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Making Connections: The Socio-Economic Impacts of an All-Wales Integrated Transport System

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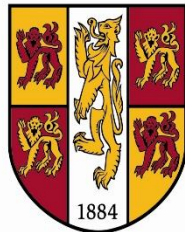
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**Making Connections:
The Socio-Economic Impacts of an All-Wales
Integrated Transport System**

Marc Lewis

**A Thesis Submitted in Fulfilment of the
Requirements for the Degree of Doctor of
Philosophy**

1st March 2023

Prifysgol Bangor / Bangor University

Abstract

The findings: Wales displays relatively high levels of urban and rural deprivation and low economic development in comparison with other European countries. Across a range of socio-economic indicators Wales performs less well than other parts of Europe. The Joseph Rowntree Foundation (2016) estimated that 20% of public services expenditure was related to poverty.

The thesis research question asked

“Is there evidence from other small European countries (the Netherlands, Switzerland, Catalonia, Ireland and Scotland) that an integrated transport system could assist in addressing Wales’ intractable levels of poverty and deprivation and problems of economic development? If so, what would such a transport system look like and how would it operate?”

Evidence indicated that integrated transport systems can address issues of economic performance. The four countries with high and medium levels of transport integration, The Netherlands, Switzerland, Catalonia and Ireland, all had better levels of economic performance than Scotland and Wales. Consequently, more resources were available for other sectors of the economy, including poverty and deprivation reduction. It is suggested that transport integration facilitates economic agglomeration effects by providing faster, more reliable physical links between markets and nodes of production.

Three models for a Welsh integrated transport system were examined. The Dutch national scheme, the Swiss regional transport unions, and the Catalan metropolitan transport authorities. It was recommended that a version of the Dutch system be adopted, this combines a high level of inter-modal service integration with a national public transport smart card that charges passengers per kilometre travelled.

No hard evidence supported a positive answer to the research objective question

“Does transport investment free government expenditure for other sectors of the economy?”

However, as noted above, economic activity was higher in those jurisdictions with high and medium integration.

There was evidence that expenditure on integrated systems was effective in achieving planning, social, economic development and environmental objectives. These were not possible to capture in a deregulated transport environment because of ownership issues and lack of service stability. However, there were no direct positive indications to the question

“Are integrated public transport systems an effective way of minimising capital and revenue expenditure on transport?”

The question

“What would an integrated public transport system look like and how would it be organised?”

provoked a clear view from questionnaire and interview responses that the ‘one size fits all’ approach to public transport provision is not effective. Not only strategic and regional services were needed but also tertiary level services connecting villages with each other and local towns, and at times when conventional services did not operate. Consequently, an integrated network would incorporate demand responsive services.

Contribution to Academic Knowledge: The integration of Wales within the legal jurisdiction of ‘England and Wales’ results in most transport studies and data being at an ‘England and Wales’ level. This is inadequate given the different cultural, geographical and socio-economic conditions in the two countries. Whilst there is a body of historical work available, particularly on development of the railway system, transport in Wales, and its relevance to economic development, poverty and deprivation reduction, is a relatively unstudied area from an academic point of view. This study provides seeks to provide a foundation for further research.

Also, by using transport and socio-economic statistics from five other European countries to achieve international comparisons with Wales, and the use of government reports and other sources, this study provides a new strategic and comparative overview of the situation in Wales.

Finally, by analysing questionnaire and interview data the work formulates thirteen recommendations for policy makers and stakeholders to consider in the areas of transport policy, poverty and deprivation and economic development.

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Introduction

I.1 Introduction

Early transport initiatives such as the turnpike toll roads, canals, and first public railways were sanctioned by enabling acts of parliament which permitted land acquisition, construction and operation. Bogart (2004), the UK Parliament (2023), and Dawson (2020) all reference this type of legislation which is typical of the 'laissez-faire' economic approach of the late 18th and early 19th centuries. Health and safety concerns began to emerge through the experience of railway operation in the early lightly regulated environment. The Regulation of Railways Act 1871 is considered to be the basic legislation of modern railway safety (ORR, 2015).

A recognition of the importance of transport to wider society, and to the economy, was expressed through the Railways Act 1921 (UK Parliament, 1921). This grouped the main line railways into four large companies for reasons of economy and efficiency. Also, the later London Passenger Transport Act 1933 (UK Parliament, 1933) consolidated London's underground railways, tramways and buses into the London Passenger Transport Board, London Transport, to provide a coordinated service to the UK capital.

Subsequently, in the post-second world war period, the debate between state owned or privatised transport, 'predict and provide' highways planning or traffic restraint, deregulated service operation or integrated transport networks, has provoked polarised political positions in the area, and abrupt changes of public policy to reflect this. An increasing trend, has been a tendency for governments, irrespective of political allegiance, to require transport to be involved in 'cross-cutting' policy initiatives in the areas of land use planning and sustainability, access to goods and services, poverty and deprivation relief, disability issues, and an aging demographic profile. Lyons (2003) in his paper "Transport and Society" discusses this tendency, and the social, economic and political issues involved.

The Welsh Government has a consistent history, dating from the establishment of devolution in 1999, of championing sustainable, integrated, and policy cross-cutting transport. This has been an incremental process of policy, institution, and service

building. The latest expression of this is “Llwybr Newydd: the Wales transport strategy 2021” (Welsh Government, 2021) which is discussed in depth in Chapter 1.

I.2 The Research Question

This research argues that Wales has been held back by chronic under-investment in its transport infrastructure and public transport services (Evans, 2017). The consequence of this has been to restrict the economic development that could relieve the structural poverty and deprivation that has developed in the wake of the restructuring of the Welsh economy, especially that of the extractive and manufacturing industries. Day (2015, pp. 68-72) describes the cultural, geographical and social complexity of this situation in the Upper Afan Valley pointing to the closure of the coal pits, and the loss of the successor manufacturing jobs which has obliged people to travel out of the valley for work. He identifies problems of entrenched poor educational achievement, low-skilled and low-paid work, long-term limiting illness, and a population half of which is economically inactive.

My research set out to test whether greater transport integration in Wales was possible, what form, or forms it might take, and what this might mean for Welsh economic development, and the impacts on poverty and deprivation, were it to be achieved. It did this by examining the development of better integrated transport systems in the Netherlands, Switzerland, Catalonia and Ireland and by analysing how the Scottish and Welsh systems reached their current sub-optimal situations. It also compared socio-economic data from all of the exemplar countries to draw conclusions about the wider impacts of integrated transport systems.

The research question is:

“Is there evidence from other small European states/autonomous regions (The Netherlands, Switzerland, Catalonia, Ireland and Scotland) that an integrated transport system could assist in addressing Wales’ intractable levels of poverty and deprivation, and problems of relatively low economic development? If so, what would such a transport system look like and how would it operate?”

Five international comparisons are made with Wales. The choice of these smaller European countries was dictated by the integration categories which were formulated

to compare the different systems. These were i) high transport integration: the Netherlands and Switzerland, ii) medium integration: Catalonia and Ireland, and iii) low integration: Scotland and Wales.

The importance of this research question is that it mobilises the following research factors:

- The exemplar countries and their related data act not only as exemplars, but also as controls to analyse the situation in Wales
- Comparing Wales with European examples expands a discussion that is usually conducted within just a British context
- The European examples as ‘actual, existing, integrated systems’ have potential for providing justifications for different levels of future Welsh transport investment
- The research question has provided the basis for a research design that has generated data for the recommendations to Welsh Government and stakeholders in the ‘Conclusion.’

I.3 The Related Research Objectives

The related research objectives were to examine evidence that transport investment does produce positive economic and social outcomes by asking:

- Does transport investment free government expenditure for other sectors of the economy?
- Are integrated public transport systems an effective way of minimising capital and revenue expenditure on transport?
- If so, what would an integrated public transport system look like and how would it be organised?

These wider research objectives informed three sub-objectives:

Firstly, are railways an appropriate core of integrated transport systems? To put this in context the rise, decline, and partial re-emergence of the Wales and Borders railway system as the framework for an integrated system was reviewed, together with the international comparisons.

Secondly, a further research stream asked what models are there for a potential Welsh integrated transport system and would the travelling (and non-travelling) public, industry and the commercial sectors benefit from integration? This raised the issue of how would an integrated system be structured, what indicative levels of service pattern would be required, and what would the indicative opportunity costs be?

Thirdly, would an integrated system raise GDP/GVA, improve the quality and breadth of employment and social opportunities, and stimulate financial transfers from the health, welfare and social security budgets to create a 'virtuous circle' of investment in the 'productive' Welsh economy. How would socio-economic benefits and costs be quantified and monitored?

In the current context of potential economic retrenchment linked to the United Kingdom's withdrawal from the European Union these questions are of great importance. The above factors are highly germane to the structure of a potential Welsh integrated transport system and to the capital investment which would be required to produce positive socio-economic outcomes for the country, if evidence is available that this can be justified.

I.4 The Research Instruments

It was originally intended to concentrate on several semi-structured interviews for each of the five respondent domains of National Assembly for Wales¹ and Welsh Government, Local Authorities, Transport Operators, Community Groups or Lobbying Organisation and Individual or Other Description. However, lack of capacity to produce transcripts and analyse large numbers of interviews led to the development of a questionnaire that would record respondent opinions over the range of relevant areas, whilst also giving respondents the opportunity to express their own views if they wished.

¹ The National Assembly for Wales / Cynulliad Cenedlaethol Cymru was formed at the outset of devolution in 1999. As its competence has since expanded to include legislation for all areas of public policy not reserved to the UK government it was renamed the Welsh Parliament / Senedd Cymru in May 2020. National Assembly of Wales (2020), 'Senedd and Elections (Wales) Act 2020.'

Because of anticipated professional and personal sensitivity issues the research instruments were submitted to a risk assessment in addition to the University's ethical approval process.

The questionnaire was sent to key stakeholders in five different groups. These were the i) Welsh Government and Senedd (Parliament): elected members and officers, ii) Local Authorities: elected members and officers. iii) Transport Operators: rail, and bus and coach, vi) Community Groups / Lobbying Organisations, and to those responding as an v) Individual / Other Description.' The questionnaire explored their views regarding aspects of transport policy, poverty and deprivation, economic development, identifying transport challenges and solutions. and any other issues. Although the response rates could have been better this approach has nevertheless produced some rich and interesting data.

Five semi-structured interviews were also conducted with one interviewee from each of the categories covering all the questionnaire areas in more depth, excepting transport policy. These were intended to give a deeper insight into the qualitative data collected from the questionnaires.

I.5 Contribution to Knowledge

Historically Wales has been integrated within the legal jurisdiction of England and Wales. The re-emergence of Wales as a legal national entity only dates from the late 19th and early 20th centuries. This has had implications not only for academic studies in the fields that this thesis covers but also the data that are available. Studies at an England and Wales level are inadequate given the different cultural, geographical and socio-economic conditions in the two countries. Whilst there is a body of historical work available, particularly on development of the railway system, transport in Wales and its relevance to economic development and poverty and deprivation reduction is a relatively unstudied area from an academic point of view. This is symptomatic of Wales' geographical, political and economic peripherality within both the United Kingdom and England and Wales. Using statistics from five other small European countries to achieve international comparisons with Wales, and the use of government reports and other sources, this study provides a strategic overview of the situation in Wales. The study indicates whether, or not, the integration of transport does promote

economic development, which reduces poverty and deprivation thus releasing resources for allocation to further economic development and creating a ‘virtuous circle.’

I.6 The Socio-Economic Context of the Research

This thesis was undertaken in political and economic circumstances which were quite different from those in which it was originally conceived. The referendum of June 2016, and decision to terminate the United Kingdom’s membership of the European Union, took place in the wake of a period of what Lowndes & Gardner (2016, p. 358) refer to as “super-austerity” which dated from the 2010-15 Conservative and Liberal Democrat Coalition Government’s Welfare Reform Act 2012 (UK Parliament, 2012). The political driver for this programme was to reduce the national deficit after the financial crisis of 2008.

Lowndes and Gardner (2016, p. 158) contend that whilst devolution to English conurbation combined authorities, from 2011 onwards, apparently promotes greater sub-regional autonomy and economic growth; this policy actually represents a means of decentralising the UK government’s austerity programme, and the apparent political responsibility for the effects of it. If this was true of England it was certainly true of Wales. Ifan and Sion (2019a, p. 5) note that between 2009-10 and 2017-18 the value of Welsh Government support to local authorities fell by £918.5m, or 18.9%.

Table I.1 Results and Turnout at the EU Referendum					
	Leave	%	Remain	%	Turnout %
UK	17,410,742	51.9	16,141,241	48.1	72.2
Wales	854,572	52.5	772,347	47.5	71.7
England	15,188,406	53.4	13,266,996	46.6	73.0
Scotland	1,018,322	38.0	1,661,191	62.0	67.2
Northern Ireland	349,442	44.2	440,707	55.8	62.7
BBC, 2016					

In June 2016 the combined electorate of the United Kingdom produced a ‘leave’ vote in the referendum for remaining or withdrawing from the European Union, see Table I.1 above. The percentage for withdrawal in Wales was slightly lower than in England,

on a lower turnout. Scotland voted to remain as did Northern Ireland (BBC, 2016). Crafts (2019, p. 2) argues that the effects of the banking crisis of 2008-09 and the UK Government's subsequent austerity programme were significant factors in this result. If the current EU-UK Trade and Cooperation Agreement (European Commission, 2020) continues to function as it has, in 'hard Brexit' mode, because of the structure of Welsh exports to the EU Wales will suffer economically (Khorana & Perdakis, 2018). The Statistics for Wales bulletin 'Welsh exports: April 2019 to March 2020' (Welsh Government 2020a, pp. 1-3) notes that in 2019 the EU accounted for 60% of the value of Welsh exports of which a majority went to France and Germany. In contrast to this the whole UK exported only 47.2% of the value of its exports to the EU in 2019.

Wales displays relatively high levels of poverty and deprivation in comparison with UK averages, in both urban (cities and the Valleys) and rural (small towns and countryside) settings. This rate can be calculated by using two measures, either before or after housing costs are deducted:

“those in relative low income: living in households with an income that is below 60% of the median level for a given year, or those in absolute low income: living in households below 60% of inflation adjusted median income in a base year, usually 2010/11.” (Francis-Devine 2021, p. 5).

Because of the Covid-19 pandemic and the possible atypical effects it may have on socio-economic statistics the following datasets concentrate on the years 2019-20. In addition, because statistical inputs from London and the South East tend to skew UK and English data results upwards, Tables I.2 to I.6 also include comparative results for Scotland and Northern Ireland, and for two English regions, the South West and the North East. The South West is included as an example of a largely rural region, with the exception of the cities of Bristol, Exeter and Plymouth. The North East is somewhat different. Although it has the cities of Newcastle upon Tyne and Sunderland within the Tyne and Wear conurbation its large rural hinterland is often post-industrial in character, with the relics of both intensive coal mining in Durham and Northumberland, and extractive mineral mining. Other regions are included as necessary. Both regions, like Wales, demonstrate socio-economic issues related to peripherality to London and the South East.

Table I.2 Percentage of People in Relative Low Income, 2017/18 to 2019/20 by Region / Country, after Housing Costs	
	%
Northern Ireland	18
Scotland	19
South West	19
UK	22
Wales	23
Yorkshire & Humberside	24
West Midlands	25
North East	25
London & South East	27
Francis-Devine, 2022, p. 50	

Table I.2 demonstrates that Wales had levels of people in relative low income after housing costs consistently 1% higher than the UK between 2017/18 and 2019/20. Northern Ireland recorded a relatively low percentage, whilst Scotland and the South West were at the same level. Yorkshire and Humberside had a higher level than Wales as did the West Midlands and North East. London had the highest level, a reflection of higher housing costs in comparison with other regions of Britain.

Table I.3 Percentage of People in Persistent Low Income by Region / Country, 2016 to 2020, after Housing Costs	
	%
Northern Ireland	9
Scotland	10
South West	11
Wales	12
UK	12
England	12
Yorkshire & Humberside	14
North East	14
West Midlands	14
London & South East	17
Francis-Devine, 2022, p. 52	

Table I.3 shows the percentage of people who experienced persistent low income after housing costs between 2016 and 2020. In this case Wales and the UK shared an equal level. Northern Ireland had the lowest percentage, possibly a reflection of the special housing measures in the region. Scotland reported the same level as which was lower than Wales. Yorkshire and Humberside, the North East and West Midlands displayed the same higher for all three. Persistent low income after housing costs affected more Londoners than in any other region during this period, reflecting the relatively expensive housing market in the region.

Table I.4 Regional Gross Disposable Household Income by Area 2019		
	GDHI per head (£)	Total GDHI (£m)
England	21,978	1,237,085
London & South East	30,256	271,155
South West	21,222	119,370
North East	17,096	45,645
UK	21,433	1,431,678
Scotland	19,649	107,346
UK excluding London & South East	19,189	933,635
Northern Ireland	17,331	32,820
Wales	17,263	54,427
Monmouthshire	21,392	2,024
Blaenau Gwent	14,630	1,022
Welsh Government, 2021c		

Across a range of other statistical indicators Wales compared less favourably with the UK average. Table I.4 indicates that Regional Gross Disposable Household Income (GDHI) for 2019 was £21,433 for the UK. That for Wales was 80.5% of that for the UK (Welsh Government, 2021c). Of the Welsh local authority areas GDHI varied from a maximum in Monmouthshire to the minimum in Blaenau Gwent. The table shows that when the contribution of London and the South East was deducted UK GDHI per capita fell to 89.5% of the original level, indicating the significance of this region economically. The GDHI for England, including London and the South East, was highest. South West England had a significantly higher level of GDHI per head than the North East which recorded a lower level than Wales. The Scottish level was higher than Northern

Ireland, or Wales. These income data indicate continuing relative disadvantage in Wales.

Table I.5 Summary of Gross Domestic Product Growth Statistics for Selected Countries and Regions 2019		
	Annual growth in 'real' GDP %	Annual growth in 'real' GDP per head %
London & South East	2.2	1.5
UK	1.3	0.7
Scotland	1.3	0.8
England	1.3	0.8
North East	0.9	0.4
South West	0.8	0.4
Wales	0.7	0.2
Northern Ireland	0.3	-0.3
Fenton, 2021, table 1		

Table I.5 displayed relatively low levels of Welsh economic development in comparison with the UK when measured with gross domestic product (GDP). An Office for National Statistics article explained:

“It’s a way of keeping track of how the economy is doing, how big it is and whether it’s healthy. The higher the value of GDP, the bigger the economy” (Office for National Statistics, 2016).

The size of the economy measured in this way does not reflect how wealth is shared within it. The report “Poverty and Deprivation in Rural Wales” (National Assembly for Wales, 2008, p. 1), said of the 2008 Welsh Index of Multiple Deprivation results that:

“Almost half of ‘income deprived’ people live in the most deprived 30 % of Wales.”

Consequently, it follows that the other half is spread over the remaining 70 % of Wales. The Joseph Rowntree Foundation (2016, p. 3) report “Prosperity without Poverty: A framework for Wales” estimates that £1 in every £5 (i.e. 20%) spent on public services in Wales is linked to poverty. This amounts to £3.6 billion every year - equivalent to £1,152 for every person in Wales.

Wales had comparatively low ‘annual growth in ‘real’ gross domestic product’ in 2019. Table I.5 shows the annual percentage growth of Welsh GDP, and per capita growth

was the smallest but one (Northern Ireland was bottom) compared with the UK (Fenton, 2021, Table 1). There is no Welsh equivalent of the German ‘Mittelstand’ independent small and medium-sized enterprises (SMEs) with a strong focus on specialist manufacturing. Poor access to employment, goods and services, and the relatively high percentage of low paid jobs for those in work (McGuinness, 2018b, p. 34), results in relatively low multiplier effects for local economies. In addition, the current ‘stripping out’ of better-paid jobs in the public sector is another factor contributing to this problem. Both England and Scotland share annual growth and per capita percentages. North East England performed better on this indicator compared with the South West, although both share the same per capita result. Northern Ireland had both the lowest level of GDP and per capita GDP.

Table I.6 Summary of Gross Domestic Product Statistics (per capita) for Selected Countries and Regions 2019		
	GDP per capita (£)	Total GDP (£m)
London	56,199	503,653
England	33,809	1,902,986
UK	32,876	2,214,362
Scotland	30,560	166,957
South West	29,147	163,941
Northern Ireland	25,656	48,584
Wales	24,586	77,517
North East	24,068	64,260
Fenton, 2021, table 1		

The impact of the above annual growth GDP percentage figures in financial terms is shown in Table I.6. Welsh GDP per capita was only 74.8% of that for the UK, 72.7% of the English figure, 80.5% of that for Scotland, and 95.8% of the Northern Ireland per capita amount. Of the two comparison English regions the South West produced a higher amount per head than Wales, whilst the North East reported an amount 2.1% lower than Welsh per capita figure.

2019 mid-year population estimates (ONS, 2020a) indicated that Wales has a population of 3,152,000, and a demographic profile with a relative over-representation of older people aged 65 and over at 662,376, or 21% of the population. An aging population has adverse implications for health and welfare spending.

The outwards migration of well-qualified young people for higher education is also a serious concern for the economy. This latter issue also raises concerns about the erosion of the Welsh language, in those communities where it is the primary means of communication and cultural transmission.

This research argues that the poor socio-economic performance of Wales is exacerbated by a transport system that is not 'fit for purpose' in extent, capacity or performance. In their evidence to the Select Committee on Welsh Affairs (Transport in Wales) on 17th December 2002 CBI Wales (UK Parliament, 2003, para. 3) stated that:

“Transport is generally regarded by business as being towards the top of the list of priorities for improving the climate for investment and performance.”

However, the transport system of Wales is sub-optimal for reasons of topography and past and present demographic, political and socio-economic patterns. Current Welsh transport arteries present evidence of investment gaps by being of poor quality and with little or no capacity to deal with future traffic demand growth. The Wales Route Utilisation Strategy (Network Rail, 2008, p. 92) defined an investment gap as:

“The difference between what the system can currently supply, in terms of infrastructure and train services, and what is demanded of the system, in terms of what it needs to do for passenger and freight requirements, and at suitable levels of performance.”

The strategy listed forty-one gaps across the Wales and Borders Route (Network Rail 2008, pp. 95-101). Eleven years later, in the Wales Route Strategic Plan the “Prioritised Needs” section asked “Does the Wales Route have the capacity/ability to deliver on its plans?” It recorded an amber warning, indicating risks to delivery. (Network Rail 2019, p. 79). Barry (2018, p. 5) noted that the Wales Route covers 11% of the British rail network but receives only just over 1 % of the enhancement budget.

With regard to the inadequacies of highways network the Welsh Government demonstrated the need for further enhancements with a list of no less than fifty-four projects intended to improve the trunk road network. However, these are currently being reviewed by an independent panel chaired by Dr Lynn Sloman, of these only ten will not be affected by the review (Mosalski, 2022). The outcome of this exercise remains to be seen but may prove to be contested.

The concentration of most of the population in the three main cities of Cardiff, Swansea and Newport, and the adjacent valleys to the north, has necessarily created a 'transport sub-region' in the south east of the country. The concentration of population and industry around Wrexham and Deeside in the north east of the country also functions as a second 'transport sub-region.' Both regions require, and are now receiving, interventions that are appropriate for their specific characteristics.

Before devolution, the once comprehensive Welsh rail network had never functioned as a national system. The closure of much of it prior to and under the 'Beeching Report' (British Railways Board, 1963) not only weakened already tenuous north-south links and left large gaps in the network, but also undermined the Welsh economy as jobs in the operation and maintenance of the railways were eliminated and businesses lost access to rail. Gibbons, et al. (2018, p. 3) comment that their research on rail disinvestment found:

"The overall conclusion is that places experiencing large reductions in rail centrality experienced falls in population, the number of educated and skilled workers and an increase in the proportion of older workers, relative to places that were less affected."

The closures were largely uncontested at official level as by the time that the, then new, Welsh Office had gained transport powers the closure programme was largely complete. British Rail was left operating an underinvested residual Wales & Borders network and, because of budgetary pressures, was forced to pursue a constant search for economies that undermined the capacity and resilience of the network. The 1970s were a time of retrenchment, with the exception of the introduction of the Inter-City 125 high speed train on services to south and west Wales. However, under the Organising for Quality strategy of the 1980s four new business sectors (InterCity, Network South East, Regional Railways and Railfreight) specified timetables, rolling stock and infrastructure capacity and quality appropriate for their own services. The railways became business rather than engineering standards-led and the base for the customer revival of the 1990s was laid. Unfortunately, privatisation handed the infrastructure back to the engineers and costs increased again.

Subsequently the Wales & Borders network was franchised by the Strategic Rail Authority to National Express Wales & Borders between 2001-2003 and then by the

UK Department Transport to Arriva Trains Wales from 2003 to 2018 when franchising became a Welsh Government responsibility. Although neither franchise was specified for passenger growth the period saw a limited number of station and passenger line re-openings, and some investment in infrastructure, signalling, rolling stock and station improvements. Under the new Transport for Wales Rail Services franchise, specified by the Welsh Government's Transport for Wales' agency, there are ambitious plans for converting the core Valleys Lines network to a light rail system, renewing the current rolling stock fleet and for station improvements across the country.

However, unlike in Scotland, control of railway infrastructure as distinct from the franchising of Wales and Borders railway services, has not been devolved. In summer 2017 the UK Secretary of State for Transport announced cancellation of the electrification of the South Wales Main Line between Cardiff Central and Swansea High Street stations. The decision was widely criticised in Wales as damaging economic development in south Wales. It also impacted on the Welsh Government's plans for electrification of non-Valleys lines, local and regional train services in the south.

The highways system that was left to handle much of Wales's transport needs was, excepting the M4 and the A55 'North Wales Expressway,' essentially a collection of local roads reclassified as a national network. The A470 (Llandudno-Cardiff) is the main north-south artery, with the A487 (Bangor-Haverfordwest) its western shadow. The A483 (Chester / Wrexham-Swansea) forms the north east to south west corridor. Over the years there have been incremental rather than strategic improvements to the highways network such as town bypasses, new bridges, accident and congestion location route deviations, and local online alignment upgrades. Despite these projects, the risk rating of the Welsh A road network classifies most links in north, mid and west Wales as either low medium risk, medium risk, medium-high risk or high risk, irrespective of the direction of traffic flows (Road Safety Foundation, 2018, p. 17).

Initially, at the outset of devolution, the priority was for developing north-south road links, but since the 4th National Assembly of 2011-2016 the policy emphasis has been on west-east transits for economic reasons, principally integration with neighbouring English regions, Merseyside and Cheshire, the urban West Midlands and Avon. It remains to be seen whether this approach will promote economic development or

reinforce the branch plant economy syndrome, in which productive capacity is made vulnerable by being spatially separated from corporate decision-making and research. Breathnach (1993, 21) discusses this with regard to both the Irish economy and employment gender issues.

I.7 Thesis Structure

This chapter, Introduction, sets out the research question, and the allied research objectives. The research instruments and the factors involved are briefly reviewed, and it is explained how the research contributes to knowledge. The broad socio-economic context in which the research was being undertaken is considered, as is the structure of the thesis,

Chapter 1 explores the distinct geographic, climatic, cultural, historical, political, and socio-economic context in Wales.

Chapter 2 discusses the concept of integrated transport, and the key concepts of high, medium, and low integration used in the thesis.

Chapter 3 discusses the methods and design of the research.

Chapter 4 evaluates the socio-economic impact of integrated transport by benchmarking Wales against international comparisons, using statistics for economic productivity levels, transport funding, and social expenditure.

In Chapter 5 the factors contributing to the development of the two high integration transport network exemplars of the Netherlands and Switzerland are analysed.

In Chapter 6 the factors for the middle integration examples of Catalonia and Ireland are analysed.

Chapter 7, part 1 discusses the impact of UK state policy on the Scottish and Welsh 'low integration' networks before analysing their development in part 2. Transport integration networks comparisons are reviewed in part 3.

The next three chapters 8, 9, and 10, discuss the research questionnaire and the semi-structured interview data in three specific areas. Chapter 8 looks at transport policy in Wales, its implementation, and future challenges. Chapter 9 examines poverty and

deprivation in Wales. Chapter 10, parts 1 and 2 look at responses to questions about economic development, whilst part 3 looks at economic development and transport infrastructure.

The Conclusion examines the extent to which the research has answered the research question and objectives. It integrates the findings of the research and generates recommendations for Welsh Government and stakeholders. It evaluates the research design, the thesis, and provides recommendations for further work.

The bibliography is followed by the appendices which contain copies of the research instruments, and the documents relating to them.

I.8 Conclusion

This chapter has described the organisation of thesis and set out some of the socio-economic and transport issues which have informed the research question and its related research objectives. The methodology of the research has been outlined and the way in which the research contributes to the body of knowledge in the field.

The next chapter looks at the Welsh context in detail and discusses the historical development of the Welsh devolution and its transport policy.

Chapter 1: The Welsh Context

1.1 Introduction

This chapter examines the historical, physical and governmental structure of Wales.

Following on from the broad socio-economic comparisons of the previous Introduction, this chapter relates to the aims of the thesis by providing an overview of the underlying conditions that gave rise to modern Wales. It asks, “What is Wales and how have we got to where we are now?” The chapter explains the governmental, socio-economic and transport context of modern Wales. It outlines how the geography, climate, history and governance of Wales have all contributed to the current situation of Wales. It also discusses the development, since 1999, of an increasing measure of legislative autonomy for the country. This continues to struggle with the factors of transport, economic development, and poverty and deprivation which are the main concerns of this thesis.

A significant factor in why Wales has been unable to develop integrated policy approaches to transport, in order to address the emerging and evidenced socio-economic needs of the country, is because of its subordinate political relationship with England, and later the United Kingdom. After the conquest of 1282-4 England had militarily occupied and colonised the country by the Statute of Rhuddlan of 1284 (Law Wales, 2016a). It was then politically annexed through the Laws in Wales Acts (UK (English) Parliament, 1536 and 1542). From the nineteenth century onwards Welsh resources such as manpower, livestock and agricultural produce, slate, coal and water, were economically expropriated.

