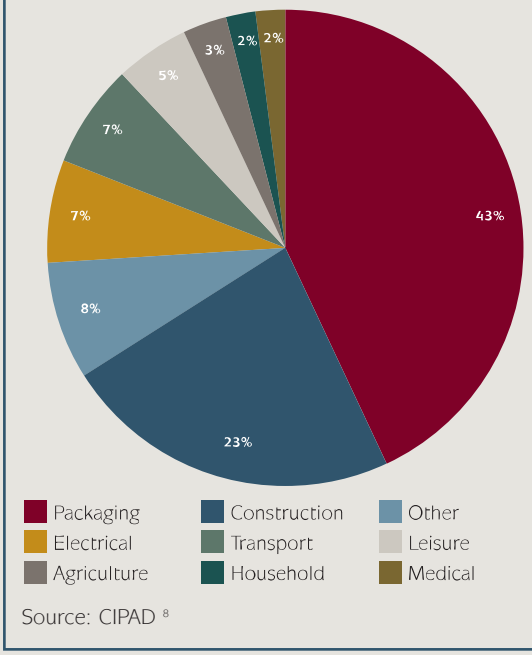
In addition to the environmental regulations already mentioned, European-driven legislation affecting product safety also has considerable influence upon certain sectors (e.g. the Medical Devices Directive), while manufacturing processes are also affected by the ongoing process of harmonising national, European and international standards.

Developments in major end-user markets

Plastics find their way into almost every area of manufacture, so one might expect markets to be very fragmented. In fact, some end-user sectors emerge clearly as key markets. By far the greatest proportion of the global market, in terms of consumption by weight, is taken by packaging and construction, with market shares of 43 per cent and 23 per cent respectively.

Higher profile applications such as automotive and electrical/electronic (both at 7 per cent) support markets for high added value goods. Relatively new and developing markets, such as medical and leisure, currently account for a very small share of overall consumption, but again tend to produce higher added value goods which result in a considerably larger proportion in terms of sales revenue (Figure 2.6). Trends in these end-user markets are explored in more detail below.

Figure 2.6: Global plastics consumption by weight, 2003



Source: CIPAD [8]

Packaging

The packaging market is the largest global consumer of plastic. Plastic is the number one material for packaging due to its flexibility, weight and ease of processing. Limited volume growth in recent years is indicative of a need to do more with less, rather than a decline in its use. This pressure will lead a drive to ever more sophisticated multi-layer films. Barrier films will also grow in importance and there is likely to be a role here for nano-barrier technologies. Health considerations and security concerns will offer new opportunities for tamper-evident packaging. Overall, markets for rigid and flexible plastics packaging are expected to continue to expand in the coming years, driven by these technological advances and also lifestyle changes such as the rapid growth in microwaveable ready meals.

The plastics packaging industry will need to project its positive aspects to counter environmental criticism, such as weight reduction leading to lower transportation costs, and also the reduction in food spoilage that can be and has been, achieved. Historically there has been limited interest in plastics recycling due to the material's light weight and subsequently small contribution to meeting recycling targets. Although this situation is changing, there remain widespread concerns regarding the transportation of plastic bottles to the Far East for recycling, fuelled by the burgeoning demand there for plastics materials. Developments in biodegradable and compostable plastics materials, as well as other plastics products manufactured from plant-based materials, will all help to improve the industry's image. Retailers will play a major role in driving these changes in the industry.

[8] International Status Report 2003 - Council of International Plastics Associations Directors (CIPAD)

The leading activity of packaging is based largely on film extrusion, thermoforming and blow moulding. The polyolefins - low and linear low density polyethylene (LDPE and LLDPE), HDPE and PP - account for the vast majority of processor consumption. PS is widely used in transit packaging and also in rigid items such as compact disc 'jewel-boxes'. The share taken by PVC has been declining, having been largely supplanted in bottle applications by PET and plastics bottles have replaced glass almost entirely in some applications. It has also been reported that plastic caps and closures are set to take almost 50 per cent of market share by 2009, overtaking metals in these applications.

Construction

The flexibility and durable nature of plastic makes it a valuable material for the construction industry. Key applications include sheeting and membranes, foamed insulating products, cladding, rainwater and soil goods, piping and windows and doors. PVC has a dominant market share, while polyurethanes (PU) and expanded polystyrene (EPS) are also important in this market.

In general, plastics offer a combination of durability, strength, light weight and insulating properties (water, heat, noise and vibration), as well as a wide range of high quality textures, colours and finishes, which enable them to be used in diverse visible and hidden applications. Consumption of plastics by the building and construction sector in Western Europe is predicted to rise by 60 per cent, to almost 8MT by 2010.

The most important factor driving this growth is the demand for energy efficiency in buildings, exploiting the insulating properties of plastics in new build and retrofitted installations. Corrosion resistance and mechanical strength, as well as their relative ease of fabrication, also make polymeric and plastics composites attractive materials for many structural applications. However, uptake is hindered by a lack of knowledge and experience of the material's potential in the construction industry. The long lifespan of most construction products means that the use of plastic building materials is less beset by concerns around recyclability (compared with single-trip packaging, for example), and hence the outlook is largely positive.

In general, demand for the well-established but low value, light weight, bulky construction goods is likely to be dependent upon local construction and renovation programmes. It has also been reported recently that some products, such as plastic pipes for drinking water, face trade barriers due to slow progress on pan-European standards. At the other end of the spectrum, there is considerable interest in developments in smart materials in construction applications, which might either respond to changes in light or temperature levels, or potentially provide continuous monitoring of the structural integrity of a building. Plastics building components have also benefited from exposure in high-profile construction projects, such as the roof of the Olympic stadium in Athens.

Electrical and electronics

The electrical and electronics markets attract a wide range of plastics materials. Around 10 generic material types have a significant market share, the leader being acrylonitrile butadiene styrene (ABS), a material used principally for appliance housings and telephones. PS and PP are also important materials.

Plastic is increasingly being used in the electronic and electrical markets. There is constant innovation and very rapid product cycles. Mobile telephones are an obvious example. Companies operating in this sector must always be on the lookout for the next big thing. Optical fibre and wireless technologies are recent growth areas. Recycled materials are less of an issue in these markets because of the need to retain flame retardancy, but design for dismantling and recovery is likely to be increasingly important. The European WEEE (Waste Electrical and Electronic Equipment) Directive, currently being implemented across the EU, will have a significant impact here.

Technological and scientific advances which will continue to drive growth in electronics markets include liquid crystal materials, conductive polymers and flexible circuitry; Philips Research, for example, has recently demonstrated a flexible computer display which can be rolled up into a 1cm tube.

Transport and automotive

Plastics are increasingly being used in the transport market, and especially in automotive manufacturing. Plastics are used for a range of products, including body panels, interiors, under bonnet and trim. Material flexibility is an advantage in terms of styling, while its light weight improves fuel consumption when replacing heavier materials. There has been a high growth rate in its use since 2002, partly due to strong car sales and partly from continued substitution of traditional materials. Continuing growth in the market for small and micro cars will fuel demand for colour variations internally and externally. Plastic fuel tanks and systems are attracting considerable interest at present, as are polycarbonate windows. Hydrogen fuel cells for vehicles are the subject of much press coverage at present, as a consequence of concerns regarding oil supplies, but there are still considerable obstacles preventing their commercialisation.

Further legislative pressures on the automotive market can be expected on fuel economy, emissions, safety and noise. Plastics will have a role here. However, the need to recover and recycle materials from life-expired vehicles may influence and limit the range of plastics in use and will require ingenuity in design and traceability in manufacture. At present, mixed waste plastic from dismantled cars largely ends up in landfill and there are few incentives for car manufacturers to incorporate recycled materials into their new vehicles.

Elsewhere in the transport market, mass transit applications offer considerable opportunities, particularly for composite materials. Recent materials developments have addressed issues around flammability which had been highlighted by the adoption of a new European standard for mass transit applications following a number of accidents on trains, trams and metro systems. Weight savings of 20 per cent, compared with aluminium, make composites extremely attractive for major structural components of aircraft in the fuselage and wings, and predictions have been made that composites will eventually account for 50 per cent by weight of even civilian aircraft. One current concern for manufacturers in this market is a global shortfall in the manufacture of carbon fibres.

Medical devices

Ageing populations, longer lifetimes and higher quality of life expectations mean that the medical and healthcare markets should remain strong in the long term, both in the EU and within developing countries. Functional pharmaceutical packaging is a key trend, with the packaging not only protecting its contents, but also being key to its administration. The most obvious application is the insulin pen for diabetics, a market currently growing at 9 per cent annually, with a single Irish moulder producing over 100 million items.

Well-publicised increases in the occurrence of diseases such as diabetes and asthma will continue to fuel this growth, as will technological advances, such as the recent announcements surrounding inhaled dry powder insulin. Use of polymers within the body will also continue to increase (again driven by technology and demographics), and 'personalised treatment' will emerge as a key trend. One particularly interesting area is the creation of 'custom' implants, made to order using rapid manufacturing techniques such as laser sintering, and specifically shaped to fit the needs of the recipient. Another interesting technological advance is the use of polymeric scaffolds based on materials such as polyesters, to support growing cells in tissue engineering situations, to replace or repair damaged material.

Outlook

Four summary messages emerge from this review of global trends:

- Demand for plastics applications looks set to increase in the medium-to-long term, fuelled by substitution in mature markets like Western Europe and volume growth in developing markets, such as China;
- The price of commodity plastics will remain high as long as global demand increases and while the oil price stays high. This is likely to squeeze margins for the processors unless cost increases can be passed on;
- Environmental issues, already a significant factor for the industry, will continue to grow in importance. Environmental regulations are likely to remain a major cost to the industry, while the changing attitudes of consumers may open up new markets for recycled polymer materials; and finally
- Energy is a major cost to the industry. The lack of competitive energy pricing in some of the more mature processing countries is a serious obstacle to business competitiveness in the global marketplace.

3. Profile of the Industry on the Island of Ireland

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Provenance of the data used

The polymer and plastics industry is a difficult one to define. Traditional Standard Industrial Classifications (SICs) are widely regarded to underestimate the size of the industry, as plastics processors often define themselves in other ways, most commonly by their end product (such as the manufacture of automotive parts, domestic appliances, etc.)

Against this challenging background, this analysis has sought to develop a more accurate data picture of the all-island industry. This has involved the following steps:

- Drawing on all available open sources, a list of all plastics processors on the island of Ireland was prepared. This was shared with the industry associations and checks were made to remove duplicate references and companies that are no longer trading;
- Where possible, firms were identified by the main market they served and their primary process. This information was not always readily available and a number of firms demonstrated multiple markets and processes which made any accurate assessment difficult. Nevertheless, the vast majority of firms were classified[9];
- The most up-to-date data on the identified firms across the island of Ireland was then sourced from 2 data services companies: Experian for Northern Ireland and Dun & Bradstreet for Ireland. Again, data on every company was not available, but it has been sufficient to provide an acceptable level of accuracy. The analysis in this section draws heavily on these data;
- Data for a small number of 'exceptional' firms has been deliberately omitted from elements of the analysis. These firms have been allocated an 'average' industry turnover to reflect their presence. This has been done for large firms, for whom plastics processing is a small element and where including their annual turnover would skew the data picture excessively. This includes Bombardier and Visteon in Northern Ireland and Smurfit in Ireland; and
- The results of the data analysis have been considered in the light of the intermediary and firm interviews and compared with SIC data, to ensure that the overall 'feel' of the industry picture is right.

