TRANSPORT POLICY, LAND-USE DYNAMICS AND ECONOMIC DEVELOPMENT PATTERNS: SCENARIO MODELLING FOR THE DUBLIN-DUNDALK-NEWRY-BELFAST CORRIDOR




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Transport infrastructure improvements are frequently dealt without adequate consideration of land-use management issues. Theoretically, this would not appear to be consistent with urban economic theory which prioritises the critical role that transportation plays in all urban economic spatial land-use patterns. This linkage between transport and land-use is clear in the evolution of theory from central place theory through to concentric theory and to modern thinking in economic development based on agglomeration and synergy effects. Additional complexities arise in cases where such investments are across administrative borders / jurisdictions or national borders which necessitate collaborative working – and detailed research.

In this paper, we examine policy evolution as well as recent policy outcomes and trends in the Dublin-Dundalk-Newry-Belfast Corridor in light of the major infrastructure investment which has occurred. This is based upon official data for the time period mid-1990s (when many investments commenced) to 2012 (completion and use of those investments). It will investigate recent trends in terms of emerging economic development patterns since the creation of the M1 motorway and improved rail links, and will incorporate spatial analytic modelling of current and future development trends along the Corridor. Analysis will concentrate on the Greater Dublin Region (GDR) as an example of land-use modelling along this strategic Corridor – and what such analysis can tell us in terms of future development patterns. While this research is specifically concerned with the transport-land-use interface, it is clear that related policy issues arise in relation to other cross-border development initiatives in areas such as energy infrastructure across the island of Ireland, the EU and internationally.

Evolving Transport and European Union Policy Trends

It is recognised that major implementation difficulties must be addressed to achieve cross-border infrastructure development. These arise initially in terms of funding, and later in terms of working within differing planning, procedural and local government systems. In addition, it is increasingly clear that international and European Union (EU) environmental legislation and Directives means that interregional management and planning systems need to be better aligned.

Within Europe, transport initiatives have been assisted by EU funding of interregional cross-border infrastructure projects. International, and particularly EU Policy, recognises the importance of modern high-capacity transport links and hubs for all modes

of transport, and this has led them to the definition of the trans-European transport corridors which, in turn, make up the Trans-European Networks (TENs)[1]. Further, the Treaty establishing the EU provides a sound legal basis for the TENs[2]; the development of TENs being seen as a key element for the creation of the Internal Market, and the reinforcement of Economic and Social Cohesion. This development includes the interconnection and interoperability of national networks, as well as access to such networks[3].

The European Commission (EC) has in recent decades placed considerable emphasis upon spatial planning which undoubtedly has a key role to play in establishing the trans-European transport networks (TEN-T). In practice, there is a growing awareness of the increased need for coordination in the planning of infrastructure projects across the Member States. In this regard, the TEN-T Guidelines are the Community's instrument for policy definition and network planning. They include two planning layers: a comprehensive network layer – that is, plans for rail, road, inland waterway, combined transport, airport and port networks – and a second layer of 30 priority projects (CEC, 2009a).

TENs have contributed a lot to enhance transport's environmental performance. However, the EC accepts that the transport system is not yet sustainable and looking 40 years ahead, that transport cannot develop along the same path. Recognising that transport is fundamental to our economy and society, the new White Paper, *Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*, aims now to achieve transport sustainability by promoting competitiveness, reducing environmental impact and enhancing quality of services and jobs (CEC, 2011).

In this new roadmap, the Commission state that sustainable transport systems are a crucial element for achieving smart, inclusive and resource efficient growth in Europe – as defined in the *EU Horizon 2020 Strategy*. As such, the EC has adopted a roadmap of 40 concrete initiatives for the next decade to build a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. These include, for example:

- A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services;
- By 2050, to connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight; and
- Define the measures necessary for further integrating different passenger transport modes to provide seamless multimodal door-to-door travel.

At the same time, the proposals are geared towards dramatically reducing Europe's dependence on imported oil and cut carbon emissions in transport by 60% come 2050[4].

A key priority set in *Horizon 2020* is to support research on practical issues identified in the *Europe 2020 Strategy* (heretofore referred to as EU2020). For this purpose, six societal challenges have been specified, one of which is 'smart, green and integrated transport' (CEC, 2010) which entails innovating for a competitive and resource-efficient transport system (Petrov et al., 2011; see www.transport-research.info). Further, in line with the flagship initiatives, the targets in core areas of transport research and innovation for 2020 are:

- Resource-efficient and environmentally sustainable mobility;
- Better mobility;
- Competitiveness of the European transport system; and
- Supporting policy-making (CEC, 2010).

Broader EU Policy Trends

Initiatives at EU level include also the European Territorial Cooperation 2007-2013 (ETC) which operates at three dimensions: cross-border

cooperation, transnational cooperation and interregional cooperation. The ECT supports policy development related to EU Cohesion Policy and has reached 75 cross-border programmes (including external EU borders), 13 transnational programmes, 1 interregional programme, INTERREG IVC, and the three networking programmes: URBACT (Connecting Cities Building Successes), ESPON (European Observation Network for Territorial Development and Cohesion) and INTERACT[5].

The INTERREG programmes are clearly geared to cross-border development studies; providing as it does funding for interregional cooperation across Europe. At the moment, INTERREG IVC supports two types of projects: Regional Initiative Projects and Capitalisation Projects. The overall objective of the programme is to improve the effectiveness of regional policies and instruments, and is linked to the objectives of Lisbon and Gothenburg agendas. Additionally, on the island of Ireland the Special European Union Programmes Body (SEUPB) has funded on-going PEACE and INTERREG programmes for border areas which have experienced reduced investment – in part due to the previous political conflicts (Yarwood, 2006).