This has resulted in a general UK policy context, and specifically a transport infrastructure, which has prioritised the needs of England over and above the needs of Wales, has inhibited economic development and exacerbated the country's relatively high rates of poverty and deprivation. Hechter (1975) describes this process as “Internal Colonialisation” in which the population of a colonised country become de-facto “proletarianized” in relation to the population of the colonising power as part of the capitalist expropriation process. Bulpitt (1983) characterises relations between the centre, i.e. the monarch's court or later the London government, and the periphery as

being differentiated by high politics, i.e. issues of direct concern to the centre, and low-politics, i.e. issues not of direct concern to the centre which could be informally devolved to indirect rule by local elite collaborators. Consequently, he rejects Hechter's view of the centre as being coercive and exploitative.

It is argued that these apparently antithetical approaches are complementary. Hechter being correct about the coercive and exploitative nature of the UK state, particularly during the post-conquest and industrial revolution periods, and Bulpitt correctly describing the *modus operandi* of the state as being usually exercised through local co-operative elites, such as the gentry and magistrates, except when events were a threat to the 'centre' and required suppression by coercion, for example the Glyndŵr Rising (1400-15), the Merthyr Rising (1831) and the Tonypandy Riots (1910 and 1911).

It is also argued that the doctrine of the Supremacy of Parliament, which allows London governments to legislate for Wales, or to strike off Welsh measures, without the consent of the Welsh Government and Senedd represents proof of Hechter's approach, whilst devolution itself, as currently constituted, demonstrates some of the centre-periphery governance components set out by Bulpitt.

These are not just theoretical issues for the Welsh Government which, because of the current form of the devolution settlement, does not have the full range of powers over the policy levers with which to address the issues of poverty and deprivation, and which can be faced with London governments determined to undermine the devolution settlement (Batchelor, 2021).

The distinctive geographical, historical and socio-economic context of Wales, and its relevance to Welsh transport development, is set out in this chapter. Knowledge about the past of Wales, and how it led to the country's contemporary context is often limited, sometimes even within the country itself. Welsh history is often contested by different interpretations of the development of the British state, either affirmative or hostile. Consequently, a brief outline of the historical events and developments that have made modern Wales, and the physical setting in which they were played out, is provided. These are significant factors in the shaping and continued survival of Wales as a distinctive nation with its own political and socio-economic needs.

In the absence of strong native state institutions Welsh society, of necessity, shaped itself at community level. Keating (2004, p. 6) considers that:

“Welsh Nationalists emphasize community as an almost mystical alternative to the classic form of nation.”

In making this statement he seems to misunderstand the mechanisms by which this emphasis arose, there is nothing ‘mystical’ about the importance of community in Welsh history; it is simply the response of a stateless nation to the lack of appropriate institutions to protect its interests. Key to this process was the persistence of the Welsh language and the community culture articulated by it. This eventually had the effect by the 19th century of producing a localised form of both agricultural and industrial entrepreneurship which would be reflected in the development of localised transport systems away from the strategic links between London and Dublin which ran across north and south coastal Wales. The locally promoted Llanidloes and Newtown Railway of 1859, the first railway in mid Wales, was an example of this trend (Christiansen and Miller, 1971, pp. 21-26).

In view of the history of Wales as a territory annexed into a larger state it is necessary to emphasise that Wales is classified as a country and is recognised as such by the International Standards Organisation in Geneva (2011, 27), although part of the multi-national state named the United Kingdom of Great Britain and Northern Ireland which was established after the independence of the 26-county Irish Free State in 1922.

1.2 The Topography and Climate of Wales

Map 1 shows that Wales is a mountainous peninsula situated in the highland zone of the Island of Great Britain. This zone is open to various classifications, but the higher lands of the island are north and west of a line drawn between the estuary of the River Humber in north east England to the estuary of the River Exe in south west England.

Wales is surrounded to the north and west by the Irish Sea, to the south by the Bristol Channel, and to the east it shares a land border with what is now England. Much of the modern border is demarcated by an earthwork known as Offa’s Dyke. This structure which was 20m wide, including a flanking ditch, and 2.4 m high was thought to have been constructed by the Anglo-Saxon King Offa of Mercia (757–796 CE) to

demarcate the border along 283 km from Prestatyn in Denbighshire in the north east to Chepstow in Monmouthshire in the south-east. The border as it is today, was established by Henry VIII's Laws in Wales Acts (UK (English) Parliament, 1536 and 1542).



Map 1: Physical Map of Wales. Maphill (2011).

Being surrounded by sea on three sides Wales is a wet, cloudy and windy country with a temperate maritime climate. Whilst highland areas can experience severe winter weather the coasts and the border regions which lie in the lee of the 'highland spine' have a more equitable climate (Meteorological Office, 2016). However, severe weather events, which are almost certainly a result of climate change, are causing increasing disruption to the transport system through high winds, torrential rain,

flooding and landslides. The need to plan for network resilience also means that the costs of operation, maintenance and enhancements are becoming progressively more expensive.

1.3 The Culture and Language of Wales

Wales as an entity emerged from the withdrawal of the Roman Empire from Britain, and in the distinction and differences of language, law and culture with the peoples of the feudal kingdoms that would become England, principally Mercia. Despite the country's history of eventual conquest and absorption in a larger state the concept of Wales has continued to persist. Although the discourse is to habitually present the United Kingdom as a mono-lingual, mono-cultural nation-state, objectively it is a multi-lingual, multi-cultural, multi-national state with the continuing and daily use of Welsh, Scottish Gaelic, Irish, to a far lesser extent Cornish, as well as the languages that 19th and 20th century flows of immigration have naturalised.

The Welsh sense of difference was centred firstly, and most importantly on the development of the Welsh language. Secondly, on the different character of Welsh social organisation, and thirdly on the nature of the nation's history; both actual and mythological. By the late 20th Century this necessitated a differentiated solution to governance and policy development through the establishment of devolution. Morgan (1971, pp. 153-159 and 161-172) discussed this journey, at least to the 1970s, in his paper "Welsh Nationalism: The Historical Background."

In the absence of a state to sustain the political and socio-economic aspirations of the nation, the continuing existence of the Welsh language has often acted as an alternative political focus for nationhood. Merriman and Jones (2009, pp. 350-375) described this process of language symbolism in the modern context, in relationship to the campaign for bilingual road signs in Wales. The imperative to support the language and its distinctive culture has, at various times throughout Welsh history, led to demands for and attempts at political autonomy or self-government to create the socio-economic conditions to sustain them. Parks and Elcock (2000, pp. 87-106) in their paper "Why Do Regions Demand Autonomy?" identify a continuum of four points that stimulate the demand for autonomy. They classify Wales in the first category of "Definite Regions or nations without states" and comment:

“We postulate that most regions which seek a measure of political autonomy do so for a mixture of cultural and functional reasons: they may want to promote a minority language on one hand and attract inward investment to replace declining industries on the other. The perceived validity of their regional or national claims will be affected by the strength or weakness of each feature and of the geographical boundaries relating to each” (Parks and Elcock, 2000, p. 89).

Welsh transport, and the difficulties around achieving an adequate system for the benefit of the country and its people, has been part of this discussion, Gruffudd (1995, pp. 232-236) traces proposals for a custom built north to south road as far back as 1917 and discusses the arguments made for and against it. The experience of maintaining a minority language and culture in a multi-national state over a very long period, sometimes in face of open hostility and sometimes in the face of indifference from that state, and the responses to this situation, has shaped the contemporary governmental institutions of Wales that will form the Welsh transport system of the future.

1.4 The Historical Context and the Shaping of Welsh Politics

Welsh attempts at creating a unitary state during the late medieval period were hampered by cultural and political differences between the rulers and regions of the country, and by a geography that made communications, and consequently the establishment of a national centre of political power and unity, problematical.

Table 1.1 charts the incorporation of Wales in the English state. By the late 1200s Llywelyn Ap Gruffudd of Gwynedd had consolidated power in the north and had expanded his control over most of the country. At this point it appeared that the ‘Principality of Wales,’ the majority of the land area of the country, was likely to establish the core of a unified feudal Welsh state. However, on 11th December 1282 Llywelyn encountered an English raiding party at Cilmeri near Builth and was killed. Welsh resistance continued but by 1283 they had been decisively defeated by overwhelming military forces, as they were again in an attempted national rising in 1294-5.

Table 1.1 Historical Milestones in Welsh Governance	
Year:	Milestone:
1284	The Statute of Rhuddlan: An English royal ordinance annexed the former Principality of Wales to the English Crown as a dominion. It introduced English common law to the Principality but allowed features of the Welsh legal system to continue. Created 6 new counties out of former native territories. The eleven feudal statelets, the Marcher Lordships, were unaffected
1400 1413	Owain Glyndŵr's Rising: Attempted to establish an independent Welsh state with its own parliament, church, and university. After initial success and control of much of the country the rising was overcome by the superior numbers of English forces
1536 1542	Laws in Wales Acts 1536 & 1542, English Parliament: Completed the annexation of Wales to the Kingdom of England by enforcing English legal and administrative systems to create a single state and jurisdiction. Enabled Welsh representation in the English Parliament. Abolished the marcher lordships and introduced five further counties to create a uniform system of 13 Welsh counties. Established the current border between Wales and England. Made English the only legal language for legal and governance purposes

In losing their political independence and facing an existential threat to their cultural existence the Welsh developed a strong sense of difference, of national consciousness and solidarity that continues to persist in the 21st century. This can be said to explain the differentiated nature of contemporary Welsh politics and institutions, which developed largely in a context of the constantly contested position of the Welsh language and culture.

After the conquest, rebellions continued intermittently, often sparked by grievances against external rule. These resentments coalesced into the nearly successful uprising of Owain Glyndŵr, which lasted from 1400 until about 1413. The English crown eventually succeeded in re-establishing its military control over the country and Glyndŵr became a fugitive but was never captured. Davies (1994, p. 203) says it is believed he died in September 1415 in Herefordshire.

As mentioned above, the modern border, which has never been challenged or changed, was finally established as a result of English parliamentary measures under Henry VIII named the Laws in Wales Acts of 1536, and elaborated upon in 1542. These statutes abolished the Principality of the native Welsh princes dating from the early 1200s, and which after the conquest had become the individual property of the

reigning English monarch. The Laws in Wales Acts introduced a unified county and legal enforcement system and annexed Wales to the Kingdom of England as an internal colony. Whilst these made Welsh subjects legally equal to English subjects the Laws confirmed that English, not Welsh, was the language of the law courts and administration within Wales.

In the negotiated union of 1707 Scotland had retained many of the institutions of a state, excepting the parliament but including a separate legal system (Old Scottish Parliament, 1707). Wales remained within the jurisdiction of England and Wales, except for a few items of distinctive legislation such as the Sunday Closing (Wales) Act' of 1881 (UK Parliament, 1881). This reacted to demands by the Welsh nonconformist constituency for the closing of public houses on Sundays. It was constitutionally significant in being the first major piece of Wales-only legislation since the Commonwealth period of 1649 to 1660. Equally significant was the 'Welsh Church Act' of 1914 (UK Parliament, 1914) enacted in 1920 to disestablish the Church of England in Wales in view of the country's overwhelming loyalty to nonconformist forms of worship.

1.5 The Development of Administrative Devolution

Following the command economy of World War II the broadly politically bi-partisan post-war 'Welfare State' settlement provided full employment and comparative social stability throughout the UK. The post war period also saw the legislative and administrative re-emergence of Wales as an entity. After the 'Sunday Closing (Wales) Act 1881' there had been a number of specifically Welsh legislative and administrative measures, as shown in Table 1.2 below.

Table 1.2 Nineteenth and Twentieth Century Milestones in Welsh Governance	
Year:	Milestone:
1881	Sunday Closing (Wales) Act 1881, UK Parliament: Closed Welsh public houses on Sundays in deference to Welsh nonconformist opinion. The first modern piece of Wales-only legislation
1914	Welsh Church Act 1914, UK Parliament: Disestablished the Church of England in 'Wales and Monmouthshire' and created the Church in Wales - The second piece of legislation recognising Wales as an entity
1907	Welsh Department of the Board of Education
1908	Commission on Ancient and Historic Monuments in Wales
1919	Welsh Board of Health
1922	Welsh Department of the Ministry of Agriculture and Fisheries
1948	Council for Wales and Monmouthshire
1951	Minister of Welsh Affairs: Home Office junior post
1951	Minister of State for Wales: Upgraded from Minister of Welsh Affairs
1964	Secretary of State for Wales
1965	Welsh Office
1967	First Welsh Language Act 1967, UK Parliament
1979	First devolution referendum: Proposals rejected by the electorate
1997	Second devolution referendum: Proposals accepted by the electorate
1998	Government of Wales Act 1998, UK Parliament
1999	First meeting of the National Assembly of Wales, 12th May 1999

In 1948 the unelected Council for Wales and Monmouthshire was established to oversee and monitor the impacts of UK government policies on Wales. A junior Home Office post of Minister of Welsh Affairs was created in 1951 and upgraded to Minister of State in 1951. The Secretary of State for Wales was first appointed in October 1964 followed by his department the Welsh Office in April 1965. (Welsh Parliament/Senedd Cymru, 2021). This formed the basis for the territorial governance of Wales and subsequent devolution.

The Welsh Office subsumed most UK government departmental functions relating to Wales and it assumed responsibility for culture (including the Welsh Language), economic planning, environmental health, historic buildings, housing, local government, the Welsh national parks, sewerage disposal, and town and country planning. By the onset of executive devolution in 1999 the Welsh Office had grown to encompass responsibility for agriculture, transport planning and the environment, health, economic development, education, establishments (i.e. Cadw: Welsh Historic

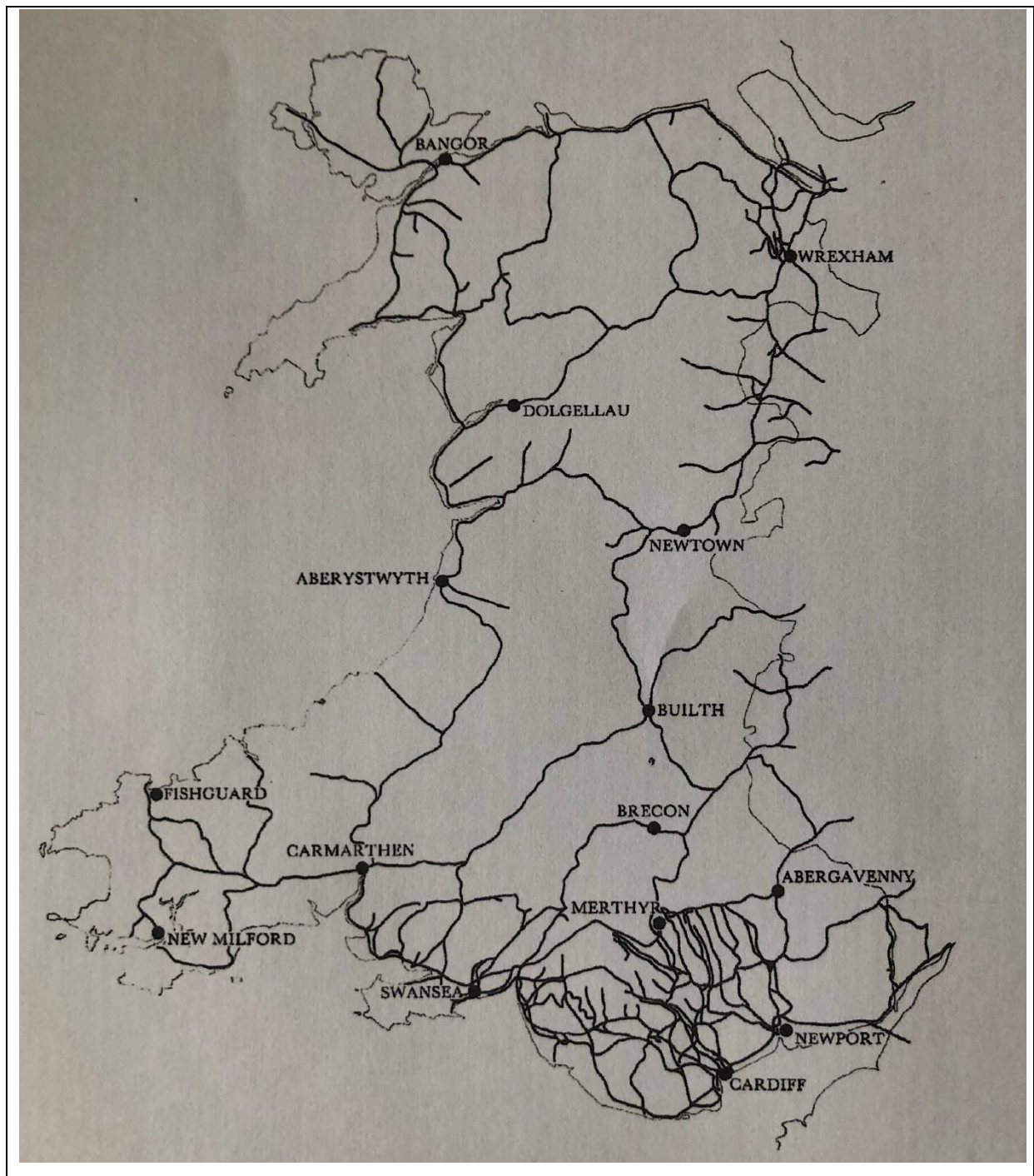
Monuments), health professionals, health services, industry and training, legal matters and local government (UK Parliament, 1999). McAllister (1999, p. 635) speaks of:

“...the Welsh Office’s incremental and disjointed accrual of powers and responsibilities over the past thirty years.”

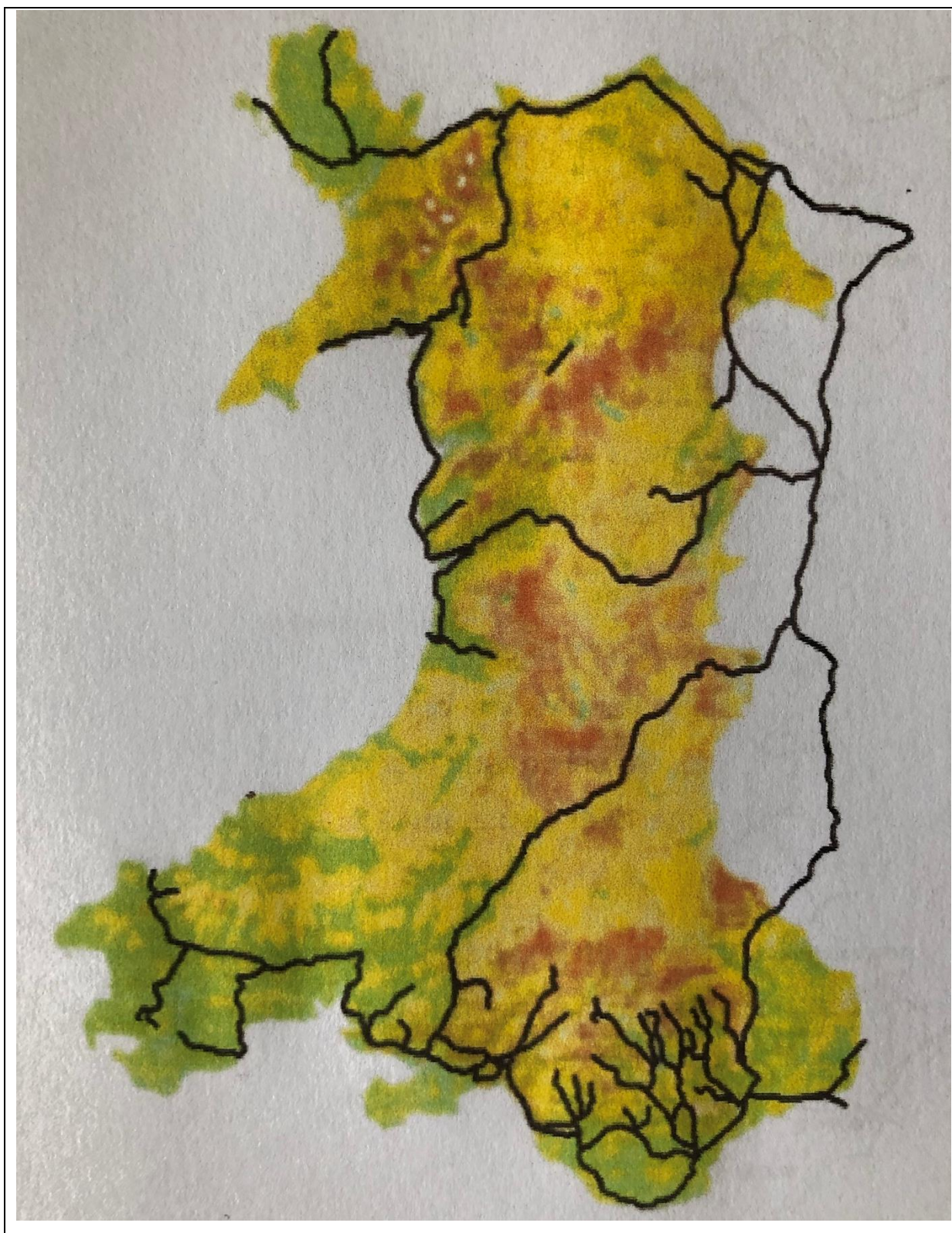
Unfortunately, unlike in Scotland, the transport and planning function was delegated too late to stop the Beeching closures of much of the country’s railway system (British Railways Board, 1962. Edwards (2017) comments:

“Across Wales, of the 1,500 miles / 2,413 km in operation in 1951, only 670 miles / 1,078 km remained in 1965, By 1975, the figure had fallen to less than 500 miles / 804 km.”

Maps 2 and 3 show the Welsh railways before and after the Beeching cuts. Although the nadir has been reversed through a small number of re-openings in south Wales, Network Rail (2008, p. 14) reported that the miles in operation had risen to 678 miles / 1,090 km, nevertheless only 45.2% of the 1951 route mileage remains open. This is in three unconnected sections in the north, mid and south which are linked by a route along the borders, of which is 75% in England.



Map 2: Railway Network of Wales in 1920. Owen-Jones (1997, p. 48)



Map 3: Wales Railways: Circa 1982. Source Unknown.

Consequently, the Welsh Office's scope for transport planning and provision was heavily skewed towards highway maintenance and construction, and in public transport by the provision of bus services. The growing pace of administrative devolution could be said to be a technocratic response to the increasingly complex issues of governance in Wales, rather than any attempt to democratise decision-making.

Plaid Cymru (the Party of Wales) had been founded in the mid-1920s with a left-leaning programme of national self-determination, but had failed to make much headway electorally. In the 1951 general election their four candidates had only registered 10.9 thousand votes or 0.7% of the Welsh vote. In 1955 eleven candidates received 45.1 thousand votes (3.1%) (Audickas et al., 2020. p. 10, table 1g).

The Liverpool Corporation Act (UK Parliament, 1957) authorised the flooding of the Tryweryn valley, and the Welsh-speaking village of Capel Celyn between Bala and Trawsfynydd, to provide additional industrial water supplies for Liverpool. It provoked opposition across the country and no Welsh MPs supported the measure in Parliament. In the 1959 general election Plaid's support rose to 77.6 thousand (5.2%) (Audickas et al., 2020. P. 10, table 1g). Works to flood the valley resulted in acts of sabotage by activists against construction facilities and electrical equipment (Atkins 2018, 463). In the July 1966 Carmarthen by-election Gwynfor Evans was elected as Plaid's first MP (Atkins 2018, p. 462).

In addition, the Beeching Report railway closure programme was turning a previously comprehensive network into a shadow of its former self and many voters would have agreed with the assessment of the Chair of Montgomeryshire County Council (Christiansen and Miller, 1970, p. 171):

“...the Government seems to be intent of depriving us of all the facilities we are entitled to.”

With regard to the status of the Welsh language, from 1962 onwards Cymdeithas yr Iaith Gymraeg (the Welsh Language Society), a cultural activism off-shoot of Plaid Cymru, were engaged in their campaign of civil disobedience and direct action to secure official recognition of the Welsh language (Atkins 2018, p. 459). The Welsh Language Act, 1967 (UK Parliament, 1967) had permitted the use of Welsh in the courts, and also replaced the automatic designation of England to Wales. The 1967

Act was replaced by the Welsh Language Act 1993 (UK Parliament, 1993a), and by later legislative measures and standards, in response to increasing pressures for cultural recognition and equality.

A decision to formally invest Prince Charles as Prince of Wales at Caernarfon Castle in 1969 was welcomed by many Welsh people, but it was also opposed by others of a republican and nationalist outlook, there being two terrorist incidents in response to the ceremony. The flooding of Capel Celyn, the Beeching rail closures, and the Investiture reinforced the view in the country that it needed more control over its affairs. Atkins (2018, p. 463) says of Tryweryn:

“...the final decision lay with the Westminster government resulting in the exposure of the ineffectiveness of Welsh protest and the restrictions upon Welsh politicians influencing policies deemed of national importance.”

The Labour government of 1964 to 1970 wished to address the democratic deficit that technocratic administration was creating and in 1969 established the Royal Commission on the Constitution, known as the Kilbrandon Commission, which reported in 1973 (UK Government, 1973). In view of the heightened national consciousness outlined above it might be thought that any move towards devolution would be welcomed. However, an initiative in 1979, informed by the report of the Commission, to introduce a non-legislative assembly to scrutinise Welsh Office activity in the country, was firmly rejected by a referendum of the Welsh electorate on St. David's Day 1979. A majority of 79.7% voted “no,” with 20.3% voting “yes” on a turnout of 58.3% (Johnes, 2019, p. 4). The referendum came at the end of the Winter of Discontent of 1978-79, during which both private and public sector workers either imposed overtime bans or went on strike in protest against the government's 5% wage increase limit (Hay, 2009, pp. 546-547), which was intended to reduce the average consumer price index inflation rate of 8.28% (inflation.eu 2022). This may have influenced the extremely negative result, together with concerns about the lack of substantial powers as the Scots were being offered legislative devolution.

However, the period of radical financial and industrial restructuring initiated by the Conservative governments of 1979 to 1997 starkly illuminated the inability of Wales to defend its interests within the UK context. Fluctuating interest rates, high unemployment and policies of deregulation and privatisation severely impacted on the

Welsh economy which was strongly skewed towards heavy industry, public services, and nationalised industries. Margaret Thatcher's signing of the Single European Act in 1986 did allow new opportunities for Welsh commerce and manufacturing which oriented Welsh exports toward mainland Europe, and particularly Germany.

The Welsh legislative and executive branches of government have undergone changes over the years as devolution has increased its scope and competencies. These changes are summarised below in Table 1.3.

Following the twenty-year experience of economic and social pressure from outside the country, there was a greater appetite for more control of Welsh affairs from within. The desire for greater internal control was manifested through the Labour Party's 1992 proposals for devolution to a corporate body, in which the executive and legislature were combined, with only secondary legislative powers over the areas of responsibility held by the Secretary of State for Wales. This was not a great advance on the rejected 1979 proposals. Nevertheless, a second referendum in September 1997 produced a wafer-thin majority for acceptance of 50.3%, or 6,721 votes on a turnout of 50.2% of the electorate (Welsh Parliament / Senedd Cymru 2020, p. 2).

The UK Parliament passed the enabling Government of Wales Act 1998 (UK Parliament, 1998a). Elections on the 6th May 1999, using a form of proportional representation, produced a combined constituency and regional list result for Welsh Labour of 28 seats, Plaid Cymru 17 seats, the Welsh Conservatives 9 seats and the Welsh Liberal Democrats 6 seats (Audickas, Cracknell and Loft, 2020, table 16). This meant that Welsh Labour decided to govern with a minority administration as they had fallen short of the majority threshold of 31 seats. The National Assembly for Wales / Cynulliad Cenedlaethol Cymru had 60 seats. Y Llywydd / The Presiding Officer, who is analogous to the Speaker in the House of Commons, is chosen by the chamber from amongst the members and is politically neutral (Welsh Parliament/Senedd Cymru, 2020).

Table 1.3 Devolution Milestones

Year:	Milestone:
1979	Welsh devolution referendum 1979: Proposed an assembly without primary legislative or tax-raising powers. Secondary legislation powers only and assumption of the powers and function of the Secretary of State for Wales. Rejected by the electorate 79.74% to 20.26%
1994	Local Government (Wales) Act 1994, UK Parliament: Replaced Welsh county and district councils with 22 single tier unitary authorities
1996	Local Government (Wales) Act 1994 took effect
1997	Welsh devolution referendum 1997: Proposed an assembly with secondary legislation powers only and assumption of the powers and functions of the Secretary of State for Wales. Approved by the electorate 50.3% to 49.7%
1998	Government of Wales Act 1998, UK Parliament: Enabling act for the National Assembly for Wales (NAfW). Any legislation proposed by the NAfW to be scrutinised and made by the UK Parliament
1999	First sitting of the National Assembly of Wales 12th May 1999
2002	NAfW decided to separate its legislative and executive functions to the extent allowed by the Government of Wales Act 1998. Welsh Assembly Government was now used to describe the action and policies of the Welsh Cabinet
2006	Government of Wales Act 2006, UK Parliament: Implements limited legislative powers for the NAfW and legal separation of the legislative and executive functions
2007	Following from the Government of Wales Act 2006, from the 2007 Assembly elections the NAfW gains limited legislative powers and the Welsh Assembly Government becomes a separate legal entity
2008	One Wales Delivery Plan, 2008-11, National Assembly for Wales
2009	"One Wales: One Planet: The Sustainable Development Scheme of the Welsh Assembly Government."
2011	Welsh devolution referendum 2011 on whether the NAfW should have full legislative powers in its 20 devolved areas. NAfW powers extended following a "yes" referendum decision on 3rd March 2011. Welsh Assembly Government refers to and brands itself as the Welsh Government
2014	Wales Act 2014, UK Parliament: Confirmed Welsh Government's change of name
2015	Well-being of Future Generations (Wales) Act, National Assembly for Wales
2017	Wales Act 2017, UK Parliament: Confirmed the permanence of the National Assembly and introduces the reserved powers model
2020	Following assent for the Senedd and Elections (Wales) Act, National Assembly for Wales renamed Y Senedd Cymru/The Welsh Parliament on 6th May 2020

1.6 The Development of Legislative Devolution

Since 1999 it had proved necessary to extend the powers of the National Assembly from having secondary legislation competence in specified devolved fields to primary legislative powers in all areas not reserved to the United Kingdom. Table 1.3 above sets out the main milestones in the development of devolution. Scully and Wyn Jones (2012, pp. 162-166) writing about the 2011 referendum on legislative competence noted that the need for it was a result of the original inadequate 1998 legislation. They also noted that the referendum result indicated that in the ten years of devolution it had become an accepted feature of Welsh political life. However, despite the relatively high level of inter-party cooperation within the referendum “yes” campaign, they expressed dissatisfaction at the dominance of Welsh Labour in the political process, and they felt that the dominance of one party was unhealthy for democracy.