By its nature, the data set produced is a 'best fit' and should be regarded as a reasonably accurate snapshot of the industry as it is currently formed.

Exchange rate

Unless otherwise specified, currency conversions are based on Bank of England average exchange rates for the year (**Table 3.1**).

Table 3.1: Exchange rates, 2002-2004

Year	GBP-EUR	EUR GBP
2002	1.5909	0.6286
2003	1.4456	0.6918
2004	1.4739	0.6785

Source: Bank of England

[9] For example, In Northern ireland, 88 per cent of firms were able to be classified by a primary process, and 80 per cent of firms in Ireland by end-user market.

Size of the sector

The study has identified 283 firms in the all-island polymer and plastics processing sector, comprising 78 firms in Northern Ireland (28 per cent) and 205 (72 per cent) in Ireland.

Turnover

The total turnover in the all-island industry in 2003-2004 was £2,081m (€3,008m), as **Table 3.2** shows. This equates to a North-South turnover split of 33 per cent and 67 per cent respectively, broadly similar to the balance of firms.

Table 3.2: Total industry turnover, 2003-04

	€m	£m	% of total
All-island	3,008	2,081	100%
Northern Ireland	986	682	33%
Ireland	2,022	1,399	67%

Source: Experian UK and D&B Ireland

Average firm turnover in the industry is slightly higher in Northern Ireland compared to Ireland, as **Table 3.3** indicates. This is also reflected in median[10] firm turnover (the midpoint in the range of firm turnover data), with firms in Ireland tending to be smaller in turnover (€1.8m) compared to those in Northern Ireland (€4.34m).

Table 3.3: Average turnover per firm

	All island		Northern Ireland		Ireland	
	€m	£m	€m	£m	€m	£m
Mean	10.63	7.35	12.63	8.74	9.87	6.83
Median	3.22	2.23	4.34	3.00	1.80	1.25

Source: Experian UK and D&B Ireland

Employment

Table 3.4 outlines the employment levels and average firm size by employment in the plastics sector. For both Ireland and Northern Ireland, employment in the plastics sector constitutes approximately 5 per cent of total manufacturing employment. The average size of polymer and plastics firms is quite similar - 74 employees per firm in Northern Ireland and 64 employees per firm in Ireland. However, the Northern Ireland average is raised considerably by the presence of Michelin, with its workforce of over 1,000. Without Michelin, average workforce size in Northern Ireland drops to 60. The North-South split for total employment is very similar to that for turnover: 31 per cent in Northern Ireland and 69 per cent in Ireland.

[10] The median is the middle number of a set of values, such that half of the values are greater, and half smaller. The mean is the arithmetical average, and is usually the term referred to in common usage of 'average'.

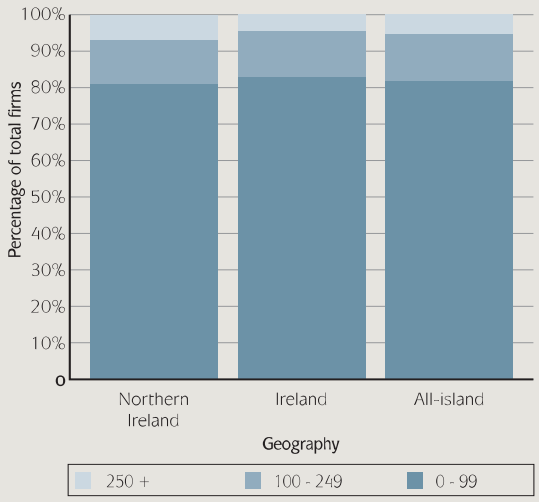
Table 3.4: Total employment and average firm size

	All-island	Northern Ireland	Ireland
Number of firms	283	78	205
Total industry employment	18,750	5,778	12,972
Proportion of all-island employment	100%	31%	69%
Average (mean) number of employees per firm	66	74	64
Total manufacturing employment	349,300	97,200*	252,100**
% of manufacturing employment	5.37%	5.94%	5.15%

Source: Experian UK and D&B Ireland and OECD
* OECD data for 2002
** OECD data for 2001

For both Ireland and Northern Ireland, median firm size by employment is lower than the mean quoted in the above table - 36 in Northern Ireland and 31 in Ireland. This suggests that a few large firms are distorting the overall picture of a sector, North and South, which is heavily reliant on small firms. **Figure 3.1** confirms that this is the case, with 83 per cent of the all-island sector made up of firms with fewer than 100 employees. In terms of ongoing sector collaboration, the predominance of smaller firms may impact on the type of support mechanisms required.

Figure 3.1: Firm size by employee numbers



Source: Experian UK, D&B Ireland and OECD

Table 3.5: Turnover per employee

	Total employees	Total turnover €m	£m	Turnover per head €	£
All-island	18,750	3,008	2,081	160,000	111,000
Northern Ireland	5,778	986	682	171,000	118,000
Ireland	12,972	2,022	1,399	156,000	108,000

Source: Experian UK and D&B Ireland

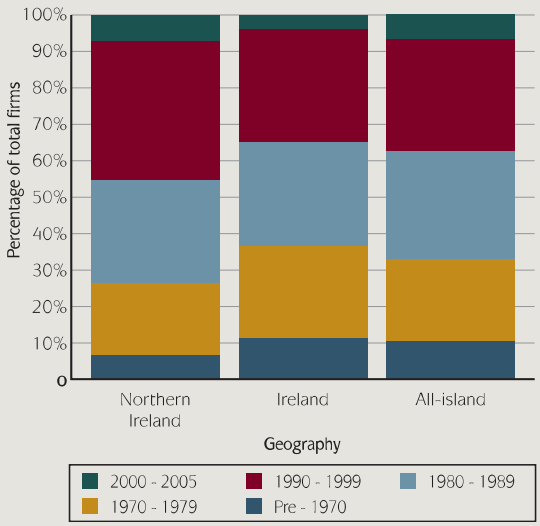
Turnover per head

As **Table 3.5** shows, turnover per employee for the industry is similar across the island of Ireland, with an overall average of £111,000 per head (€160,000). Again performance, North and South, is very similar.

Age of firm

There is a broadly similar picture across the industry in terms of the ages of the firms in the sector (**Figure 3.2**). As one would expect, given the increased proliferation of demand for plastic products throughout the 1970s and 1980s, there are few firms more than 35 years old (7 per cent in Northern Ireland and 13 per cent in Ireland).

Figure 3.2: Age of firms

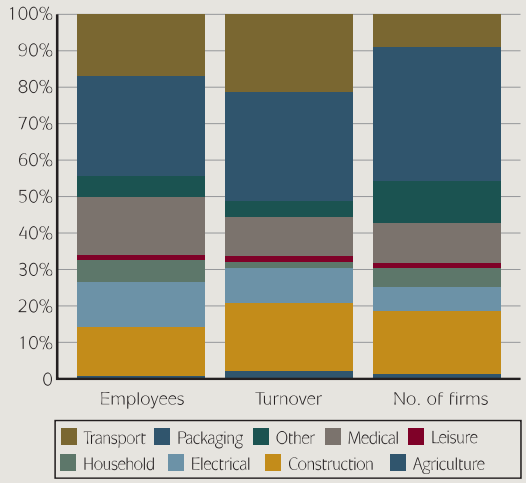


Source: Experian UK and D&B Ireland

By end user market

Figure 3.3 shows how the polymer and plastics processing sector relates to its key end-user market across the island of Ireland. The figure demonstrates the importance of each market in 3 ways: the number of processing firms serving the market; the turnover of those firms; and their workforce. This shows, for example, that packaging is the largest end-user market in terms of scale across all 3 metrics. Transport appears to be dominated by a relatively small group of firms who generate a large turnover compared to their numbers. The medical sector is relatively labour intensive, while construction is more labour efficient.

Figure 3.3: All-island sector size by main market

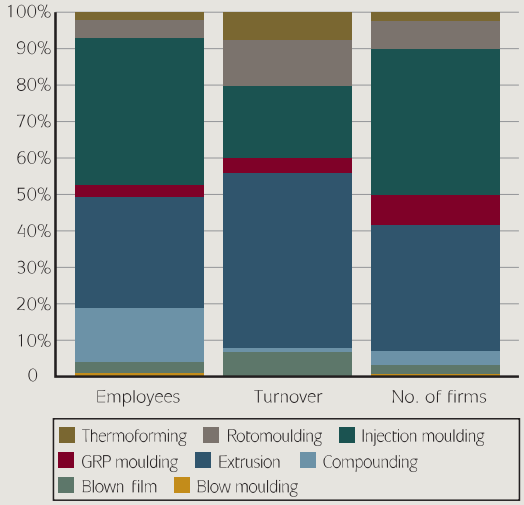


Source: Rapra/SQW, Experian UK and D&B Ireland

By process

Using the same methodology, **Figure 3.4** shows the relative size of the sector by primary process across the island of Ireland. Extrusion and injection moulding dominate, but injection moulding in particular appears to be a sub-sector with a high number of firms and employees compared to its turnover. Extrusion, on the other hand, appears more efficient as a process in terms of firm scale and labour utilisation. Similarly, rotomoulding seems well positioned.

Figure 3.4: All-island sector size by main process



Source: Rapra/SQW, Experian UK and D&B Ireland

Note: Turnover figures are for Northern Ireland only, due to the lack of sufficient data for firms in Ireland

Location

Polymer and plastics firms are well spread across the island of Ireland - firms are located in all 6 counties of Northern Ireland and in 24 of the 26 counties of Ireland (**Table 3.6**). Across Northern Ireland, there is no major concentration of plastics firms in 1 particular county, although the counties of Antrim and Down, as well as the greater Belfast area, show higher numbers of firms than the other counties.

Table 3.6: Location of firms across the island of Ireland

County	Percentage of all-island firms
Northern Ireland	
Antrim	7%
Down	7%
Belfast area	6%
Armagh	4%
Other North*	5%
Ireland	
Dublin	19%
Cork	9%
Wicklow	6%
Galway	5%
Other South**	33%

Source: Experian UK and D&B Ireland

* (3 counties less than 2% per county)

** (20 counties, less than 5% per county)

In Ireland, there is a significant concentration of firms in County Dublin - 19 per cent of the all-island industry. The reasons for this are manifold: logistical advantages, the location of Trinity College Dublin and proximities to skilled employment and consumer bases.

Not highlighted in **Table 3.6**, but worthy of note, are the following:

- 'Clusters' of medical plastics firms in Galway and, to a lesser extent, Sligo and Westmeath;
- A co-incidental grouping of blow moulders in a cross-border area around County Cavan; and
- A concentration of rotomoulding in Northern Ireland, perhaps because of early development work by Queen's University Belfast.

Geographical employment density

Table 3.7 highlights the employment density of plastics firms across the island of Ireland. The highest density is in the county of Antrim, which accounts for 15 per cent of total plastics employment across the island of Ireland.

Of note, only 5 per cent of plastics firms are located in Galway, but the county accounts for 11 per cent of employment in the sector, due to the presence of a large medical plastics firm. In contrast, Cork has 9 per cent of Ireland's plastic firms, but accounts for only 5 per cent of total sector employment, suggesting a predominance of smaller firms located in that county.

