

2.1 Shipping and Maritime Transport Research Programme

2.1.1 Introduction

The shipping and maritime transport industry in Ireland is a dynamic, multi-faceted industry employing approximately 6,000 people (direct employment). It has an estimated annual turnover of approximately €1.3 billion. It is the largest sub-sector of the marine industry in Ireland. The sector, which is primarily service driven, encompasses a variety of businesses varying in size from very large (1,200+ employees) to two-person SMEs. It can be broken down into two distinct strands of commercial activities, (1) Shipping Services Sector and (2) Ports and Maritime Logistics. The seafaring sector, although not a stand-alone sector, is an important element of the Irish shipping industry, employing just over 2,000 people.

Collectively, these elements form an essential part of the strategic infrastructure that allows the Irish economy to connect with the global market place. In 2004, in excess of €130 billion worth of goods passed through the Irish maritime transport supply chain.

The sector has experienced a number of significant policy changes in recent years. In 1999, Government established the Irish Maritime Development Office (IMDO). The IMDO is the dedicated national body responsible for the promotion and development of the Irish Shipping Services sector and related industries. A key role of the IMDO is to provide assistance to the Irish maritime industry in order to support and maintain competitiveness in the international marketplace. A particular focus of the IMDO is the attraction of foreign direct investment. The IMDO is also the designated Short Sea Shipping Promotion Centre for Ireland and participates in a number of EU initiatives related to the promotion of research and development.

In 2002, the Government introduced a special tax measure, the 'Tonnage Tax regime', to support the Irish shipping industry. The measure also aims to cultivate an environment that attracts foreign direct investment from the international shipping services sector. Competitive taxation policy and clear pro-business legislation provide an excellent platform for international shipping companies to grow.

In January 2005, the Government launched its Ports Policy Statement 2005. It requires that ports operate commercially, without Exchequer support, and provide adequate capacity for the future needs of the economy. A process is underway to investigate how the ports will address future capacity and investment issues.

In 2000, the European Commission published a White Paper on Maritime Transport⁶. This paper set out requirements for future research and aid programmes for the European shipping sector. The next EU Framework Programme (FP7) will provide funding for identified priorities.

2.1.2 Sector Profiles

Shipping Services Sector

The sector is made up of a wide range of specialist services to, or conducted by, ship-owners, operators and managers. It consists primarily of onshore services and ancillary service elements that connect Irish industry through an international maritime services network of trade. Many foreign shipping companies operating on Irish routes have established shore-based operations in Ireland. These companies are predominately involved in containerised trades. The shipping and operating segment of the sector has seen considerable investment by the owners and operators over the past decade. This investment has increased capacity on key trade corridors and provided innovative modal and transport solutions, while at the same time maintaining a cost symmetry that has enabled Irish companies involved in international trade to grow and expand their overseas markets. New direct shipping services have been created around Ireland, linking Ireland's regions and its trade with access to new markets.

In recent years, a number of new and emerging high-value niche sectors have been created. In particular, ship banking and finance activities are beginning to emerge due to the recent introduction of a highly competitive and transparent tax regime for the shipping sector. Recent measures introduced by the Government now make Ireland one of the most competitive locations to own, operate and manage ships in Europe. These measures could provide an additional new layer of high added-value activity in the intellectual management of foreign direct investment in shipping companies' assets and activities in Ireland. This could provide lateral opportunities for the other niche emerging sectors to benefit and grow.

Shipping and Maritime Transport (2003 Turnover - €1.3 Billion)		
Shipping Services	Port and Maritime Logistics	Seafaring
<ul style="list-style-type: none"> > Maritime Financial Services > Marine Insurance > Maritime Law and Legal Services > Ship Management > Ownership and Operations > Roll-On/Roll-Off Operators > Load-On/Load-Off Operators > Ship Broking, Chartering, Sale and Purchase > Shipping Agents and Brokers > Marine Engineering > Marine Technology and Innovation 	<ul style="list-style-type: none"> > Port Companies > Liner and Port Agents > Container Services > Stevedores > Freight Forwarders > 3pl and 4pl Logistics Providers > Supply Chain Services > Dredging > Pollution Control > Salvage Companies > Software and ICT 	<ul style="list-style-type: none"> > Maritime Education > Maritime Training

⁶ European Commission (2001) White Paper: European Transport Policy for 2010: Time to Decide. COM (2001) 370.