The UK coalition government’s St David’s Day Agreement was published in the 2015 command paper “Powers for a Purpose: Towards a Lasting Devolution Settlement for Wales” (UK Government, 2015). This led to the Wales Act 2017 (UK Parliament, 2017a) which conferred a state of permanence on the National Assembly. The Act moved the Welsh legislature to the ‘reserved powers’ model that was already operating in the Edinburgh and Belfast administrations. This meant that powers in Wales that were not specifically on a schedule of those allocated to the UK Parliament were, by default, within the competence of the National Assembly. One should add a rider to this though, because of the doctrine of the Supremacy of Parliament the Westminster body can still legislate on Welsh issues not reserved to the UK, although under the Sewel Convention the UK Parliament will not usually do so. If this is considered necessary, the consent of the devolved government should be sought, although as Paun et al. (2020, p. 3) point out the convention is not legally binding upon the parties and the UK Parliament can legislate on devolved issues without the consent of the devolved administrations.

The Welsh Parliament and Welsh Government have been through various iterations of powers since 1999. Whilst the current reserved powers model has brought Cardiff into broad alignment with Edinburgh and Belfast although the outcome is still somewhat asymmetrical (Cheung et al., 2019). This is explained in large part by Wales still being subsumed within the legal jurisdiction of England and Wales, whereas

Scotland and Northern Ireland have their own territorial legal jurisdictions. Nevertheless, much progress has been made in the areas of powers and administration of semi-autonomous governance in Wales since 1999. To quote Davies (1998, p. 15):

“Devolution is a process. It is not an event, and neither is it a journey with a fixed endpoint. We test our constitution with experience, and we do that in a pragmatic and not in an ideologically driven way.”

1.7 Devolution and Transport Policy

The development of Welsh transport policy has followed the increasing scope of the Welsh Assembly Government’s (and from 2011 the Welsh Government’s) powers. Table 1.4 below summarises the main developments.

The role of local authorities working at regional or sub-regional level was also important. At the outset of devolution, they had produced the 5-year Local Transport Plans (LTPs) which were required of Welsh counties and county borough councils by Section 108 of the UK Transport Act 2008 (UK Parliament 2000). These subsequently became statutory in mid-2001. The LTPs, once published, were subject to annual progress reports, and to be replaced when determined by the Assembly. Section 108 also stipulated that the local authorities should develop policies for implementation in their area of the future Wales Transport Strategy, when published, and include these in their LTPs (Law Wales, 2016b, p. 1). As later set out in the “Transport Framework for Wales” (National Assembly for Wales, 2001a) the LTPs were integrated with wider policies and covered integrated transport, widening travel choice, traffic management and demand restraint, rural transport, and sustainable freight distribution (i.e. logistics). In addition, the establishment of four voluntary non-statutory joint local authority regional transport consortiums for the north, mid, south west and south east was supported.

Table 1.4 Welsh Transport Milestones

Year:	Milestone:
1962	"The Reshaping of British Railways" (The Beeching Report), Parts 1&2, British Railways Board
2000	Transport Act 2000, UK Parliament. Required Welsh local authorities to produce 5-year local transport plans and submit them to the NAFW
2001	"Transport Framework for Wales," National Assembly for Wales.
2005	Railways Act 2005, UK Parliament: National Assembly ministers given limited powers over railway services and infrastructure. Co-signatories to the Wales and Borders rail franchise
2006	Transport (Wales) Act, UK Parliament: Duty of Welsh Ministers to produce an all-modes transport strategy
2008	"One Wales: Connecting the Nation: The Wales Transport Strategy," National Assembly for Wales: Reflected the priorities of the One Wales Delivery Plan 2008-11. Set out long-term transport strategy, and desired outcomes
2008	"Wales Route Utilisation Strategy," Network Rail
2009	"One Wales: One Planet: The Sustainable Development Scheme of the Welsh Assembly Government"
2009	Regional Transport Consortia publish Regional Transport Plans for Submission to NAFW
2010	"National Transport Plan," Welsh Assembly Government: Set out national transport project delivery and monitoring
2011	Welsh Government sponsored TrawsCymru medium / long distance bus services introduced Aberystwyth-Carmarthen and Cardiff-Newtown
2015	"National Transport Finance Plan," Welsh Government: Detailed project progress, finance and expenditure
2015	Well-being of Future Generations (Wales) Act, National Assembly for Wales
2016	Transport for Wales established on 1st April 2016
2018	Wales and Borders rail franchise awarded to Keolis Amey for 15 years by Transport for Wales
2019	April, Welsh Government declares a climate emergency. July, Welsh Government abandons the M4 Corridor around Newport (M4CaN) project
2019	TrawsCymru expanded to a network of nine routes, two once-daily routes and four TrawsCymru Cysyllt / TrawsCymru Connect shorter routes
2021	Transport for Wales Rail Ltd takes over the Wales and Borders rail franchise as operator of last resort
2021	"Llwybr Newydd: a new Wales transport strategy"
2022	Welsh Government consultation: "One network, one timetable, one ticket: planning buses as a public service for Wales"

After assuming existing Welsh Office powers over transport an early document, the “Transport Framework for Wales” (National Assembly for Wales, 2001a) laid out the main reasons for establishing the ‘aims and themes’ which the Assembly (at this time a corporate entity comprising a legislative and an executive arm) wished to apply to the development of the transport system (National Assembly for Wales, 2001a, p. 1). The broad cross-cutting policy themes of economic development, environmental improvement, promoting thriving rural and urban communities, opportunity and inclusiveness and addressing the decline in public transport use are ones that have continued to be promoted with broad consistency of the past twenty years, as are the strategic aims of sustainable development, tackling social disadvantage, promoting equal opportunities and developing:

“a better co-ordinated and sustainable transport system to support local communities and the creation of a prosperous economy.” (National Assembly for Wales, 2001a, p. 6)

These objectives were intended to lead planning and were seen as, as Preston (2014, p. 5), suggests:

“It is based around a vision statement and a series of high level objectives. It is often associated with accessibility, and more naturally lends itself to integration with other policy areas ... This is consistent with the view of transport as a derived demand.”

The UK Railways Act 2005 (UK Parliament, 2005) had given ‘Welsh Ministers’ limited powers over rail services and infrastructure for the first time. They had to be consulted by the now defunct Strategic Rail Authority on the contents of the agreement for the planned Wales & Borders passenger franchise. As co-signatories to the franchise the National Assembly ministers were granted powers to finance ‘the provision, improvement or development for any Welsh services to which the agreement relates’ (Section 10, F2 (3) (a)). Powers were also granted to finance freight services and facilities (Section 11, (1) (a) and (b) (i) (ii)).

The Transport (Wales) Act 2006 (UK Parliament, 2006a) had placed a duty on Welsh Ministers to prepare an all-modes Wales transport strategy. Following the formation of the One Wales Coalition Government between Welsh Labour and Plaid Cymru in June 2007 this was published in 2008 as “One Wales: Connecting the Nation: The Wales

Transport Strategy” (Welsh Assembly Government, 2008a), this was accompanied by a Welsh transport strategy equality and diversity assessment.

The role of the local authorities in helping to deliver the ‘Wales Transport Strategy’ was brought into question by the 1996 reorganisation of Welsh local government. This had replaced eight large two-tier strategic county councils with twenty-two smaller unitary county and county borough councils. The size of the new smaller authorities was not optimal in addressing cross-boundary issues and having the strategic and economic gravity needed for transport policy and service provision. Stafford (2011, p. 8) commented:

“The reorganisation led to serious questions being raised regarding the capacity of smaller unitary authorities in terms of the expertise and resources required to deliver transport policy, particularly in terms of the development and management of major Transport Grant schemes.”

Consequently, between the late 1990s and early 2000s the four voluntary regional transport consortia SEWTA (South East), SWWITCH (South West), TraCC (Mid) and Taith (North) emerged with the mission to prepare Regional Transport Plans and apply for project grants and manage the projects. Because there was a longer history of inter-authority working in the field in the south, SEWTA and SWWITCH were more advanced in their capacity and organisational ability than was TraCC or Taith.

The provisions of the Transport (Wales) Act 2006 (UK Parliament, 2006a) gave the Welsh government powers to establish statutory Joint Transport Authorities (JTAs) if the existing voluntary regional transport consortia failed to achieve local and regional transport planning consistent with the intentions of the National Assembly. The concept of JTAs was strongly opposed by the local authorities and the Welsh Local Government Association as being a diminution of local government powers arguing that:

“they had effectively instituted a top-down model of ‘dictate and deliver” (Stafford (2011, p. 8)

Whilst on one hand the JTAs would have been focussed organisations with specialist capacity, on the other hand it could be argued that as powerful semi-autonomous

organisations they would have made it more difficult for local government to deliver the cross-cutting policy and services agenda.

Welsh Government conceded on this issue, with only the constitutions of the voluntary consortia being legally-binding and the Regional Transport Plans (RTP) themselves being a statutory obligation. The consortia drew up the Regional Transport Plans and published them in 2009. The process was extended and not particularly smooth because of delayed RTP guidance from the government. The RTP was delivered internally in the cases of SEWTA and SWWITCH, and through using consultants in the cases of TraCC and Taith. The consortia delivered regional projects until the withdrawal of funding streams by a ministerial decision in 2014 (Minnis, 2014, p. 4), the ramifications of this move are dealt with later.

“One Wales: Connecting the Nation: The Wales Transport Strategy” (Welsh Assembly Government, 2008a) reflected the priorities of the Government’s “One Wales Delivery Plan 2008-11” (Welsh Assembly Government, 2008b). The document was a base framework for all Welsh transport planning and interventions that set out Welsh long-term strategic transport priorities and the ‘desired outcomes’ (Skates, 2017, p. 1(2)), as well as the pathway for local authorities to contribute to the Strategy. Cross-cutting input from the WTS to the Government’s non-transport priorities was also required. Ministers were required to keep the Strategy under review and in February 2013 the Cabinet decided that it should remain in force.

Delivery of interventions was to be through Welsh Government at national level, the regional transport consortiums at regional level, and by local government at local level. with the progress of interventions monitored.

2008 also saw the publication of two further documents which were closely related to the transport strategy. These were the “Welsh Transport Planning and Appraisal Guidance (WelTAG) 2008” (Welsh Assembly Government, 2008c) and Network Rail’s “Wales Route Utilisation Strategy 2008” (Network Rail, 2008).

WelTAG is the assessment mechanism through which Welsh Government, and applicants for Welsh Government funding, decide the most beneficial project option from amongst a number of options. It also allows comparisons of funding candidate projects to be made on a ‘like for like’ basis. The practice, rather than the theory, of

WelTAG has been somewhat controversial and comments are expressed by the questionnaire respondents and semi-structured interviewees in Chapter 8.

The “Wales Route Utilisation Strategy 2008” (Network Rail, 2008) provided a benchmark for the network, its characteristics, capacity and restraints, many of which were a result of money-saving infrastructure rationalisations in the 1960s to 1980s. Consequently, it provided a fit with the Welsh Government’s responsibility as co-signatory for the Wales and Borders franchise, and the powers conferred by the Railways Act 2005 (UK Parliament, 2005) for the Welsh Government to engage in discretionary spending on both passenger and freight services and infrastructure, in order to provide additional capacity and/or reliable service delivery.

The Welsh Assembly Government was formerly one of only three governments in the world to have a legal requirement to promote sustainable development (UK Parliament (2006b), section 79). Royles (2010, p. 23) comments:

“The ‘One Wales’ coalition agreement between the Labour Party Wales and Plaid Cymru committed to using sustainable development as the central organising principle for all WAG activities and argued that climate change was a key global threat.”

An important addition to the existing suite of cross-cutting strategies impacting on Welsh transport policy was the Well-being of Future Generations (Wales) Act 2015 (National Assembly for Wales, 2015). This has been internationally acknowledged as ground-breaking legislation in the area of sustainability. In general, it establishes the principle that the current generation should not leave the environmental and socio-economic condition of the country, or essential resources, in a worse state for future generations.

It sets seven well-being goals: i) a prosperous Wales, ii) a resilient Wales, iii) a healthier Wales, iv) a more equal Wales, v) a Wales of cohesive communities, vi) a Wales of vibrant culture and thriving Welsh language, vii) a globally responsible Wales. The Act places a duty upon Welsh public bodies, the Well-being Duty, to undertake sustainable development by: i) identifying and publishing well-being objectives to maximise their contribution to achieving the seven well-being goals, and ii) by taking all reasonable steps in the exercise of their functions to fulfil their well-being objectives (National Assembly for Wales, 2015).

The Sustainable Development Principle of the Act explains how public bodies are to comply with the 'well-being duty' and requires public bodies to: a) balance short-term needs with the ability to meet long-term needs, b) plan to prevent problems occurring or getting worse, c) to consider how a body's 'well-being objectives' fit with the 'well-being goals' and the 'well-being objectives' of other bodies, d) to collaborate either internally or externally to comply with their own 'well-being objectives,' and e) to involve stakeholders with an interest in achieving the 'well-being goals,' stakeholders need to be representative of the area served. The bodies are required to publish a Well-being Statement, report on progress annually, respond in public to any recommendations that the Future Generations Commissioner may make and submit to the Auditor General for Wales such information as he/she may require to assess compliance with the Act. Davies (2016, p. 56) says of the Act:

“Much is expected of the WFGA in terms of making Wales a nation truly governed by the principle of sustainable development where the interests of future generations are subjected to legal protection.”

However, he adds the rider that:

“...a detailed review of the Act and its accompanying guidance, leads one to the conclusion that this endeavour is over-leavened with expectation rather than assurance” (Davies, 2016, p. 56).

In other words, he was sceptical of the Welsh Government's ability to translate the provisions of the Act into reality. However, some level of assurance appeared in April 2019 when the Welsh Government declared a Climate Emergency followed in July 2019 by First Minister Mark Drakeford (Welsh Government, 2019c) announcing the controversial decision not to proceed with the M4 Corridor around Newport (M4CaN). M4CaN was a £1.4 bn, 22 km, six-lane M4 relief motorway bypassing the four-lane Brynglas tunnels and Newport urban motorway section by new construction to the south across the port area (BBC, 2019a). The project was considered essential by business interests in south Wales because of journey-time delays in the area costing an estimated £31m per annum (BBC, 2017). Although the cost of the project and the Welsh Government's inability to fund it was cited by the First Minister as being the major consideration in the decision, he said that he attached more weight than the public inquiry inspector on the environmental effects of the projects which would have

had an ‘adverse impact’ on the wildlife, historic landscape, and sites of special scientific interest of the Gwent Levels coastal strip. Future Generations Commissioner Sophie Howe had opposed the project and praised the Government’s decision as being:

“...the right one for people and planet...I hope this marks a policy shift for Wales and the Welsh Government (will) now quickly bring forward investment in public transport” (BBC, 2017).

“A Railway for Wales: Meeting the needs of future generations” (Welsh Government 2019a) was the Government’s vision for full rail devolution which included new stations, and upgraded, reopened and/or new lines integrated with bus services, particularly on the north–south corridor. It explicitly set out how the outline programme aligned with the seven well-being goals of the Well-being of Future Generations Act:

“With the full and proper devolution of infrastructure and services aligned to a fair funding settlement we will be able to develop a railway in Wales that meets our own needs and objectives for the economy, our responsibilities to the environment, and our obligations under the ‘Well-being of Future Generations (Wales) Act 2015” (Welsh Government, 2019a, p. 10).

The “Wales Transport Strategy” was the seminal document for Welsh transport policy which informed the policies and structure of the new transport policy document “Llwybr Newydd (new path): the Wales transport strategy 2021” (Welsh Government, 2021d). Because of its importance it is appropriate to summarise its main features.

After ministerial comments the strategy opens with a brief introduction and a glossary of useful terms (Welsh Government, 2021d, pp. 5-18). The strategy sets out the Welsh Government’s 20-year vision of “An accessible, sustainable and efficient transport system.” The strategy then expands on this statement:

“Accessible: means a transport system that is accessible to all because transport providers are taking action to address the barriers that can prevent people using transport including physical, financial and attitudinal barriers.

Sustainable: means a transport system that is good for people and communities, good for the environment, good for the economy and places and

good for culture and the Welsh language, addressing each of the national well-being goals

Transport system: means transport infrastructure (such as footpaths, cycle paths, roads and rail) as well as transport services (such as aviation, public transport and logistics). The wider system encompasses transport providers (the organisations involved in delivering transport services) as well as transport governance (the system that supports these” (Welsh Government 2021d, sections 1-2).”

The Strategy contains four 20-year ambitions for a transport system that is:

“good for people and communities, good for the environment, good for the economy and places in Wales, and good for culture and the Welsh language.”

These are intended to contribute towards the seven national well-being goals which are enshrined in Welsh law in the ‘Well-being of Future Generations (Wales) Act 2015’ (Welsh Parliament / Senedd Cymru, 2015). These goals are:

“a more equal Wales, a resilient Wales, a healthier Wales, a more equal Wales, a Wales of cohesive communities, a Wales of vibrant culture and thriving Welsh language, and a globally responsible Wales.”

The interface between the strategy’s four-long term well-being ambitions and the Welsh Government’s seven well-being goals is shown in a diagram on page 23. (Welsh Government, 2021d, pp. 13-23).

Delivery is informed by the priorities for the five years 2021-2026:

- Priority 1: planning for better connectivity
- Priority 2: public transport services
- Priority 3: safe, accessible, well-maintained and managed transport infrastructure
- Priority 4: making sustainable transport more attractive and affordable
- Priority 5: support innovations that deliver sustainable choices

(Welsh Government, 2021d, pp. 24-36)

The vision, priorities, and well-being ambitions headlines are expanded by a short explanation, and by specific commitments as to what steps the Welsh Government will take to achieve them

Section 4 outlines the quantitative measures that will be required to annually measure progress against the four well-being ambitions. This will include development of a national travel survey, in association with Transport for Wales. For data collection there will be an emphasis on this quantitative survey, together with other existing sources including transport operations and communications data. Other indicators from multiple sources, covering all transport modes, will be also included. The intention is for a wide-ranging data set which can be broken down by mode, demographics, socio-economic and geographic categories. This will be used to assess the impact of the Welsh Government's transport funding on the Strategy's well-being measures (Welsh Government, 2020d, pp. 40-46).

Delivery of the strategy project and programmes will be backed by priority funding from the Welsh Government. The emphasis is on making the best use of existing infrastructure, managing it optimally to reduce maintenance backlogs and avoid major "emergency investment," and adapting it to counter climate change and support modal change. In the case of new infrastructure, the government's Sustainable Transport Hierarchy will prioritise active travel, public transport, and low-emissions vehicles. In view of the discontent expressed by some respondents to the questionnaire and semi-structured interviews for this research it is interesting to see a commitment to reviewing the transport grant schemes, to keeping the WelTAG transport project appraisal under review, and monitoring completed projects to ensure that the benefits put forward in WelTAG applications have been achieved (Welsh Government, 2021d, pp. 49-50).

A five-yearly "National Transport Delivery Plan" (NTDP) will be based on a "Statement of Funds Available" from the UK Comprehensive Spending Review, and will provide high, medium, and low budget scenarios to allow Transport for Wales to plan appropriately. It will contribute to the implementation of the spatial strategy 'Future Wales: The "National Plan 2040" (Welsh Government 2021e) and will also be aligned with the Wales Infrastructure Investment Plan. The NTDP will provide specific details of interventions and will monitor progress and track finances on projects and schemes financed by the Welsh Government. In the wake of the decision not to bypass the M4

Brynglas tunnels at Newport (Welsh Government, 2019c) the South East Wales Transport Commission (Welsh Government, 2020g) provided a set of recommendations for the M4 corridor between Cardiff and Newport (and on to Bristol) which will also form part of the delivery of Llwybr Newydd. (Welsh Government, 2021d, pp. 51).

Linked to these delivery mechanisms will be a return to Regional Transport Plans formulated by the four new Corporate Joint Committees for north, mid, southwest, and southeast Wales (Welsh Government, 2022a). These will be required to broadly comply with the objectives of 'Llwybr Newydd' and 'Future Wales,' and will contain both regional transport policy and delivery plans.

An issue which attracted criticism from respondents to the research instruments for this thesis was the lack of cross-cutting policy working. "Llwybr Newydd" proposes to:

"address this problem through working across Welsh government policy areas 'to integrate transport considerations into wider decision-making, feeding into policy development, and learning from both successes and failures."

"Other priorities will be partnership working with relevant Welsh and UK authorities and bodies, ensuring that other Welsh Government policies and guidance are synchronised with "Llwybr Newydd," and ensuring that Welsh Government, partners and delivery organisations have both the capacity and skills to deliver the strategy." (Welsh Government, 2020d, pp. 53-54).

The progress of both Welsh Government and their transport partners will be monitored against the four well-being ambitions and the five priorities. The priorities will be reviewed and updated regularly to allow for changing circumstances and major policy changes. An independent review of progress against the Strategy will be commissioned by Welsh Government within five years and a performance board will be established to monitor the overall progress of "Llwybr Newydd," the "National Transport Delivery Plan," the regional transport plans, work by Transport for Wales, and other Welsh Government transport partners such as the UK Department for Transport and Network Rail. (Welsh Government, 2020d, pp. 56-58).

The five ways of working set out in the Well-being of Future Generations (Wales) Act 2016 (Welsh Parliament / Senedd Cymru, 2015) will be employed in the implementation of the Strategy. These are:

Involvement: involving service users and a wider range of stakeholders in the design and delivery of transport services. Special attention will be paid to people with protected characteristics and Welsh speakers, as well as non-sustainable transport users.

Collaboration: working with the various specialist commissioners in Wales, the UK government, local government/the new regional Corporate Joint Committees, Transport for Wales, and cross-collaboration with other government policy areas.

Prevention: preventing existing issues like poor health and social isolation from becoming worse through meeting the Strategy's four well-being ambitions.

Integration: ensuring that strategic policies and project programmes are integrated, and that these are integrated with the seven national well-being goals. Integration between transport modes will be implemented through planning for whole journeys for people and goods, rather than prioritising modes, and improving connections between modes.

Long term: balancing the short-term requirements of the priorities with safeguarding long-term needs. The priorities are actions for immediate implementation whilst the long-term ambitions will enable tracking of the Strategy's impact on society over time. (Welsh Government, 2020d, pp. 59-64).

The final section of the Strategy contains nine modal and transport mini plans laying out the broad framework for the delivery of Strategy priorities. These are broken up into how they fit into the vision, the five-year priorities, the 20-year well-being ambitions, and the five ways of working. The mini plans cover active travel, bus, rail, roads/streets and parking, the third sector, taxis and private hire vehicles, freight and logistics, ports and maritime transport, and aviation (Welsh Government, 2020d, pp. 65-101).

Responses to the consultation on the Strategy (Welsh Government, 2021b) were broadly positive with 83% of 254 respondents to the question either agreeing or strongly agreeing with the long-term vision. Strong agreement and agreement with the

20-year ambitions was registered by 79% of the 242 respondents replying to the question, whilst 72% of 236 respondents strongly agreed or agreed with the five-year priorities (Welsh Government, 2021b, pp. 4-5).

Whilst “Llwybr Newydd” establishes a framework for integrating and establishing cross-policy working on transport issues its effectiveness will be proved by the delivery of the interventions in the National Transport Delivery Plan and the four regional transport plans, and their successful implementation as components in an integrated transport system. The ambition and extent of these will ultimately depend on the amount of public investment available.

Following a series of commercial bus service withdrawals and company collapses the Welsh Government tabled the Bus Services (Wales) Bill at the Senedd in March 2020 (Welsh Government, 2019b). The intention was to provide local authorities with more control and flexibility in the procurement and quality of local bus services through partnership and franchising schemes, or even operating their own bus companies. Clark (2020, p. 28) suggests that this has caused a further wave of uncertainty amongst private operators, some of whom have cancelled orders for new vehicles. He also quotes an industry expert on whether the current small local authorities will have the capacity to use the provisions of the final act, and his opinion that the franchising powers might be subject to legal challenges from existing operators (Clark, 2020, p. 29). However, the demands on the Welsh Government caused by the Coronavirus pandemic led to the withdrawal of the Bill in 2020 (Welsh Government, 2020c). This has now been re-tabled as a consultation paper ‘One network, one timetable, one ticket: planning buses as a public service for Wales’ (Welsh Government, 2022b). The proposals are:

- Requiring the franchising of bus services across Wales
- Allowing local authorities to establish new municipal bus companies, and
- Relaxing current restrictions on current municipal bus companies so that they would operate on the same legal basis as new ones

The first proposal reflects the Transport for London bus franchising model. Welsh Government would set high level parameters for the network including minimum timetabling, service integration and ticketing standards. Local authorities, or the new regional Corporate Joint Committees, would establish networks of services to be

franchised and bid for by private/local authority bus companies. The Welsh Government considers that there are ten key success factors for these proposals:

- Area-wide networks with all significant destinations within them included
- One unified ticket system
- Easy to understand network
- One brand
- Easy and reliable transfer (including integration with the rail network)
- Reliable travel times
- Accessible and comfortable
- Public feedback and customer care
- Passenger safety, security, and health, and
- Network efficiency and financial affordability.

(Welsh Government, 2022b, pp. 16-17)

1.8 Current Transport Infrastructure and Operation

The Welsh transport system is focussed on west–east transits Minnis (2011, p. 2) notes that:

“As the main population and economic centres in Wales are in the north and south, with transport links focussed on links to the UK, and beyond. Demand for north-south links is also (sic) comparatively low”

but even many of these east-west corridors, road or rail, are of relatively poor quality. Minnis (2011, p. 3) further comments:

“Significant ‘pinch points’ and lack of resilience in road and rail networks on both key east-west corridors currently hamper key economic links outside Wales, and must be addressed to equip Wales for future demand allowing the economic and population centres of north and south Wales to sustain the Welsh economy”

These issues are compounded by the historical and geographic factors relating to the development of the nation’s transport system, previously outlined, and they make public transport an uncompetitive option when compared with the private car. This is

particularly the case for time-sensitive business travel within the country, and to/from England. Links of acceptable quality links are confined to the A55 dual carriageway corridor, and the Holyhead-London Euston inter-city rail service in the north, and the A465 (mainly) dual carriageway / M4 motorway corridors, and the West Wales / Swansea-London Paddington inter-city service in the south. Otherwise, travel is predominantly on single carriageway roads with limited infrastructure to pass slower traffic, or on the remaining relatively low-speed regional rail services. This situation effectively obliges business travellers to drive which contributes to the undermining of the Welsh Government's sustainability duties as set out in the Well-being of Future Generations (Wales) Act 2015 (Welsh Parliament / Senedd Cymru, 2015).

The current pattern of railway routes and services, see map 6.3, is embedded in a Welsh transport system which reflects both the country's difficult topography, the historic lack of a Welsh political centre, and past and contemporary political, economic demographic and cultural patterns. This is evidenced by its focus on the transport of people and primary goods such as coal, iron, steel, slate and agricultural produce to benefit external markets (predominantly in England), Secondly, it reflects UK strategic concerns as evidenced by the primacy and relatively high quality, when compared with internal rail links, of 19th / early 20th century north and south Wales rail links from the centre to the Irish Channel ports.

Although the pre-Beeching mid-1960s Welsh railway system was so comprehensive that there were few major settlements without passenger or freight rail access, the operation of the Welsh rail network was organised around the financial and operational concerns of distant headquarters at Euston and Paddington, with no consideration given to the socio-economic needs of the Welsh nation. Lloyd (2018, pp. 73-98) provides a case study of how vigorously the London & North Western Railway Company defended its own business model and managerial, political and cultural agenda against widespread political criticism in North Wales during the period 1870-1900. As previously mentioned, the primary strategic objectives of the network were the export of coal, slate and steel, and also linking London with Ireland. Owen-Jones (1997, p. 9) states:

“Once the successful outcome of the Liverpool & Manchester Railway, opened in 1830, became apparent, the government realised the great potential of railways for improving communication with Ireland. In political and economic terms this was highly significant. The government regarded it as expedient to offer financial encouragement and support for suitable rail proposals.”

The subsequent fragmentation of the Welsh railway system under the Beeching report (British Railways Board, 1965) closures, confirmed this model of Welsh railways as being primarily being for the benefit of external requirements. The report contained no separate references to Wales at all. Beeching removed branch lines, which in many cases were probably better served by bus services, and a considerable number of passenger stations and freight depots were also closed on those railways which remained. Another tenet of Beeching was the closure of duplicate lines. These were railways built by one company to compete with another nearby railway owned by another company, e.g. the Great Western Railway line from Birmingham Snow Hill to Wolverhampton Low Level which competed with the London & North Western Railway line from Birmingham New Street to Wolverhampton High Level (Conolly, 1967, p. 13). Apart from some cases in the South Wales Valleys (Conolly, 1967, p. 43) this policy paid absolutely no regard to the geography of Wales. The definition of a duplicate line in Wales was unrealistic given that the access hinterland of any railway was limited due to the mountainous and hilly character of much of the country. Railway closure hearings by the Wales Transport Users’ Consultative Committee were restricted to the grounds of hardship. Christiansen and Miller (1972, p. 165) noted:

“The Welsh committee found the definition of hardship a little elusive but it was taken to embrace such factors as the extra time and cost which a rail traveller might have to bear using other mean of transport to go to work, to the shops or for recreation.”