Table 3.7: Geographical employment density of firms

County	Proportion of all-island employment
Northern Ireland	
Antrim	15%
Down	5%
Belfast area	3%
Armagh	2%
Other 3 counties	2%
Ireland	
Dublin	12%
Galway	11%
Carlow	6%
Wicklow	6%
Cork	5%
Clare	5%
Other 19 counties	27%

Source: Experian UK and D&B Ireland
Note: Figures do not include data for Michelin or Smurfit

Internet presence

Table 3.8 suggests that there is a considerable difference between Ireland and Northern Ireland in terms of firms' internet presence. While 84 per cent of firms in Northern Ireland had accessible websites, the figure in Ireland is 49 per cent. For the former, this may be indicative of the particular efforts of the public sector in Northern Ireland to stimulate internet connectivity; for the latter, this may point to the relatively high number of trade moulders in Ireland, who perhaps rely on relationships with locally based customers, and who therefore do not see the need for a website.

Table 3.8: Internet presence of firms

Geographical Area	Percentage of firms
All-Island	59%
Northern Ireland	84%
Ireland	49%

Source: SQW Ltd

The lack of a presence on the internet is a potentially major barrier to widening customer bases and the development of export markets. It may also be an indicator of a firm's wider reluctance to embrace and adopt new business processes and technologies.

Exports

Complexities of measurement

Just as the sector as a whole is hard to define, so are the levels of its exports. It is widely acknowledged within the polymer and plastics processing industry that published statistics on the volume of exports substantially underestimate the levels of actual trade. This is because many firms are supplying components into sectors, such as medical, where the final product is exported, but is not categorised as plastic. For example, information from customs bodies in the island of Ireland indicates that the level of cross-border trade between Ireland and Northern Ireland amounts to around 1 per cent of the all-island sector's turnover. Based on consultations with sector experts, this seems far too low. The picture on exports is further complicated by the fact that trade between Northern Ireland and Great Britain is not classified as exporting, but trade between Ireland and Great Britain is.

Destination of international trade

While volumes might be questioned, official statistics are generally thought to be more accurate in determining the destination of exports. Data for Ireland in 2004, for example, shows that 81 per cent of exports (by value of finished plastic products) went to other EU states, with Great Britain being the largest single market (38 per cent of all exports), followed by France and Germany. For Northern Ireland, the proportion of EU exports was 82 per cent for the same year, with Ireland as the single largest market (33 per cent), followed by the Netherlands.

Qualitative comments

In the absence of robust export data, a number of comments can nevertheless still be made about the sector's approach to exporting based on qualitative information.

In Northern Ireland, the relative dominance of large firms producing high volume, bulky products, such as those destined for the construction industry, means that overall export propensity beyond the British Isles (i.e. Ireland and the UK) is assessed as being quite low. There are a few firms, such as Michelin, where export activity is high, but these do seem to be exceptions. Furthermore, it is unlikely that smaller firms are any more export-oriented, as their scale is likely to drive a focus on markets nearer to home.

The situation in Ireland is likely to be different. The sector in Ireland has attracted a large number of international firms over recent years, which have a more pronounced focus on export markets. Ireland's use of the Euro is also thought to have implications for export propensity to the Eurozone countries.

For the all-island industry as a whole, export activity is likely to be more pronounced for producers of high value, low volume products, where logistics make longer distance transport more cost-effective. Furthermore, with the increase of global competition on the island of Ireland, the sector must increasingly focus on new markets further afield.

Observations

The polymer and plastics industry on the island of Ireland is a varied one. A number of differences are apparent in terms of markets served and processes used between Ireland and Northern Ireland. This reflects the very different economic and industrial evolutions that Ireland and Northern Ireland have undergone in previous decades, and the subsequent development of the polymer and plastics industries in different directions. There is also a clear difference in scale of activity, which is indicative of the relative size of their respective economies.

Yet, despite these differences, our data analysis indicates that there is much about the industry that is similar across the island of Ireland. This suggests a level of commonality, in some respects of business performance, which could be built on to develop a more collaborative all-island sector.

Where differences are evident between Northern Ireland and Ireland, however, there should be scope for sharing expertise and knowledge, thereby improving the industry's overall performance.

4. Benchmarking against Competitors

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Introduction

Operating in a global industry, it is important that the all-island sector benchmarks its performance against its international competitors. However, reliable benchmarks are difficult to find. The process is made more difficult by the fact that this study is trying to benchmark the all-island polymer and plastics sector, comprising 2 jurisdictions, with single state competitors.

In order to provide as common a data format as possible, the benchmarking section draws heavily on Eurostat data, which gives information for EU states. Six countries have been used for the analysis:

- **Ireland and the United Kingdom**, to provide an indication of the performance of the all-island sector;
- **Portugal**, as a similarly-sized territory which, like the island of Ireland, does not have an indigenous petrochemical industry to serve its processors;
- **Spain**, as a mid-sized competitor;
- **Poland**, as a newly emerging and low cost competitor; and
- **Germany**, as the largest and arguably best performing sector in the EU.

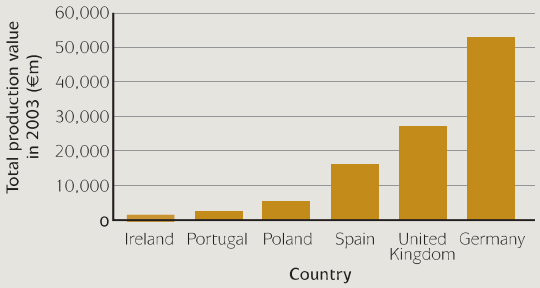
Due to the need to compare like-with-like, this Section uses the SIC codes for the polymer and plastics industry. However, where possible, the benchmarking data is considered against the profile of the sector set out in the previous section.

Sector size

By production value

Figure 4.1 provides an indicative scale of industry size across the comparator countries by production value (a similar measure to turnover used by Eurostat). Germany dominates in terms of its overall production value, with the relatively small size of the sectors in Portugal and Ireland being clearly illustrated by comparison.

Figure 4.1: Sector size by production value, 2003

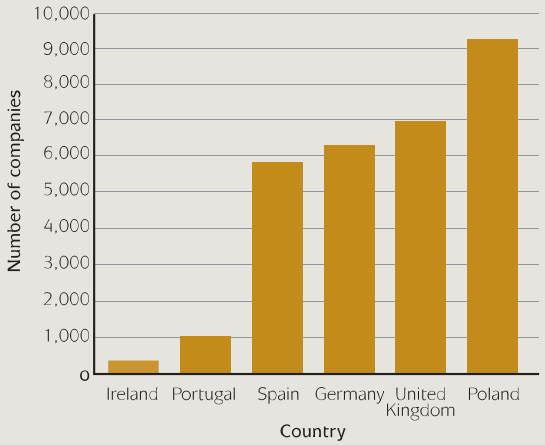


Source: Eurostat

By firm numbers

In terms of numbers of firms, Poland dominates in size, with more than 9,000 firms (**Figure 4.2**). This suggests that the sector is largely made up of relatively small firms, while the German industry is relatively well consolidated by comparison. This would be expected given Poland's recent economic history, and the fact that only relatively recently have market disciplines started to run through the economy.

Figure 4.2: Sector size by number of firms, 2003



Source: Eurostat

By employment

More precise information on firm size by employment is not available on Poland, but Table 4.1 shows the relative split across 4 of the comparator countries. This shows that Ireland has a similar proportion of SMEs as Germany, and does better for medium-sized companies than Portugal or Spain. However, Germany benefits from a greater proportion of larger firms.

Table 4.1: Proportion of firms by employment size, 2003

	Germany	Spain	Ireland	Portugal
Less than 49	75%	93%	80%	89%
50 to 249	20%	7%	19%	9%
More than 250	4%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**

Source: Eurostat

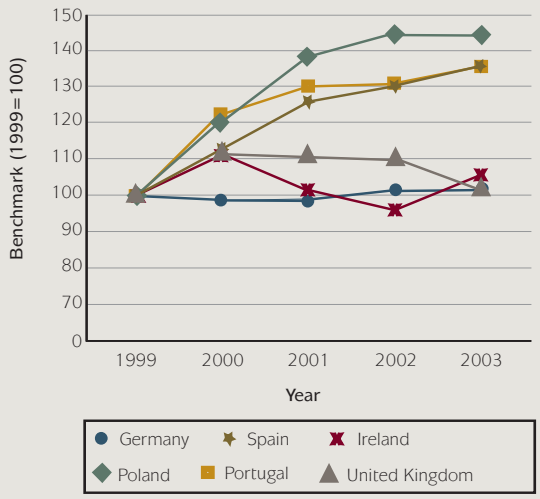
By comparison, the data accessed by this study suggests an all-island industry where 8 per cent of firms have more than 250 employees. The variance between this figure and that maintained by Eurostat is likely to be due to 2 factors. The first is that the sector is relatively small, so individual firms can have a significant impact on the proportions. Second, the all-island sector profile deliberately includes some larger scale manufacturers for whom plastics processing is only part of their operations. In these cases, a large firm may be included, despite the fact that only a limited proportion of their employees may be engaged in processing.

Trends

By production value

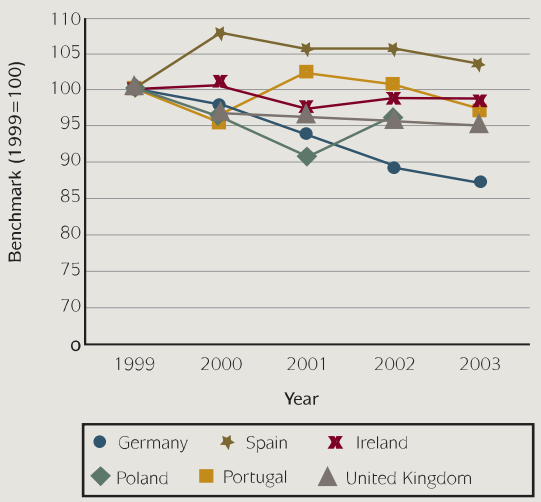
Figure 4.3 shows an interesting mix of fortune in terms of production value over a 5 year period. The rise of Poland in production terms has been considerable, as has that of Spain and Portugal, all lower cost producers, and relatively 'new' to the sector. By comparison, the mature, high value producers of the UK, Ireland and Germany have witnessed much flatter growth.

Figure 4.3: Trends in production value, 1999-2003



Source: Eurostat

Figure 4.4: Trends in company numbers, 1999-2003



Source: Eurostat

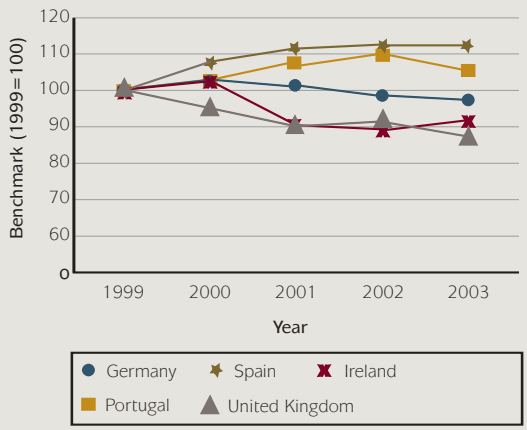
By firm numbers

The increase in production value has not been matched by a commensurate increase in firm numbers (**Figure 4.4**). Only Spain has a greater number of firms in 2003 than it did in 1999. This production growth, in the context of declining total numbers of firms, is suggestive of a sector where rationalisation through mergers and acquisitions is taking place.