In terms of networking, URBACT is an European exchange and learning programme promoting sustainable urban development[6] while INTERACT is the European programme which was created in 2003 especially to assist the territorial cooperation programmes. Of particular relevance to this discussion is the ESPON Programme which provides comparable information, evidence, analyses and scenarios on framework conditions for the development of regions and larger territories. In doing so, ESPON expects to facilitate the mobilisation of territorial capital and potential, contributing to improving European competitiveness, territorial cooperation and enabling sustainable and balanced development. Research on the *Case for Agglomeration Economies in Europe* (CAEE), published by ESPON in 2009[7], included an examination of the Dublin City-Region in terms of the growing differences in the economic importance of urban areas and the importance of governance arrangements in maximising the potential of functional economic areas. The study found that urbanisation economies, which result from being located within an 'industrial core urban region', have become more important in recent decades than localisation economies which are related to industry clustering by sector (industry size) (ESPON, 2009: 5).

National Strategies: Linking Land-Use and Transport Policies

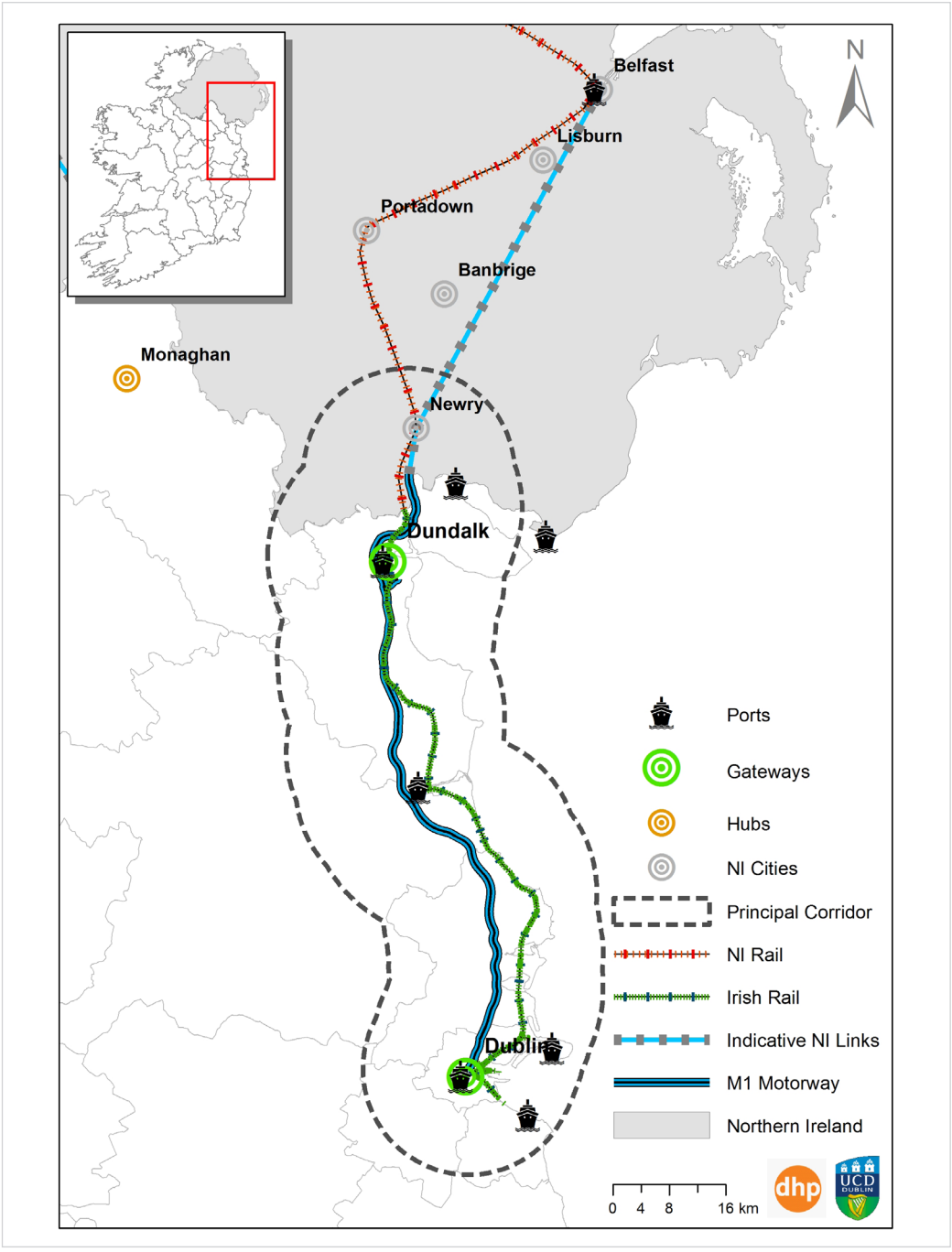
Land-use plays an important part in, and should be intrinsically linked to, transport policy. In practice, land-use policies may be somewhat limited within the bounds of existing cities and administrative areas (Santos, 2010). But as cities grow and new regions evolve, policy-makers need to increasingly place more emphasis on understanding and linking land-use and transport on a broader basis than in the past.

The core aims of the *European Spatial Development Perspective* (ESDP), which has evolved common European approaches in managing development, have been adopted over the past decade by a number of member states in developing strategies for urban-rural relationships. This includes on the island of Ireland. The approaches contained in strategic planning policies as represented in the *Regional Development Strategy* (RDS) for Northern Ireland (DRD, 2001; DETR, 2000) and the *National Spatial Strategy* (NSS) for Ireland (DoELG, 2002) embody concepts of polycentric spatial development based on economic and transport linkages, and cross-border cooperation. The internal and external transport and communication linkages are expressed in terms of "gateways", within the context of regional systems and diversified development strategies.