Regardless of hardship all four lines to Brecon from Moat Lane near Newtown, Neath, Newport and Hereford were closed despite their distance from the South Wales and Newport-Shrewsbury main lines which they allegedly duplicated. In the north the Ruabon-Barmouth line was considered a duplicate of the geographically remote Cambrian main line from Aberystwyth to Shrewsbury and was also closed.

Strategically, the worse effects of Beeching were the closure of the Bangor-Afon Wen line connecting the North Wales Coast main line with the Cambrian lines, the 'rationalisation,' i.e. the operational capability down-grading, and partial closure of the Cambrian system, and closure of the Aberystwyth-Carmarthen line which connected the Cambrian lines to the South Wales main line.

This left the only north-south Wales rail corridor being through Newport, Hereford, Shrewsbury, Wrexham and Chester, about 75% of which is in England. In addition, this route was without north-south through services from Cardiff to Holyhead until the advent of devolution in the early 21st century. Consequently, Wales was left with a skeletal railway system that resembled an inverted 'E' with the Central Wales Railway forming a triangle across the lower half of the 'E' from Llanelli to Craven Arms south of Shrewsbury, see maps 2 and 3. A few branch lines survived in west Wales, the Cardiff Valleys and in mid and north Wales. Excepting the Swansea-Cardiff-London / Cross Country Inter-City 125 services, British Rail was forced to run the residual Welsh rail service with maximum economy because of declining state support.

The post-Beeching period saw some publicly funded station and passenger line re-openings, and some investment in infrastructure and signalling (mainly to restore capacity removed by British Rail to save money), and station improvements. After railway privatisation the 'Wales & Borders' franchise was established by the former Strategic Rail Authority in 2000. Because of previous franchise commitments it took until 2003 to include the whole country, the first time since the establishment of the industry that railways in Wales had a domestic strategic focus, although there were no Welsh powers over the franchise until 2006. The franchise was awarded to Arriva Trains Wales in December 2003 and run by them until October 2018. Under the new Transport for Wales Rail Services franchise, specified by the Welsh Government's Transport for Wales agency, there were ambitious plans for renewing the current rolling stock fleet and for station improvements across the country, together with converting the Core Valleys Lines network to a light rail system (this is a transport mode that encompasses an operating spectrum from modern street tramways to segregated route light metros, often on the same system). To achieve this the Core Valleys Lines were transferred from Network Rail to Transport for Wales (Modern Railways, 2019).

However, unlike in Scotland, control of most Welsh railway infrastructure, as distinct from the franchising of Wales and Borders railway services, has not been devolved. In summer 2017 the UK Secretary of State for Transport announced cancellation of the electrification of the South Wales Main Line between Cardiff Central and Swansea High Street. The decision was widely criticised in Wales as damaging economic development in the Swansea city region and the environment. It also impacted on the Welsh Government's plans for electrification of non-Valleys lines local and regional train services in the south.

A subsequent investigation (National Audit Office, 2018) found a reduction of the cost / benefit ratio (CBR) for the section from 0.6 to 0.3:1, i.e. a reduction from 60p to 30p of benefit for each pound spent. It could be argued that this poor CBR is due to the de-coupling of the section from the main project which has diluted the benefits obtained. Network Rail has experienced considerable cost inflation in the Great Western electrification project, but it is not clear from the NAO report to what extent this is responsible for the poor revised CBR result. In addition, there were also other issues relating to the affordability of Network Rail's Control Period 5 (2014/15 - 2018/19) investment portfolio.

The UK government has allowed train operating companies to make premium payments to their shareholders at the cost of transfer to the public sector. Bowman et al. (2013) note in their report for the University of Manchester's Centre for Research in Socio-Cultural Change (CRESC) 'The Great Train Robbery,' that the costs of artificially low track access charges and additional rail infrastructure renewal have been transferred away from the train operating companies to the public sector and Network Rail's accumulated debt which now stands at £30 billion (Moran, 2013).

The highways system developed mainly from early droving roads, local connections, and 18th and 19th century strategic Royal Mail coaching roads which were focussed on west-east cross-border journey patterns. Rosevear et al. (2019, pp. 426-428) have demonstrated how Wales went from no advertised London stagecoach routes in 1760 to three in 1790. In the north a Holyhead-Chester-London service, and in the south two Cleddau estuary to London services. By 1836 the Holyhead to London coach had diverted to Telford's new road broadly on the route of the modern A5 via Shrewsbury and Birmingham.

On the modern network (see Map 17, p. 215) low average speeds caused by route and carriageway alignment issues and the inability to overtake slower traffic, relatively high levels of journey time uncertainty, lack of route corridor redundancy in emergencies such as infrastructure damage or road traffic collisions, vulnerability to climate change events and the absence of a planned system of active traffic management and service stations/rest areas make longer road journeys in Wales a function of necessity rather than pleasure. Even in the case of the M4 motorway and A55 'North Wales Expressway' the design of the roads was under-specified and consequently they suffer from problems of journey time reliability. As in the case of the railways the road network is maximised towards facilitating west-east journeys.

The A470 exemplifies the problems of long-distance road travel in Wales. The country's main north-south route, it runs for a sinuous and sharply graded 298 km. A Llandudno North Shore to Cardiff Bay journey would occupy 4 hours and 23 minutes at an average speed of 67.9 km/h according to the AA Routefinder. Welsh Government projects have improved its infrastructure considerably over the last 20 years. However, it still varies widely in quality from urban road in Cardiff and Llandudno to dual carriageway from Cardiff to Merthyr Tydfil and around Brecon. The remainder is a mix of extensive stretches of high-quality single-carriageway rural road but also sub-optimal stretches and locations where the mountainous nature of the countryside has prevented improvements without substantial expenditure. Another problem is the inability of traffic to overtake slow-moving agricultural vehicles and HGVs which causes driver frustration and can result in risky overtaking behaviours. One of the objectives of 'One Wales' was to overcome this with stretches where overtaking could be safely accomplished. However, the objective was not to be realised as with the end of the 'One Wales' agreement in the 2011 election the incoming government was faced with a choice, as Minnis (2011, p. 3) pointed out:

“The challenge for the next Welsh Government is to balance both perspectives (i.e. north-south and east-west) in the context of real terms capital spending cuts in transport of more than 35 per cent between 2010-11 and 2013-14.”

At present bus industry operators are free to run commercial services with relatively minimal safety and registration regulation whilst local authority tendered routes and/or journeys cover socially necessary services that operators deem to be 'non-

commercial.’ Buses are still Wales’ predominant mode of public transport with approximately 100 million journeys each year, in comparison with 30 million journeys by rail. In 2016-17 79% of services were provided commercially, with the other 21% being contracted or otherwise supported by local authorities for social reasons. However, between 2011/12 and 2016/17 there was a fall of 13.9% in journeys from 115.7m to 99.6m (Welsh Government, 2018a, pp. 10-11).

In practice the predominance of commercial service provision can lead to unstable networks. In December 2013 Arriva Buses Cymru withdrew all their west Wales services, including the X40 Aberystwyth-Carmarthen-Cardiff route which they had run commercially since February 2012 after unilaterally withdrawing from the former Welsh Government co-ordinated TrawsCambria (now TrawsCymru) long distance network (Welsh Government, 2013). This necessitated Welsh Government and the local authorities having to make emergency arrangements to maintain essential services which took some time to implement.

Responding to queries on the buses market from the Welsh media in February 2018 I made the following points regarding factors leading to this decline (Lewis, 2018), and the consequences of them:

“The UK government’s austerity programme means that the Welsh Government’s budget is falling year on year. Consequently, WG’s financial support to local authorities for supporting financially uneconomic but socially necessary bus routes is also falling. Welsh Government’s support to the bus companies that run the network is also falling exacerbating the problem. The cutbacks have the effect of reducing the number of routes, restricting frequencies, and the length of the operating day over which services run. For example, in Powys most bus routes only operate during the traditional working day and not in early morning or the evening. This causes the numbers of passengers to fall and reduces bus company fare box revenues. Consequently, fares rise to compensate for passenger falls and passenger numbers fall further, a vicious circle of decline. Those sectors of society most affected are the most vulnerable ... the poor on social security / unemployment benefits and poorly-paid workers, people with long-term limiting illnesses and disabled people, young people and elderly people.”

During the past twenty or so years the dominant professional discourse has been in favour of inter-modal integration. In the case of Wales this has been posited without any strategic models of what such a system would be like and whether, or not, inter-modal integration is the most efficient way of providing services. The 'integration discourse' is linked to an assumption that investment in transport infrastructure and services promotes economic and therefore social benefits, the key subject of this research. However, as Lang (2016) comments regarding the proposals for the Cardiff Capital Region Metro:

“There remains a lack of robust methodological approaches to conclusively prove the link between transport investment and social and economic outcomes.”

Winkler (2013) in her report for the Welsh Government on the development of the TrawsCymru long-distance bus network (see map 4 below) draws attention to the competing objectives and outcomes that public transport investment in this country experiences, such as the need to link with rail services whilst at the same time providing regional and local connectivity in the context of severe financial

This research will investigate both the issue of integrated models and attempt to establish whether capital and revenue investment in transport networks can be linked to favourable socio-economic outcomes. In the current context of potential economic retrenchment linked to the United Kingdom's withdrawal from the European Union these questions are of great importance.

The above factors are highly germane to the structure of a potential Welsh integrated transport system and to the capital investment which would be required to produce positive socio-economic outcomes for the country, if evidence is available that this can be justified.



Map 4: TrawsCymru Bus Network. TrawsCymru (2021).

1.9 Political Changes and Transport Policy

The One Wales coalition government of 2007 to 2011 had a strong emphasis on the need to improve north-south links particularly by rail via Hereford, Shrewsbury, Wrexham and Chester and the via A470 Cardiff Bay-Llandudno trunk road. However, this was also balanced by a commitment to improve east-west cross-border links.

After the coalition, linking manufacturing centres within the country with key economic centres outside Wales, particularly the Merseyside / Greater Manchester, West

Midlands and London / South East conurbations, became the policy priority. In the new 2011-15 government the Welsh Labour Party had 30 of the 60 seats in the National Assembly and so were able to govern without a coalition.

As has been previously mentioned there had been doubts about the capacity of, at least some, of the regional transport consortia to bid for and deliver their Regional Transport Plan projects. The Ministerial Advisory Group (MAG) report on transport in Wales (Ministerial Advisory Group, 2009) took a damning view of the consortia:

“The concept of regional consortia has not been embraced fully by local authorities, with the consortia funded largely by Welsh Government. This has left the consortia inadequately resourced and without the skills to deliver. In addition, the consortia do not have any formal powers...”

The MAG considered that the Government should either use their powers to create one or more statutory transport authorities or redefine the strategic highways network to encompass major routes into urban areas and effectively ‘nationalise’ the transport and planning function, leaving the local authorities with only local highways, street and traffic authority functions. This was politically unacceptable to the Government who replied that it considered local authorities are best placed to undertake the planning and delivery of local transport (Barry, 2009).

As late as 2013 Welsh Government was strengthening the powers of the consortia and urging inter-authority collaboration. However, Edwina Hart, Minister for the Economy and Transport from 2011 to 2016, expressed her dissatisfaction with the capacity of the consortia to deliver and claimed they were an ‘ineffective’ and an “additional level of bureaucracy” (Clark, 2014). Stafford (2011, p. 20) recounts a stakeholder observing that the Welsh Assembly Government expected the consortia to produce robust, detailed plans but had failed:

“to get its hands dirty and adequately finance them to do so.”

Hart announced in January 2014 that Welsh Assembly Government would stop funding the consortia. This would result in all 22 Welsh local authorities having to prepare their own local transport plans and bids for Local Transport Grant funding separately. The decision was contrary to the general view of the Commission on Public Service Governance and Delivery (Williams, 2014) that a major drawback of the

structure of the Welsh public service was small organisations without sufficient expertise and capacity to fulfil their roles, and that mergers and partnership working should be encouraged by the government.

1.10 Future Impacts of Devolution on Welsh Transport

How does the current devolution settlement affect transport policy, regulation and socio-economic policy within Wales, and what is its future?

The UK Government White Paper “Powers for a Purpose: Towards a Lasting Devolution Settlement for Wales” (UK Government, 2015) reported a consensus on accepting the Silk Commission’s recommendations (Commission on Devolution in Wales, 2014) regarding transport, excepting the devolution of funding of the railway infrastructure to the Network Rail Wales and Borders Route, and the devolution of drink-driving limits.

The following additional transport powers were devolved: road speed limits, bus service and taxi registration, the formal consultation process between the Welsh and UK governments on strategic cross-border roads, responsibility for the Wales & Borders rail franchise, seaports policy. In addition, the Welsh Government was to be fully consulted on the specifications of the inter-city rail franchises to and from Wales determined by the UK Department for Transport: (i) Holyhead / Llandudno / Wrexham-London Euston; (ii) Carmarthen / Pembroke Dock (seasonal) / Swansea-London Paddington; (iii) Cardiff-Bristol-West Country, and (iv) Cardiff-Birmingham-Derby-Nottingham).

Consequently, the Senedd and Welsh Government now have wide, but not entirely full, transport powers under the current dispensation. The notable significant exception is the lack of funding powers over Network Rail’s Wales and Borders Route which would complete the devolution of rail powers and allow a more rational comparative decision-making process between rail and road transport investment.

Another gap in powers is Air Passenger Duty. The House of Commons Welsh Affairs Committee Fifth Report on the Devolution of Air Passenger Duty recommended devolution, but this was rejected by the UK Government on the grounds that Welsh ministers have indicated that they consider Air Passenger Duty as an opportunity to

promote Cardiff Airport which would have an impact on Bristol Airport, Cardiff's closest competitor, and to a lesser extent, other English airports. (UK Parliament: House of Commons, 2019a/2019 b).

Since Cardiff Wales Airport had less than a fifth of Bristol's passenger volume in 2018, 1.5 million passengers compared with 8.7 million (CAA, 2019), it hardly seems like a potentially problematic competitor. Bristol Airport's Chief Executive estimated that if the Welsh Government scrapped Air Passenger Duty his airport might lose one million passengers, and airlines, to Cardiff (BBC, 2019b). Cardiff Wales Airport's Chief Executive estimated a maximum gain of six hundred thousand by 2025 (BBC, 2019b).

In view of the restricted and unstable range of flights currently available from Cardiff Wales Airport the potential Air Passenger Duty revenue stream would not be very large. However, it is revenue that if devolved could be applied to increase spending on the sustainability requirements of the Well-being of Future Generations (Wales) Act 2015.

Alternatively, the duty could be reduced, or even abandoned, to attract further airlines and destinations to the airport and so reduce travel to airports outside the south Wales conurbation, particularly via the congested M4 through Newport and over the Second Severn Bridge.

Formed in 2016 Trafnidiaeth Cymru / Transport for Wales (TrC/TfW) is a 'not for profit' private company limited by guarantee and wholly owned by the Welsh Government. Its mission statement says that:

"Transport for Wales exists to drive forward the Welsh Government's vision of a high quality, safe, integrated, affordable and accessible transport network that the people of Wales are proud of. Transport for Wales is key to delivering the Welsh Government's key themes as set out in 'Prosperity for All: The National Strategy' (Transport for Wales, 2020).

The Company board is responsible for providing support and expertise to the Welsh Government on transport initiatives. The mechanisms for this are the Agreed Articles of Association, the approved Management Agreement, the Minister for the Economy and Transport's remit letter and the Business Plan, all agreed between Welsh Government and Transport for Wales (Scurlock, 2018, p. 3). Transport for Wales

procured a new operator Keolis Amey for the Wales and Borders rail franchise in 2018. They were responsible for timetable improvements and extra services, the refurbishing of some rolling stock and transition to a new fleet, opening new stations, station improvements and installing ticket machines in association with Network Rail, and development of a pay as you go smart card ticketing system. Following the failure of the franchise Transport for Wales took control as operator of last resort in February 2021 as Transport for Wales Rail Ltd (Welsh Government, 2021f). Keolis Amey will continue to work with Transport for Wales on the South Wales Metro project and other infrastructure improvements.

It is still not clear at present if planning and management of the Welsh Government trunk road network, the TrawsCymru bus network, and eventually control of Network Rail's Wales and Borders Route, will become TfW responsibilities but with the March 2022 proposal for TfW high level control of the local bus network this would seem to be a rational direction of travel.

Regarding socio-economic policy, the National Assembly and Welsh Government already have powers, excepting those on business policy and regulation which are shared with the UK Government, and social security and employment which is reserved to the UK Government. The further devolution of business policy and regulation would be useful for enhancing economic development in Wales. Whilst the better integration of NHS and social welfare services in Wales is a valuable policy tool, the lack of any control over the areas of social security and employment policy, unlike partial competence in Scotland and totally devolved control in Northern Ireland, is a significant drawback. The Welsh Government's cross-cutting policy strategy "Prosperity for All: the National Strategy" (Welsh Government, 2017a) is informed by its duty to legislate to ensure the social equality and well-being and the already referred-to sustainable development provisions of the internationally significant Well-being of Future Generations (Wales) Act 2015 (National Assembly for Wales, 2015).

"Prosperity for All: the national strategy" (integrates the objectives of transport policy, economic development policy and equalities and deprivation in Wales. Despite a number of somewhat diffuse objectives in the strategy there are also a considerable number of quantifiable and deliverable objectives (Welsh Government, 2017a).

At present the architecture of the Government's transport policy appears to be improving with an emphasis on more cross-policy working. The consultation draft of the new policy transport strategy "Llwybr Newydd: A New Wales Transport Strategy" was published by the Welsh Government in November 2020 (Welsh Government, 2020e) with an end to the consultation period in January 2021. The results were published in February 2021 and indicated a high level of support for the Strategy. Of the 402 respondents "83% either agreed or strongly agreed with the 'long-term vision,'" "79% agreed or strongly agreed with the 20-year ambitions," and "72% agreed or strongly agreed with the five-year priorities" (Welsh Government, 2021b, pp. 4-5).

The adopted strategy (Welsh Government, 2021d) reverses the abolition of the regional transport consortia with the new corporate joint committees. This had left a vacuum in non-strategic (i.e. non-Welsh Government) areas of policy and infrastructure, and also in interaction with the public on transport issues and plans (although voluntary transport partnerships continued between local authorities in some areas). The corporate joint committees are particularly welcome because regional economic development policy is now being driven by economic 'deal' partnerships of local authorities, the private sector and Welsh Government in north, mid, south-west and south-east Wales

1.11 Conclusion

Factors such as the Well-being of Future Generations (Wales) Act 2015, the restoration of the regional consortia, the development of the city deal regions, the introduction of Transport for Wales, and the forthcoming bus legislation, have produced a current transport policy environment in Wales that has a somewhat incremental and fragmented character to it. In addition, the crucial integration of transport policy with spatial planning policy has not produced the synthesis between land use and transport 'on the ground' that was intended, and the results are variable. The successful implementation of the new Wales Transport Strategy will be key, the cross-cutting links with the seven high level ambitions, and particularly the Well-being of Future Generations (Wales) Act 2015 (National Assembly for Wales, 2015) and "Prosperity for All: The National Strategy" (Welsh Government, 2017a). More frequent

updates of the strategy's delivery report the "National Transport Plan" would be valuable for establishing what progress is being made.

The historical and socio-economic trajectory outlined in this chapter has been shaped by the experience of geography, climate, conquest, annexation, and of being a stateless cultural and political community. Later industrialisation, and the resistance to the injustices it caused, and then the post Second World War settlement, and its decline, are all basic factors in the formation of contemporary Welsh society. Subsequently, the rise of the 'devolution state' has given Wales autonomy in the areas of agriculture, culture and education, economic development, local government, the NHS, planning, social services and transport. Further devolution in the areas of railway infrastructure, social security, employment, taxation, policing and justice would give the Welsh Government further policy levers, and responsibility, for reducing poverty and deprivation and promoting economic development. As will be clear from the research findings the planning and operation of transport is an essential element in these objectives.

In the medium term it seems likely that Transport for Wales will become the prime vehicle for translating Welsh Government transport policy into actuality. If the objections of the UK government can be overcome this would include complete control of railway infrastructure and services in 'Wales and the Borders.' Forthcoming buses legislation would give Transport for Wales overall responsibility for a franchised, modally integrated and co-ordinated local and regional bus system, logical additions to this would be the vesting of control of the TrawsCymru bus network, and maintenance and operation of the trunk road network.

Having discussed the Welsh Government's ambitions for a multi-modal integrated transport system, the next chapter explores the concept of integrated transport in greater depth.

Chapter 2: Integrated Transport

2.1 Introduction

The previous chapter makes it clear that transport integration is a major objective of the Welsh Government for social, economic and environmental reasons. This chapter will examine integration, and rural, small city and metropolitan examples of its implementation. In this context the term 'integrated transport' is defined as being a system the purpose of which is to give the customer a seamless journey or freight forwarding experience. Accessing and using a transport network in which the means of transport are efficiently linked within each mode, and together between modes, for the benefit of the user. This is achieved by public policy which defines strategic transport requirements to satisfy the economic, social and sustainability objectives of society. Newton (2014, p. 1) provided two models of transport provision:

“There are distinctions between multimodal and intermodal systems: a multimodal system accommodates different modes of transport, whereas an intermodal system ensures strategic connections between different modes.”

These modes are any means of travelling from one place to another. Hull (2005, p. 322, Table 1) lists them as being walking, cycling, bus, rail, car and air. Whilst integration between rail and the private car and road freight transport has existed for some time through Park and Ride sites and road/rail freight interchanges, active travel has not been a priority for British transport planners. Zavareh et al. (2020, pp. 1-2) comment on the environmental and health benefits that the self-powered active travel modes of walking and cycling can deliver. The prioritisation of powered road transport since the 1960s has resulted in degraded conditions for both walking and cycling which are only now being seriously addressed here, particularly in the wake of increased demand for cycling during the Covid-19 pandemic (Réat et al., 2022).

The concept of multimodality suggests the primacy of consumer choice of mode by prioritising 'deregulated and privatised approaches, in which market signals replace high-level planning. Integrated intermodal systems suggest connecting modes which are suitable for the passenger demand in the corridors, or in the case of freight for the journeys, on which they operate. Cole (2005, pp. 348-9) identifies the policy relations

which countries that have successfully implemented a level of integrated transport have used. He argues that the translation of high-level integrated transport objectives into reality is achieved through: i) integration within and between different types of transport: better intermodal interchanges, intermodal ticketing, better information; ii) integration with the environment: considering the sustainability impacts of policies and prioritising the least environmentally damaging solutions; iii) Integration with land-use planning: reducing the need to travel and ensuring that new development is accessible by public transport; and iv) cross-cutting integration with social welfare and inclusion, educational, health and economic development policies. Cole (2005, pp. 348-349) also identifies three structures required to achieve integration either nationally, regionally or locally: a) a single policy and budgetary body at geographical strategic level; b) a single co-ordinating body at geographic strategic level; c) co-ordinating operational bodies to achieve seamless ticketing and physical interchange between modes, within modes, and between modes and land use. Functions a) and b) would be exercised by a single body, whilst function c) could either be integrated with a) and b), or free-standing. He confirms the validity of his model by stating:

“Such a system exists in most member states of the European Union where high investment levels, with co-ordination of policies of services, fares and infrastructure developments, may be found in major centres as well as in local areas” (Cole, 2005, p. 349).

The freight and logistics industry operates predominantly on free market principles, although state ownership exists with logistics companies such as DB Schenker, and UK state regulation exists regarding drivers’ hours (Department for Transport/Driver and Vehicle Standards Agency, 2014), vehicle che

cks (Driver and Vehicle Standards Agency, 2011) and vehicle condition and maintenance (Driver and Vehicle Standards Agency, 2013). Forms of freight transport integration occur in several ways. Firstly, through the load consolidation process. Baklenko (2017, p. 2) explained that:

“Consolidated shipping is a method of shipping where a consolidator combines individual LCL (less than container load) shipments from various shippers into one full container shipment. Participating in consolidated shipping earns the shipper preferred rates. When the full container shipment reaches its destination, the shipments are then deconsolidated into their original LCL shipments.”

Secondly, where highway authorities may require Heavy Goods Vehicle (HGV) movements to be restricted to designated roads, for environmental or social reasons. Thirdly, at air freight airports where van, lorry or HGV loads are physically transferred to the cargo holds of aircraft, and fourthly at ports and rail shuttle termini where intermodal movements from road to ship/ferry or rail take place. Fourthly, some urban areas are pursuing the objective of freight consolidation centres on their urban peripheries to prevent HGVs from entering central areas. Loads from different HGVs would be consolidated into locality-specific loads and then transferred to smaller and zero emission delivery vehicles. There are a number of ways of doing this as set out in a report for Transport for London by Peter Brett Associates (2019, pp. 4-7).

Some cities with tramways have considered using tramway-connected transfer centres and freight trams for the final inner-city delivery stage. Like others before it, a major scheme for Amsterdam by the start-up company ‘Cargo Tram’ using cargo trams for freight and parcels deliveries proved to be abortive. Arvidsson and Browne (2013, pp. 8-14) explain that trial runs from an outer suburban road/tram transfer point to the planned tram/local delivery electric vehicle transfer point in the inner city had been successful. However, a combination of the 2008 financial crisis, political issues between the private company and Amsterdam City Council, and operating problems with the municipal tram company GVB resulted in the bankruptcy of ‘Cargo Tram.’

A model of how this idea could be made viable is set out in a paper by De Langhe et al. (2019). They propose a three stage ‘viability model’ (De Langhe et al., 2019, pp. 5-9) with inputs of i) a ‘reference scenario,’ the current transport situation, and ii) the ‘project scenario’ of pre-haulage and post-haulage goods handling and storage, and type of tram transport. The data from the input was then calculated using three options of a dedicated freight tram, a freight wagon behind a passenger tram, or freight carried in a passenger tram. The outputs were a business economic analysis evaluating

project viability through the discounted case flow method, and a socio-economic analysis appraising the contribution to welfare using shadow prices and a social discount rate. In both cases the net present value (NPV) and internal rate of return (IRR) were calculated to assess if the project should proceed.

It is not unreasonable to assert that the concept of integrated transport, and increasingly cross-cutting policy integration, is widely accepted by transport policy makers and implementers. Schöller-Schwedes (2010, p. 85) observed:

“Both in the science and policy of transport, a strategy of integration has been the concept followed since the 1990s. The central idea of an integrated transport policy that has established itself as a hegemonic discourse is being followed by the EU and on the level of its individual members comprises all sorts of societal protagonists.”

In the context of climate change and environmental degeneration transport needs to be as sustainable and as zero-carbon as possible. Potter and Skinner (2000, p. 7) noted that:

“The OECD had developed a definition of sustainable transport that includes some more precise criteria. ‘This is transport that ‘does not endanger public health and ecosystems and meets needs for access to people, goods and services consistent with a) use of renewable resources at below their rate of regeneration, and b) use of non-renewable resources at or below the rate of development of renewable substitutes.’”

Also provided was the useful distinctions of functional and modal integration (Potter and Skinner 2000, p. 10).

Ticketing for multi-modal journeys constitutes functional Integration. These systems include pre-loaded payment mechanisms such Transport for London’s Oyster Card, which includes travel card and pay as you go options through bank account debiting via contactless credit or debit cards, or mobile phone payment apps. Fare capping is included so that the passenger pays no more than the cost of a day travelcard for the zones in which they have travelled.

Potter and Skinner observed that the aim of modal integration was to achieve the easy transfer of passengers between different transport modes through both physical

proximity at interchanges and by integrated timetable planning. They noted that the Citizens' Network green paper (European Commission, 1995) combines the functional and modal integration approaches with the intention of producing public transport which is as comprehensible and useable as roads are for drivers (European Commission, 1996, p. 1b). Cole (2005, pp. 348-349) identifies the high-level policy relations from countries that have successfully implemented integrated transport, to a greater or lesser extent.

The issues and difficulties around achieving these objectives in the privatised and deregulated British legislative context are discussed below.

Governmental expectations of transport integration are focussed on five criteria benefits of accessibility, safety, environment, economy and integration, as set out in the Cost Benefit Analysis and Environmental Impact Analysis processes (Cole, 2005, pp. 366-373). However, the ability of a mode or an interchange to deliver integration also depends on the extent to which it is well-integrated within itself, and within its policy and physical environment. Reporting on options for urban and rural transport interchanges for TraCC, the mid Wales local authority transport partnership, Atkins (2010, p. 4) described a minimal approach to defining an interchange:

“The process of encouraging the use of alternative modes to the private car relies heavily on good interchange facilities; and a clear interchange strategy that provides: a secure and generally weatherproof environment; high quality travel information; cycle storage facilities; through ticketing between bus and rail services; access to other modes; and co-ordination of service timings to minimise waiting time for the passenger.”

Cole (2005, p. 348) provided a wider vision of integration within and between modes. To paraphrase, these are: better intermodal interchanges which: i) provide integration between public transport, active travel and private transport; ii) Integrated intermodal travel information and ticketing; and iii) integration with the environment by considering the effects of transport on the environment and by selecting the most environmentally friendly, or the least environmentally damaging solution. In practice Cole's final objective of 'integration with the environment' is the most difficult to achieve for institutional and political reasons. This objective was given policy impetus by

publication of the 'Bruntland Report' (1987). Neilson (2020, p. 427) pointed out that the concerns raised by Bruntland are played out in the transport sector every day.

The emergence of viable self-driving cars (connected and autonomous vehicles (CAVs), may be either complimentary to or competitive with public transport systems. In their paper on the factors involved with CAVs, the UK Government Actuary's Department (2017) discusses regulation, town planning, insurance, road accidents and other existing and emerging risk factors. They do not consider the environmental factors which such vehicles will continue to generate. Neilson (2020) focusses on these with reference to the public health implications of rubber tyred vehicles:

"While vehicle exhaust emissions have attracted a great deal of attention, it is the smallest (sub-PM2.5) particulates that cause the greatest injury to respiratory systems. The interaction of rubber tyres with road surfaces causes the emission of over 1,000 times more of these health-damaging particulates than are emitted from vehicle exhausts. Recent work by Sustainability West Midlands (SWM) for the West Midlands Combined Authority has identified that reducing levels of just one pollutant (PM2.5) by 50% would prevent 952 deaths and save GBP 1.4m (EUR 1.53m) of NHS costs in the WMCA area per year."