By employment

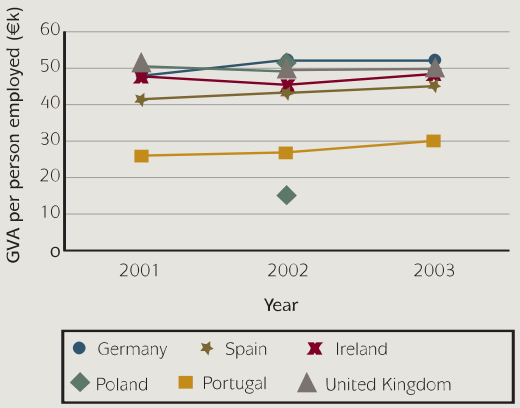
The trend in employment growth appears to follow a pattern between more mature manufacturers, such as Germany, the UK and Ireland, and the lower cost countries of Portugal and Spain (no data is available for Poland). As **Figure 4.5** shows, those countries with higher labour costs have seen a reduction in overall employment over time, compared to modest increases in Spain and Portugal. However, the flattening out and decline of employment numbers in the latter two countries by 2003 may indicate that they are also coming under pressure from even lower cost countries in Central Europe and further afield.

Figure 4.5: Trends in employment numbers



Source: Eurostat

Figure 4.6: Labour productivity, 2003



Source: Eurostat

Productivity

Productivity here is measured in terms of Gross Value Added (GVA). GVA represents a measure of the difference between the value of goods and services produced and the cost of raw materials and other inputs which are used up in production.

Figure 4.6 indicates that labour productivity (GVA per person employed) has been relatively static and similar in Germany, the UK and Ireland between 2001 and 2003, ranging between €46,000 and €52,000 over the period. In contrast, the performance of Poland is well down the scale, at €15,000 (figures are only available for 2002). This is likely to reflect the higher use of labour in the manufacturing process in countries where labour costs are low, thereby reducing the average productivity per worker.

GVA figures for the all-island sector have been collated from the respective national statistics offices (**Table 4.2**). This seems to confirm that the all-island sector is in the same higher productivity range as the UK and Ireland, with GVA per employee at around €50,000 (£31,000).

Table 4.2: Total GVA and GVA per employee

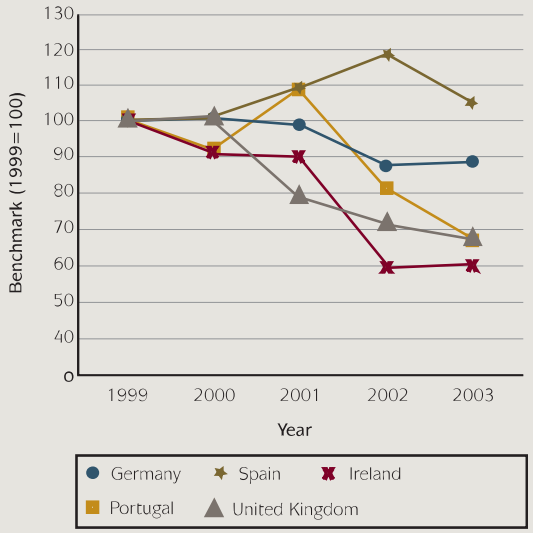
	All-island		Northern Ireland		Ireland	
	€	£	€	£	€	£
Total GVA	685m	426m	257m	160m	428m	266m
GVA per employee	50,790	31,572	50,718	31,527	50,833	31,599

Source: Census of Industrial Production, Census of Industrial Enterprises, Ireland (CSO); Northern Ireland ABI (DETI), Northern Ireland Census of Employment 2001 - constant 2001 prices.

Investment

Figure 4.7 shows how gross levels of investment in machinery within the industry have changed over time. Only Spain demonstrates an increase in investment over the period, while the UK and Ireland have seen the largest drop in capital investment levels, falling by more than 30 per cent in both cases. In part, this reduction in investment may be linked to the wider global economic downturn that occurred from 2001, and the retrenching impact that is likely to have had on businesses. However, it should be noted that the data ran only to 2003, while the information derived from the company survey (presented in the following Section) suggests that capital investment (at least in those better-performing firms) has been on the rise in more recent years.

Figure 4.7: Gross investment in machinery, 1999-2003



Source: Eurostat

Competition

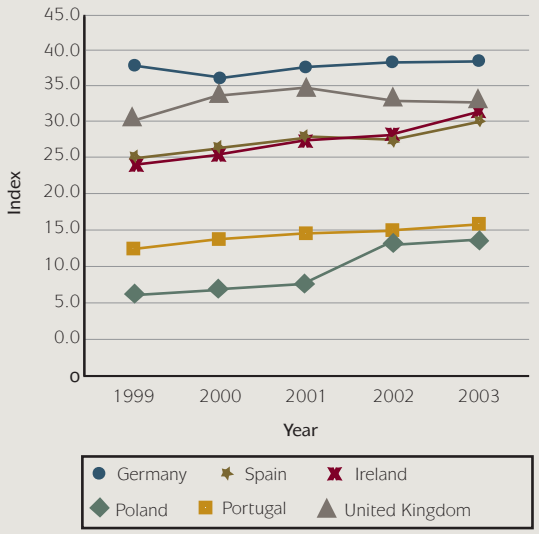
Energy costs - a major competitive factor - are widely commented on as being uncompetitive on the island of Ireland. For example, since 2001, business tariffs for electricity and gas are estimated to have risen by 60 per cent and 100 per cent respectively. A business survey undertaken by IBEC (Irish Business and Employers Federation) in 2005 benchmarked energy costs in Ireland and found them on average to be 8.1 per cent lower in key competitor countries. The pattern is similar in Northern Ireland, prompting IBEC to call for an all-island energy strategy for business.

Labour

Figure 4.8 illustrates the difference in unit labour costs between the 6 states. Germany has the highest unit labour cost, followed by the UK and Ireland. Ireland's unit labour costs have seen a steady rise over time, while in the UK there has been a slight decline. Nevertheless, there is a substantial difference with the considerably lower labour costs in Poland and Portugal.

In recent years, there has been a substantial increase in the employment of foreign workers within processing firms on the island of Ireland. This has been driven by the lack of availability of indigenous staff, who have been attracted to higher pay in other parts of the economy.

Figure 4.8: Indexed unit labour cost 1999-2003

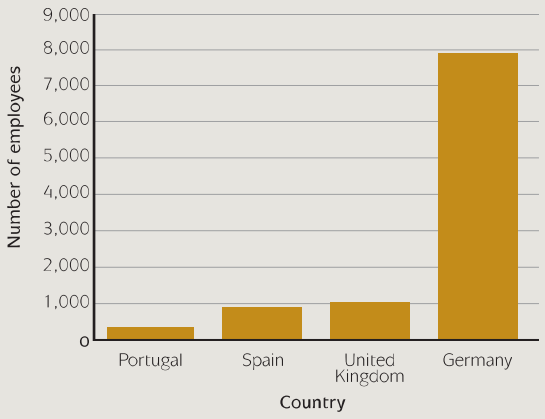


Source: Eurostat

Innovation

Data on innovation within the sector is limited. Figure 4.9 provides information on the number of R&D staff employed in 4 states, and highlights the significant difference between the levels of R&D employment between Germany and others. In proportion terms, 2.1 per cent of the sector workforce in Germany is engaged in R&D, compared to 1.1 per cent in Portugal and only 0.5 per cent in the UK.

Figure 4.9: Number of R&D staff employed, 2003



Source: Eurostat

It is possible to compare the performance of the UK and Germany in terms of the proportion of firm value-added that is R&D expenditure. This reflects a similar picture to employment, with German R&D expenditure in 2003 at 3.7 per cent of value-added, compared with just 0.7 per cent for the UK. Data are not available for Ireland, but the evidence does suggest that greater investment in R&D may be required for the all-island sector.

Other benchmarking data appear to reinforce the disparity between all-island innovation performance and that of Germany. A 2000 report by the Northern Ireland Economic Research Centre, for example, benchmarked regional manufacturing innovation in Bavaria, Northern Ireland and Ireland. It found a substantial gap in the performance on the island of Ireland compared to the German region, despite institutional support and encouragement.

The boxed text on the following page details an overview of the Singapore plastics industry, intended to provide a future international benchmark for the industry on the island of Ireland.

AN INTERNATIONAL BENCHMARK FOR THE FUTURE - SINGAPORE

The Singapore plastics industry displays many similar characteristics with the sector on the island of Ireland and could provide an interesting international benchmark for the future.

The Singaporean industry is similar in size to that on the island of Ireland, with 320 processors, employing 13,000 people, and producing 300,000 tonnes of product mainly for the electronics and medical devices industries (2001 figures). Almost all of the production is for export as the domestic market of 4m people is small.

The Singaporean government has actively 'managed' the plastics industry, encouraging the transfer of low margin business first to Malaysia (Johore), and then on to other low manufacturing cost countries in Asia, including China (Wuxi) and India (Bangalore), where the government has established Singapore Technology Parks. Consequently there is a significant amount of overseas investment by Singaporean companies. At the same time, there has been a positive policy of retaining higher technology and higher added value business at home and continuously moving up market to higher quality products.

There is a strong mould making sector in Singapore producing high quality but rather expensive product for the domestic market, for Malaysia and for export. Cheaper, general-purpose tooling is imported from Taiwan and Hong Kong.

There is no plastics machinery manufacture in Singapore. All equipment is imported mainly from Japan, Europe, Taiwan and Hong Kong.

Electronics is the mainstay of Singapore's plastics industry, with injection moulding the main process operated. It is estimated that, in 2001, 20 per cent of the industry was making computer printers for Hewlett Packard and, with other customers, printers became the dominant product.

Healthcare products are also being developed and several 'clean room' moulding operations have been established. High labour costs have been ameliorated by the extensive use of automation and robotics and almost every moulding machine is equipped for automatic loading and unloading.

R&D is carried out in tertiary education establishments who are encouraged to focus on applied research. The Singapore Precision Engineering & Tooling Association (SPETA) has the task to oversee development in the toolmaking sector and links research to customer requirements. The multi-national focus of customers in the electronics industry and healthcare has engendered a culture for quality and management systems and most companies have attained the necessary international standards and accreditations.

Despite the numbers of qualified scientists and engineers leaving the Singaporean university system, the sector struggles to attract graduates who seem to prefer a career in business and financial services.

COMMENT

While the all-island sector is unlikely to benefit from the same interventionist approach from its respective governments as Singapore, there are nevertheless some interesting lessons to learn:

- The sector has been assiduous in its constant move to higher value and better quality products, identifying new markets and responding to their needs;
- As an island economy with a relatively small domestic market, Singapore has been forced to look internationally for customers and has outsourced or invested overseas in order to keep production costs to a minimum; and
- The industry has good links to applied R&D within the education sector.