Ports and Maritime Logistics Sector

Irish commercial ports are highly significant economic motors of national and regional industrial activity. Irish ports are facilitators of growth and provide a gateway for Irish industry to access the global market place. Ports are also areas where value can be added to the activity linked to the import and export of commodities, in particular through the emergence of leading logistics companies and supply chain capabilities in Ireland. As an island economy, the role of ports in the national transport infrastructure grid and their connectivity with this network is hugely important. As the shape and structure of Irish industry and trade continues to change and evolve, it is essential that our ports continue to innovate and evolve in step with the demands of our economy.

It is clear that the competitiveness of Ireland's transport linkages with the rest of the world, and in particular the rest of the EU, has a considerable bearing on the overall competitive performance of the Irish economy. The total value of Irish merchandise exports in 2004 is estimated to be €84 billion; with imports valued at €50 billion. Goods valued in excess of €120 billion passed through the Irish maritime supply chain and its ports and shipping services.

Ireland's dependence on shipping, combined with opportunities and challenges in the international operating environment, currently present unparalleled opportunities for the sector to develop. To make the best use of these opportunities, Ireland must ensure that future planning (including infrastructure planning) and development takes place to service the evolving Irish economy. Developing and integrating intelligent transport information systems, GIS-based planning systems, e-commerce logistics and supply chain design technologies should also form part of this future vision.

Seafaring Employment

Seafaring is one of the oldest and most traditional trades remaining in Ireland today. It is, without doubt, an important sector within an island economy. The development and retention of maritime knowledge is central to Ireland's place in the shipping service economy. The Irish seafaring sector consists of approximately 2,000 seafarers, of which 1,000 are serving on Irish vessels and the balance on foreign owned and flagged ships.

The Government is seeking to replicate its successful education policy in the areas of science, business and IT by an unprecedented development in maritime training. The new National Maritime College of Ireland (NMC) is at the centre of this commitment and represents a €60 million investment, ensuring that along with other initiatives to develop Ireland as an international shipping centre, the skilled workforce will be there to meet the future demands of the sector. In addition, a valuable internationally traded service can be developed by offering training courses for overseas students. This investment represents a significant opportunity for Ireland to position itself as a centre of maritime training excellence in Europe.

2.1.3 Key Opportunities and Challenges

Opportunities for the Irish Ports and Shipping Services Sector

- > Although Ireland cannot change the trend of globalisation, it can prepare itself to evolve ahead of change. Globalisation will affect the future shape of the international shipping industry; an area where Ireland could target niche growth opportunities.
- > It is essential that capability to deliver a-fit-for purpose Ports and Shipping Master Plan that incorporates trade changes, technology drivers and cost and competitive issues be developed. The changing type and size of vessel, and their impact on Irish trade, also need constant review.
- > Increasing Irish imports will provide excess transport capacity for exports, especially containers. There may, therefore, be a continued focus on the comparative advantages of Irish export costs.
- > The transfer of goods from road to sea motorways and removing cargo bottlenecks are top priorities for the European Commission, with several EU funding opportunities in this area including Motorways of the Sea under the TEN-T Programme, and the Marco Polo Programme. These programmes essentially provide grant-aid to sustainable transport services such as short-sea shipping. It is important that Ireland aligns itself to this European strategy and maximises any lateral opportunities for funding for its sector.
- > Socio-economic benefits would accrue from a fully integrated shipping policy and strategy where regional and national transport infrastructure planning and management decisions are co-ordinated among all the relevant government, semi-state and industry stakeholders.
- > Ireland has a reputation in aircraft leasing and a strong financial capability built through the Irish Financial Services Centre. A potential high-value opportunity exists for Ireland to replicate this success through the creation of competence in international ship leasing and finance.