The Dublin-Dundalk-Newry-Belfast Corridor

The Dublin-Belfast Corridor, which also serves Dundalk and Newry, is the most significant economic region on the island of Ireland; accounting for approximately 50% of the output of the island (see Figure 1). Over 2 million people live in the corridor, out of 6 million on the whole island. Transport wise,

Figure 1: The Dublin-Belfast Corridor



Source: UCD & Downey Hynes Partnership, 2012

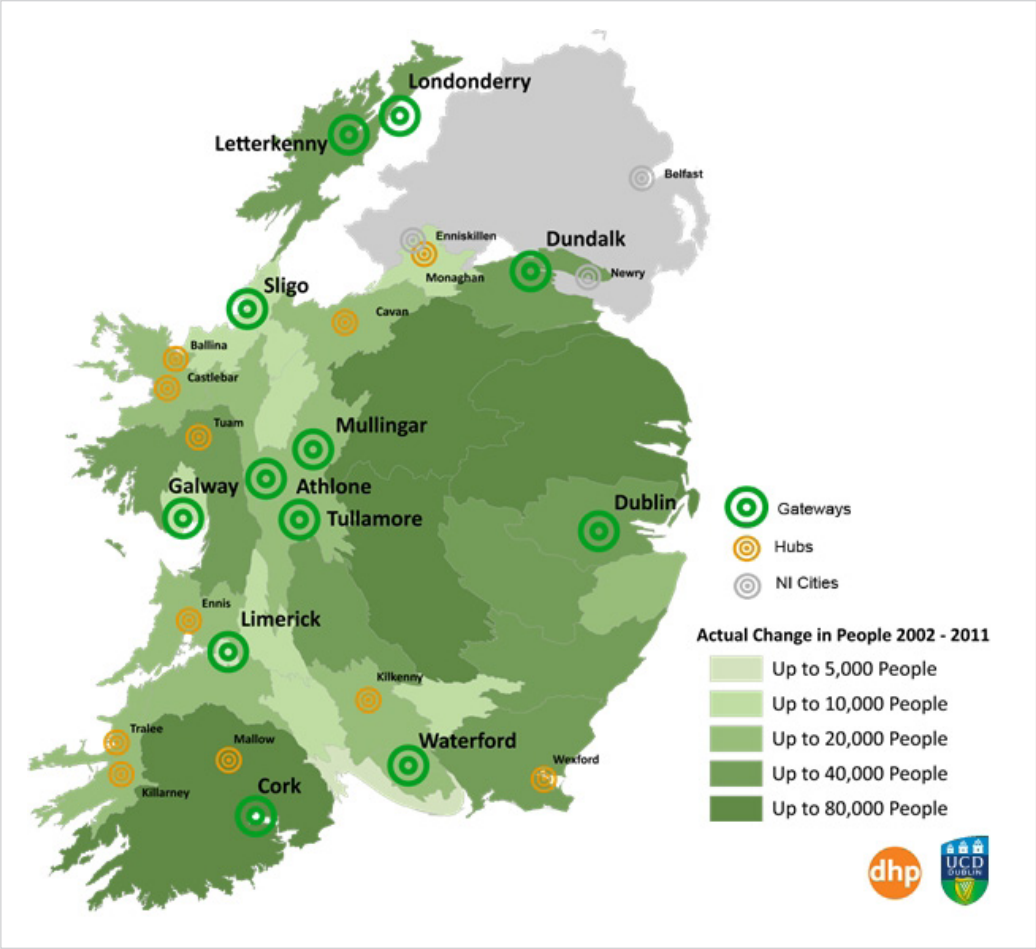
the Corridor is approximately 160 km in length and is defined by the M1-N1-A1 motorways connecting the two cities. There are three major airports serving not only the region but the island as a whole – Dublin Airport, Belfast International Airport, and Belfast City Airport – which deal with 32 million passengers each year[8]. In addition, there is one train line connecting the cities of Dublin, Dundalk, Newry and Belfast, with a connection time of 127 minutes between Dublin and Belfast with eight trains per day in each direction (Morgenroth, 2011).

At a policy level, the *Regional Development Strategy* (RDS) for Northern Ireland (DRD, 2001) identifies the importance of the Corridor in the context of the Belfast Metropolitan Area and the designation of growth towns such as Banbridge and Newry. Similarly, the *Strategic Planning Guidelines for the Greater Dublin Area* (GDA) and the statutory development plans for North Dublin (Fingal) also place an emphasis on the importance of the Corridor particularly for future development planning of the Newry-Dundalk 'Twin City' Region. The Strategic Guidelines include the development of a polycentric / multi-centred urban system to strengthen partnership between urban and rural areas and promote integrated transport and communications concepts.

Since 2006, with the publication of the Buchanan Report on the Newry-Dundalk 'Twin-City' Region, there has been a number of studies and activities, supported by both Governments on the island, to build the cooperative relationship between these settlements (ICLRD, 2010; ICLRD, 2009). It is recognised that through joint actions and shared policies, the 'Twin-City' Region can benefit from its strategic location on the Dublin-Belfast Corridor. Such cooperative action culminated with the signing of a Memorandum of Understanding (MOU) between Newry and Mourne District Council, Louth Local Authorities and Dundalk Town Council in 2011 which has committed the local authorities to joint action – leading to mutual benefit – in the areas of spatial planning, emergency services, tourism and conservation to name but a few. The practical benefits of cooperation between the two administrative systems are reflected in the efficiencies in providing economic infrastructure and the pooling of expertise. It also allows the sharing of good practice and improved efficiencies in enterprise development and sustainable management of the Twin-City's unique natural heritage (ICLRD, 2009).

The future of urban regions across the island of Ireland and within Europe is dependent on a combination of policies involving economic competitiveness, social cohesion and environmental quality as essential requirements in delivering a sustainability agenda. Development processes influencing such policies include a combination of factors. Firstly, the restructuring of economic activities is resulting in shifts towards high technology industries and internationally traded services. Secondly, the agglomeration of economic activities is being encouraged as commercial enterprises cluster to achieve economies of scale. Finally, the emergence of economic corridors within urban regions are experiencing strong development pressures, particularly along the main transport axis which link urban areas and smaller settlements. The extent to which policy aspirations are being achieved and not achieved in Ireland can be seen in Figure 2a which shows the actuality of development as represented by location analysis of population changes to 2011. Figure 2b provides population change between 2002 and 2010 within the District Councils of Northern Ireland. High population growth areas are found along both the A1 and M1 transport corridors. Associating urban growth with transport accessibility, the population along these corridors benefit from high levels of connectivity and access to employment opportunities and services. However, from an analysis of employment / unemployment trends – as visualised in Figure 3 – it is clear that while economic activities have developed in the subject area, unemployment remains a major problem, especially in the current recessionary period.