Observations

The benchmarking process suggests that the all-island sector compares well in productivity terms to the leading competitor, Germany. It has the characteristics of a mature manufacturing sector, with high and rising labour cost terms driving a reduction in the overall workforce.

However, 2 areas of major concern are, first, the need to maintain pressure on the overall manufacturing cost base; and second, the importance of greater innovation. On the first, the major issues for the sector's cost base are labour and energy. In both of these areas, the all-island sector is uncompetitive. Labour costs are rising, although the increasing use of foreign labour has helped to alleviate skill shortages and thereby, to a certain extent, stemmed the rise.

In the face of higher labour costs, it will be vital for the sector to improve its competitiveness through more efficient, automated production processes. High energy costs are predominantly due to the structure of the energy production sector on the island of Ireland, but it should also act as a driver for greater energy efficiency measures within the sector until the wider strategic problem is resolved.

On innovation, while the all-island industry's labour cost profile suggests that it is a mature manufacturing sector, its levels of innovation appear to fall behind other key mature competitors, such as Germany. The performance of the sector here is reflected more broadly in the relatively low levels of innovation and research and development within the all-island economy as a whole.

5. Perspectives on the Industry

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Introduction

The aim of this Section of the analysis is to summarise the main findings from primary research conducted with the following 4 groupings within the industry:

- **Plastics processors:** 20 firms, drawn equally from Northern Ireland and Ireland;
- **Suppliers to the industry:** 4 firms based in Ireland, but with wider experience, covering polymer raw materials, masterbatching, process machinery and toolmaking;
- **Customers:** 3 firms based in Ireland, covering the automotive, food packaging and electronics end-user markets; and
- **Intermediaries:** 12 interviews with intermediaries drawn from academia, trade bodies, and public sector organisations.

A full list of companies and intermediaries who were interviewed is supplied at **Annex A**.

Given the size of the sample, it is not possible to draw any statistically-accurate quantitative conclusions from the interviews undertaken. In addition to its limited size, the sample firms were specifically chosen for interview in collaboration with the trade associations North and South, to provide access to some insightful and forward-thinking industry experts. As a consequence, the findings reported below should not be taken to be a representative view of the industry as a whole.

Plastics processors

Overview

Turnover and profitability

Due to the nature of international companies, a large number of interviewed firms either would not disclose precise turnover figures, or could not (due to internal market mechanisms which precluded an accurate assessment). However, for the whole sample, an encouraging 88 per cent expected turnover to increase over the next 5 years, with the balance anticipating that turnover would remain about the same.

Ten firms disclosed current turnover and sales expectations in 5 years time. Current turnover ranged from £4.5m (€6.6m) to a high of £70m (€103.2m). Nine of the responding 10 firms anticipated an increase in turnover in the next 5 years, ranging from 18 per cent to 167 per cent (the latter a firm with substantial expansion plans).

All but 3 of the firms reported that their current operations were profitable; 1 firm was experiencing losses, and was undertaking a restructuring exercise to turn around performance as a consequence, while another reported a breakeven performance. Two of the profitable firms stated that profitability needed to be higher if their longer term business goals were to be met, indicating that there was still room for improved competitiveness and performance.

Markets

The majority of firms - some two thirds - manufactured for more than 1 end-user market. **Table 5.1** presents the markets that the firms served, with packaging, transport and medical as the most common, being mentioned by 35 per cent of respondents in each case. Diversification in this way ensures that firms are not tied to a single individual market, thereby reducing the exposure to market-specific downturns.

Table 5.1: Key end-user markets for interviewed firms

End-user market	Proportion of firms mentioning
Packaging	35%
Transport	35%
Medical	35%
Construction	25%
Electrical	20%
Household	10%
Leisure	5%
Other	5%

Source: SQW primary research, 2005

Sales concentration

Interviewed firms were asked about the concentration of their sales, and whether they focused on just 1 or a small number of key customers. For nearly half of the firms, less than a quarter of their total sales went to a single customer, indicating a healthy lack of reliance on one source. However, two-thirds of firms were reliant on only 3 customers for more than half their sales, representing quite a high level of reliance on a relatively small number of customers.

This may be entirely natural if, for example, the market is highly specialised, such as for medical devices. But it could also reflect a more general problem with the size of a firm's overall customer base, and in policy terms might argue for continuing effort to diversify customer basis and markets.

Processes

Half of the processors used injection moulding as their principal manufacturing process (**Table 5.2**). Thirty five per cent of firms stated that they used other processing technologies in addition to the principal manufacturing process. Firms supplying more than 1 end-user market tended to employ a greater number of processes.

Table 5.2: Principal manufacturing process

Principal Process	No. of firms	%
Injection moulding	10	50%
Extrusion	3	15%
Rotomoulding	1	5%
Expanded polystyrene	1	5%
Compounding	1	5%
Rubber compounding	1	5%
Thermoforming	1	5%
Blow moulding	2	10%
Total	**20**	**100%**

Source: SQW primary research, 2005

Employment

The average size of an interviewed firm was 340 FTEs (full time equivalents), however this figure was pulled up by 2 major employers with workforces of over 1,000; 74 per cent of firms were classified as SMEs (fewer than 250 employees), while workforce size ranged from 30 to 2,900 across the sample.

Looking ahead 5 years, 63 per cent of firms thought that they would be employing more staff in the future, with 16 per cent expecting a decrease (**Table 5.3**). Higher levels of automation were stated as the primary reason for reducing the size of the workforce, rather than an anticipated downturn in performance or activity. The 14 firms who quantified the loss or gain in employment over 5 years expected a net average increase of 14 per cent on 2005 levels.

Table 5.3: Expected change in employee numbers over next 5 years

Response	%
Increase	63%
Stay the same	21%
Decrease	16%

Source: SQW primary research, 2005

Management practices

Firms were asked to comment on their management practices, such as the use of regular business plans. All of the respondents reported use of at least 4 standard business tools (**Table 5.4**), representing a relatively high level of management sophistication. However, there was less evidence of strategic alliances, or the use of non-executive directors. Those firms with strategic alliances tended to be subsidiaries of international firms, with the strategic alliances taking place at an international level, rather than necessarily on the island of Ireland.

Table 5.4: Business performance processes and structures

Type	%
Business plan	100%
Management accounts	100%
Performance reviews	100%
Staff appraisal	100%
Strategic alliances with other firms	53%
Non-executive directors	47%

Source: SQW primary research, 2005

Clean room

Forty per cent of firms had clean room facilities. This tended to occur most often with firms who supplied the medical and electronics markets. For other markets, such as construction, clean room facilities were not necessary.

Tooling

Seventy per cent of firms questioned had their own in-house toolrooms, where activity focused on maintenance of tools, with a small element of modification. All but 1 firm used external toolmakers, of which around a quarter were located in Ireland, 1 in 7 in Northern Ireland, a fifth in the rest of the United Kingdom, and a further quarter in other European countries.

Firms cited a range of issues which impacted on the factors they had to consider when outsourcing tooling. These included:

- **Price**: price pressure tended to drive tooling to lower cost regions, such as the Far East;
- **Capability**: local tooling capability in Northern Ireland was cited by 1 firm as a reason for sourcing elsewhere;
- **Quality**: higher quality tooling requirements tended to mean a European source; and
- **Security**: concerns over the protection of proprietary designs led some firms to avoid outsourcing to the Far East.

There was little evidence of firms crossing the border on the island of Ireland in order to source tooling. This is mainly indicative of the fact that the 2 sectors vary in terms of their need - for example, the predominance of injection moulding in Ireland and extrusion in Northern Ireland. Thus, there are few toolmakers in Northern Ireland, though there may also be a lack of understanding of the capabilities of toolmakers on 'the other side' of the border.

Accreditations

Some 75 per cent of firms had quality standards in place (ISO9000 and beyond), with 25 per cent having environmental accreditation (such as ISO14000). These are high levels of accreditation, and reflect the survey sample; it is unlikely that this level of accreditation is normal for the industry as a whole.

Competition

Sources of competitiveness

The current main sources of firm competitiveness, according to respondents, were customer-focused: proximity to the customer, customer service and quality. When asked for the most likely main source of competitiveness in 5 years time, quality was regarded as a given, rather than a differentiator. Firms saw themselves as focusing increasingly on service aspects of the business rather than manufacturing, and in providing total solutions to customer needs, whether it be sub-assembly or providing a complete packaging service.

In terms of primary constraints to competitiveness, firms listed primarily high labour costs, energy prices and logistical problems in transporting bulky products to distant markets.

While most firms reported that they used internal and external benchmarking techniques, such as EFQM and Key Performance Indicators, this was not a given. Indeed, 1 firm stated that it had tried benchmarking, but had derived no benefit from the process and was now no longer using the technique.

Technological developments

Across the firms interviewed, a broad move to increased automation was being driven by a need to reduce labour costs and to meet increasingly sophisticated customer requirements such as sterile production conditions. Examples included in-mould assembly, robotic assembly of components into systems, automated surface finishing and spray painting, and automatic packaging.

Developments such as the use of electric drive injection moulding machines were reducing energy consumption and improving production quality and efficiencies. In sectors such as medical, moulders were becoming much more involved in the design and development phase in response to the need for new devices. This gave them an element of 'ownership' of the design, increasing their security of tenure in the business and distancing them from the 'trade moulder' trap.

Amongst the firms interviewed, there were some early moves in the area of 'micro-moulding', in support of micro-manufacturing of everything from medical devices, through consumer electronics to micro-robots. This could provide a growing niche market for the all-island industry.

Materials

At the commodity end of the raw materials spectrum, there was some optimism amongst firms that increasingly tougher emission regulations will drive a shift to higher value, newer and more expensive materials.

More generally, interviewed firms were having to absorb a significant proportion of raw material price increases, as they were limited by tough contracts in the extent to which these were passed on to customers. Inevitably, this was squeezing firms' already tight operating margins and was unlikely to be sustainable in the long term. In the past, a polymer price hike was always an excuse for the whole supply chain to increase their margins, but present day strategic supplier agreements preclude this. Subsidiaries of international firms may be slightly better off, in that they can sometimes benefit from global price deals on raw materials.

The price increases on the back of expensive oil and high demand were hitting the naptha-based bulk polymers - polythene, polystyrene and PVC - the hardest. For those polymers that are less dependent upon oil as their main raw material, and the higher end of the raw materials spectrum, there appeared to be less concern about materials pricing. Medical grade plastic, for example, is expensive, but the volumes used tend to be small, so the plastic price as a percentage of total unit cost remains low even if raw materials prices rise.

Firms reported that improved material properties, in conjunction with improved processes, have increased productivity. Tougher, easier flow polythene, for example, had allowed stretch-wrap film to be made much thinner, while providing the packaging protection required, thereby getting more packaging from less polymer. Similarly, easy flow moulding compounds allowed thinner walled mouldings and finer detail, for instance in mobile phone casings.

Local market competition

The injection moulders interviewed tended to compete in global markets such as electronics, so had little to say about local market competition. Amongst the extruders, by contrast, there was evidently much more all-island competition. In particular, there were at least 6 companies competing in drainage pipes, gutters and profiles for the building industry. This intense local competition, combined with the high cost of shipping bulky goods into the island of Ireland, protected the sector from import activity. There was a similar situation in the packaging market, both for blow moulded bottles and extruded sheet for vacuum forming tubs. Successful differentiation in the polythene film sector had included developments such as the use of proprietary materials or processes, and the delivery of full service solutions, such as undertaking the packaging process itself.