Consequently, two major strands towards the objective of 'integration with the environment' are of importance for both sustainability, public health, and public finances. The integration of transport with land use planning aims to reduce the need to travel, and therefore vehicle movements, through some level of remote internet-based home working where this is possible, through internet shopping (but only where delivery vehicles are not adding to pollution and congestion), and by making new housing, retailing and workplace developments as sustainable as possible through accessibility by public transport and active travel. Some towns and cities such as Chester, Doncaster, Shrewsbury, and York operate bus-based 'park and ride' schemes to deter motorists from entering their central areas.

Another strand is through cross-cutting integration with non-transport policies such as land-use, sustainability, education, health, social inclusion, and economic development. The overall objectives are to promote economic development and community 'wellness' through access to employment, goods and services, and education without dependence on the private car, and preferably using active travel.

The implementation of land-use integration is improving. There are now several major urban development areas in Britain with good integration with public transport. These include London Docklands, which was provided with a pre-development transport system by the Docklands Development Corporation's plan for the Docklands Light Railway, and Salford Quays which has several stops on the Eccles and Trafford Park lines of the Manchester Metrolink tram system. In Scotland Edinburgh Park to the north of the city is on Edinburgh Tram line 1 and has rail connections available nearby at the Edinburgh Gateway interchange.

In Wales progress has been less marked and the Cardiff Bay Development Corporation chose only to retain the existing railway branch line from Queen Street to the Bay. This railway branch is to be developed as part of the South Wales Metro and the complementary 'Cardiff Crossrail' tram-train projects (Cardiff Council, 2020, p.12, p. 17). At St. Mellons in the east of the city the 'Hendre Lakes' business district project will support up to 6,000 jobs together with a transport hub (Cardiff Hendre Lakes, 2021). The supporting £120 million four-platform Cardiff Parkway station is currently awaiting authorisation (Rail, 2021, p. 25) and will incorporate a bus station and possibly a terminus for the 'Crossrail' tram-train line.

Selecting the most environmentally friendly, or the least environmentally damaging, solutions, are often contested as decisions as to the location of developments and the extent to which they are sustainable can be affected by the economic imperatives of scheme developers, or by local or national priorities, which may either be helpful or obstructive to the optimal outcome. The Transport Planning Society (2020, p. 51) noted that:

"Spatial planning and transport planning are separated at national and, in many areas, at local level. This separation does not support the creation of sustainable and attractive places for people to live, work and invest in. The report has highlighted research, including by the TPS, showing that many new housing developments are in locations that are entirely car dependent. There are national planning policy frameworks in each country, and these set out some links with transport. However, the link between these planning policies, transport strategies and investment are unclear..."

Faced with a lack of clarity as to how sustainability, transport and land-use policies interconnect, and the need to provide desperately needed jobs or facilities, councillors may well be prepared to consider approving planning proposals that are sub-optimal in terms of the relevant guidance. However, the sustainability of transport, retail and housing developments is improving through interventions such as routes for local wildlife, the retention of existing areas of natural planting, or the provision of new natural environments alongside or within a development. In the built environment interventions include the use of low-carbon or appropriately recycled building materials, improved building insulation, water recycling, low carbon heating systems associated with solar panels, electricity generation using photovoltaic cell installations, and presence-activated lighting and escalators.

Cole (2005, pp. 348-349) identified the primary means of transport integration as being a single policy and budgetary authority at national level. In the Welsh context this would equate to a version of Trafnidiaeth Cymru/Transport for Wales with full road and rail powers, with the newly nationalised Transport for Wales Rail Ltd. operations division, and probably additional divisions for TrawsCymru and local bus services and the trunk road network. He also recommends operational co-ordinating bodies at regional level to achieve seamless interchange between modes and within modes through ticketing, and between modes and land use. These could be the operating divisions of reinstated versions of the four regional transport partnerships, the proposed regional corporate joint committees, interacting with and reporting to the national transport authority.

Efthymiou and Papatheodorou (2015, p. 460) noted that:

“Intermodality is a key element in a modern transport system because it refers to all kinds of transport inter-linkages. It describes both the policy objective and quality of the transport system.”

To which one could add ‘inter-linkages’ within and between the organisations to enable the making and implementing of policies, and using them to provide effective integrated transport services. It will be seen from the above that the term ‘integrated transport’ describes a complex and interacting physical, organisational and policy ecology involving: i) the physical assets such as railway rolling stock, buses, infrastructure such as railway lines and bus lanes, the telematics systems connecting

rolling stock or vehicles to traffic control and operations management centres, the interchange stops, buildings, public information systems and staff that enable physical integration; ii) the organisational matrix that includes the national, regional, and local bodies charged with planning, implementation and maintenance of timetable and fares integration, the public information systems, the telematics and the rolling stock and infrastructure; and iii) the suite of policies that specify the high-level framework of national and regional local integration, and the governance framework of commercial, operating and quality assurance agreement and specifications that implement integration at the regional and local level. All the above factors have interactions with each other which need to be planned for and managed.

2.2 Interchange Case Studies

Having examined the complex of policy components that provide the basis of integrated transport systems, this section looks at the practice of infrastructure provision to enable integrated transport and illustrates how externalities impact on the planning and operation of them.

This provides insight into the research question “What would an integrated system look like and how would operate?” (Introduction, pp. 18-20). It also provides examples of some of the policy and practical issues in establishing and maintaining infrastructure for integrated transport services.

Firstly, guidelines are set out around the minimum provision that might be expected for bus stops, bus interchanges, and bus/rail interchanges. This is intended to demonstrate that even in the three ‘minimalis’ scenarios presented there is a complex of factors involved in the planning and operation of these facilities. Having established the minimum requirements, four examples of integrated transport practice are then provided. Two of these use the development of two ‘small’ public transport interchange schemes, i.e. five bus stands with passenger shelters only, in the mid Wales market towns of Newtown and Machynlleth. These were selected to illustrate the relative complexity of even small-scale interchanges, and to explain how externalities impact on the planning and operation of interchanges, and which need to be identified and considered at an early stage in projects. Newtown was successful, but with sub-optimal intermodal interchange, whilst Machynlleth experienced policy and practical

issues that have, to date, prevented its implementation. At the 'medium-sized' interchange, i.e. eight bus stands with full covered passenger facilities, at Wrexham there was poor connectivity with the neighbouring railway stations, and the issue of anti-social behaviour and the fear of crime has affected public transport patronage. This example points towards the importance of adequate staffing and security at these locations. Finally, the Tyne & Wear Metro is examined as Britain's only purpose-built integrated public transport system. After a successful start its carefully planned integration with feeder bus services was 'disintegrated' by the UK government's Transport Act 1985, which allowed buses to compete with the expensively built system. Nevertheless, it still manages to return net benefits to the regional and UK economy, although the potential benefits of integration evidenced in its early days have been lost.

2.3 Minimum Interchange Provision

Facilities for physical integration can vary greatly in complexity and the facilities provided for the travelling public. Even a minimal interchange provision bus stop (or group of stops) based on Transport for London guidelines (2017, p. 8) would have a number of elements such as: i) local authority provided dropped curbs on routes approaching it to allow access for all; ii) security provided by lighting and possibly CCTV; iii) a prominent bus stop post and flag with an adequate passenger shelter with at least 'perch' seating; iv) passenger information services including timetables, system maps, local area maps, and preferably real-time bus operating information; v) adequate drainage and good connectivity to surrounding pedestrian footways; vi) a Kassel kerb for level bus stop to bus boarding; vii) bus stop road surface markings; viii) road space for buses to manoeuvre to the boarding point, and adequate approach and exit paths for buses. Should several different routes operate from a cluster of stops, each stop should be marked individually (A, B, C etc.), and information provided as to which routes operate from which stop. If a stop, or stops, are associated with a railway station, a safe and well-lit route and wayfinding signage to the stop/s and bus service information should be provided at the station, and vice versa. It is important that the stops, and any related way-finding signage, are clean and in good repair, that lighting and drainage is working, and that information is up-to date. This represents a

commitment by the operating organisation/s to continuous cleaning, maintenance and information updating.

2.4 Newtown and Machynlleth: The Practicalities of Planning Market Town Interchanges

This section discusses the practical issues involved in establishing small transport interchanges in two mid Wales market towns. The primary sources for this section are unpublished project sponsorship daybook notes by the author (Lewis, 2011-2015). According to the 2019 mid-year estimates Newtown, in Welsh Y Drenewydd, is the largest town in Powys county with a population of 11,222 inhabitants (ONS, 2020). Situated in the upper valley of the River Severn (Bro Hafren) it is an administrative, educational, medical and retail service centre with four light industry estates. The town's by-pass, on the southern face of the valley, was opened in 2019 and takes traffic on the A483 Swansea to Chester trunk road and the A489 Machynlleth to Craven Arms road away from the town centre which, prior to the new construction, was very congested during the tourist season. The A470, the main north-south Wales trunk road lies 10 km to the west at Caersws. The town is also on the Cambrian main line railway with through services from Aberystwyth, Pwllheli and Machynlleth to Welshpool, Shrewsbury, Telford, Wolverhampton, Birmingham New Street and Birmingham International, for the airport. Adjacent towns are Welshpool, Llandrindod, Llanidloes and Machynlleth.

Newtown bus interchange is owned and maintained by Powys County Council. It lies just to the west of the town centre and adjacent to the art gallery and a large car park on the B4588 'Back Lane,' a local road which avoids the town centre. It serves two strategic TrawsCymru routes, the T4 to Llandrindod, Brecon, Merthyr Tydfil and Cardiff, and the T12 TrawsCymru Connect from Machynlleth to Montgomery, Welshpool, Oswestry and Wrexham. Other long-distance routes are the X75 running from Llanidloes to Welshpool and Shrewsbury, and a daily National Express coach from Aberystwyth to London Victoria via Welshpool, Shrewsbury and Birmingham. There are local services to Machynlleth and Welshpool, three town services and 'market day only' routes to several destinations on either side of the Welsh/English border (Traveline Cymru, 2021).

As shown in Figure 1, the bus station originally had five low and narrow loading platforms, with small ineffective shelters, and a taxi waiting area. This meant that to join or leave services passengers had to cross an active apron area with arriving and departing buses and taxis, an obvious safety risk. In addition, the island configuration of the station made access and level boarding for people using wheelchairs, buggies, or experiencing mobility impairments, impossible for some and difficult for others. The increasing length of new bus designs in the restricted space available was also considered to be an increasing risk factor.



Figure 1: Newtown Bus Station Before Reconstruction: Lewis (2014).

The County Council and Trafnidiaeth Canolfan Cymru (TraCC), the mid Wales transport partnership, had concerns about the potential safety risks of the site as it was originally configured, and also the social exclusion issues resulting from the unsatisfactory boarding arrangements. Atkin's 'Study of Urban and Rural Interchanges' for TraCC had reviewed the situation at Newtown and made recommendations for improvements (Atkins, 2010, pp. 170-181). Consequently, it was decided to redesign the interchange. This provoked conversations regarding interchange between the bus station and the railway station, which was just under 0.8km and 12 minutes walk away to the south (Traveline Cymru, 2022). Ideally the bus interchange and railway station would have been co-located but this was not

possible because of space constraints on the Old Kerry Road outside the railway station. In addition, moving the bus interchange would have been inconvenient for most passengers who wished to access the town centre and would also generate excess pedestrian traffic on the two walking routes into the town centre, neither of which were optimal. Originally the railway station was served by the T4 TrawsCymru and a town bus service. A public service vehicle actuated 'bus gate' was installed at the western entrance to Old Kerry Road to prevent private vehicles using the area as a through route. When the T4 and the local bus was withdrawn from the railway station because of operating constraints the improvement and way-marking of the walking route became imperative. This was done with improvements to the footway, provision of dropped curbs and new signage which, whilst not 'best practice,' produced an acceptable link.

The County Council required a 'drive in/reverse out' configuration for the rebuilt bus interchange so the public could enter the interchange from Back Lane and, without leaving the public area, access the buses on the level. Three bays on the eastern side of the site were designed for larger long-distance buses to do this in consultation with operators, although there were representations from some members of the public claiming that this frequently used method was unsafe. A pedestrian 'peninsular' extended east to west through the site on its northern side, which also incorporated two 'drive in/drive out' bays for town service buses on the outer face, with the active bus apron being on the inner side. The peninsula also facilitated access from the town centre to the car park and the western side of town and so was expected to attract considerable footfall. The rebuilt interchange opened on 26th April 2015 and cost £315,000 from the Welsh Government's Local Transport Fund for 2014-15 (my newtown.co.uk, 2021). After opening, town councillors were concerned that members of the public would wander off the peninsula and on to the active bus apron. Discussions and consultation took place regarding these concerns which were resolved by reinforcing the pedestrian routes with surface markings, and by placing bench seating along the inner, bus apron edge to discourage entrance.

It had been hoped to adapt a former county council information and payments building which lay between the eastern bus bays and Back Lane as a waiting room. Unfortunately, the county council estates department had leased this to a local charity and so four enclosed shelters with seating were provided instead. Recently Welsh

Government has provided a TrawsCymru branded electronic bus departures display. Other traffic on the site includes local taxis which have lay-over bays on the exit road and the local dial-a-ride service. Post-opening snagging dealt with initial small issues and the interchange has now been in successful operation for over seven years and has fulfilled its objectives of access for all and minimising public / bus interactions.

Figures 2 and 3 below show the interchange as completed with the elimination of pedestrian / bus conflicts and the achievement of level bus boarding.

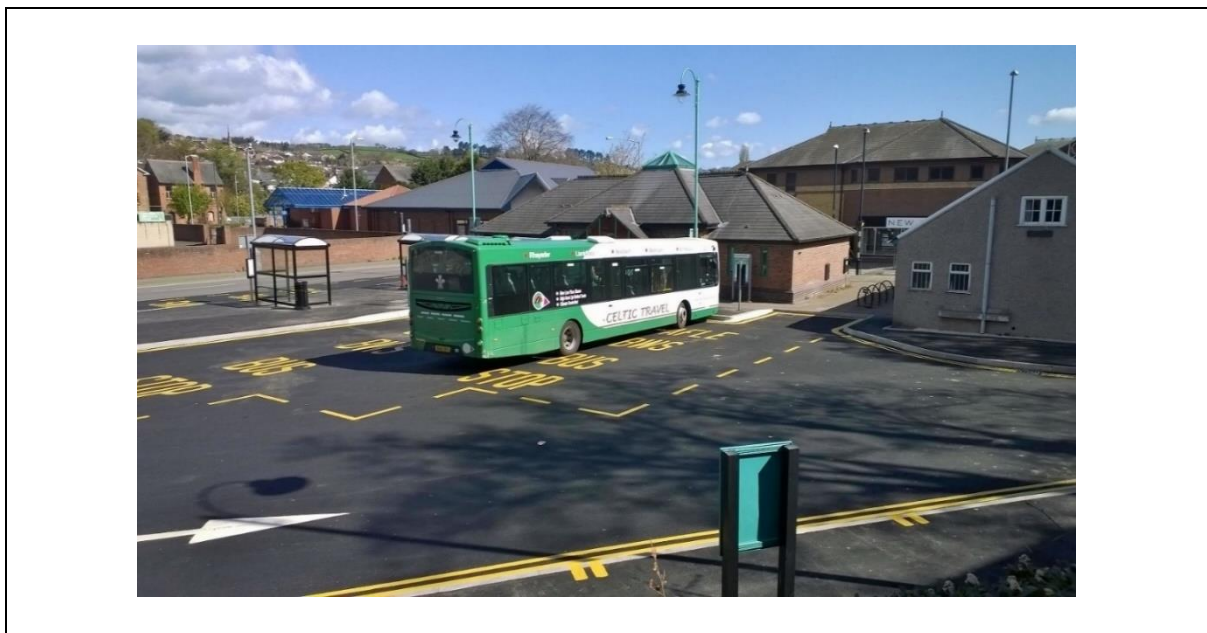


Figure 2: Newtown Bus Station After Reconstruction: Lewis (2015).



Figure 3: Newtown Bus Station After Reconstruction Showing 'Access for All' Boarding: Lewis (2015).

Machynlleth, 46 km to the west of Newtown, is a market town providing educational, medical and retail services for the Dyfi and Dulas valleys, there is also a small industrial estate. With an estimated 2019 population of 2,248 (ONS, 2020) it lies on the junction of the A487 Haverfordwest to Bangor trunk road and the A489 Machynlleth to Craven Arms road. Adjacent towns are Dolgellau, Newtown, Llanidloes, Aberystwyth and Tywyn. Figure 4 shows an aerial view of the study area. The transport industry is a major employer in the town. Machynlleth railway station, which is 0.6 km and a ten-minute walk from the town centre (Traveline Cymru, 2022), is the focal point on the Cambrian lines system where trains to and from Aberystwyth and Pwllheli join and split and cross each other in the passing loop. The station has good passenger facilities with a modern ticket and information office, heated waiting area, a café, toilets, pay phone and post box. It is also a centre for railway operations activity with a train crew depot, the signalling centre for the line's European Train Management System, and a train maintenance depot where the line's fleet of trains is maintained. Across the road from the railway station, on the A487 Heol-y-Doll, Lloyd's Coaches provides bus services across mid and north Wales from its operating headquarters and maintains its vehicles in the garage on the site.

The proximity of Lloyd's headquarters to the railway station meant that non-passenger bus movements were carried out onto the road outside the garage and that bus loading and unloading was being carried out at the stops at the foot of the station drive, 0.2 km and a 3 minute walk (Traveline Cymru, 2022). The northbound stop was located next to the vehicle apron in front of Lloyd's garage and the southbound stop on a narrow footway opposite. Neither stop had a shelter, there was no pedestrian crossing connecting the northbound stop across Heol-y-Doll, which was busy during the tourist season, with the railway station drive. Access for mobility impaired people at both stops was poor. The Atkins report (2010, p. 157, Table 26.1) noted a total of 46 bus services in both directions. In addition, the railway station drive carried traffic to and from the 30-bay station car park, the 8 sheltered bicycle parking spaces, and the train maintenance and Network Rail depots next to the station, both of which needed continuous HGV access. There were also three touring bus bays. The Lloyds depot had a service station / supermarket located next door which also generated traffic in the area. Another problem was that the road underneath the railway was also subject to flooding in heavy rain. On considering the above factors the area, shown in Figure

4 below, was classified as a potential road traffic accident risk and an environmental problem.

Atkins (2010, p. 161) suggested re-routing bus services up to the station forecourt to an interchange with bus shelters with Kassel kerbs, a real-time passenger information system and turning circle, with concomitant loss of parking places. Other options were improving the existing bus stops with improved flags and signage to and from the railway station and providing additional car parking of 100–200 additional spaces on sites to the northwest or the southwest of Heol-y-Doll. The additional car parking proposals were discounted as they would encourage car use, use land some of which was prone to flooding, and would require extensive road alterations.

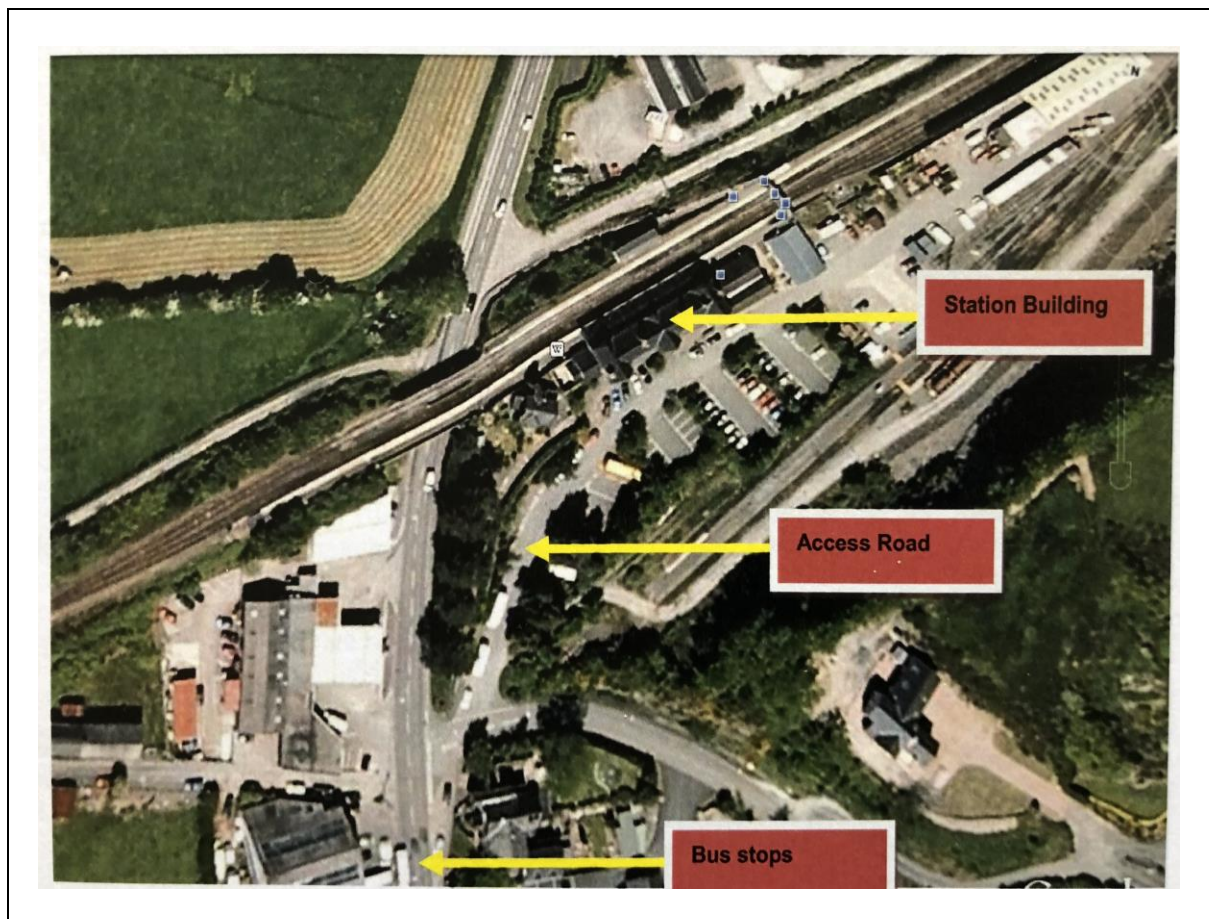


Figure 4: Machynlleth Interchange Aerial View: Atkins (2010, p. 158).

Further work by the County Council produced six options: i) 'do nothing' apart from improving the existing unsatisfactory bus stops, this was not considered acceptable in view of the sub-standard arrangements and lack of access for all; ii) enhanced bus lay-bys and stops, these were difficult to achieve because of the configuration of the land, road and buildings in the area; iii) the railway station interchange option, this was

seen as being problematic as at the time the railway station was leased from Network Rail by Arriva Trains Wales, which would have meant negotiating the alterations with both organisations, there would also have been the loss of some of the already inadequate number of parking bays for a bus turning circle. Nevertheless, the scheme was seen as a possibility and drawings were produced; iv) relocation of the Lloyd's depot to elsewhere in the town (possibly the industrial estate) and using their site for an interchange with improved pedestrian links to the railway station, this option proved to be unpractical as few suitable alternative sites were available in the town for a business the size of Lloyd's and a move would have been disruptive for the bus company whilst they continued to maintain their services; v) an interchange sharing an expanded depot site with Lloyd's by relocating the depot to the west away from Heol-y-Doll and a bus interchange, with good pedestrian links to the railway station, fronting it. This option was considered to give the greatest benefits in that the new bus depot could be constructed and moved into without disruption to existing services. The interchange could then be constructed on the vacated land and the loading and unloading of buses and depot-related movements would be taken off Heol-y-Doll; vi) an in-town interchange on the town centre car park at Heol Maengwyn with a town bus link was discounted for the practical reasons of loss of parking spaces, and the additional local bus service costs.

Talks on Option V with relevant parties commenced and a considerable amount of effort was expended by the County Council on working-up designs (Coach & Bus Week, 2012). Various problems were encountered including the presence of the invasive, persistent plant species Japanese Knotweed in the field that was to be the location of the re-sited bus depot. The species can potentially cause damage to concrete building foundations, such as were intended for the re-sited depot, and is difficult and expensive to eradicate (Royal Horticultural Society, 2021). Because of this, and issues on land purchase, discussions eventually stalled and thoughts turned to again to the railway station scheme. After a considerable hiatus the Welsh Government announced on the 21st May 2020 that £600,000 had been allocated for "Passenger Infrastructure Enhancements: Machynlleth Rail / Bus" under the local transport network fund, the intention of which is to further the 'Llwybr Newydd' objectives to:

“Support economic priorities for jobs and growth; reduce economic inactivity by delivering safe and affordable access to education, key service and employment, particularly for those living in disadvantaged or rural communities; connect communities; encourage active and sustainable travel, and improve public transport reliability and reduce journey times” (Welsh Government, 2020e).

A local newspaper reported that:

“The Machynlleth project will deliver improvements to the existing car park at the rail station to enable bus access and provide bus bays and passenger waiting facilities and information” (Powys County Times, 2020).

2.5 Wrexham: A Medium Sized Urban Interchange

Wrexham gained city status in May 2022. The built-up area has a population of 61,259 (ONS, 2020) and is the largest centre of population in north Wales. It is a major administrative, cultural, educational, employment, and retail centre. The city is the headquarters of Wrexham County Borough Council, the main campus of Glyndŵr University, and the health sciences campus of Bangor University. Wrexham Industrial Estate is one of the largest in Europe and Wrexham Maelor Hospital is a major regional healthcare centre. The city is on the A483 Chester to Swansea trunk road and 12.5 km from the A55 Holyhead to Chester trunk road. Rail services run from Wrexham General station on the Marches line to Cardiff / west Wales, Holyhead, Chester, Liverpool, and to Wrexham Central and Bidston on the Borderlands line which runs through the station.

Wrexham has a medium-sized covered bus station in the town centre, shown in Figure 5. It is not particularly well connected for inter-modal interchanges being 0.4 km/5 minute walk on-street to Wrexham Central Borderlands line railway station and 0.6 km/9 minute walk to Wrexham General, the town’s mainline station (Traveline Cymru, 2022). Re-opened on its former site in the early 2000s it is an island facility constructed in a steel and glass modern style with a central departure hall containing toilets, a waiting area, small retail and food outlets, an information desk and the town’s shopmobility service. Incoming buses unload passengers at a footway on the northern side of the building and run round to load at one of eight ‘sawtooth’ bays running along

a footpath on the south side. Passengers waiting in the departure hall access the bays directly through eight doorways which remain closed until a bus is alongside.



Figure 5: Wrexham Bus Station: McKay (2019); Wikimedia Commons: CC BY-SA 2.0.

In the case of bus stations good information, access and security and safety are key factors. Unfortunately, in recent years this bus station has experienced a wave of anti-social behaviour related to alcohol and drug abuse which has undermined both the use of the facility by the public and the image of the town it serves. Some bus operators have threatened to start and terminate their services elsewhere (The Leader, 2016). Apart from additional staffing, security and partnership working with the police there are other strategies to reduce anti-social behaviour. Making environmental adjustments to the structure of the facility can help and the Tyne & Wear Metro successfully pioneered the use of playing classical music at some stations to reduce anti-social behaviour, this was also later replicated by London Underground at selected stations where problems were occurring (BBC News, 2005).

Newton (2014, p. 2) reported that:

“A number of surveys have identified that fear of crime and personal security is a major inhibiting factor to the use of public transport, second only in many surveys to reliability and accessibility.”

He also commented on the fragmented responsibilities and reporting systems for security across transport systems (Newton, 2014, p. 3). This issue, and the concomitant effects that it may have on patronage, emphasises the importance of budgeting for an adequate staff presence at all times of operation and partnership working between transport operators and the police. However, on a broader societal level it should be noted that such measures displace such behaviours elsewhere into wider society rather than eliminate them.

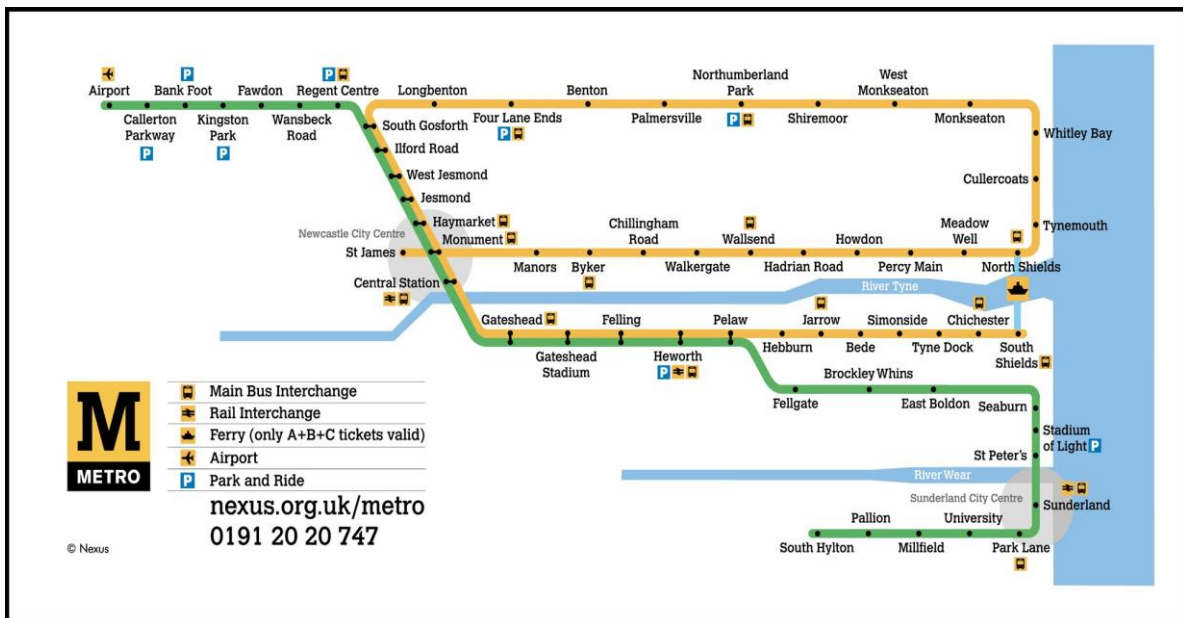
2.6 A Fully Integrated Transport System: The Tyne and Wear Metro

This is a 74.5 km, two-line, 60 station light rail system. It carries 38 million passengers per year and employs around 600 staff (Nexus, 2021, p. 5). It has been extended twice from its original 55km (Nexus, 2020a, p. 2). Metro took over British Rail's run-down North Tyneside loop and South Shields lines and constructed new underground links through the centres of Newcastle-upon-Tyne and Gateshead to the boroughs of South Tyneside and North Tyneside, also included was a new bridge across the River Tyne. The initial system was opened by Tyne and Wear Passenger Transport Executive (which trades as 'Nexus') between 1980 and 1984 and formed the core of fully integrated public transport system with connecting timetables and zonal fare ticketing irrespective of mode. Metro-liveried PTE and National Bus Company buses fed into a series of purpose-built interchanges with the Metro across the metropolitan county as shown in Figure 6. A route map is shown on Map 5.