Figure 2a: Actual Population Change to 2011

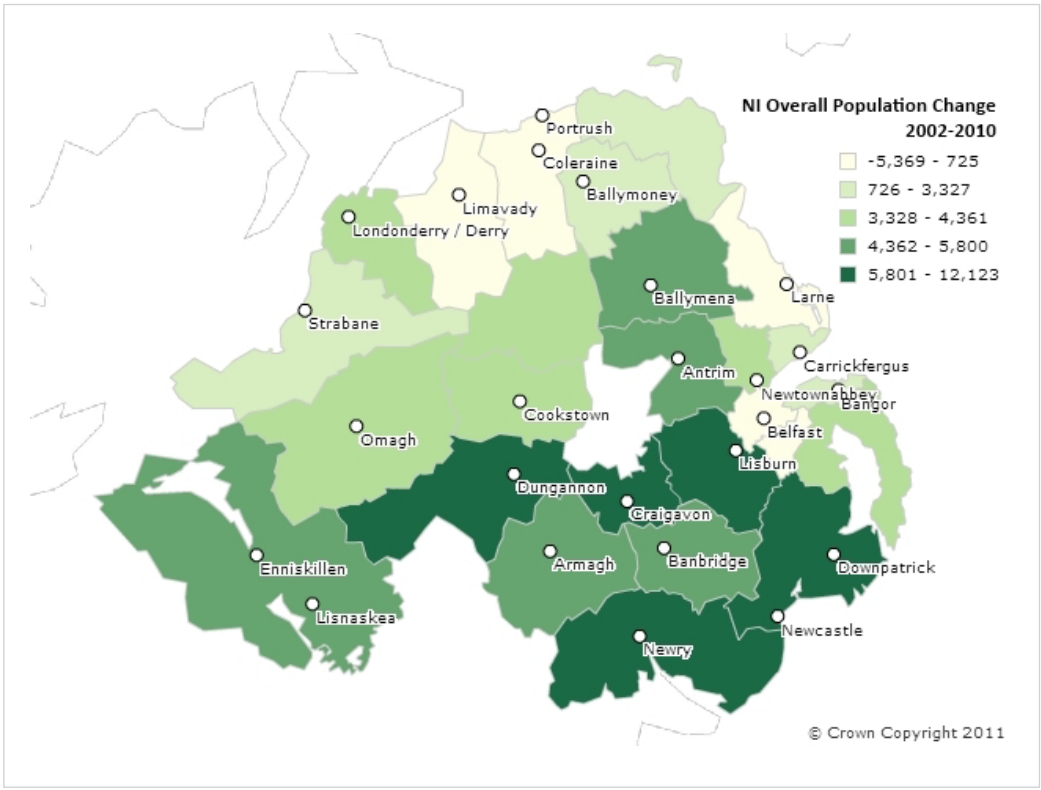


Source: UCD & Downey Hynes Partnership, 2012 - extracted from Central Statistic Office

In this context, the Dublin-Dundalk-Newry-Belfast corridor is identified as a core axis on the East Coast of Ireland (Yarwood, 2006), with the potential to attract inward investment flows from the economies of Europe and the USA. Reports undertaken by business organisations, both North and South, such as the Confederation of British Industry (NI) and the Confederation of Irish Industry, have identified the potential spin-off in terms of economic growth, revenue generated and employment created from enhanced business and commercial links on an all-island basis. Research undertaken on the integration of spatial planning strategies in the all-island context indicates the mutual benefits of collaborative actions on the key transport corridors in core areas such as inward investment, energy, accessibility, accelerated growth, and economic competitiveness through the joined up delivery of public services and infrastructure networks (Inter*Trade*Ireland, 2006).

Key concepts which have emerged as part of policy approaches in both parts of Ireland include:

Figure 2b: Population Change in Northern Ireland, 2002-2010



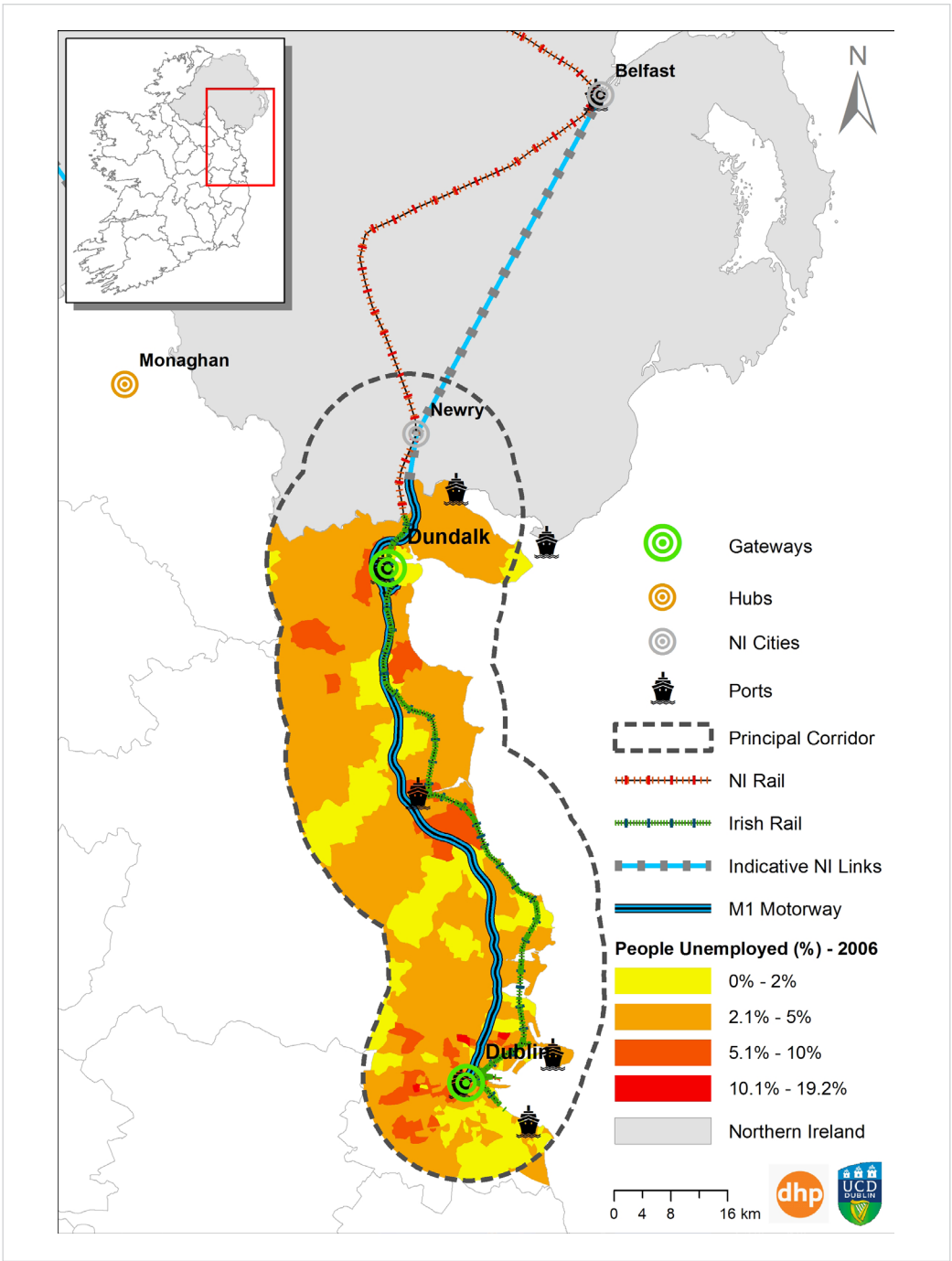
Source: extracted from the Northern Ireland Neighbourhood Information Service (NINIS), 2012[9]