Firms did comment that trade moulders were operating in a tough environment, as they became increasingly exposed to international competition; proximity to the customer was no longer enough by itself.

Global competition

Firms evidenced the shift of electronics (and its packaging) and automotive sectors to Eastern Europe and the Far East as a sign of the pressures the all-island industry faces from global competition. For processing activities to survive on the island of Ireland, firms believed that the industry had to improve its performance in a number of areas, including:

- Embracing new technologies and materials;
- Widening the customer base, especially for trade moulders;
- Growing the service side of operations;
- Designing cost out of production; and
- Providing total system solutions to customers' needs.

The alternative was to see the industry increasingly lose its manufacturing competitiveness, with the implication that firms would retain R&D and initial production runs for new products, but that full production would take place elsewhere. Indeed, there was evidence from interviewees that several companies were already setting up parallel operations or strategic alliances in Eastern Europe and the Far East and transferring lower margin business to them.

Investment

Recent investment in new plant and machinery within the sample was at moderate levels, with 39 per cent of firms stating that more than 25 per cent of their equipment had been purchased within the last 3 years (**Table 5.5**).

Table 5.5: Percentage of plant purchased in the last 3 years

Percentage purchased in last 3 years	No. of firms responding	%
None	2	11%
Less than 10%	4	22%
10-24%	5	28%
25-49%	5	28%
More than 50%	2	11%
Total	**18**	**100%**

Source: SQW primary research, 2005

Innovation

Firms reported that they tended to manufacture either uniquely to their own in-house design, or with additional input from customers (**Table 5.6**). This suggests a reasonably high level of proprietary design within the sample. In the construction sector in particular, design also tended to be shaped by regulatory issues, such as environmental and safety standards.

Table 5.6: Main source of design

Response	No. citing	%
Manufactured to customer specification	5	25%
Manufactured to company's own design	8	40%
Mixture of the two	7	35%
Total	**20**	**100%**

Source: SQW primary research, 2005

In terms of resources dedicated to design and innovation, precise metrics were difficult to identify, mainly because international companies had access to teams of researchers and designers within their global operations. Taking these firms into account, 64 per cent of respondents had access to dedicated research staff, of which 55 per cent had staff located on the island of Ireland.

All the firms stated that their main source of innovation was customer need and requirements, either explicitly stated or anticipated. In addition, the role of suppliers (materials and tooling) was also considered to be of importance in designing new products.

All but 2 of the firms had used external sources of assistance in design and innovation, including academic institutions (the Polymer Processing Research Centre - PPRC - at Queen's University Belfast and Trinity College Dublin), PDC (the Polymer Development Centre, Athlone), the Institute of Technology in Athlone (AIT) and other specialist providers such as Rapra Technology. Assistance from further afield tended to be more common with those firms which were subsidiaries of international operations.

Firms stated that their main constraint in design and innovation was financial resources (40 per cent), either from within the firm's own resources or, in 2 cases, due to claimed difficulties in sourcing financial support from the public sector.

Skills

With a few exceptions, firms were relatively confident about skills and labour supply. There had been a shortage of skilled labour in the heyday of the moulding industry, but downsizing (which brought experienced people back into circulation) had alleviated the situation. Given that the firm sample tends to favour larger and more developed firms, it is perhaps not surprising that they were well-positioned to undertake training and development in-house, and so were not unduly concerned about labour supply issues. These are likely to be of greater concern to smaller firms.

As with other areas of the economy, North and South, there is evidence that polymer and plastics processors are using Eastern European labour to a considerable extent. Much of this recruitment originally happened because the local labour situation was so tight, with skilled employees attracted to higher wage jobs in newer industries such as ICT and Biotechnology. Many of the new recruits were not skilled in plastics processing, although they were generally well educated, often to degree level. This education, alongside a revitalised Eastern European work ethic, quickly turned them into a valued part of the workforce, whether as forklift truck drivers or process engineers.

For many firms, especially in Northern Ireland, qualifications were less of an issue with potential employees than the application of skills to the business environment. Firms in Ireland also had some trouble in recruiting workers for continuous shifts involving anti-social hours.

Firms in Ireland reflected the opinions of intermediaries in terms of their concerns about the demise of the PDC and the quality of applicants to, and therefore graduates from, polymer and plastics courses at AIT. First Polymer Training, however, was viewed as a good quality training provider.

Enterprise

The processors interviewed were predominantly established in the 1980s (47 per cent) and 1990s (21 per cent). Older firms were more heavily represented in Northern Ireland (the 4 oldest firms were based in Northern Ireland), while 4 of the 6 most recently established firms were in Ireland. Newer firms were more likely to be subsidiaries of larger global companies: all 4 sites established in the 1990s were subsidiaries, 3 of which belonged to US parents.

In terms of ownership, 35 per cent of the firms were independent concerns, with the remainder (65 per cent) being subsidiaries of larger, international companies. Firms reported to parent firms across the globe, the most significant location being the US, headquarters for 30 per cent of the interviewed firms (Table 5.7).

Table 5.7: Location of firm headquarters

Location	Count	Proportion of total
US	6	30%
Republic of Ireland	5	25%
Northern Ireland	3	15%
Rest of UK	2	10%
Mainland Europe	2	10%
Japan	2	10%
Total	**20**	**100%**

Source: SQW primary research, 2005

Collaboration

There was little, if any, evidence of informal collaboration or networking horizontally between processors in the industry, either within their own countries or between Northern Ireland and Ireland. The evidence from other areas of the study suggests that the lack of collaboration is not likely to be driven by competition issues. It is possible that the reason is the variation within the industry and the need to clearly identify areas where successful and worthwhile collaboration can be developed.

Vertically within the industry, successful firms demonstrate considerable levels of collaboration, with toolmakers and machinery suppliers on the supply side and customers on the demand side.

External assistance

Existing sources of assistance beyond the sector were widely regarded to be of high quality by firms, many of whom had used the services of organisations such as Enterprise Ireland and Invest Northern Ireland. There were, however, some concerns that business support was not always sufficiently well signposted, which posed particular difficulties for SMEs who did not have time to search out and apply for assistance.

Identifying and exploiting best practice

There were many examples from the interviews of firms taking action to move up the value chain. Firms who have already moved to more value added activity tended to demonstrate one or more attributes which generate a competitive advantage, for example:

- The use of proprietary technology, especially in markets such as medical devices and packaging;
- Good technical input on niche products, especially small precision components; and
- Good project management and design skills.

There is considerable advantage to be had in sharing this best practice more widely within the industry.

Suppliers - the toolmaking sector

The toolmaking industry on the island of Ireland is an integral part of the plastics processing supply chain. It is of particular importance in Ireland, which is a reflection of the fact that there are fewer trade moulders in Northern Ireland.

The injection moulding and extrusion industry in Ireland is supported by a well established, if somewhat fragmented and struggling, tool-making sector. Moulds for other plastics processes - rotational moulding, blow moulding and vacuum forming - are made in different ways, in different materials, often by a different group of 'tool makers'.

A 2002 report for the Industrial Development Agency (IDA) in Ireland estimated that the injection tool business sector alone is worth about €75m (£50m) annually; approximately 5 per cent is exported, but much more imported. However, the 10 largest Irish toolmakers, who share approximately 80 per cent of the business between themselves, estimated its value as only €20m/year (£13.3m). The IDA Converge report suggested that only 2 toolmakers were operating at a 'fully professionally managed' level, with the rest being family-run, 'lifestyle' companies with limited management, sales and administration capacity. Though capable, capacity limitations mitigate against growth.

Ireland's toolmaking had its heyday in the electronics boom of the 1990s. The withdrawal of several large electronics multinationals, such as Digital, over a 12-18 month period in 1997 decimated the sector. The trade moulders who relied upon it, and the toolmakers that served them, were hit badly. However, this is not a problem unique to Ireland. Toolmaking is labour intensive and Western countries have increasingly lost business to lower cost competitors, initially Portugal and East Europe, and latterly the Far East.

By contrast, East Asia, led by Taiwan, has grown in influence. Although comprising a myriad of small/medium companies, the sector is better co-ordinated. In Taiwan there is a very active trade association operating as the 'manager' of Taiwan Toolmakers Ltd, a virtual company promoting the industry through active participation in sales, marketing, technical development, etc. They have succeeded in capturing 35 per cent of the world market. Attempts to set up a similar model in Ireland, though strongly supported by intermediaries, have met with apathy from the toolmakers themselves.

A shortage of good toolmakers could emerge in the near future. Some of the best have been recruited by locally-based multinationals to run their in-house tool maintenance shops and the dramatic downturn in business has meant that nobody is taking on new apprentices for the future. The apprentice programme, now run by FÁS, has virtually collapsed, and could constructively be re-examined.

The prognosis for the immediate future is one of somewhat more stability. As the injection moulding business has evolved to serve the medical/pharmaceutical industry, and especially medical devices, it has become more stable. Product lifetimes are very much longer in the medical industry (3-5 years in development and 15-20 years of continuous production).

Industry safety requirements require that all stages of the supply chain are certified and qualified and have to have complete traceability. This makes the business less portable, more difficult to pick up and move to lower cost locations. Markets for medical devices also tend to be relatively 'local' (within c.500 miles from the point of manufacture) and the well-developed medical market in Europe is huge.

One area of development is micro moulding, where moulds have minute cavities (often multi-cavity with up to 100 cavities) that have to be very accurately dimensioned with high quality surface finish. Switzerland and Germany lead on this technology, with associations set up to sponsor activity and provide a knowledge base for development. Somewhat belatedly the industry in Ireland is also getting together under the 'Microman' micro-manufacturing initiative led by Trinity College Dublin.

Customers and end-user market developments

Packaging

Packaging tends to be a largely indigenous business supporting local industries. Hollow packaging such as bottles, cans, tanks, tubs and mushroom trays, is expensive to ship very far and is generally manufactured close to point of filling. The all-island dairy, food and drinks business is a large user and increasing consumer demand for small convenience packs keeps the business buoyant.

Similarly, expanded polystyrene packaging for consumer electronics is usually locally made.

The polythene film business in Ireland was hit severely by the deposit on supermarket bags, which decimated the business overnight. The fertiliser sack has been replaced by woven polypropylene (WPP) intermediate bulk containers (IBCs) and other applications are under considerable pressure to minimise packaging. This is driving a requirement for thinner, higher performance materials.

Medical packaging is growing with the industry as many devices have to be packed under sterile conditions, often within the clean-room where moulding takes place.

Construction

Interviewees reported that the construction industry has boomed across the island of Ireland over the past 15 years, especially in Ireland. Plastic products for the industry are relatively protected from imports because of bulk, and with internal competition forcing good productivity, the sector has grown, though margins are tight. Firms remain positive about the buoyancy of the construction sector, especially in Ireland, for at least the next few years.

Automotive

The lack of an indigenous automotive industry makes it difficult to supply a sector that demands 'just in time' delivery. Bulk items such as body panels, bumpers and interior trim tend to be made, or at least stored, near manufacturing plants. This leaves the component sector - mirrors, trim, under bonnet and electronics. At the higher end of the automotive market, there is some evidence that prestige manufacturers are moving to 'optimum market' pricing, where the suitability of a supplier is assessed on a basket of indicators, including price, quality, delivery and accessibility. This would provide an edge for producers with high service and quality standards, but who operate with a higher cost base. The development of 'infotainment' systems for cars is also viewed as a growing market for the future.