Metro was also the first rail system in Britain to be fully disability accessible. Metro was part of a strategic land use and transportation planning structure for the county of Tyne and Wear formulated with the intention of restraining peak road traffic flows into central Newcastle-upon-Tyne, particularly on the three congested cross-Tyne bridges between Gateshead and Newcastle (Nexus, 2021a, 2). Nexus reported that in its first year of full operation 1985/86 there were more than 60 million passenger journeys on Metro, and that the cost of the initial system was £280 million (Nexus, 2020a, 3) or £1.2 billion in 2020 prices (Bank of England, 2021).



Figure 6: Tyne & Wear Metro / Bus Interchange 1983: Nexus (2020a).



Map 5: Tyne and Wear Metro Map 2018: Nexus (2018).

Early in the life of Metro integration was curtailed by the Transport Act (1985) (UK Parliament, 1985) with deregulation in Tyne and Wear taking place in October 1986.

This allowed direct bus competition with the Metro and bus services to access Newcastle-upon-Tyne via the Tyne bridges. Jeffrey (2019, p. 6) noted:

“Ridership on the Tyne and Wear Metro dropped by more than 13 million - more than 27 per cent - in the first year of bus deregulation when bus operators competed with the light rail system rather than complement it.”

A surviving component of the integrated system is the Transfare ticket which allows a passenger to make a bus to metro/train/ferry, or vice versa, single journey across up to three zones in the Nexus area. National Rail services from Blaydon to Sunderland and the North to South Shields Ferry are included (Nexus, 2020b).

Jeffrey also pointed out the hidden costs of competition to government:

“As a result, ever since Tyne and Wear local authorities and national government have been paying twice for higher subsidy to support the Metro (as well as higher levels of Bus Service Operators Grant, a fuel subsidy to support bus operators) to provide overlapping and competing services” (Jeffrey, 2019, p. 6).

The same can be said of road–rail competition across Britain, before even considering the environmental costs. Nevertheless, even in a situation where Metro is not allowed to operate at its full potential it makes a substantial contribution to the regional economy. The report ‘VfM: Economic Value of Metro and Local Rail to the North East’ (Nexus, 2019, p. 6) states that the Metro:

“...carries about 40 million passenger journeys per annum. The North East is also served by 31 National Rail station, with a network catering for 2.8 million trips per annum.”

This gives 42.8 million Metro and National Rail journeys, of which 6.5% is accounted for by National Rail. The report’s key findings are that:

“In 2017 Metro and Local Rail contributed approximately £165.6m of GVA to the North East economy per annum under the core scenario and fixed land uses. The equivalent GDP and welfare impact for the North East, inclusive of impacts of individuals and society, amounted to £367.6m in 2015. This GDP and welfare benefit is equivalent to a marginal impact of £8.50 per passenger” (Nexus, 2019. 19).

The analysis of the factors points to the wider value generated by transport integration:

“This value captures the benefits accruing to individuals, businesses, and wider society from more efficient travel, greater productivity through better business connectivity, and selected social and environmental impacts which can be more readily monetised” (Nexus, 2019, p. 19).

Neither are the benefits just regional:

“Net UK benefits are also substantial, and amount to £256.5m of net economic benefits per annum to the UK economy (under the core scenario, fixed land uses). The UK benefits account for displacement of economic activity between areas due to transport provision” (Nexus, 2019, p. 19).

Apart from being well integrated with buses the Metro had a double platform station underneath British Rail's Newcastle Central station, a hub for inter-city, regional and local rail services. At Heworth in Gateshead the Metro and bus interchange was integrated with the British Rail station for services to and from the Durham Coast Line to Sunderland, Stockton-on-Tees and Middlesbrough. The Metro was extended to Newcastle Airport in 1991. The extension gives the fastest journey time between an airport and city centre in Britain. The latest extension was to Sunderland South Hylton in 2002 (Nexus, 2020a, p. 2). The seven-station section of the route between Pelaw Junction and Sunderland Fawcett Street Junction is on Network Rail infrastructure which had to be electrified and modified to accommodate the Metro's signalling system for shared Metro/national rail services. From a junction just after Network Rail's Sunderland station the route to South Hylton is along a reopened railway line (Nexus, 2020a, p. 2). Metro is well integrated with the commercial and retail city centre at Newcastle with stations at Monument, which has an entrance in the Eldon Square shopping centre, Haymarket and St James. Integration with the centres of Gateshead, North Shields, South Shields, and Sunderland is also good.

The system is currently under a series of planned renewals of track, power and overhead line traction supply, control, communications and signalling systems and a new fleet of forty-two trains built by the Swiss rolling stock company Stadler will be starting service shortly (Nexus, 2021b). Longer-term plans envisage further network extensions.

2.7 Explaining the Three Levels of Case Study Transport Integration

The six cases in the later Chapters 5, 6 and 7 demonstrate three levels of network integration between the railway systems and with other forms of transport within a sample of smaller European countries. In this context “network integration” refers to the capacity, operational functioning, and redundancy of networks, as distinct from “intermodal integration” as described in Chapter 2. “Internal development” of the system means that finance and planning for the railways came from inside the country, whilst “external development” means that they came from outside the country. After examination of the route structure and performance attributes of each of the cases they were allocated to the following self-formulated categories. The levels of integration are:

- High Integration comprehensive network cases: The Netherlands: internal development of system, and Switzerland: internal development of the system.
- Medium Integration medium network cases: Catalonia: internal and external development of system, and Ireland: internal and external development of the system.
- Low Integration sparse network cases: Scotland: internal and external development of system, and Wales: external and internal development of the system.

The characteristics of the three levels of integration are shown below in Table 2.1:

Table 2.1 Levels of Network Integration		
High Integration	Dense networks highly connected	High levels of system route redundancy
Medium Integration	Less-dense networks but well-connected	Acceptable levels of system route redundancy
Low Integration	Sparse networks poorly connected	Low levels of system route Redundancy

El-Rashidy (2014, pp. 1-4) explains that system redundancy is defined by the potential performance of a network under adverse or extreme conditions (for example climate change events, infrastructure failure, accidents, or rolling stock/vehicle failures) in terms of extra capacity available, or alternative routings, within a destination link. Consequently, a network with sparse alternative destination links has low redundancy, and the potential for high disruption, whilst a network with dense alternative destination links has high redundancy and so the potential for low disruption. Alternatively, route redundancy can be created without recourse to alternative routes by optimising the traffic management of existing routes through techniques such as 'smart motorways'. This uses CCTV and sensors to monitor traffic levels / incidents and dot matrix signage to impose variable speed limits/lane changes / hard shoulder running. On the railways digital in cab signalling such as the European Train Management System (ERTMS) advises of optimal running speeds in real time and enables better track capacity.

The development of transport networks in six the smaller European countries, including Wales, will be discussed in Chapters 4 to 6. The purpose of these chapters is to explain how and why transport systems in each of the case countries developed in an economic, spatial and political context, and to provide a comparative context with the five other countries and Wales. Attention is drawn to the varied factors, including governance, that have given rise to these transport systems and how these legacies continue to influence socio-economic conditions.

The development of the railway system in the Netherlands and Switzerland, both with excellent networks rating 5.3 and 7.2 on the Boston Consulting Group's Rail Performance Index (2017, p. 3), is examined and then contrasted with the development of less comprehensive but still well-integrated systems in Catalonia and Ireland, and then the relatively sparse and poorly connected networks in Scotland and

Wales. The development of road networks tends to be a more generic area, but note is made of particular characteristics where appropriate.

2.8 Conclusion

Within their limited commercial remit, the main private bus groups operate an acceptable service but to a shrinking customer base. The 'Bus Passenger Survey' (Transport Focus, 2019) reports on passenger satisfaction results across a range of English rural and urban local authority areas. Scores for 'Overall satisfaction with the journey' were, Arriva 88%, First 84%, Go-ahead 91%, National Express West Midlands 85% and Stagecoach 91% (Transport Focus, 2019, p. 8). However, the scores for 'value for money - fare paying passengers' were considerably lower, Arriva 64%, First 55%, Go-Ahead 59%, National Express 66% and Stagecoach 66% (Transport Focus, 2019, p. 10), which reflects the profit-making imperative of these groups. Privately owned transport services can of course be components of an integrated transport system as effectively as publicly owned ones. However, the owners of private transport assets in Britain prefer to exercise their ownership, and their commercial freedom, outside of pre-determined structures such as the first level Voluntary Partnership Agreements, second level Statutory Quality Partnerships, and the third level Statutory Quality Contracts (SQC). These latter enable local authorities to set ticket prices, timetables and route structures, with the running of services contracted to bus operators. York City Council, the first local authority to consider establishing a SQC noted that:

"Whilst a Council decision to introduce a SQC is unlikely to be met with favour by bus operators, the contract would provide bus operators with a guaranteed revenue stream, allowing them to focus more clearly on operational and performance issues." (Bradley, 2009, paragraph 4.3)

An attempt in 2013 by Nexus, the Tyne and Wear Passenger Transport Executive, to introduce a SQC as part of a re-integrated transport system with the Metro was fiercely resisted by the main bus groups in the region, with threats of legal action or closing depots (Topham, 2013). The challenging nature of third level bus legislation, the Statutory Quality Contracts, is such that political leadership and administrative and technical capability is required since the financial commitment is considerable. York

City Council estimated the financial outlay to initiate a SQC at £3 million from establishing a SQC project team to the route tendering stage (Bradley, 2009, Table 2). Thereafter annual running costs were estimated to £0.5 million per annum (Bradley, 2009, paragraph 57). Combining privately owned bus operators with local democratic control over route structures, timetables, integrated ticketing, and service standards using QCS is so challenging that it is unlikely that many local authorities or combinations of authorities would be prepared to engage with the process.

UK Government actions also seem to be at odds with its declarations of wanting to see a transfer of demand to public transport. Holland (2019) reports Tyne and Wear leaders demanding that the UK government takes funding of the Metro expansion plans seriously. In addition, Transport for the North's "Phase 1 Smart cards for rail" integrated ticketing and travel information initiative was suspended following reductions in HM treasury funding (Transport for the North, 2018) (Whitfield, 2021).

Where private operators have entered the public transport sector there have been examples of both functional and financial instability, especially when considering the circumstances of the collapse of Railtrack plc, the removal of the franchise from East Coast main line train operator GNER in December 2006 after its American parent company had filed for bankruptcy protection in the USA, and the collapse of bus operators such Express Motors of Penygroes. The Transport Act 1985 regulations made possible the withdrawal of the Arriva Aberystwyth-Carmarthen area group of services with only a short period of notice for the local authorities to organise replacements.

Since the advent of the Covid-19 pandemic the UK government has been obliged to convert the English railway franchises to emergency 'recovery contracts,' effectively contracts to run and manage services on behalf of the Department of Transport (Kollewe and Topham, 2020). The Williams-Shapps Rail Plan 'Great British Railways' (UK Government, Department of Transport, 2021b) will re-establish a strategic 'controlling mind' to replace the abolished Strategic Rail Authority. This will also control the operation and maintenance of the infrastructure, replace the English train operating company franchises with management contracts, and receive the revenue from them. This could be the agent of reintegration of the industry within England and

between the industry and other modes of transport. How the interfaces would operate with Wales and Scotland are not clear at present.

The broad and positive policy of the Welsh Government on public transport integration has been made clear in 'Llwybr Newydd' (Welsh Government, 2020e), as is the intention to ensure that Welsh transport companies are 'fit for purpose' so that they have capacity to play their part in Welsh national transport policies. England is still in a confused position with a bus integration policy that, whilst it acknowledges the advantages of integration, is virtually impossible to implement through the current structure. The railway industry is in a state of flux because of the pandemic and is awaiting political decisions to be made on the recommendations of the Williams-Shapps Rail Review (Department for Transport, 2021b), neither has there been much progress on the transport powers granted to the metropolitan combined authority mayors. There is no sign of a move to an English integrated transport policy. In Scotland, the latest update to Transport Scotland's integrated ticketing scheme 'Smart and Integrated Ticketing and Payments: Delivery Strategy 2018' scheme was in 2018 (Transport Scotland, 2018). It aims at a ten-year delivery horizon.

There are signs that the benefits of integrated transport are being understood in England and Scotland but there is no urgent policy infrastructure to achieve it at the national level in either country. The re-election of a Welsh Labour government in May 2021 with thirty seats out of the sixty in the Senedd (Holzinger et al., 2021) will give all the political parties an opportunity to demonstrate if they support integrated transport by voting for provisions related to Llwybr Newydd' (Welsh Government, 2020e).

Having set out the basis for this research in the 'Introduction' and Chapters 1 and 2, the next chapter will discuss the methods and design used in the research and to formulate the research instruments, the results of which are considered in Chapters 8 to 10 and the 'Conclusion.'

Chapter 3: Research Design and Methods

3.1 Introduction

Having ‘set the picture’ in the previous chapters it is apposite to discuss the basis on which the research was conceived, designed, implemented and reported. This chapter discusses the data sources, paradigm context and methodological background of the research, the issue of research reflexivity, the development of the primary research instruments, i.e. the Questionnaire and Semi-Structured Interview Schedule, the application of these, and how the data generated by them has been used in Chapters 8, 9, 10 and the Conclusion.

3.2 Research Design: Data Sources

It will be recalled that the research question was formulated in response to Wales’s relatively high levels of poverty and deprivation, poor economic development, and a transport system which is fragmented, sub-optimal in many cases, and un-integrated.

A wide range of data was collected in response to the research question. Whilst this thesis incorporates the primary data generated by the questionnaire responses and the semi-structured interviews which are discussed later in the chapter, there is also a wide range of secondary data of a documentary, statistical and observational character. Because the study draws from a wide range of disciplines it was decided to discuss the concepts and views expressed in the references in the text, rather than in a conventional bibliography.

The reporting of the research in this thesis is undertaken through an Introduction, ten subject chapters, and a Conclusion. The Introduction contains statistical socio-economic data comparing Wales with the UK, and other nations and regions within it. Chapter 1 “The Welsh Context” details the history of Wales, the development of the Welsh ‘devolution state’ and its transport policy. It incorporates considerable amounts of mainly qualitative data relating to these areas. Chapter 2 “Integrated Transport” discusses the concept of integration and contains four case studies of integrated

transport projects. The first two examples related to rural market towns at Newtown and Machynlleth and represented experiential evidence from the author's role as project manager for both. These appear early in this thesis because it was considered appropriate include them in Chapter 2 as concrete examples of some of the issues involved in pursuing integrated transport. Chapter 2 also sets out the definitions of the high, medium and low transport integration networks that are used for the comparisons with Wales. The main comparative socio-economic statistics are set out in Chapter 4. These were derived predominantly from the UK Office for National Statistics, from Eurostat, and from state statistical bureaux, and from non-official sources where necessary. In view of the disruption social and economic disruption caused by the Covid-19 pandemic many of the statistics are for the years 2018-19, or 2019-20 so that they reflect established trends. Chapters 8, 9 and 10 discuss transport policy, poverty and deprivation, and economic development in Wales respectively, in relation to the data produced by the questionnaire and semi-structured interviews. The Conclusion provides a summing up of the research, and a range of research-derived recommendations for Welsh Government and stakeholders.

Regarding the collection and quality of the quantitative data, all the official organisations of the countries from which statistical data has been collected have subscribed to the 'United Nations Fundamental Principles of Official Statistics Implementation Guidelines' (2015). Documentary evidence was also used throughout the thesis from sources including the European Union, the UK, Welsh, Scottish and other governments, the UK, Welsh and Scottish parliaments, transport operators, and newspaper and magazine media.

The academic sources were derived from academic and professional journals, books, and blogs. Initial reading around the area of transport integration provided the broad structure for the research and the thesis. Those sources referenced in the thesis represent only part of the literature consulted and considered, thus reflecting the constraints of the word limit.

The thesis also incorporates maps and pictures to clarify the text where necessary. In some cases, it was surprisingly difficult to find images that were relevant and suitable for reproduction. It is hoped that those selected are suitably informative. The Newtown

bus interchange pictures were taken by the author, other pictures and maps are credited as appropriate.

3.3 Paradigms

The task of any policy or social research is to unite the theoretical approaches to a field of study with what happens in the real world in so far as possible. Therefore, in this research the hierarchy of reasoning is that:

- i) paradigms - inform the broad theoretical context of the research and influence the choice of:
- ii) the methodology - which outlines the way in which the research is undertaken and provides an over-arching framework for:
- iii) the methods chosen - the instruments used to gather the quantitative and qualitative data, which then generate:
- iv) the outputs, or findings.

This hierarchy was employed to analyse and select what research instruments would be appropriate for the research. The reasoning is that the paradigm is the theoretical position, or the lens through which the research process is viewed, which over-arches the theories and methodology of a field of investigation. In the search for an appropriate broad theoretical context for this research Kuhn's (1962) work on the contested nature of paradigms in the social sciences was revisited. Wray (2011, p. 380) says of his work:

“Kuhn was struck by the differences between the natural sciences and the social sciences. In the former, there is broad agreement about the fundamentals, whereas in the latter there is often significant disagreement about fundamentals.”

As if to confirm this, neither the exclusively quantitative nor qualitative approaches seemed to be appropriate conceptual bases for the selection of the research methodology. Neither were the other dominant paradigms in social research such as positivism, social constructivism, the critical paradigm, or the postmodern.

To contextualise the chosen paradigm, it is appropriate to briefly describe the above possibilities. Positivism, the contention that only observable and quantifiable phenomena should be used in the study of society, was promoted by (but not used by), Auguste Comte (1798-1857) in his argument that society evolved through stages. The meritocrat Saint-Simon had previously laid the philosophical basis for sociology in his 1817 work 'L'Industrie' (Taylor tr. ed., 1975, pp. 158-161), which identified the welfare of 'working class' as being a social priority. The discipline developed in response to the increasing complexity and conflict of industrialising society with the social Darwinianism of Herbert Spencer (1820-1903), and the revolutionary socialism of Karl Marx (1818-1883).

Positivism was first systematically applied by Durkheim (1858-1917) in his study 'On Suicide' (Durkheim, 1897) The paradigm is based on the methods of 'normal science' using empirical and observable evidence, such as statistics, for investigation, which this paradigm sees as being value free. Data dealing with subjective experiences such as individual attitudes is avoided by positivists. The apparently objective methods of normal science applied to positivism are expressed through the rigorous collection of societal data which then has inductive reasoning applied to it to allow the formation of theories, which can be verified by further study. Whilst this study used statistics it ranged further than the positivist view of objective reality in considering the effects of the historical record, politics, and public policy.

Social constructivism as discussed by Berger and Luckman (1996) sees reality not as an objective state, but a varying, socially constructed, and ever-changing state which is created through interactions between people, and the interpretations that are made of these interactions. Practitioners operating within this paradigm are interested in how social context and interactions shape perceptions of reality. This paradigm does not only consider individual responses but also that of groups, ranging from personal partnerships to nations, and the way in which they normalise ideas of truth and reality. These ideas have a collective social power and reality beyond the individuals or groups who created them. They are also contested by individuals and groups seeking to redefine them, thus creating a dynamic process of change. Attention was paid to this paradigm during the research as it had implications for the policy-making process

in transport, but it was not thought to be a sufficiently encompassing basis for the research.

The critical paradigm as posited by social theorists such as Horkheimer (2002), and latterly by feminist critics such as Fraser (1989), focusses on the exercise of power, inequality, and the need for social change. This paradigm argues that the social sciences can never be completely objective since projects are conceived, designed, implemented, analysed, and disseminated in a pre-existing social framework. This paradigm has a commitment to achieving social change through scientific investigation with the knowledge that certain groups in society are marginalised, disadvantaged, and discriminated against. It describes what is wrong with existing social reality, identifies the actors that could change it, provides a clear framework for criticism, and it presents practical means for change. Thus, researchers working within the paradigm seek to promote positive change in participants, and in the social systems being studied to change power imbalances. This paradigm's criticism of bias in the social sciences was held in mind during the research process as being a useful reminder that both the research and the organisational and policy structures being analysed were part of a power hierarchy.

For any social researcher the postmodernist position on the essential unknowability of social reality is a challenging and existentially difficult one. Whilst the application of this position seems to be unachievable in a piece of research such as this, it has been kept in mind as a valuable counterpoint to the positivist paradigm. The postmodern paradigm, as discussed by Seidman (1994), holds that there are inherent problems with the preceding paradigms and that reality and truth operate within an historical and cultural framework with there being no universal truths. Postmodernism argues that researchers impose their own reality and truth on those of others whilst studying. In addition, this paradigm would ask of the power structures discussed by the critical paradigm whose reality and truth are in question? This raises the possibility that what is being studied is relative, or only reflects the researcher's current and individual experience. Clearly, whilst the questions posed by postmodernism are interesting and challenging, and were considered by the researcher, again it was not possible to actively apply them to this research.

However, an appropriate paradigm has developed in response to the advent of hyper-globalism and connectivity, resulting from which is the narrative that transport and mobility are essential elements of socio-economic development. Sheller & Urry (2006, p. 207) observe that:

“... a new paradigm is being formed within the social sciences, the ‘new mobilities’ paradigm. Some recent contributions to forming and stabilising this new paradigm included work from anthropology, cultural studies, geography, migration studies, science and technology studies, tourism and transport studies and sociology.”

They argue that social science has traditionally concentrated on static situations and has been dismissive of the importance of mobility, and the means of mobility, in economic, political, and social life; especially where mobility, or the lack of it, creates or reinforces inequality (Sheller & Urry, 2006, p. 207). To overcome this the new mobilities paradigm demonstrates a commitment to the demolition of disciplinary silos in the study of spatial mobility, information circulation, and in society through the application of a multi-disciplinary approach. Sheller (2014, p. 2) betrays an impatience with conventional views of ‘the paradigm’ when she comments:

“It is neither structuralist nor post-structuralist, but instead advocates for a realist relational ontology for contemporary social science capable of transcending old debates and bridging disciplinary boundaries.”

Whilst the paradigm acknowledges the positive benefits of mobility it also takes a critical view of it regarding the immobilising and disadvantaging of some. The authors comment that:

“These diverse yet intersecting mobilities have many consequences for different peoples and places that enhance the mobility of some peoples and places and heighten the immobility of others, especially as they try to cross borders ...” (Sheller & Urry, 2006, p. 207).

The concern with the “mobility left behind,” those socio-economically deprived by a lack of mobility, and those experiencing forced mobility, such as conflict and economic

refugees is a concern of the mobility paradigm but the authors state that their means of inquiry is fluid:

“... we do not insist on a new ‘grand narrative’ of mobility, fluidity, or liquidity. The new mobilities paradigm suggests a set of questions, theories, and methodologies rather than a totalising or reductive description of the contemporary world.” (Sheller & Urry, 2006. p. 210).

They propose seven methods for mobilities research (Sheller & Urry, 2006, pp. 217-19) all 21 of which were aligned towards the study of mobility with individuals or groups, rather than the public policy basis of mobility which forms the core of my work. Consequently, I offer this paradigm my research as a further expression of its endeavour, using my overview which incorporates both temporal and spatial dimensions, and research methods encompassing data from the primary research instruments, non-primary statistical data, historical and geographical interpretation, documentary evidence, experiential evidence, and the graphic evidence of photographs and maps.

3.4 Methodology

Methodology is defined as being the systematic theoretical analysis of the methods applied to examine an area of study. In addition, methodology includes the theoretical model applied to an area of study to make it structured and comprehensible, the phases in which the research takes place and whether quantitative or qualitative methods are chosen. The methodology for this research is both derived from the new mobilities paradigm and includes elements of it in its synthesis of a sociological, transport planning and policy research approach. Initially, it was intended to base the research on discussing existing quantitative data sources, these are shown below in Table 3.1.

This was originally to be expended through a series of semi-structured interviews (S-SIs) to capture the opinions of transport policymakers and professionals on the desirability and achievability of integrated transport systems, the models they had in

mind, and the transport and wider socio-economic benefits they would expect to be delivered.

This stage is shown as: “c) Participatory action research semi-structured in-depth interviews with transport policy, strategy, planning and operations professionals.”

Table 3.1 Methodology: Data Sources	
Quantitative data:	Qualitative data:
1) UK Census: 2011 and previous	a) Literature review of research field
2) Demographic data: census-derived and projections	b) Case studies of research field
3) Welsh Index of Multiple Deprivation (WIMD)	c) Participatory action research semi-structured in-depth interviews with transport policy, strategy, planning and operations professionals
4) Transport operators' statistics: e.g. demand, revenue, investment, operations costs, assets, asset condition	d) Deliberative research with further in-depth interviews arising from c) above
5) Governmental and other transport statistics e.g. road and rail demand trends	e) Governmental and other transport policy and strategy documents e.g. Welsh National Transport Plan
6) Governmental and other macro-economic data e.g. GDP, GVA	f) Continuous monitoring of current economic, political, social and transport developments in order to inform research
7) Governmental and other micro-economic data e.g. local authority population estimates	g) Attending relevant meetings, seminars and events in order to inform research and make contacts
8) Transport projects benefit / cost analyses: e.g. WelTAG, STAG and guidance	

Lewis (2016).

Allied to the emergence of policy makers and professionals' concerns during this stage of the research was to be the drafting of related deliberative interview schedules for transport user groups and other stakeholders, shown in Table 3.1 as:

“d) Deliberative research in-depth interviews arising from c) above.” After careful consideration of which sectors of society should be invited to participate, which was derived from my past professional knowledge and experience, and reflexive consideration of this, it was decided that the research population should have five domains: Welsh Government / National Assembly for Wales, elected members and officers; Local Authorities, elected members and officers, Transport Operators: rail, and bus and coach, Community Groups / Lobbying Organisations, and finally Individuals / Other Category.

In the original research proposal, the use of a questionnaire was avoided because there was concern that the potential length of the instrument would militate against maximising response rates amongst policy makers and practitioners. However, Rolstad et al. (2011, pp. 1101-1108) in their review of the ‘response burden’ in patient questionnaires, arguably an equally stressed group of respondents, concluded that:

“Given the weak support for an association between questionnaire length and response burden, decisions on the choice of instrument are best based on the quality of the content from the patient’s point of view rather than the length per se.”

There were multiple complexities and influences at play in the area which would not be well-served by purely positivist methods. Public policy work still has a perceived tendency towards the positivist paradigm of “objectivity,” “knowability,” “logical deductivism” and “value free” work, with a heavy reliance on operational statistics and questionnaires to reveal the “truth” as a basis for public policy making. However, Hammer et al. (1999, p. 169) point out that this is not a value free process:

“The elevation of the analyst as an expert, insulated from society, had the effect of detaching “policy” from its root: the “polis” of political community.”

My awareness of this problem, and my previous experience of social and policy research, tended towards the adoption of a combination of both positivism and social constructivism which could be accommodated within the mobility paradigm, which insists on equality between the researcher and the researched, as far as possible. Consequently, at this stage in planning the research it was appropriate that I applied the process of reflexivity, that is considering one’s personal beliefs, prejudices, and

assumptions in relation to the research design, its undertaking, and power-relations; as Finlay (1998, pp. 453-456) suggests, I had to accept that I was part of the research, and not a dispassionate observer.

My background of railway manual and then clerical work, a late first degree in my mid-30s, working as a civil service and local government social science researcher, and then in transport policy and projects had given me plenty of experience in the dynamics of power inequality between professionals and non-professionals, and I applied these my concerns in my application for authorisation of the questionnaire and semi-structured interview schedule, which included a risk assessment to Bangor University's CBLESS Ethics Committee (see appendices 1 and 2). As a result of my professional experience, I was aware that I had a professional bias towards the concept of transport integration and consequently, took steps to counter this.

As a means of testing my assumptions and combatting my biases I decided to establish an informal 'Research Advisory Panel' (RAP) from six highly qualified existing contacts. Two of these were academic acquaintances from Catalonia, and the remaining four were domestic professional contacts, one of whom had experience in assessing PhD funding applications. Three of the group had PhDs.

To test my reflexivity they critically tested the proposed research strategy and reviewed the content and ethical aspects of the proposed semi-structured interview schedules and, after the initial strategy changed, also the questionnaire for unconscious bias. Subsequently members of the panel challenged me and offered comments and advice on the research design. The panel members all had extensive experience in designing, implementing, analysing, and reporting on research projects. Consequently, this body of experience was relevant to checking the validity of the proposed research instruments, the implementation of the planned research design and programme, and the cogency and appropriateness of the application to the University's CBLESS Ethics Committee. Whilst I listened to the panel's advice and discussed it with them, at no point did I allow their arguments to over-rule my instincts as a professional social researcher. The outline details of the panel members are as follows:

A former Active Travel Officer at Powys County Council, she has extensive expertise in bidding for Welsh Government funding for cycling and walking projects, in designing and conducting questionnaires for public consultations on active travel, and in conducting and reporting on public consultation exercises for specific projects.