Challenges for the Sector

- > The trend towards increased globalisation and the future role, connectivity, size and position of our ports in facilitating and evolving with the changing patterns of globalised trade present a significant challenge.
- > The efficiency of Ireland's role as a pan-European location with an efficient integrated transport network will influence future decisions of multinationals to invest here.
- > The drive to reduce logistics costs throughout the supply chain is continuing to exert pressure on integrating the transport modes and nodes using satellite-based technologies for seamless route and traffic planning. The Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission (UNCID) estimate the costs of data flows associated with international trade to be between 4 and 7% of the value of the goods.
- > A central trend in global manufacturing in the next decades is likely to be the customisation of mass produced products. A part of the mass customisation is providing improved and timely information to customers, increasing perceived value of logistic services. This strengthens the drive for the development of increasingly 'Intelligent' Supply Chains.

- > The cost of congestion, or 'bottlenecks', in the Irish supply chain, and the scarcity of infrastructure space are key challenges in the logistics sector, both on a national and global scale.
- > The Irish exports profile is expected to continue to change to more high-value, knowledge-based products. It is also believed that the imbalance in the trade balance in favour of imports will continue, This presents challenges in the change of pattern of shipping and logistics supply chains.
- > There is no long-term or continuous central master plan for the shape and future role of Irish ports and their important macro position as facilitators to the Irish economy.
- > R&D intensity is currently very low and there is an acknowledged gap in strategic research aimed at building up maritime logistics knowledge in terms of business expertise and maritime economics. There is also a lack of detailed information on port productivities benchmarking.
- > The ports and maritime logistics sector is not traditionally innovative. Companies are not generally pro-active in searching for IT solutions to address productivity issues or infrastructure difficulties relating to efficient utilisation of space.
- > The energy market, through rising fuel costs, will continue to have major implications for the sector.

Regulation and Technology

In addition to the opportunities and challenges outlined above, the following regulatory and technological issues will have implications for the future of the shipping and maritime transport sector.

- > Maritime-related activities will be subject to increased regulation.
- > Security issues will be a central element in the regulation of the sector.
- > The 'Polluter Pays' principle and 'Road Pricing' equivalents, such as green taxes, will increasingly be applied to the sector and thus be critical economic factors.
- > The management and control of ships as polluting entities will be integral to the successful operation of the shipping sector.
- > Overall, a convergence of regulations worldwide in relation to environmental matters in the shipping sector is expected.
- > The sector will see increased recognition of the economic, environmental and societal impact of ports. This will affect development of existing and new ports, with, for example, land access issues being important in new ports outside city/urban areas.
- > Technology will play an important role in the development of the sector with, for example, the development of improved IT and logistics systems affecting both its operation and management, and the use of technology to assist in environmental mitigation and design issues.
- > Resources to direct Irish IT expertise towards the area of maritime transportation have not been identified or allocated.

2.1.4 2020 Scenario

2020 SCENARIO

Port and Shipping Services Sector

The Irish shipping and maritime transport sector will have grown at a rate of nearly 6% per annum since 2005. New foreign companies will be attracted to Ireland in the services and technology sub-sectors. Port infrastructure will be fit for purpose and operate efficiently; supported by technology investments.

Ports and Maritime Logistics

This will be a vibrant sub-sector driven by a continuing vibrant economy, with expanded capacity and extensive use of technology. It will have successfully transferred and integrated intelligent transport through its entire supply chain and through its international intermodal traffic management systems, and have developed niche capabilities in supply chain technologies and intelligent traffic handling systems. Ireland will be the 'best connected' island economy in Europe.

Shipping Services and Maritime Commerce

Vibrant new high-growth services will be attracted to Ireland, aided by a pro-business regime and strong R&D.

2.1.5 2013 Objectives

The following objectives have been identified as critical milestones to be achieved by 2013:

2013 OBJECTIVES

- 1 Develop the capacity and capability to plan strategically for the development of the Ports and Shipping sector. This includes the ability to incorporate trade changes, capacity issues, cost and competitive issues, and changing vessel characteristics into planning and investment strategies.
- 2 Establish niche capabilities in the development of Intelligent Supply Chain Management systems and e-commerce technologies.
- 3 Adapt Information & Communications Technology (ICT) and Intelligent Traffic Systems (ITS) applications to national and regional intermodal infrastructure and traffic planning systems.