Medical

Interviewed firms had mixed views on this sector. Some firms pointed to healthcare spending, which will continue to increase in Europe and developing countries, as a sign that the market will remain for years to come. The continued trend towards single use, disposable devices and drug delivery systems provides growth and the need for certification and qualification provides protection. Others were more pessimistic, expecting medical devices to go the same way as electronics in the next 10 years, i.e. with manufacturing switching to the Far East.

Other sectors

The local demand for agricultural and horticultural film remains strong for applications such as silage wrap, polytunnels and mulching film. The household goods market - consumer electricals such as hairdryers, power tools, vacuum cleaners and 'white goods' - has all but disappeared along with the electronics business.

The views of intermediaries

Competition

Strategic approach

One of the most common comments heard about the industry was the extent to which it focused too much on immediate business issues, rather than the long term. Firms tended to focus on their short term survival. This generated a primarily sales-driven approach to business, which came at the expense of concentrating on a forward strategy and preparing for the future.

Customer focus

It was evident that the more successful firms and sectors within the all-island industry are those that have a strong customer focus. Differentiation through service and quality are increasingly important. This may involve delivering a more tailored service or product, for example, or improving design and testing turnaround times.

While customer requirements should be the priority for the industry, it was recognised that customers are not always aware of what is available in terms of product design, or what is possible through the use of polymer and plastics materials. There is an opportunity here to deliver innovative solutions to customer needs.

Intermediaries felt that the industry could not afford to rely on today's customers still being around tomorrow. This means that new customers, either in existing markets or new ones, should be sought out as a matter of course. This will require a more pro-active approach to marketing and networking, especially if it involves targeting new and more geographically remote markets.

Global market competition

To a certain extent, the impact of low cost competition from the Far East is already thought to have 'sweated through' the industry, North and South. Intermediaries felt that the impact of this has been the demise of some uncompetitive firms and the survival of others willing and able to reduce costs and improve efficiency.

Nevertheless, exposure to global competition, and especially low cost competitors, was felt to remain the most significant challenge to large elements of the industry, both now and in the short to medium term. The all-island industry was still regarded as having a high cost base relative to its international competitors. This goes beyond labour costs, encompassing insurance, local government costs (such as planning issues), energy costs and the impact of regulatory changes, such as EU environmental directives.

More specifically, the emergence of low cost competition had had a threefold impact on the sector:

- Contract processors, who tended to be reliant on the local market, had seen a number of their customers relocate to other countries in the search for a lower cost base themselves. This had particularly been the case among electronics manufacturers;
- Departing customers were not being replaced at the rate that they were leaving, as mobile investment, especially into Ireland, tailed off and headed elsewhere in the world; and
- Contract and in-house processors were increasingly having to compete for remaining local contracts against firms based in low cost regions, such as the Far East. This was particularly the case for non-technical, uncomplicated and high volume work.

Innovation

Product innovation is a crucial competitive advantage, which in turn requires a strong research and development (R&D) base in the industry. Intermediaries were of the view that firms' investment levels in R&D needed to rise across the industry.

Links between academic research institutions and the industry were seen as very important here. Some good linkages already exist: there are a number of knowledge transfer partnerships between the industry and the Polymer Processing Research Centre (PPRC) at Queen's University Belfast; Trinity College Dublin has polymer science and micro-manufacturing expertise that draws in industry collaboration from sectors such as medical devices. These have the capacity to be built on further.

Intermediaries generally felt that the industry as a whole needed to become more flexible and responsive to market demands. Lean manufacturing and lowering scrap levels would benefit all firms, irrespective of their size and operation. There are still many companies in the industry which are poor users of ICT and which have low levels of automation.

Skills

Operating in a more flexible business environment, with higher complexity and variation in product design and manufacture, requires a well-skilled workforce. The skills picture across the island, North and South, was felt to be a mixed one. At higher levels, there are some good skills pools, such as at the PPRC, Queen's University Belfast.

In Ireland, there appear to be greater concerns about the quality and availability of technical skills compared to Northern Ireland. Those close to the industry commented on the declining quality of graduates from the Athlone Institute of Technology (AIT), which reflects a lowering of entry grades to encourage more students to apply.

This, it has been argued, is indicative of a wider problem: that the industry (and manufacturing in general) is viewed as an unattractive career path to those yet to enter the labour market. The closure of the Polymer Development Centre at Athlone was also believed by intermediaries to have impacted negatively on the industry in terms of both innovation and as a training ground for scientific and technical staff.

Collaboration

While open to the possibility of increased all-island collaboration, intermediaries nevertheless identified a number of issues that represent challenges to the creation of a more proactive and responsive industry. These included:

- The diversity of companies within the industry (size, ownership, market focus, technology used, geographical position, etc), which might suggest little commonality of approach to specific competitiveness issues;
- The difficulty of energising the industry as a whole, rather than relying on a small group of enthusiasts and volunteers (an issue not unique to the polymer and plastics industry), especially when so many firms felt under short term pressure to survive; and
- A slightly loose and ad-hoc approach to existing support structures and collaboration, including some concerns that the plastics associations were not sufficiently well resourced to take on the challenge of leading and delivering a more collaborative and competitive industry.

Observations

As has already been noted, the sample of firms was small and tended to favour the more successful businesses. With these caveats, there are nevertheless elements of their performance that are worth highlighting as examples of ways in which the whole sector might improve its competitiveness:

- Diversification of customers and customer markets reduces the reliance on a single end-user, thereby improving the chances of business survival in the event of the loss of a contract. Diversification of markets served may mean increasing the number of manufacturing processes;
- Regular investment in new machinery is essential if operating costs are to be minimised. Increasing automation reduces labour requirements and new technology is cutting energy use in the manufacturing process. These are both recognised as the most significant costs to the sector;
- Customer service is increasingly seen as the key to competitiveness. Quality is now being perceived by customers as a given, not an option; and
- Product differentiation is important, especially in commodity items, for example through the use of proprietary designs or materials. Successful innovation requires close vertical collaboration with suppliers and customers.

In addition to these positive points, there were a number of issues for the industry to consider addressing further, for example:

- There is a greater capacity for benchmarking activity within the industry, which would help improve overall competitive levels;
- More consideration is required on how outsourcing of low value added production or investment overseas in marketing and distribution might help the sector to compete globally;
- Low levels of enterprise need to be tackled; and
- Some firms still tend to view the island of Ireland as 2 distinct markets, despite the evidence highlighted elsewhere in this study that the similarities and synergies are considerable.

The views of intermediaries lead to the following observations regarding future collaboration and industry competitiveness:

- Attention must switch to exploiting markets where cost is less of a comparative advantage, such as those for highly specialised and niche products. This will include identifying emerging growth areas within the all-island economy where plastics have a relevance, but where volumes are low and cost is less relevant. Medical devices is an example of a relatively well-protected market that is growing, especially in Ireland, but also in Northern Ireland;
- The industry must become more internationally-focused, both in terms of customer markets and potentially using the global market to the sector's advantage by outsourcing low quality and price sensitive work through strategic alliances in low cost markets;

- There is significant process and materials science expertise on the island of Ireland, which should provide the research and academic foundations for the industry to increasingly characterise itself as a global centre of excellence. But collaboration between academic institutes, and between those institutes and firms, needs to be deeper and wider; it is currently sub-optimal;
- The industry must consider whether it will have access to a sufficiently well-trained workforce in the future. This will require significant consideration of the industry's skills needs in the medium term; and
- Encouraging firms to take a longer term approach to business planning is an absolute priority if the industry is to improve its competitiveness in the longer term.

6. Conclusions

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Global trends

Demand for polymer and plastics applications continues to grow at a higher rate than GDP and looks set to increase in the medium-to-long term, fuelled by substitution for traditional materials in mature markets like Western Europe, and by volume growth in developing markets, such as China. In terms of global value and size, therefore, the market is not likely to diminish.

The polymer and plastics industry is undergoing constant technological change. For mature processing sectors, such as that on the island of Ireland, it is particularly important to stay ahead in terms of process and materials development, as competition on the basis of cost alone is unlikely to be viable. This argues for a focus on those international markets where sophisticated components are required, for example in the field of electronics, transport, or medical devices.

Closer to home, there are also markets where proximity to the customer works in favour of local processors, either in terms of being able to respond rapidly to need, or because the bulky nature of the product makes long distance supply logistically difficult and expensive.

The price of commodity plastics is likely to remain high in the current environment of high demand and high oil prices. Processors will need to maintain a focus on cutting costs in order to maintain their margins, as it is clear that many are unable to pass on all or some of the raw material cost to their customers.

Environmental issues will continue to affect the industry in the long term, because of the demand for increased recyclability and growing importance of energy recovery. In a sector which is dominated in cost terms by the high price of energy, the all-island sector should regard improved environmental performance as a priority and an opportunity.

The all-island sector

This study has identified an all-island sector comprising 283 firms, with a combined turnover of some £2.08bn (€3.00bn) and employing 18,750 people (5.4 per cent of total manufacturing employment). This is larger than the standard classifications suggest and provides a more accurate value of the sector in terms of its contribution to the all-island economy. It also reflects the fact that a significant number of firms who manufacture with polymer and plastics do not think of themselves primarily as plastics processors. The plastic components they produce in turn support other important added value manufacturing sectors such as electronics, communication, medical, transport and food.

In terms of markets served and processes used, there is some difference between Ireland and Northern Ireland. This reflects the very different economic and industrial evolutions that Ireland and Northern Ireland have undergone in previous decades and the subsequent development of their polymer and plastics industries in different directions. There is also a clear difference in scale of activity, with a larger number of companies in Ireland, indicative of the relative size of the respective economies.

Crucially however, there are extensive synergies, North and South. The sector comprises mainly small firms, but also contains a small number of very large firms. Yet, despite these differences, the data analysis indicates that there is much about the industry that is similar across the island of Ireland. This suggests a level of commonality, in some respects of business performance, that could be built on to develop a more collaborative all-island sector.

Where differences are evident between Ireland and Northern Ireland, however, there should be scope for sharing expertise and knowledge, thereby improving the industry's overall performance.

Relative competitiveness

The all-island sector appears to perform well in productivity terms, relative to its major European competitors. It has high and growing labour costs and the response has been to reduce overall employment in the sector through greater use of automation. Company amalgamations and closures have reduced firm numbers and maintained levels of turnover. The combined effect of these factors has resulted in a leaner, more efficient sector which will be more capable of facing future shocks and uncertainties.

However, labour and energy costs remain key factors limiting the sector's global competitiveness. Labour could be further reduced by increased levels of automation and investment in new machinery. Leaner manufacturing and a drive for greater energy efficiency are required to offset the problem of high energy costs.

While in cost terms the all-island sector looks similar to other mature manufacturing nations, it falls behind in its levels of innovation. This urgently needs to be addressed. As competitive edge based on price is progressively worn away, new ideas, designs and content must be the way forward if the sector is to build on its current good performance.