- Urban clusters of neighbouring cities, including cross-border agglomerations;
- Urban networks of cooperating cities; and
- Urban-rural partnerships recognising the linkage of urban and hinterland areas.

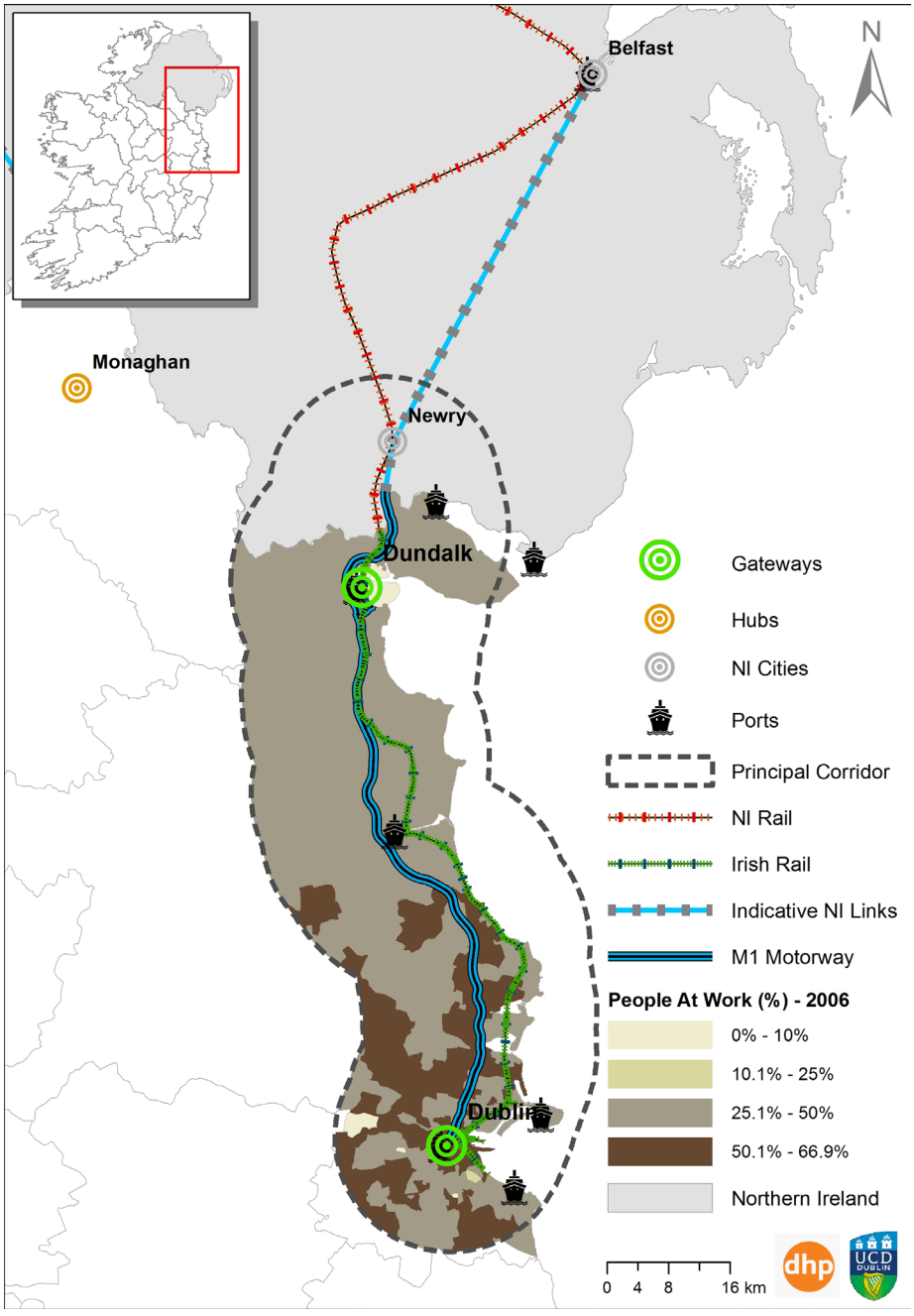
Evidence of Agglomeration and Development Impacts in the Corridor

The growth in urbanisation economies can be especially linked to the services sector growth in Ireland, and Dublin specifically, over the past decade. In this regard, Figure 4 shows the significant clustering of professional, scientific and technical services in the key urban areas nationally, and along the M1 Economic Corridor specifically. This pattern is not confined to the Professional Services sector and was replicated for the Construction and Wholesale and Retail sectors. The M1 Corridor and the extension of business clustering within the GDA can be considered to form a "natural economic area". The ESPON CAEE study (2009) found a positive relationship between employment density and labour productivity which is strengthening; while the geography of economic activity is broadly reflective of a move to higher-value service sector activities – in part facilitated by investment in road infrastructures (ESPON, 2009: 94). In any case, the external economies of a skilled labour force located on a TENS Corridor – such as Dublin-Belfast – are important factors in driving the agglomeration of industry and talent along that corridor. At the same time, however, understanding the magnitude of the affect of external economies as they relate to space and / or time or market size – whether they are