2.1.6 RTDI Requirements & Key Outputs

The identified RTDI requirements and key outputs for delivering on the 2013 Objectives of the research programme are presented below.

Table 2.1 Research Requirements & Key Outputs for the Shipping and Maritime Transport Sector to 2013

Objectives 2013	RTDI Requirements	Key Outputs
<p>1 Develop the capacity and capability to plan strategically for the development of the Ports and Shipping sector. This includes the ability to incorporate trade changes, capacity issues, cost and competitive issues, and changing vessel characteristics into planning and investment strategies.</p>	<ul style="list-style-type: none"> > Research and establish trade patterns in and out of Ireland by country/region, commodity and mode of appearance > Forecast these trade patterns, considering potential developments, using existing studies or gathering new data where necessary > Establish inland pattern of demand, including future land-use patterns and location of distribution warehouses > Establish capacity of existing system, including ports and inland infrastructure > Research and develop reliable databases of traffic, trade flows and economic time-series from which models can be tried and tested for econometric analysis; thus enhancing our understanding of where, why and how trade is moving, and the strategic requirements of the ports and transport sector to facilitate this trade 	<ul style="list-style-type: none"> > Long-term strategic integrated transport framework that can effectively meet future traffic demands on all transport modes and nodes > Long-term (up to 2020) forecast scenarios of maritime traffic, port developments, port capacity, investment strategies, ownership models, pricing and competitive market factors, changes in manufacturing and industry trends
<p>2 Establish niche capabilities in the development of Intelligent Supply Chain Management systems and e-commerce technologies.</p>	<ul style="list-style-type: none"> > Research and harness existing ICT competence and academic research in Ireland in the areas of traffic management systems (i.e. door-to-door IT structures), integrating tracking and tracing systems and Electronic Data Interchange systems > In collaboration with global shippers based in Ireland, research and identify methods and technologies to increase efficiency of the supply chain in Ireland to reduce time deficiencies and increase cargo productivity 	<ul style="list-style-type: none"> > Advanced logistic chain management systems and tools that will optimise supply chain performance for Irish and international shippers moving goods inwards and outwards from Irish ports
<p>3 Adapt Information & Communications Technology (ICT) and Intelligent Traffic Systems (ITS) applications to national and regional intermodal infrastructure and traffic planning systems.</p>	<ul style="list-style-type: none"> > Collaborate with existing transport planners and users of ITS and GIS applications to adapt existing know-how for broader intermodal traffic planning > Research the feasibility of applications that would enable planning, simulation, and routing of traffic along the different transport modes and nodes. The planning tool should also have the objective of simulating scenarios to match forecast traffic and capacity requirements on a regional and national basis 	<ul style="list-style-type: none"> > Software applications that can cost-effectively meet objectives > Performance evaluation of pilot and recommendations for further actions

2.1.7 RTDI Capacity/Capabilities

Current Research Capacity

Third-level Sector

There is very little dedicated research associated with shipping and transport in the third-level sector in Ireland. However, there are currently a number of research groups and individual researchers (approximately 35 researchers in total) within the third-level sector with skills and technology that are directly relevant to the objectives outlined above. The research focus of these groups includes the areas of supply chain management and logistics, advanced technologies and logistics trends, spatial analysis, GIS technologies, e-commerce, maritime law, transport economics and policy research, and ICT.

One third-level institute undertakes dedicated maritime transport research. Through the Marine RTDI programme of the NDP, the Marine Institute is currently funding a PhD at the International Maritime Studies Institute (National College of Ireland) focusing on research into maritime clusters.

The National Maritime College of Ireland is primarily an education and training facility with an important role in contributing to a vibrant shipping industry. It has the potential for research in the future.