A former 'Head of International Projects' at the Fondació Jaume Bofill, Universitat Politècnica de Catalunya, Barcelona and Currently Project Officer, ICT in Education, UNESCO, Paris. He undertakes strategic planning, project creation, research, managing international events and interfacing with international and non-governmental organisations. Also, project effectiveness measurement and staff management.

A former academic Director at Geneva Business School's (GBS) Barcelona Campus, now an independent educational consultant in Paris. He has extensive research experience in the education sector and currently supports the academic programme, students and academic staff at GBS Barcelona and teaches on the MBA and BBA programmes.

An officer at the Bar Standards Board (legal regulator), London. He has previously worked in the social housing sector, several professional representative bodies and other regulators. He has a strong background in communications, report analysis and programme implementation.

Chairperson at Catholics for AIDS Prevention and Support. Previously a social worker in the area of sexual health advice with responsibility for looked-after young people in South London. As well as his role he has recently been awarded his PhD by St Mary's University, Twickenham, for conducting action-based research on the interface between organised religion and disadvantaged groups living with HIV.

Bursar at the Congregation of the Passion (England, Wales and Sweden) based in Coventry. His role includes co-ordination of the financial and administrative business of the province and assisting the Trustees to develop the strategic direction of the Congregation. He was formerly Senior Policy, Practice and Learning Officer at the Chartered Institute of Housing where they developed policy, research and best practice for housing and diversity, and learning development, including assessing and providing funding for PhD research projects.

After discussions with the RAP members and looking at work on the conflicting merits of positivist and non-positivist paradigms by commentators such as Aliyu et al. (2014), I decided that a questionnaire as the main research instrument, rather than just a series of semi-structured interviews, was required. Other means of data collection were also considered, such as unstructured interviews. These were thought to be flexible data generators, but it was considered that there was a risk that they would not produce data in a manageable form, which could be compared across the range of responses to see if major comparable concerns had emerged. The possibility of four focus groups was also considered. These would have comprised responders from the north, mid, south west, and south east. Whilst the interplay of opinions between the various stakeholder types would have been interesting, the same anxiety about data comparability applied. In addition, respondent anonymity would not have been possible with focus groups. I felt I had a responsibility towards respondents who wished to express opinions or advocate solutions that ran counter to existing transport policy orthodoxy, and that their professional credibility needed to be protected.

Although my initial reluctance to consider a questionnaire was driven by fears of 'questionnaire fatigue,' a fear that was justified by a disappointing response rate, the reasoning for this change of approach was that the questionnaire would facilitate the collection of far more data than would be possible with semi-structured interviews, and would also provide a framework that would facilitate the coding of a limited number of semi-structured interviews which would be conducted to expand on the major issues raised by the questionnaire. As part of my reflexivity awareness, I acknowledged that a questionnaire could potentially be a means of imposing my own professional concerns on respondents. To counter this, respondents were encouraged to add their own comments and concerns, without word limits, at various points throughout the questionnaire, see the following paragraph. This had the unexpected advantage of producing a large amount of rich additional data.

3.5 Methods: The Questionnaire

Having finally decided on a questionnaire as the main research instrument the task was then to review the target respondent population, which would of necessity

condition the form and content of the instrument. The research population was maintained in its original form.

The final categories chosen were:

- i) Welsh Government / National Assembly for Wales (Senedd): Elected Members and
Officers
- ii) Local Authorities (including the National Park Authorities): Elected Members and
Officers
- iii) Transport Operators: Rail / Bus and Coach,
- iv) Community Groups and Lobbying Organisations
- v) Individuals and Other Categories

The five categories chosen were intended to give a reasonable coverage between the devolved and local state, those providing transport services such as local authority officers and members, and stakeholders. Tables 3.4 and 3.5 at the end of the chapter shows the population invited to take part in the research and the numbers responding. Local authorities included the three national park authorities and the regional economic partnerships as, in the case of the former, they are classified as local planning authorities, and in the case of the latter are organisations resulting from collaboration between local authorities. The five community rail partnerships were included with the Community Groups and Lobbying Organisations category, rather than in the Local Authority group, as funding for them has now passed to the new Transport for Wales 'Wales and Borders' rail franchise.

The Questionnaire can be found in Appendix 5. After making the strategic decision on the methodology to be used, and the nature and design of the research instruments, the actual form of the questionnaire became the main issue. Previous experience with colleagues suggested that British social researchers are heavily influenced by the social constructivist paradigm. The paradigm is expressed by the inclusion in questionnaire design of opportunities for respondents to voice their opinions, and to make their own suggestions, comments and observations on the questions being

asked. In addition, this also leaves space to counter concerns raised by the critical paradigm regarding issues of power inequality in research participation (Lee et al. 2011, p. 132). This was especially relevant as some of the respondents were Welsh Government or local government officers who, because of power relations within their organisations, might be reluctant to reveal their personal opinions on the issues in question. Personal professional experience suggested that because of such institutional power structures, and the dominant discourses at play in some areas of the research, 'thinking the unthinkable' in the realm of transport policy and planning can be a threat to one's professional credibility.

Attention was also paid to the insistence in this paradigm that the primary goal of research is to bring about social change. Attention to all of the above concerns were consistent with the new mobilities paradigm chosen as the appropriate over-arching theoretic basis for the research. Consequently, whilst the research was informed by theoretical sociological perspectives on economic and social development and equalities issues, it was also designed to provide a practical high-level transport policy and strategic vision, and a discussion of the value of transport investment in socio-economic development.

In line with the non-prescriptive ethos of the new mobilities paradigm a participatory action research approach was intended generate from respondents, relevant ideas, issues and concerns, and to co-operatively produce guidance on how the final research should be best organised for practical use by transport policy makers and transport planning professionals. The original intention was to undertake participatory action research (PAR) as outlined by Chavalier and Buckles (2013, p. 2) and their commitment to:

“... deepen our knowledge of PAR and what it means to do research ‘with’ people and not ‘on’ or ‘for’ people (which is a polite way of saying ‘without truly engaging them’).”

Participatory action research is pluralistic method of research and social change. Respondents become co-researchers feeding into the research and social change process.

It was intended that participatory action research would have been adopted for the Welsh Government and the National Assembly for Wales, and Local Authorities officer member groups in order share the research as it developed, to ensure that it was relevant and useful, and that a 'virtuous circle' of creative feedback and engagement was established. In view of these objectives convincing gate keepers to 'buy in' to the research and confidence building at early stage was of key importance. In practice engaging gate keepers proved to be extremely difficult even after multiple approaches. From comments that have been made by potential respondents it is thought that the difficulty was both a symptom of resource shortages in the public and transport operator sectors together with 'questionnaire fatigue,' and a level of anxiety in general about criticising the Welsh Government.

It was originally planned to focus on what the Welsh Government / Senedd and Local Authorities groups believed to be desirable and achievable. The Community Groups and Lobbying Organisations and Individuals and Other categories would then discuss these approaches and respondents would be encouraged to express and develop their opinions on them. As the difficulty of persuading potential respondents to participate emerged it became apparent that the participative process which was also incorporated in the 'free response' sections of the Questionnaire, and Semi-Structured Interview Schedule, would be key in deepening the research data. This was reflected in the quality of the 'free responses' in the Questionnaire and in the Semi-Structured Interviews.

Unfortunately the projected virtuous research circle engendered by participatory action research had to be abandoned. However, a small core of respondents was established and who wish continued future involvement in the research, should further work be decided on.

In planning the types of question and their form Foddy's (1993) work was considered, particularly his comments on the dangers of incorporating unconscious value judgements and directive wording in questionnaire design. These concerns were also reflected in the application to Bangor University's CBLESS Ethics Committee which went beyond the basic criteria required to get approval for the research instruments. Many of the Questionnaire items initially presented respondents with a simple binary choice, for example:

“Section 1: Transport Policy: Question 3) Do you / does your organisation use transport Yes / No) 'Yes' - go to questions 4, 5 and 6; 'No' go to question 7.”

The intention to was to ensure that question design involved a pronged approach to some key questions, triggered by a direct personal approach to the respondent in order to elicit their opinions on an issue:

“Question 4) Do you feel that the transport policy documents available are i) coherent, ii) up to date, iii) cross-cutting and iv) provide a useful context and guidance? (Yes / No).”

“Question 5) From your / your organisation's experiences of these do you think they could be improved? (Yes / No).”

Consequently, the inclusion of the final element of an open question was intended to ‘set the seal’ on a process of engagement:

“Question 5a) If 'YES' please briefly say how it could be improved. (Open question).”

Having broadly considered how the questions should be asked the next step was to consider the data to be captured. In view of the over-arching concerns of the research the areas to be covered were as follows: i) Transport Policy, ii) Poverty and Deprivation, iii) ‘Economic Development, iv) Identifying Transport Challenges and Solutions, v) Any other issues. The questions asked, comments on the rationale for questions, and the results are set out in Chapters 8, 9 and 10 in the ‘Questionnaire Findings’ sections.

3.6 Methods: The Semi-Structured Interview Schedule

The Semi-Structured Interview Schedule can be found in Appendix 6. From originally being the primary research instrument, the place of the Schedule was revised to be complimentary to the Questionnaire. This was fortuitous as the open questions in the Questionnaire prompted some rich and interesting ‘free’ responses, as well as useful indicative quantitative data. Consequently, the Semi-Structured Interview Schedule supplemented the former by asking participants for their in-depth opinions about, and

experiences related to, four of the five research areas. Transport policy was excluded because of the profile of three of the five participating respondents who would not have had engagement with it. This area came up naturally with the two respondents who were directly involved in the area.

Following a review of Opdenakker's (2006, p. 2) paper on the advantages and disadvantages of interviewing techniques, the means of undertaking the interviews was also carefully considered. He classifies the four techniques as shown below in Table 3.2:

Table 3.2 Four Interview Techniques in Qualitative Research: Opdenakker (2006)		
	Time	Place
Synchronous communication	'face to face' MSN messenger Telephone	'face to face'
Asynchronous communication	E-mail	E-mail MSN messenger Telephone

It was decided that face to face interactions, rather than those mediated by telecommunications or information technology equipment, were preferred even though these would be more demanding of time and resources. It was thought that face to face interviewing signalled a higher commitment to respondent's views by the researcher and a recognition that they had given up valuable time to participate, an implicit 'contact of mutual respect' made by both parties making time to "inter-view." Reviewing the transcripts confirmed that the interviewer contributed to the process through answering the respondent's questions and providing points of information where necessary. In addition, the face to face situation enabled the researcher to observe non-verbal cues given by interviewees, and also contributed towards building up a small 'core' of committed respondents, even though this approach would be more demanding of time and resources. Because of the circumstances of one interviewee a mutual decision was made that a telephone interview was the best solution. This interview proved to be of similar length to the face to face ones, and also yielded equally valuable information. It was decided to restrict the Semi-Structured Interview

Schedule population to one response from each of the five respondent categories. Had the interviews not raised issues and concerns similar to each other, and to the questionnaire, further confirmatory interviews would have been conducted. However, there was considerable synchronicity between respondents, and between the two research instruments. Together with official papers and journal articles this confirmed the validity of responses through a triangulation process. The categories, posts of respondents, interview duration and the number of words transcribed are shown in Table 3.3 below:

Table 3.3 Semi-Structured Interview Details			
Category	Post	Duration	No. of transcript words
Welsh Government / National Assembly for Wales (now Welsh Parliament)	WG Transport Services Manager	1h05m	10,925
Local Authority	Service Directorate Director	1h09m	10,676
Transport Operator	Railway Station Manager	0h48m	8,404
Third Sector	Third Sector County Coordinating Organisation Officer	0h45m	8,399
Individual / Other	Tourism Company Commercial Manager	0h39m	7,497

3.7 Analysis of the Questionnaire and Semi-Structured Interviews

Having come to a view about the form and content of the Questionnaire the issue of how to distribute it and analyse the resulting data needed to be resolved. Access was offered by Bangor University to the Jisc Online Surveys Platform (formerly BOS). The questionnaire was translated into good standard Welsh by the University's translation unit. Two test versions with two respondents in each were run. These revealed the need for some minor revisions before the final version was launched.

The Jisc Online Surveys Platform had the advantage of making the questionnaires easy to distribute via an online URL which could be pasted on to emails, allowing the

quantitative responses to be directly input to the analysis program, and qualitative responses to be recorded for later analysis. The program produces reports for both individual responses and for all responses. It allows analysis through the filtering of responses by date order, by question number, and by the answers given. The analysis capability was more than adequate for the cross-tabulation tasks required of it. The program's Cross Tabulation and Responses Program Report used for the write-up has been archived.

All of the approaches to qualitative analysis were initially considered but because analysis was to take place predominantly within the structure of the Questionnaire areas, content analysis was felt to be the most appropriate technique. Accordingly, the broad structure of questions in the Semi-Structured Interview Schedule was linked to that of the Questionnaire to facilitate comparative analysis. Where responses were 'unexpected' the key words and phrases used by respondents in the questionnaire 'free responses' were coded and used as an analysis framework for both the 'free responses' in the Questionnaire and the Semi-Structured Interview responses, as recorded in the interview transcripts. The interviews were recorded with the permission of the interviewees and then transcribed by a professional transcribing company in Cardiff. Both the recordings and the transcriptions have been archived. Analysis identified key themes, words and phrases used by respondents. These were logged on a response grid for both research instruments to establish areas of synchronicity or variance.

3.8 Ethics

The University ethics guidelines and application form for approval of the research instruments and accompanying documents were a valuable didactic process in that they encouraged consideration of the basis for the research, and the ethical and practical issues around it, and my reflexivity, in a framework that was not of the researcher's construction. The application form provided a useful aide memoir to the basic ethical and practical components of the primary research.

The CBLESS Ethics Committee was provided with documents including the Questionnaire, the Semi-Structured Interview Schedule, and a Risk Register for the

two research instruments. See appendices 1-6 for documents related to the research instruments. The Risk Register spreadsheet for the Questionnaire and Semi-Structured Interview Schedule classified research risks in three categories:

Category A: Potential personal / professional harm to respondent and / or others through breach of ethical / professional behaviour and / or other malpractice

Category B: conflicts of respondent / researcher interests

Category C: Research instruments not fit for purpose - potential failure to meet research objectives. The ethics committee returned its agreement with the particulars of the study.

3.9 The Research Population and Recruitment / Response Rates

To access organisations, convincing gatekeepers to support the research through confidence building at early stage was of key importance, in practice engaging these proved to be extremely difficult even after multiple approaches. One major issue with local authorities and transport operators was the need to make initial contact through telephone call centres as gatekeepers to organisations. Since most organisations no longer publish staff email addresses or telephone numbers making this form of contact unavoidable. Since these call centres are primarily designed to concentrate on dealing with simple public enquiries regarding service delivery, contacting appropriate officers proved to be difficult due to some lack of understanding by contact line officers about why, what and who was required. Even when departments could be accessed there were problems in contacting officers with relevant knowledge, in addition promises to return to telephone calls and emails were often not kept. From comments that have been made by potential and actual respondents it is thought that this difficulty was both a symptom of resource shortages in the public and transport operator sectors. Another factor appears to have been questionnaire fatigue, caused by increasing numbers of researchers contacting organisations with requests to be surveyed on various issues. There was also a level of anxiety about being seen to openly criticising the Welsh Government. Even though repeated assurances were made about the

anonymity of any responses it is believed that this concern was a significant factor in non-response.

Recruiting interviewees for the semi-structured interviews faced similar difficulties with some withdrawals from people who had promised to participate, necessitating a further search for new interviewees. Further problems about arranging times and venues for interviews extended this phase of the research from its intended end summer 2019 to winter 2019-20. A spreadsheet was established and maintained of all potential questionnaire respondents. 95 potential respondents were contacted across the five categories.

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Table 3.4 Questionnaire and Semi-Structured Interview Response Target and Actual Response Rate

Type of Organisation	Invitations Issued (= 100% Response)	Responses in Category	% of Invitations	Comments
Welsh Government/ National Assembly for Wales	13	0 (2)	15.4	1 response as 'individual / other' (1 semi-structured interview)
Local Authorities (Counties/ Community /Town Councils / National Park Authorities and Regional Economic Partnerships)	35	4	11.4	4 direct responses 1 response as an 'individual / other' (1 semi-structured interview)
Transport Operators (Rail/Bus/Coach)	9	2	22.2	1 direct sponses (1 semi-structured interview)
Community Group / Lobbying Organisation (including 5 Community Rail Partnerships)	21	9	43.9	9 direct responses 4 responses as 'individual / other' (2 semi-structured interviews)
Individuals/Other Organisations	17	11	64.7	5 direct responses 6 responses from other categories as an 'individual'
Totals:	95	26 Questionnaire responses (27.4% Response Rate) 5 Semi-Structured Interviews (100% Response Rate)		

Table 3.5 below shows the questionnaire responses by the expected and actual responses received. The responses to the questionnaire were slightly complicated by 6 respondents choosing to self-identify in the Individual / Other description category, rather than the one expected. The responses of these were checked against those that were in the expected category and were broadly comparable:

Table 3.5 Questionnaire Responses by Expected and Actual Categories						
Category	Welsh Government / National Assembly for Wales (Senedd)	Local Authority	Transport Operator	Community Group / Lobbying Organisation	Individual / Other description	Total
Expected category	1	5	2	13	5	26
Different chosen category	1 x Individual / Other	1 x Individual / Other	N/A	4 x Individual / Other	N/A	6 x Individual / Other
Final category total	0	4	2	9	11	26

3.10 Conclusion

The strategy and implementation of the research necessarily changed in its character and practice in response to practical circumstances which arose during the research process. The original proposed concentration on semi-structured interviews to deepen the data from the existing sources shown in Table 3.1 was abandoned after advice from the ‘Research Advisory Panel,’ and my critical scrutiny as a researcher. Consequently, the emphasis was switched to a questionnaire supplemented by a series of five semi-structured interviews across the five respondent domains.

The development and ethics committee approval of the questionnaire, and the semi-structured interview schedule, proved to be a significant unplanned project. As mentioned in Section 3.9 although the overall questionnaire response rate was somewhat disappointing the reasons for this which emerged constituted a useful finding in itself on researching in the Welsh public sector.

Both the questionnaire and the semi-structured interview schedule have proved to be successful in obtaining a wide range of evidential data and clear 'free' responses which have provided some unexpected insights and contributed to clear conclusions in the areas covered by research instruments.

The next three Chapters 4, 5, 6, and 7 look at socio-economic comparisons between the six study countries, and at the development and operation of the high, medium and low transport integration networks.

Chapter 4: Evaluating the Socio-Economic Impact of Integrated Transport

4.1 Introduction

One of the aims of this research was to determine if investment in transport systems improved socio-economic conditions through promoting access to work and services, and stimulating economic growth, resulting in better economic performance and reduced state expenditure on health and social protection. Consequently, the use of official statistics as indicators was necessary. Bulmer (1980) asked in a research article “Why Don’t Sociologists Make more Use of Official Statistics?” He was preoccupied with rebutting the critical arguments of commentators on official data in the fields of crime and suicide. Bulmer’s defence of official data was robust:

“The advantages of such official data are here reasserted by means of examples drawn from the study of health, occupation, social class and race and ethnicity. Significant and meaningful empirical regularities have been shown using such data” (Bulmer, 1980, p. 505).

Access to official statistics has improved immensely with the advent of the internet. However, even with the benefit of the internet, and the broad standardisation of data in the categories reported to the European Union’s statistics agency Eurostat, collecting inductive data in the five selected areas of economy, demographics, social protection, health care and education was problematic. Amongst other indicators looked at were expenditure on research and development and expenditure on transport. The former was rejected as having too many problems with compatibility whilst, in view of the importance of the latter, it was retained but heavily caveated. The data sets within them, were limited and in some cases dated back some years. Consequently, some data had to be obtained from the websites of national statistics agencies, international organisations or private companies. Where this was done, or where there may be compatibility issues within datasets, attention is drawn to this. Because of the Covid-19 pandemic, 2019 was chosen as the reference year for the statistics where possible, except where the availability of data dictated the use of other years.

4.2 Comparative Populations and Population Densities

Before moving on to the socio-economic statistics it is appropriate to set out the context of the six case countries by examining their population, population densities and geographic characteristics.

Table 4.1 Populations and Population Densities				
Country	Population 2019	Area km ² 2016	Population km ²	Density
Netherlands	17,282,163	37,378	462.4	
Switzerland	8,544,527	41,287	207.0	
Catalonia	7,566,431	32,110	235.6	
Ireland*	4,904,240	69,947	70.1	
Scotland	5,454,238	78,802	69.2	
Wales	3,136,383	20,781	150.9	
Population: Eurostat NUTS 3 (2020a)				
Area: Eurostat NUTS 3 (2020b)				
* Estimated				

The above Table 4.1 demonstrates that all six cases are amongst the smaller European countries in terms of land area and population. The five countries selected for comparison with Wales vary widely from each other with the Netherlands having the largest population and population density but a land area similar with Switzerland. Switzerland and Catalonia are in the middle band for all three factors. Ireland and Scotland have similar populations, land areas and population densities with Scotland being the largest country of the six in terms of land area with Ireland being the second largest. Both countries have the lowest population densities. Wales is the smallest of the six for population and land area but between Ireland and Catalonia in population density. However, most countries have concentrations of population which display different population density characteristics to country-level data. These concentrations are usually around the capital city because of the agglomeration effects in the areas of governance, education, and the cultural sector. Consequently, transport infrastructure and services are also usually denser in capital regions to service internal movements and those in and out of the centre.

Table 4.2 Most Populated Regions and Population Densities			
Country	Population 2019	Area km ² 2016	Population Density km ²
Netherlands: Randstad	8,077,314	9,209	877.1
Switzerland: Mittelland (i)	5,690,655	12,386	459.4
Catalonia: Metropolitan Area of Barcelona	5,575,204	2,464	2,262.7
Ireland: Greater Dublin	2,107,749	7,817	269.6
Scotland: Central Belt	3,026,530	2,967	1,020.0
Wales: South Wales	1,839,011	2,857	643.6
Population: Eurostat (2020a)			
Area: Eurostat (2020b)			
(i) Area and population estimated from NUTS 3 (2016) data, and data in Swiss Federal Council (2017) briefing 'Swiss Plateau.'			

A problem in identifying population concentrations is that, whilst they are often much discussed in public policy terms, they can be ill-defined in terms of statistical definition, or they have different definitions depending on the specific purposes for which they are being analysed. Consequently, the conurbation data for the Dutch Randstad, Swiss Plateau and Scottish Central Belt that has been constructed for Table 4.2, whilst as accurate as possible, is also contestable and therefore indicative. Only in cases of Catalonia, Ireland and Wales were the definitions of the actual conurbations clear. For the sake of clarity all the definitions are shown below.

The Netherlands: Randstad. The “rim,” “ring” or “crescent” city. This densely urban region of the west Netherlands broadly incorporates the cities of Utrecht, Almere, Amsterdam, Haarlem, Leiden, Den Haag, Rotterdam and Dordrecht. Amsterdam and Rotterdam are both city conurbations. Eurostat’s NUTS 3 (2016) data for the provinces of Flevoland, Utrecht, Noord-Holland and Zuid-Holland was used to calculate the population and land area. The Flevoland data was altered to reflect the fact that only the city of Almere is classified as being within the Randstad. The conurbation has 46.7 % of the Netherlands total population, and 24.6 % of the Netherlands land area total. The rail and motorway systems are extensive and focussed on the cities Utrecht,

Amsterdam and Rotterdam. Amsterdam Schiphol Airport was the second busiest in the European Economic Area & Switzerland in terms of passenger volume in 2019 (Eurostat, 2021e, p. 6).

The Swiss Federal Council (2017, p. 1) noted:

“The Swiss Plateau (i.e. the Mittelland) stretches from Lake Geneva in the southwest to Lake Constance in the northeast. It covers around 30 % of the country’s surface area and is home to two-thirds of the total population.”

The Mittelland contains Switzerland’s largest city of Zürich, the federal capital of Bern and the internationally significant city of Geneva. Zürich, Bern and Geneva are both conurbations.

In view of the spread of some of the Mittelland cantons across the lowland / alpine boundary an estimate of population (5,690,655) and area (12,386 km²) was made using the Swiss Federal Government’s statement above (Swiss Federal Council, 2017, p. 1). The rail and motorway systems are extensive and focussed particularly on Zürich, and to a lesser extent Basle, Bern and Geneva. In 2019 Zürich Airport was the eleventh busiest and Geneva the twenty-fourth busiest airport in the ‘European Economic Area & Switzerland’ (Eurostat, 2021e, p. 6) (Zürich Airport, p. 2), (Geneva Airport, 2020, p. 16).

Catalonia: Metropolitan Area of Barcelona (AMB). The AMB which was formed in 2011 encompasses four counties: Barcelonès, which includes Barcelona City, Baix Llobregat, Maresme and Vallès Occidental. The population of AMB comprises 64.7% of the Catalan total but only 7.7% of the land area, being in a restricted location on the coastal belt between the Mediterranean Sea and the Coastal Range mountains. With 2,263 people per km² the population density of the region is the highest of the six countries with flat dwelling being the norm. Barcelona is the hub of the Catalan transport system with railways and motorways radiating to the north, south and west. Barcelona El Prat Josep Tarradellas Airport was the fifth busiest in the ‘European Economic Area & Switzerland’ in 2019 (Eurostat, 2021e, p. 6).

Ireland: Greater Dublin. This region was derived from a definition by the National Transport Authority and includes the Eurostat NUTS 3 ‘Dublin City’ region (Dublin City, Dún Laoghaire-Rathdown, Fingal and South Dublin) and the ‘Mid East’ region (Kildare,

Meath, Wicklow and Louth). The population comprises 43% of the Irish Republic's and the land area is 13.7% of the total. The region reflects the national pattern of rail and motorway routes to the north, south and west of Dublin. In 2019 Dublin Airport was the eighth busiest in the 'European Economic Area & Switzerland' (Eurostat, 2021e, p, 6).

Scotland: Central Belt. The central lowland belt of Scotland extends across the country and includes the capital Edinburgh and the largest city Glasgow, both conurbations, and large towns such as Falkirk, Cumbernauld, Coatbridge, Motherwell, East Kilbride and Paisley. The NUTS 3 data used was restricted to nine local authorities with a population density exceeding 400 people km² corresponding broadly to what is known as the 'Smaller Central Belt' model. These authorities were the City of Edinburgh, East Dumbartonshire, East Renfrewshire, Falkirk, Glasgow City, Inverclyde, North Lanarkshire, Renfrewshire and West Dumbartonshire. If the less densely populated counties of Ayrshire, Fife, Lothian and Stirling had been included, corresponding to the 'Larger Central Belt' model, the area would be about three and one third times larger.

The Central Belt has the second highest population density of the six conurbations, the Barcelona Metropolitan Area has the highest, and contains 55.5% of the population of Scotland in 3.8% of the land area. Glasgow is the focus for railways and motorways on the western side of the country with Edinburgh fulfilling the same function on the eastern side. Edinburgh Airport was the sixth busiest in the UK in 2019, Glasgow was the ninth busiest, and Glasgow Prestwick the twenty-eighth busiest (CAA, 2020, Table 10.3).

Wales: South Wales. This region is centred on the capital city Cardiff, the two other coastal cities of Swansea and Newport and the densely populated valleys that fan out from the coast into the southern escarpment of the Brecon Beacon mountains. The region is home to 58.6% of the Welsh population in 13.7% of the country's land area. There is an extensive regional road and railway system. Public transport in Cardiff and Swansea is being upgraded into two multi-modal 'metro' networks. The Welsh Government owns Cardiff Wales Airport which is 19 km to the southwest of the city at Rhoose. This was the twenty-first busiest airport in the UK in 2019 (CAA, 2020, Table 10.3).

4.3 Does Investment in Integrated Transport Promote Economic Development?

It is necessary, in relation to assessing the validity of the research question, to have an understanding of the characteristics of the countries studied through a selection of comparative socio-economic data generated by the states concerned. This section seeks to answer the crucial question in relation to the research question “Is there evidence...that an integrated transport system could assist in addressing Wales’ intractable levels of poverty and deprivation, and problems of relatively low economic development? “

The next Section 4.4 presents evidence that the high and medium integration cases have better socio-economic outcomes than the lower integration cases. The base data used in the tables has been gathered from national organisations subscribing to the ‘United Nations Fundamental Principles of Official Statistics Implementation Guidelines’ (2015).

The quality of transport system performance in terms of greater access and lower journey times for users is promoted by integrated transport systems, as demonstrated by a 27% fall in passenger numbers on the Tyne and Wear Metro when the system was ‘de-integrated’ on bus deregulation in 1986 (Jeffrey, 2019, p. 6). In their paper ‘Transport and Social Exclusion in London,’ Church et al. (2000, p. 199) report that exclusion from facilities, the labour market, and temporal exclusion are major factors for excluded groups in relation to transport. This exclusion can have implications for the participation of these groups in the employment market and education sectors. They recommended that London Transport research for the early 2000s should concentrate on:

“...on public transport accessibility between high areas of social exclusion and key opportunities, and the accessibility of key regeneration sites.” (Church et al., 2000, p. 204).

However, they caution that:

“Whilst it is recognised that improvement of the public transport system is a key element of any strategy to tackle transport based social exclusion, it is clear from the work we have done so far that it is not the whole solution.” (Church et al., 2000, p. 204).

This suggests that these issues need to be addressed through a strategic multi-agency approach of which an integrated transport system is one, although a major, component.