Figure 3: Unemployment/Employment in the Dublin-Belfast Corridor



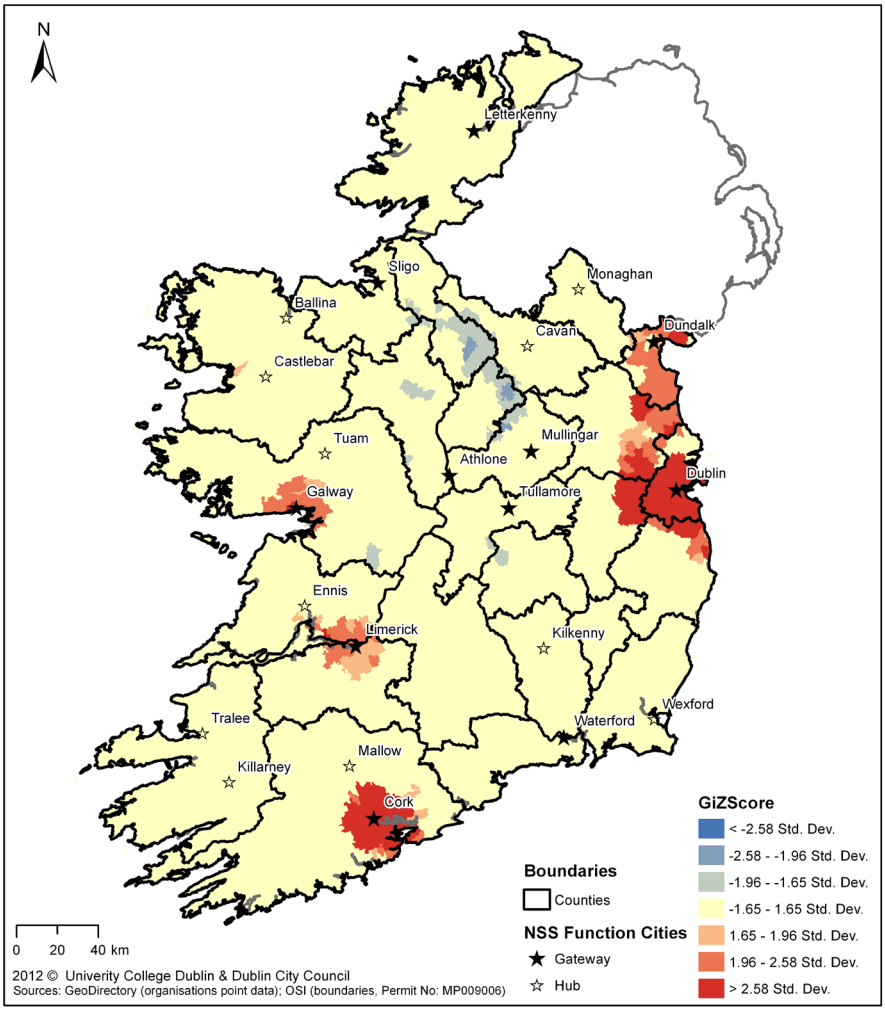
Source: UCD & Downey Hynes Partnership, 2012



Source: UCD & Downey Hynes Partnership, 2012

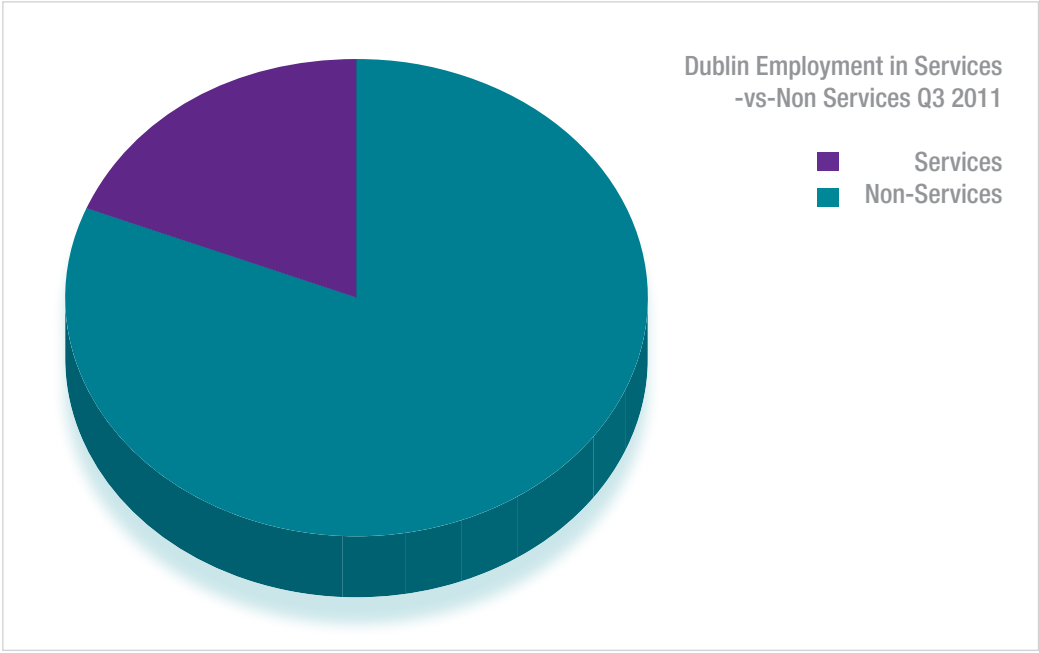
local, national or international – is complicated by the emergence of a stronger economic order and link between, say, Dublin and Belfast - as clearly demonstrated by Figure 4a and Figure 4b. In Figure 4a, services employment is extracted from the An Post Geo-Directory and highlights hot spots of activity for Professional Services, while Figure 4b shows the extent of services employment within the Dublin Region.