Table 2.2 Research Groups with Capabilities Related to Shipping and Maritime Transport

Institute	Research Focus	Institute	Research Focus
NUI Galway	Marine law and ocean policy International Law of the Sea E-commerce market cluster research	TCD	Sustainable freight distribution
DCU	Transport economics and policy research Logistics and trade corridors	Tipperary Institute	Focus on levels of ICT & plans for upgrading Mapping of e-commerce activities ICT regional strategy development
NUI Maynooth	Geocomputation Spatial analysis Intelligent and graph based systems research	UCC	Constraint-based reasoning and programming Infrastructure modelling Planning & scheduling Supply chain modelling
UCD	Supply chain management		

State Sector

The Irish Maritime Development Office (IMDO) is involved in promoting and supporting research activities. Research topics include port productivity, ro-pax ferries, ICT in ports, origin destination of traffic, Inter-European trade corridors and the potential development of a maritime cluster in Ireland. The data generated by this research are used by industry and state bodies to increase the level of understanding of the importance of the shipping industry and to develop Ireland's potential as a globally competitive market for shipping and related services. The IMDO also promotes participation in the European Union's research agenda.

Industry

The commercial maritime transport sector conducts very little research, with the exception of market analysis for the development of new services or analysis of future demand. However, industry has

expressed interest in, and is providing support for, R&D initiatives carried out by and through the IMDO.

There are a number of small private companies participating in international research programmes and offering consultancy expertise in the areas of modelling intermodal transport networks, ICT for maritime transport and logistics, port and terminal operations, safety at sea, and shipping and environmental law.

Identification of Research Skills/Competencies to Meet Future RTDI Requirements

A summary, based on the identified future RTDI requirements, of the competencies required to meet the 2013 Objectives, is presented in Table 2.3. Also included in Table 2.3 is an assessment of whether there are current strengths (S), areas that require strengthening (R), or gap areas (G), in relation to the identified requirements, within the existing research community.

Table 2.3 Competencies Required to Meet Future Research & Innovation Requirements for the Shipping and Maritime Transport Sector

Objectives 2013	Competencies Required	Assessment
1 Develop the capacity and capability to plan strategically for the development of the Ports and Shipping sector. This includes the ability to incorporate trade changes, capacity issues, cost and competitive issues, and changing vessel characteristics into planning and investment strategies.	> Strategic development in relation to planning for ports	R
	> Economic research	R
	> Quantitative and qualitative analysis of key components	R
	> Econometric modelling and data analysis	G
	> Traffic and trade flow expert analysis	G
2 Establish niche capabilities in the development of Intelligent Supply Chain Management systems and e-commerce technologies.	> Market research and benchmarking of existing ICT	S
	> Strategic planning for ICT	G
	> Developing tools for optimal supply chain performance	G
3 Adapt Information & Communications Technology (ICT) and Intelligent Traffic Systems (ITS) applications to national and regional intermodal infrastructure and traffic planning systems.	> Market research	R
	> Route and traffic planning and management	R
	> Application development for planning, simulation and routing of traffic	R
	> Identification and promotion of new and innovative technology development	G

* S – Current Strength; R – Requires Strengthening; G – Gap Area.

The lack of third-level participation in the area of maritime transport research is a constraint to the development of the sector. Many third-level institutions and private companies have research strengths in a range of disciplines that are not currently, but potentially could be, applied to shipping and maritime transport. The challenge lies in attracting and harnessing appropriate research groups to develop and apply their skills to the specific RTDI needs of the maritime transport sector.

Current Strengths	Require Strengthening	Gaps
<ul style="list-style-type: none"> > Market research and benchmarking of existing ICT 	<ul style="list-style-type: none"> > Strategic development in relation to planning for ports and shipping > Economic research > Quantitative and qualitative analysis of key components > Market research > Route and traffic planning and management > Application development for planning, simulation and routing of traffic 	<ul style="list-style-type: none"> > Econometric modelling and data analysis > Traffic and trade flow expert analysis

Figure 2.1 Research Competencies Required to Meet 2013 Objectives for Shipping & Maritime Transport

2.1.8 Prerequisites for Achieving Objectives

The following are considered as prerequisites for the successful delivery of the objectives for the shipping and maritime transport research programme:

- > A fully integrated transport policy for the island of Ireland;
- > Significant investment in port infrastructure needs and major improvement in port productivity and work practices (e.g. move to 24 x 7 operations);
- > Joint agency/enterprise/academic initiatives to identify existing ICT technologies that have the potential for port and maritime logistics applications in GIS-based transportation planning systems, e-commerce logistics and supply chain design technologies; and
- > Identification of world leaders in logistics and distribution (or shippers) who are based in Ireland to partner and test the new technologies listed above.