Lessons for the sector's firms

Evidence from the interviews with firms suggests a number of ways in which the industry as a whole might improve its competitiveness. These include:

- Diversification of customers and customer markets;
- Increased investment in new machinery and automation to minimise overhead costs, especially energy and labour;
- A focus on customer service as a key element of competitive advantage;
- Product differentiation, especially in commodity items, for example through the use of proprietary designs or materials or by providing a full downstream service; and
- Innovation though close vertical collaboration with suppliers, customers and the research base.

Intermediary views

The interviews with intermediaries highlighted the following areas of importance in relation to future collaboration and increased competitiveness within the industry:

- Benefit will be gained from a focus on markets where cost is less of a comparative advantage, for example in the production of highly specialised and niche products;
- The industry should focus more strongly on international markets and seek to gain advantage from outsourcing high volume, low quality and price sensitive work to low cost markets overseas;
- The capacity exists on the island of Ireland for the industry to become known as a global centre of excellence in process and materials science, drawing on the research and academic expertise which underpins the sector;
- There are concerns over whether the industry workforce will be sufficiently skilled and well-trained to meet the future needs of the sector; and
- It is essential that firms take a more long-term approach to business planning, if true competitive advantage is to be gained in the future.

7. Recommendations

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The case for all-island collaboration

The benefits of industry collaboration across the island of Ireland cannot be taken for granted. The participation of firms in collaborative activity will only happen if there is a clear business case for doing so. It must be assumed that firms will only engage in greater cross-border activity if they consider it to be in their commercial interests to do so. The recommendations therefore concentrate on areas that this study has identified as being of potential business benefit to processing firms on both sides of the border.

It is vital that the sector itself - businesses and trade associations - take forward the recommendations of this report. However, the public sector has an important role in helping to signpost opportunities and support employer-led initiatives which address barriers to cross-border trade and collaboration.

A first workshop

Towards the end of the study, a workshop was held with key industry experts, primarily managing directors of processing companies from both sides of the border. Building on the findings of the study and the knowledge of those present, the workshop generated a series of possible ideas for future all-island collaboration, which are drawn on heavily in this recommendations section.

It was clear from the workshop that, to date, there has been relatively little company-level interaction between Northern Ireland and Ireland, except where firms have sites in both jurisdictions.

There is also a lack of knowledge about the opportunities that might exist on the other side of the border, both in terms of new markets, sourcing supplies and potential collaborative business partners. These deserve further investigation by the sector. In addition, many of the issues raised as problems, such as labour supply and quality, skills and training and energy costs, are common across the island of Ireland and could be tackled at the all-island level.

Recommendations

General

The all-island industry faces common threats, including an increasing cost base, a reduction in the local customer base and increasing competition from elsewhere. Successful sectors in other nations, such as Singapore, are highly networked and well organised. This suggests that there is value in greater all-island collaboration.

Furthermore, there is a considerable amount of experience available within the sector that could be shared more widely, and an emerging interest in greater collaboration which deserves to be harnessed. Further investigation by the sector is required to establish the precise extent of the opportunity that all-island collaboration can provide in business performance terms. There are a number of examples of successful all-island business fora to draw on, such as BioMedIreland. This is a network for the health technology and biotechnology industries, providing an all-island focal point for the sector. The intention is to facilitate networking and the sharing of knowledge and best practice, thereby improving global competitiveness.

- **Recommendation 1**: Establish an **all-island forum** to take forward collaboration and develop the other recommendations of this report. The forum should provide clarity, consensus and visibility in the allocation of responsibility for the activities described below

The polymer and plastics industry is characterised by rapid change. There is some genuinely cutting-edge activity in the sector, but there are also indications of a 'long tail' of struggling or surviving small firms who do not have the opportunity individually to look ahead to potential future industry and market developments. Separately, the 2 sectors, North and South, may not be of a sufficient size to support a comprehensive futures-thinking approach. Foresighting is a structured approach to identifying possible drivers of change and future scenarios for the sector and developing strategies to maximise the chances of success as markets and technologies change.

- **Recommendation 2**: Create an all-island **Foresight Programme** to allow greater consideration of, and planning for, future developments in the industry, its technologies, and key markets. The programme should be led by the private sector, supported by the Higher Education community, and by facilitation from the public sector.

Innovation

Innovation is a key driver for the sector, especially if it is to try and focus on niche markets where price is less of a factor in customer purchasing decisions.

The benchmarking process has indicated that R&D levels in the sector need to increase. Firms have commented on the difficulty of accessing public sector support for innovation, and investment in innovation appears to be most problematic for smaller firms.

- **Recommendation 3**: Improve the **signposting and tailoring of public sector innovation support**, bearing in mind the specific needs of the polymer and plastics industry.

The findings of this study suggest that more could be done to integrate the evident materials science expertise in Trinity College Dublin with the process technology expertise at Queen's University Belfast, to provide a broader approach to researching new ideas and problem solving. Expertise at other institutes such as University College Dublin (UCD), University of Limerick, Athlone Institute of Technology and Sligo Institute of Technology needs to be integrated through collaboration.

- **Recommendation 4**: Encourage greater **academic collaboration in support of the industry**, especially between key process and materials centres such as Trinity College Dublin and Queen's University Belfast, and with firms through technology transfer, spin-outs and the development of intellectual property.

- **Recommendation 5**: Investigate the viability of a **sector-sponsored chair in polymers and plastics** at 1 of the key higher education establishments on the island of Ireland.

Competitiveness

There is capacity for greater benchmarking activity within the sector. Given the limitations in the size of the Northern Ireland industry, an all-island approach should be encouraged.

- Recommendation 6: Drawing on the experience of the Irish Best Practice Forum, establish an **all-island benchmarking scheme** to improve competitiveness, using evidence from within the sector and drawing where necessary on useful comparisons from other industries.

Energy costs remain a key common problem across the island of Ireland. Tackling this issue at the source requires a co-ordinated policy response at inter-governmental level. There is also much that the sector can do for itself to reduce its energy usage, such as switching to all-electric machines and exploiting the rising value of recycled materials.

- Recommendation 7: Encourage **inter-governmental co-ordination of energy policy** to increase energy sector competition and thereby reduce costs.

- Recommendation 8: Consider ways in which the sector can improve its environmental image while cutting its own energy use through **collaboration with bodies such as the Carbon Trust.**

The need to access new markets should be a driver for increased export activity, especially where logistical advantages exist, such as the relative proximity of Northern European markets. The sector could improve its visibility on the international stage by adopting a common approach to export development. Government support is key, but the sector needs to be the main driving force of the initiative.

- Recommendation 9: Encourage and co-ordinate government support to provide **all-island trade promotion schemes**, including all-island trade missions.

The issue of a high cost base could be better tackled through the use of lean manufacturing techniques within the sector and a drive for increased levels of automation.

- Recommendation 10: The sector should facilitate wider adoption of **lean manufacturing and automation techniques** throughout its business base.

Labour and skills

The availability of skilled labour has been tight, with the best being seduced away by higher wages paid by the multinationals, and too few high quality replacements emerging from the education system - many science and engineering graduates prefer to join the financial, communications and retail sectors. The situation continues to be difficult, and emphasis should be placed upon the up-skilling of existing staff.

- **Recommendation 11**: Training providers within the sector should focus on **up-skilling current employees** to meet future customer and market needs.

The plastics processing industry, and manufacturing in general, is not seen as a good career choice by those considering further or higher education options, or entering the labour market for the first time. The best young people are attracted to higher profile, more social and better paid jobs in the financial, ICT, retail and media sectors. This is a problem common across the island of Ireland, and in many other parts of Western Europe.

- **Recommendation 12**: Improve the marketing of the sector as a positive, rewarding and exciting career choice, through the use of promotional materials, mentors and advocates.

There is strong competition for the good talent that exists in the sector, with the larger, international names having a bigger 'pull' in terms of reputation and salary. They are also more likely to be able to offer in-house training, better promotion prospects and career paths for those employees who merit it, limiting the labour supply for smaller firms.

- **Recommendation 13**: Investigate the potential for the **joint and shared recruitment of specialist staff** through collaboration between small firms with mutual skills needs, for example in the field of design or marketing.

Evidence suggests that the sector skills bodies, North and South, are already energetic and knowledgeable, but lack significant interaction with one another.

- **Recommendation 14**: Conduct a **joint assessment of future skills** needs by the sector skills bodies of Northern Ireland and Ireland. This activity could logically flow as a practical action from the Foresight Programme described at Recommendation 2.

It is not clear how mobile the workforce is in terms of its willingness to cross the border in the search for work within the sector. If viable, treating the labour market as a single entity increases the potential labour pool for the respective elements of the all-island sector.

- **Recommendation 15**: Establish the extent to which **all-island labour mobility** exists, and how it may be exploited or encouraged.

Enterprise and investment

There is insufficient new business activity in the all-island sector, and there is a concern among firms that it is not clear where the next generation of business leaders and entrepreneurs will come from. This is of particular concern for indigenous firms, and especially family-owned and run businesses, rather than international subsidiaries.

- **Recommendation 16**: **Establish a fast track promotion scheme** for the sector's high flyers to encourage the retention of high quality business leaders.

There are indications that levels of investment in the sector have been declining. This deserves further investigation.

- **Recommendation 17**: Conduct an all-island survey on levels of industry investment and attitudes and barriers to increased investment.

The above suite of recommendations represents a challenging agenda for taking the industry forward over the next decade. In progressing these recommendations, it will be important that the activities they give rise to are monitored and evaluated for their economy, efficiency and effectiveness. The final recommendation is therefore as follows:

- **Recommendation 18**: Prepare a **monitoring and evaluation framework** to underpin the economy, efficiency and effective delivery of the activities set out above.

Annex A
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Annex B
Abbreviations

ABS	Acrylonitrile butadiene styrene - a common thermoplastic with lightweight and shock absorbing characteristics, used for piping, protective headgear and Lego.
EPS	Expanded polystyrene - the polymer granules are expanded using heat and a gaseous agent to provide a foam material used for insulation in the construction industry and shock-resistant packaging for fragile equipment, such as televisions.
HDPE	High density polyethylene - higher modulus than the low density polyethylenes, used for containers such as milk cartons and Tupperware.
LDPE	Low density polyethylene - the first grade of polyethylene to be produced, used to make polythene film and plastic bags for packaging.
LLDPE	Linear low density polyethylene - a higher strength version of LDPE, used to make thinner plastic film and bags.
PET	Polyethylene terephthalate - a thermoplastic resin of the polyester family, used to make products such as bottles and other food and drink containers.
PP	Polypropylene - a thermoplastic used in a wide range of applications, such as automotive components, crates and pallets, tubs and drums, and food packaging.
PS	Polystyrene - a cheap and easily moulded, transparent thermoplastic used in a wide range of products such as CD jewel cases and plastic cutlery.
PU	Polyurethane - a thermosetting reaction polymer (not thermoplastic),widely used in foam form in products such as furniture and for thermal insulation in the construction industry.
PVC	Polyvinyl chloride - a rigid, tough, plastic used in a wide range of applications, including pipes, guttering and windows for the construction industry. It can be softened by the addition of plasticisers to make flexible wire insulation, pipes, waterproof sheeting and clothing.

This publication is available on request in alternative formats including Irish language, Ulster Scots, Braille, disk and audio cassette.

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