Figure 4a: Services Employment – The Strong Economic Linkages from Dublin towards the Irish Border (following the Dublin-Belfast Corridor)



Source: Shahumyan et al., 2012 - extracted from An Post Geo-Directory

Figure 4b: The Extent of Services Employment within the Dublin Region



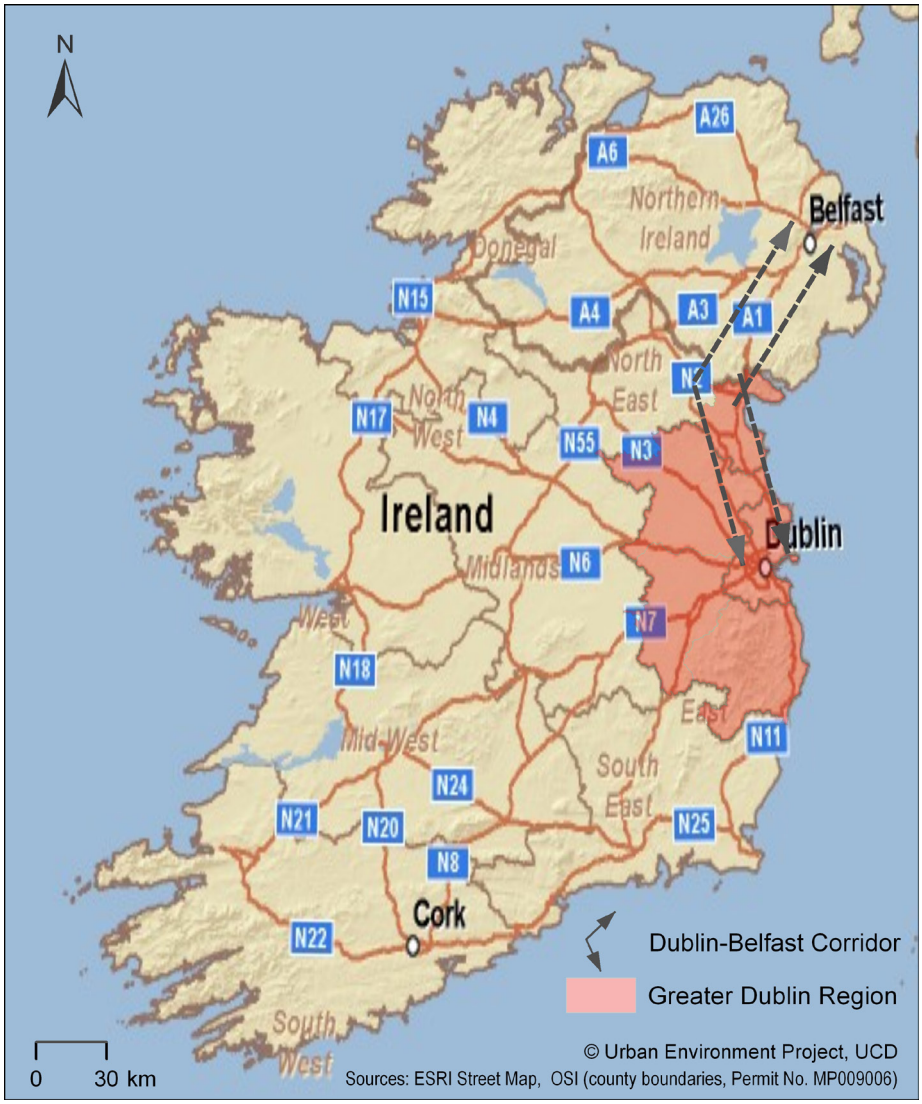
Source: CSO, QNHS Database Direct 2012

Land-Use Modelling: The Greater Dublin Region as a Case Study along the Dublin-Belfast Corridor

In this paper, we include analysis of research results using the MOLAND model, a cellular automata based urban modelling system developed under the auspices of the EU Joint Research Council which was specifically designed for regional development assessment (White and Engelen, 1997). This model was adapted and calibrated for use based on Irish data, and can simulate various urban development scenarios based on land-use change, population growth, socio-economic factors and trends, as well as spatial planning policies. In our research (Petrov et al., 2012), we scaled MOLAND to the cross-border area to analyse the dynamic processes involved in land-use change, and also an understanding of where, and with what intensity, land-take in the transport corridors occurs and how spatial growth patterns change over time. For the investigation of cross-border simulation, we concentrated on areas in the Greater Dublin Region (GDR) from Wicklow to the Irish Border (see Figure 5).

In this exercise and related project[10], the research team used land-use maps of 1990, 2000 and 2006, maps of existing and planned transport networks in the GDR, and maps of suitability and zoning. The research developed four future scenarios – business-as-usual (BU), compact development (CD), managed dispersed (MD) and recession (R)[11]. Over an extended time period, stakeholders participated in building the scenarios as well as using the MOLAND model. They tested how future scenarios, or storylines can be translated into quantitative scenarios and how the final results can be interpreted in policy research outputs. From this exercise, the four land-use scenarios for the Dublin-Belfast Corridor to the year 2026 were developed as represented in Figure 6 (Petrov et al, 2012)[12].

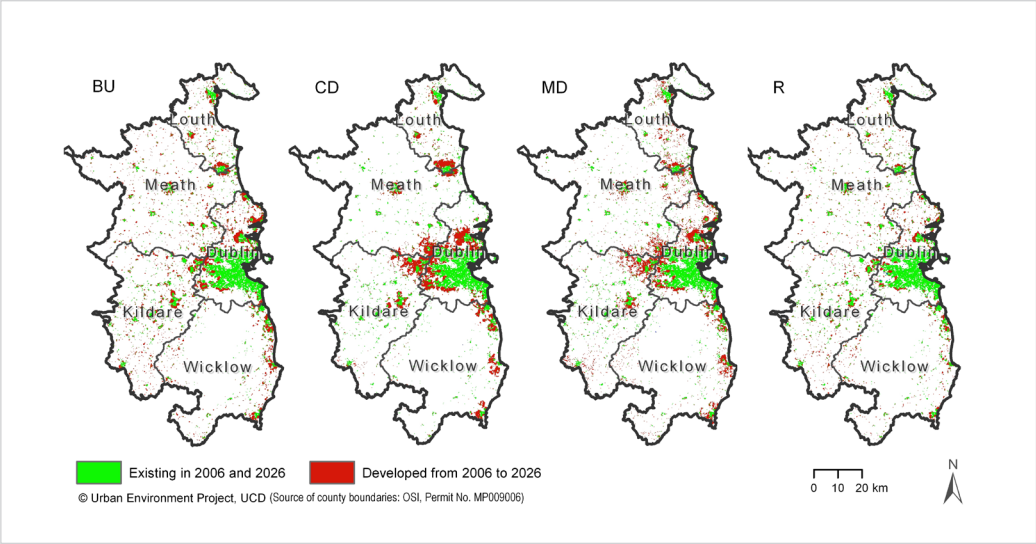
Figure 5: The GDR and Dublin-Belfast Transport Corridor



Source: Adapted from ESRI Street Map and OSI boundaries

In Figure 6, comparisons are illustrated between the actual urban development in 2006 (green) and urban areas to be developed from 2006 to 2026 (red) for the four alternative scenarios. Expansion and infrastructural changes are expected due to the dominant role of the GDR in Ireland, and also the Dublin-Belfast Transport Corridor that is identified as a core axis on the East Coast. It is clear that the

Figure 6: Land-Use 2026 Scenarios of the GDR



Source: Shahumyan et al., 2011 - Urban Environment Project, UCD

future urban development has a North West direction (following the Dublin-Belfast Corridor) in all four scenarios.

Between 2006 and 2026, the highest increase in the development category residential sparse can be seen in Business as Usual (BU) and Managed Dispersal (MD) scenarios; the highest growth rate of 220% is foreseen in Co. Meath. Among the five Southern counties analysed, the commercial activity is highest in Louth and Meath counties in all scenarios. For example, in the Compact Development (CD) scenario, the commercial areas reach a growth of 262% in Co. Louth, followed by 246% in Co. Meath. In general, the industrial, commercial and services activities show a significant increase in Meath and Louth which are located along the Dublin-Belfast Corridor. Details for Industrial Land-Use can be seen in Table 1 and for Services in Table 2.

Table 1: Percentage Change in Industrial Land-Use from 2006 to 2026

Counties	BU	CD	MD	R
Louth	122	154	122	52
Meath	98	201	97	49
Dublin	4	52	23	-12
Kildare	100	216	109	52
Wicklow	120	182	119	57

Source: Urban Environment Project, UCD, 2011

Table 2: Percentage Change in Services Land-Use from 2006 to 2026

Counties	BU	CD	MD	R
Louth	129	194	129	0
Meath	144	278	167	44
Dublin	17	62	28	17
Kildare	115	231	152	40
Wicklow	100	300	190	10

Source: Urban Environment Project, UCD, 2011

Economic analysis of the Dublin-Belfast Corridor indicates that the counties adjacent to the Irish Border (Down and Louth) benefit significantly from spill-overs from the Dublin and Belfast metropolitan poles. Whilst, the region overall has benefited from significant investment in road infrastructure with the completion of the M1 from Dublin to Belfast, both Louth and Down have large levels of manufacturing activity in high technology areas, with many plants owned by foreign companies or indigenous plants serving international markets[13].

In addition, preliminary analysis of travel to work destinations taken from the CSO Census 2011 shows the extent of gravitation to the Dublin Region rom County Louth, with 14% of persons who are resident in the County and working having jobs based within the Dublin Region (CSO, 2012). Future analysis is planned to ascertain the levels of cross-border migrations for employment purposes.

Conclusion

In conclusion, the Dublin-Belfast Corridor has been identified as a core axis as economies in Europe, and more particularly on the island of Ireland, evolve. Reports undertaken by public bodies and business organisations, both North and South, have identified the potential spin-off in terms of growth, revenue generated and employment created from enhanced business and commerce links.

With increasing cooperation, including the development of institutions – notably the Northern Ireland Assembly and various North-South cross-border bodies – it is now realistic to reassess the future potential of areas within the Dublin-Dundalk-Newry-Belfast Corridor. Importantly, both the authorities and strategic plans in Northern Ireland identify the importance of urban areas such as Newry and similarly, the NSS, Strategic Planning Guidelines for the Dublin Area and the Statutory Development Plans for North Dublin (Fingal) place great emphasis on the importance of this North / South corridor in future development planning. If borders are to cease being barriers to integration in transportation and land-use planning terms, then agencies and systems need to be able to communicate, liaise and act effectively together in priority areas. This will involve an integrated approach to the strategic planning and implementation of cross-border infrastructure and land-use investment and development.

Developing this research project further, the authors' next steps include considering the potential expansion of the MOLAND analysis to link up with related economic and spatial development research in Northern Ireland, and exploring good practice in international case studies of cross-border cooperation relating to transport and land-use areas.

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Endnotes

[1] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Transport_infrastructure_at_regional_level#Further_Eurostat_information

[2] See Chapter XV of the Treaty; in particular Articles 154, 155 and 156.

[3] http://ec.europa.eu/ten/index_en.html and www.transport-research.info

[4] See http://ec.europa.eu/transport/themes/strategies/2011_white_paper_en.htm for further information.

[5] See http://www.interact-eu.net/etc/etc_2007_13/4/2 for further information

[6] It includes 29 counties and 300 cities.

[7] The National University of Ireland Maynooth examined agglomeration economies in the Dublin Region as part of this project.

[8] This figure is made up of 25million passengers using Dublin Airport in 2008, 5million passengers using Belfast International Airport in 2007 and 2million passengers using Belfast City Airport in 2007.

[9] See http://www.ninis2.nisra.gov.uk/public/SearchResults.aspx

[10] See www.uep.ie for further information.

[11] These scenarios were developed in cooperation with the stakeholders from the local and regional administrations.

[12] Earlier research findings on population and employment projections (CSO, 2006) are used in the MOLAND simulations and are outlined in Petrov et al., 2011.

[13] For further information, see http://www.crossborder.ie/research/normal-business-restored

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