The issue of whether improved transport access has a positive effect on economic development, as expressed through financial indicators such as wages, profits, production, and Gross Domestic Product, has been the subject of considerable investigation. A range of studies over the years have concluded that transport access DOES have a positive effect on economic development. Johansson's (1993) empirical study of Swedish manufacturing industry across 280 municipalities, subjected the factor resources of firms (land, labour, capital, and entrepreneurship) and intra and inter-regional transport networks to a systematic set of regression tests. He concluded that:

"A major conclusion is that the growth of production and productivity can be explained by (i) factor resources, together with (ii) accessibility properties referring to inter and intraregional transportation networks. Accessibility is specified for a wide range of interactions, including the functioning of labour markets as well as import and export flows" (Johansson, 1993, p. 131).

Ozbay et al (2003) investigated accessibility and economic development changes in 18 counties in the New Jersey / New York region between 1990 and 2000. They concluded that:

"The regression analysis results obtained in this study show that improved accessibility has a positive impact on economic development in terms of employment and earnings. Both dependent variables are observed to be highly sensitive to consecutive changes in the level of accessibility" (Ozbay et al., 2003, p. 25).

The operation, maintenance and renewals of transport systems can also contribute towards the wider economy. Oxford Economics (2021) in their report "The Economic Contribution of UK Rail" for the Railway Industry Association concluded that in 2019 the British railway industry supported 710,000 jobs, provided £800 million in exports, paid £14.1 billion in tax through activity in, and spending by, the UK rail industry, and

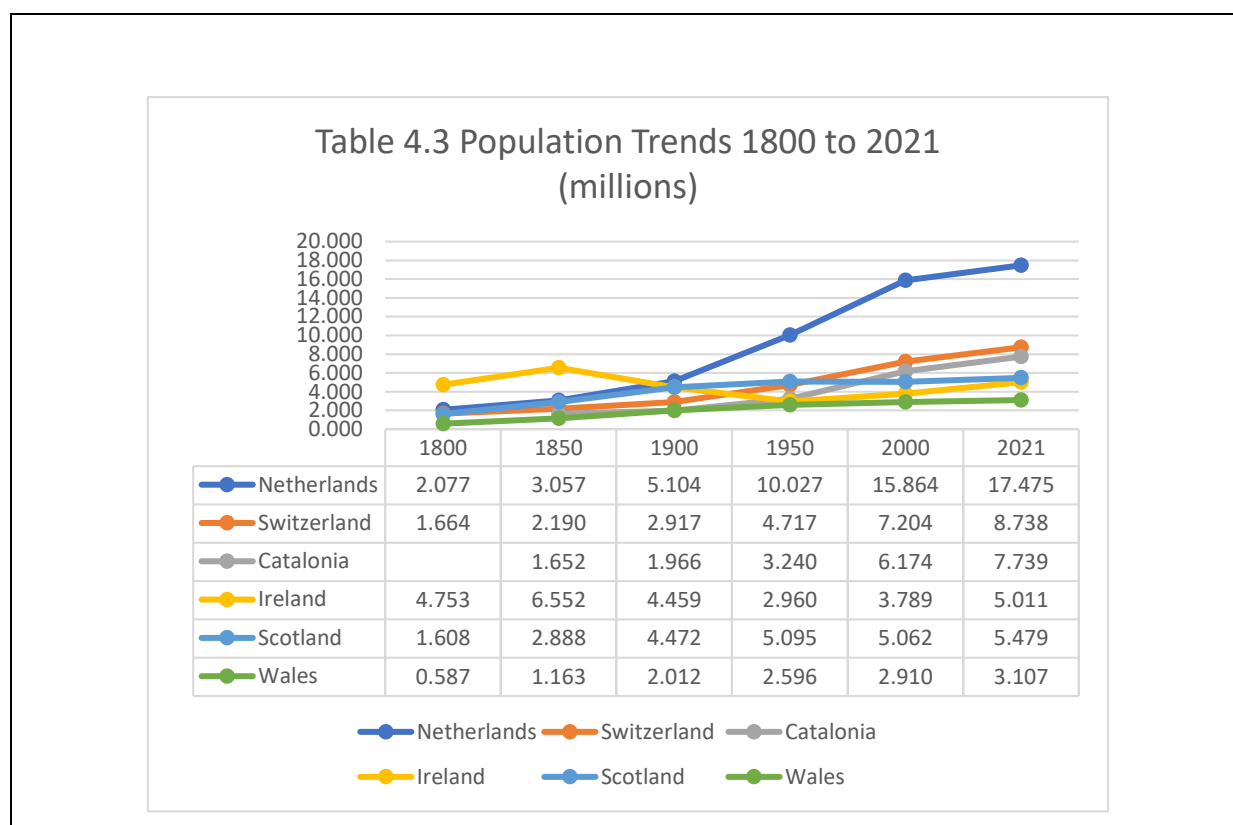
contributed over £43 billion Gross Value Added to the economy. They stated that for every £1 spent on rail, £2.50 of investment was generated elsewhere in the economy.

4.4 The Socio-Economic Comparisons

This section compares population, economic and socio-economic data from the six countries studied. The demographic and economic statistics are an indication of the performance of the six economies relative to each other, and the level of societal problems, such as poverty and deprivation, that they have. They indicate both the level of expenditure available for major items such as health care and education, and apparent 'gaps' in provision and/or uptake. Whilst it is not suggested that there is a causal link between higher levels of transport integration and state expenditure levels, there does appear to be an association between higher GDP and GVA and higher expenditure levels in the higher integration cases.

Table 4.3 below indicates that population growth in the six study countries increased substantially after 1850 as infant mortality fell, and fertility rates and industrialisation increased, and road and rail communications improved. This was notably the case with the Netherlands, with Switzerland and Catalonia following. Growth in Scotland declined slightly between 1950 and 2000 whilst Wales demonstrated steady growth of its small population. Ireland fell from having the largest population of the six in 1800 because of the Potato Famine of 1845-52, and subsequent mass emigration over the remainder of the nineteenth century and into the twentieth. No data was available for Catalonia in 1800. Davies (1993, pp. 320-321) states that the rise in the European population between 1770 and 1850 has been attributed to medical advances but a rise in fertility would seem to be a more likely cause. Zinkina et al. (2017, p. 181) point at the reduction of catastrophic mortality events such as famines, epidemics and wars, and the increase of food security, and the introduction of quarantines to contain epidemic outbreaks. They suggest that:

“In general, the ‘long nineteenth century’ (from the end of the eighteenth century to 1913) brought tremendous changes to the demographic situation in the European countries in terms of reducing not only catastrophic mortality, but also regular mortality, and increasing life expectancy.”



NL: 1800 is 1795 estimate; 1850 is the 1849 estimate. Paping (2014). "General Dutch Population Development 1400-1850: Cities and Countryside."

NL: 1900 - 2021. CBS (2022a) 'Population: key figures.'

CH: 1800 is the 1798-1837 estimate; 1850 is the 1837-1850 estimate; 1900 is the 1888-1900 estimate. BFS (2007). "History of the Population Census."

SWI: 1950-2000-BFS (2012). "Key Population Figures."

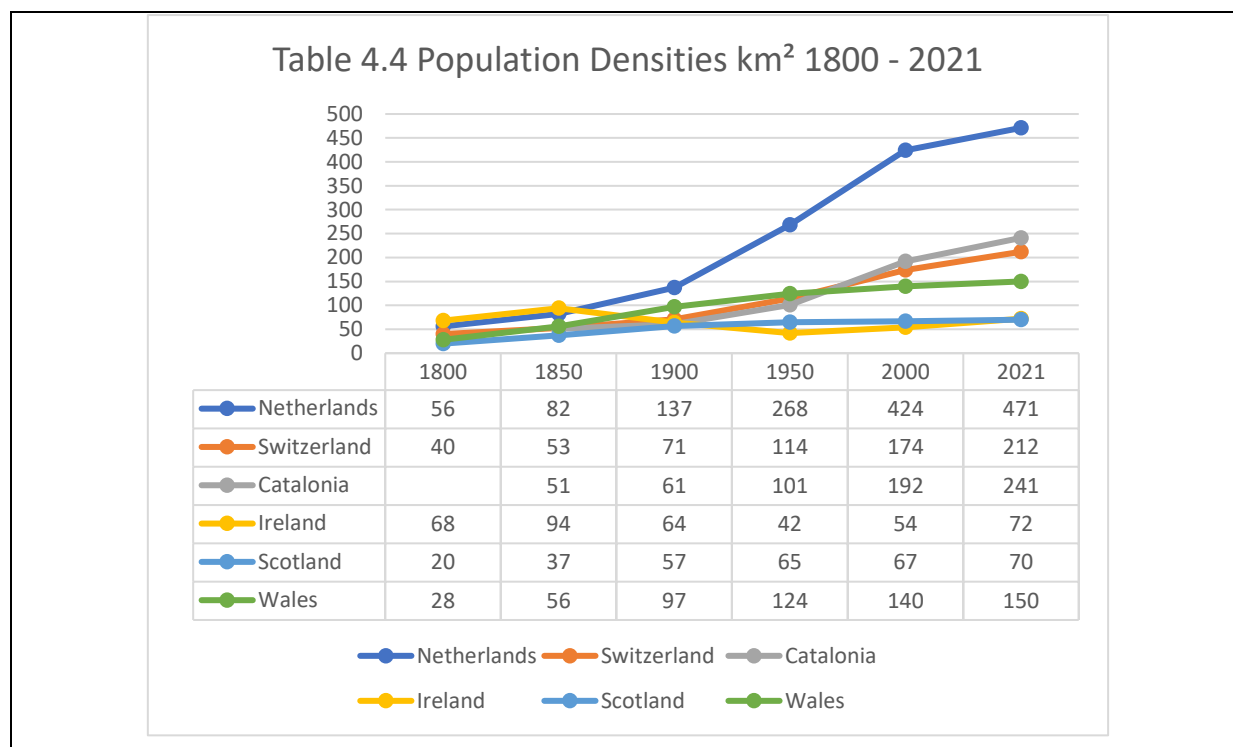
SWI: 2021. BFS (2022). "Population-What's new?"

CAT: 1850 is 1857. 1857-2021. Idescat (2022a). "Population on 1 January. Provinces."

IRL: 1800 is the 1791 estimate; 1850 is the 1851 estimate; 1900 is the 1901 estimate. O'Grada (1977). 1951-2021. "The Population of Ireland 1700-1900: A Survey." 1950-2021. CSO (2022) "Population estimates from 1926."

SCO: 1801-2001 Scotland's Census (2021). "History of Scotland's Census." 2021 National Records of Scotland (2022). "Mid-2021 Population Estimates Scotland."

WAL: 1800-2000 is 1801-2001 census. ONS (2001). "200 years of the census in Wales." 2021 Office for National Statistics, UK (2022). "Population and household estimates, Wales: Census 2021."

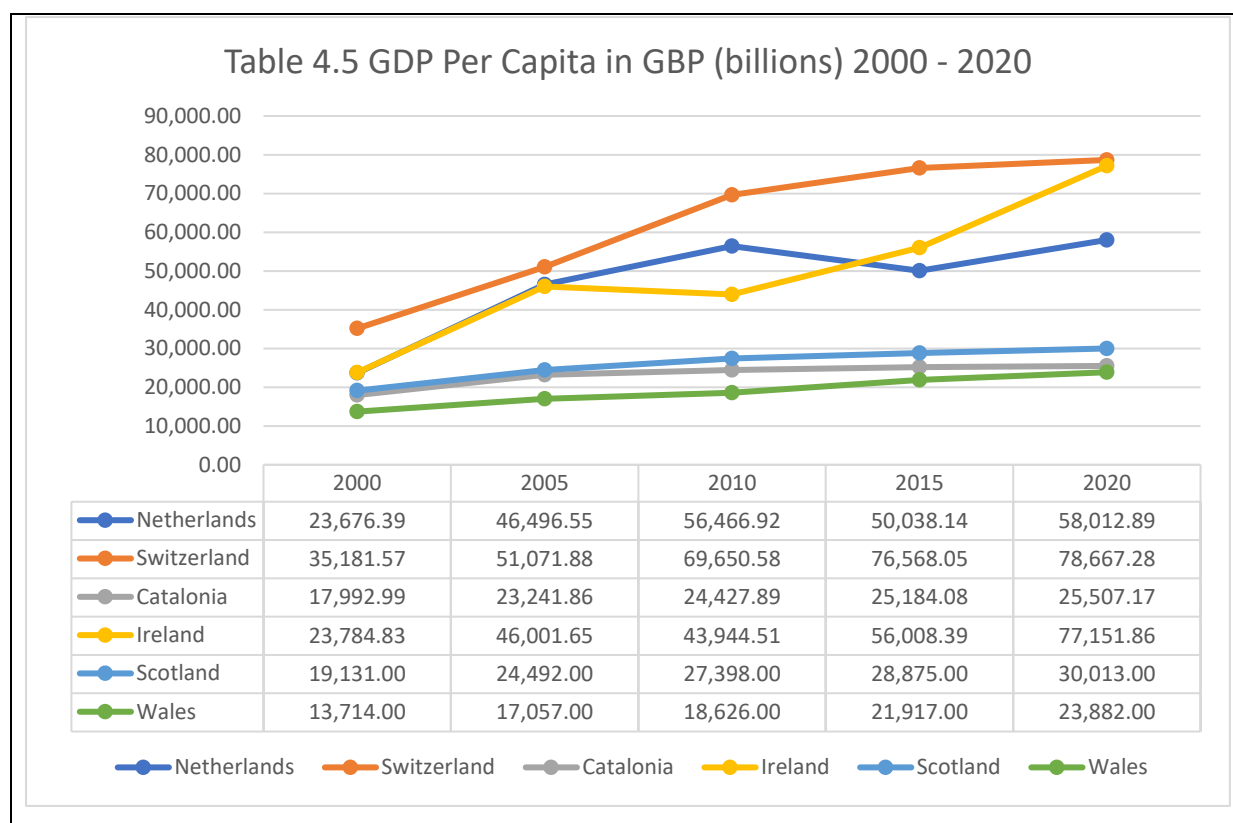


NB: Where historical official data was not available estimates have been calculated, as have those for Scotland and Wales. Because land reclamation has increased the area of the Netherlands, estimates for that country before 1950 should be treated with caution.

NL, SWI & IRL 1950-2012 United Nations (2022). "World Population Prospects."

CAT 2015-2021. Idescat (2021). "Population density: Counties and Aran, areas and provinces."

Table 4.4 reflects the rising populations of the study countries, although it should be noted that the increase in densities was far from uniform, being caused by migration from the countryside to the large cities and industrial areas as well as demographic increases. In Wales, Davies (1993, pp. 328-329) identifies this trend on previously predominantly agricultural Anglesey, in the north east, the Swansea region, and the Valleys which were all foci of industrialisation. Similar patterns can be identified in the other study countries. Although, Ireland experienced increased population densities around the towns and cities (Ó Gráda, 1995, pp. 213-14) the country had a catastrophic drop in rural population, and therefore rural densities, following the famine, as evidenced above in Table 4.3.



NB: Euro and US Dollar to Sterling conversions were made using daily spot exchange rates at 14:30 on 12th October 2022

NL, SWI, IRL: Macrotrends (2022a, b, c). "GDP - 1960-2022."

CAT: Idescat (2022b). "GDP per inhabitant."

SCO, WAL: Clark (2022) "UK GDP-Statistics and Facts."

Gross Domestic Product (GDP) is a metric that measures the extent of national wealth and the strength of an economy over time, usually in quarterly periods. It is the widely accepted expression of the economic performance of a country in comparison with others through the total value of all final goods and services produced within a country's internal economy. It varies depending on whether an economy is expanding, or in a recession. GDP differs from Gross National Product (GNP) which covers the value of all final goods and services owned by a country's residents irrespective of whether they are within a country's borders or not. GDP per capita is an indication of the living standards within a country, although it is important to note that it does not indicate the distribution of those living standards within a population.

Table 4.5 indicates that between 2000 and 2020 three of the economies Catalonia, Scotland and Wales rose modestly. Of the three in the higher range, GDP per capita was highest for Switzerland. This was followed by the open, lightly regulated and

internationalist Irish economy, with its low rates of corporate taxation. However, between 2010 and 2015 Irish GDP fell before continuing its upward trajectory. Makhoul (2021) says:

“The Irish economy is both small and globalised and as a result is more sensitive to developments around the world ... But our openness and connectedness is also a source of strength...Multinationals employ 14% of people working in the country.”

The Netherlands also experienced a dip in GDP, but between 2010 and 2015. In 2020 Dutch GDP was just above that in 2010. Wales had a per capita amount of 30.4% of the Swiss figure, 93.6% of the Catalan figure and 79.6% of the Scottish per capita GDP. These data broadly indicate an association between economies with higher levels of transport integration, and wealth, as measured by GDP.

Table 4.6 GVA (per capita) 2018			
	GVA £ billions	Population 2018	Per Capita 2018
Netherlands	624,754,064,000	17,181,084	£36.36
Switzerland	525,275,487,400	8,484,130	£61.91
Catalonia	187,211,002,000	7,488,718	£25.00
Ireland	277,615,665,800	4,830,392	£57.47
Scotland	144,898,488,680	5,436,926	£26.65
Wales	66,361,042,000	3,126,522	£21.23
Population: Eurostat (2020a).			
Netherlands, Catalonia, Ireland, Scotland, Wales GVA: Eurostat (2021a).			
Switzerland GVA (in US dollars): World Bank (2021).			
Switzerland GVA (US dollars to GB Pound): www.exchangerates.org (2019a).			
Netherlands, Catalonia, Ireland, Scotland, Wales GVA (Euros to GB Pound): www.exchangerates.org (2019b).			

In Table 4.6 the ‘Gross Value Added’ is a metric that measures productivity, the gross output of an economy, less intermediate consumption, which equals the net output or GVA. The measure also adds any subsidies that a state might grant to sectors of the economy and subtracts any taxes imposed.

Again, Switzerland demonstrated the highest rate of the six countries with Ireland second, and the Netherlands third. However, Scotland had a higher per capita GVA than Catalonia’s. Wales recorded a per capita GVA of only 34% of Switzerland, 80% of Scotland’s and 85% of Catalonia’s. Both the GDP and GVA indicated that in

comparison with the other five countries Wales was relatively poor and had a low-value economy.

Like the GDP figures these data broadly indicate an association between economies with higher levels of transport integration and wealth, as measured by GVA. The case of Ireland, a medium integration country, needs further explanation. Across the OECD average corporation tax rates are about 23% (O'Carroll, 2021). Since the 1960s the Irish Industrial Development Agency has used low corporate taxation, ranging from 0% to the current 12.5%, to attract foreign companies, and particularly American high technology firms, to provide employment. To prevent 'tax competition' between its 27 members the OECD established a rate of 15% in its Paris negotiations in 2021. Ireland resisted the change strongly but subsequently assented after gaining assurances that the OECD level was unlikely to be increased. It remains to be seen if this change will undermine Ireland's economic model and lead to the exodus of foreign high technology companies to less peripheral parts of the EU. If this happens, Ireland may become less of an outlier in international GDP and GVA rankings.

Table 4.7 Transport Expenditure (per capita) 2018			
	£	Population 2018	Per Capita 2018
Netherlands	9,800,230,000	17,181,084	£570.41
Switzerland	3,595,055,800	8,484,130	£423.74
Catalonia*	2,431,092,514	7,488,718	£324.63
Ireland	1,804,000,000	4,830,392	£373.63
Scotland	2,918,000,000	5,436,926	£536.70
Wales	1,303,000,000	3,126,522	£416.76
Population: Eurostat (2020a)			
Netherlands, Catalonia, Ireland (Euro to GB Pound): www.exchangerates.org (2019b).			
Switzerland (Swiss Franc to GB Pound): www.exchangerates.org (2019c).			
Netherlands: CBS (2020d).			
Switzerland: Federal Statistical Office (2021b).			
Catalonia: Indecat (2020a).			
Ireland: O'Halloran (2017).			
Scotland: Transport Scotland (2020a).			
Wales: Ifan, Guto, Siôn, Cian and Poole, eds., 2019b, p. 43).			

Government transport expenditure usually consists of two main areas. Firstly, revenue support payments to transport companies for socially desirable objectives such as free

or reduced fares for nominated groups like younger, older, unemployed and disabled people, or to encourage the use of public transport through fares restraint. Secondly, capital investment with expenditure on asset maintenance and renewal, and new infrastructure, signalling and control systems and rolling stock, etc. In 2018 the Netherlands had the greatest capital spend, with Switzerland second. Scotland came third, Catalonia fourth, Ireland fifth, and Wales sixth. However, capital investment tends to come in 'waves.' For example, in 2018 Swiss infrastructure spending per head was falling on completion of the 'AlpTransit' Gotthard tunnel project and with the final stages of the 'AlpTransit' Ceneri tunnel. Whilst Wales came fourth for spending per capita this was from an historically low level and most of the spend was for electrification to Cardiff, the South Wales Metro, and new road and rail rolling stock.

The data for Table 4.7 had to be collected separately from sources in each country. An attempt was made to identify comparable spending on the different transport modes, but this did not prove to be possible because governments have different ways of classifying expenditure. In addition, devolved governments may have relied on central government for elements of their transport spending which was not reflected in their totals. For example, the Welsh Government does not currently have control over Network Rail Wales & Borders infrastructure in the country, although it does make payments for ad hoc rail infrastructure improvement projects. The Catalan government does not have control over all their highway network, some of the infrastructure spending on which is made by the Spanish government. Special local considerations may also apply to the classification of infrastructure maintenance and capital investment. Some transport infrastructure in the Netherlands forms part of the flood defence system and in Switzerland the 'Alptransit' infrastructure has required high levels of capital investment through special funding 'vehicles.' Consequently, the data should be considered as being indicative.

The Netherlands had the highest per capita expenditure on transport, although as mentioned above there may be an element of flood defence spending included in this. Scotland produced the second highest level which reflects the electrification of the Central Belt rail network and a new electric train fleet. The Swiss level includes additional rail capacity and cut-offs in the Mittelland and further works associated with the 'Alptransit' project. Welsh spending came fourth, but as previously mentioned, from an historically low base, with spending on electrification of the South Wales Main Line

from London to Cardiff, expenditure on the South Wales Metro and the new Transport for Wales Rail train fleets, and improvements to the TrawsCymru bus fleet. Ireland ranked fifth. The Irish figure reflected a medium level of transport investment in the state, but also an interregnum between completion of the radial motorway network and renewed investment in the railway system. Catalan per capita expenditure came sixth. No major infrastructure construction has occurred in Catalonia since the completion of the Catalonia-Perpignan high rail speed line in 2013 and investment in the Barcelona-based Rodiales commuter network was not announced until 2020 (Catalan News, 2020).

Table 4.8 Life Expectancy at Birth 2019		
	Male	Female
Netherlands	80.5 years	83.6 years
Switzerland	81.9 years	85.6 years
Catalonia	80.6 years	86.2 years
Ireland (2016)	79.6 years	83.4 years
Scotland	77.1 years	81.1 years
Wales	78.5 years	82.3 years
Netherlands: CBS (2020b).		
Switzerland: Federal Statistics Office (2020).		
Catalonia: Idescat (2021b).		
Ireland: Central Statistics Office (2017).		
Scotland: National Records of Scotland (2020).		
Wales: Office for National Statistics (2020b).		

The following socio-economic data reflect health and education as major expenditure priorities for governments, and levels of adverse indicators which expenditure is applied to combat. Low life expectancy is an indicator of a society with higher levels of inequality, poverty and deprivation, and therefore morbidity and premature death. Rowley et al. (2021, p. 4) cite the World Health Organisation's 2005-98 Commission on Social Determinants of Health:

“The poorest people have high levels of illness and premature mortality—but poor health is not confined to those who are worse off. At all levels of income, health and illness follow a social gradient: the lower the socioeconomic position the worse the health.”

Wilkinson and Pickett provide further evidence for this proposition in Chapter 6 of their book 'The Spirit Level: Why equality is better for everyone' (2010, pp. 73-87).

The relative deprivation rates of Wales and Scotland reflected their heavy industry past, and a problematic post-industrial present. This is supported by the Welsh Index of Multiple Deprivation 2019 data showing that 23 of the 26 areas experiencing deep-rooted deprivation are in previously heavily industrialised regions in south and north east Wales (Statistics Wales, 2019, 'Lower-layer Super Output Areas (LSOAs) in Deep-Rooted Deprivation'). In Scotland the Scottish Index of Multiple Deprivation 2020 data showed 13 of the 14 areas of deep-rooted deprivation being in the previously heavily industrialised region of the western central belt (Scottish Government 2020, p. 5).

However, relative wealth can also be a problematic factor in maintaining health and prolonging life. The Greater London Authority (2015, p. 16) noted:

"Walking: Greater London Authority levels decrease significantly as the number of cars a household owns increases."

They also explained that:

"Public transport is a very important and often overlooked means of increasing physical activity levels. In London half of all walking is carried out as part of trips by public transport" (Greater London Authority, 2015, p. 17).

Consequently, the relatively high levels of public transport use in the high and medium transport integration cases may also be contributing to their higher levels of life expectancy.

As Desjardins (2004, p. 1) explains females have a greater life expectancy than males. On Table 4.8 the ranked differentials between men and women, which could be said to be indicative of male to female health inequalities, were: 1) Catalonia +5.6 years for females, 2) Scotland +4 years, 3) Ireland and Wales +3.8 years, 4) Switzerland +3.7 years, and 5) Netherlands +3.1 years. The statistics for Ireland which were the latest available were for 2016 and not 2019. It should be noted that Catalonia, Scotland and Wales which had the widest gender differentials have similar health services paid for from taxation and not through insurance.

The gender rankings by country were as follows: Netherlands: Male 3rd and Female joint 2nd; Switzerland: Male 1st / Female joint 2nd; Catalonia: Male 2nd / Female 1st; Ireland: Male 4th / Female 3rd; Scotland: Male and Female joint worst expectancy of all six countries; Wales: Male and Female joint penultimate life expectancy.

Whilst an advance in human terms longer life expectancy has mixed benefits for economies. It supports an adequate economically active workforce during working years, but it also requires the support of those who are no longer economically active. The ageing profile of industrialised economies indicates that resources are diverted away from production and that additional production is needed to replace the deficit (Daniele et al., Chapter 2).

Table 4.9 Social Protection Benefits as a Percentage of GDP 2014	
Netherlands	30.6
Switzerland	21.3
Catalonia	21.3
Ireland	21.0
Scotland	16.4
Wales	21.6
Netherlands, Switzerland, Ireland: Eurostat (2021d).	
Catalonia: Idescat (2014).	
Scotland: Clark (2020); Scottish Government (2016, p. 23)	
Wales: Clark (2021); Poole. et al. (2016, p. 19)	

The Office for National Statistics (2017) commented:

“Social protection is comprised of the various benefits provided to households, usually by public bodies, to help with their needs. Social protection benefits can either be in cash or in kind. Benefits in kind include such things as hospital stays, free school meals and home care.”

The data used in Table 4.9 is for 2014, the latest year for which all six countries had figures. The Netherlands had the highest percentage of GDP spent on social protection benefits, this was followed by Wales. Switzerland and Catalonia ranked joint third, Ireland fourth and Scotland fifth. Excepting the Netherlands, which was a high-spending outlier, and Scotland which was a low-spending outlier, expenditure was between 21% and 21.6 %. It is not known why the Scottish percentage was so comparatively low.

Social Protection Benefits, in cash or in kind, can be recycled back into the economy by allowing recipients resources to participate in the workforce, or by avoiding costs to the state, for example through ill health.

Table 4.10 People at Risk of Poverty or Social Exclusion as a Percentage of Population 2017	
Netherlands	17.0
Switzerland	17.8
Catalonia	23.8
Ireland	22.7
Scotland	19.0
Wales	24.0
Netherlands, Switzerland, Ireland: Eurostat (2018).	
Catalonia: Idescat (2020b).	
Scotland: Scottish Government (2018, p. 1).	
Wales: Welsh Government (2021c, p. 2).	

Townsend (1979, p. 38) in his work “Poverty in the United Kingdom” identified two components forming that informed the larger definition of poverty:

“people at risk of poverty, i.e. lacking sufficient financial resources to meet basic needs; or social exclusion, i.e. lacking the personal and / or community resources to play a full part in society.”

Table 4.10 contains data which was only available for all six countries for the year 2017, a break down to ‘regional; level was not obtainable at Eurostat NUTS 3 level. Consequently, national data sources had to be used for the latter. It is believed that the Catalan data is comparable to the Eurostat definition of ‘people at risk of poverty or social exclusion,’ and that Scottish and Welsh definitions of ‘poverty’ and ‘relative poverty’ are similar enough to be valid comparators.

The Netherlands and Switzerland had the lowest rate of people in this category. The Scottish recorded a fourth highest place and Ireland the third highest. Catalonia had the second highest rate, and Wales the first.

Poverty and Social Exclusion not only represents a personal and familial loss to those affected by also a societal one. For the unemployed there is a loss of contribution to the economy through goods and services not produced, and the loss of tax income.

For the ‘working poor’ there is the loss to the state in terms of the need to support people to minimum income levels.

Table 4.11 Total Health Expenditure as a Percentage of GDP 2019	
Netherlands	12.1
Switzerland	10.0
Catalonia (2017)	9.1
Ireland	6.8
Scotland	8.0
Wales (2018)	9.7
Netherlands, Catalonia, Ireland, Scotland, Wales: Elflein (2020)	
Catalonia: Dedeu (2017, p. 5)	
Scotland: Clark (2020, 1); Audit Scotland (2019, p. 4)	
Wales (2018): Clark (2021, 1); Ifan et al. (2019b, p. 40)	

The 2019 ‘total expenditure on health spending’ data in Table 4.11 had two exceptions. The latest available data for Catalonia was 2017, and for Wales 2018. The Netherlands and Switzerland have health care systems based on insurance and private provision. Catalonia, Scotland and Wales have national health services with free access at the point of access. Ireland has a hybrid system between the two. Brady and O’Donnell (2010, p. 5) commented that the ad hoc development of the service has made it difficult to categorise. ONS (2019, Figure 1) indicated that the public systems in Spain and the UK were less expensive than other models. Health care represents a service with high levels of professional and support staff, the use of sophisticated high technology, and therefore a considerable contribution to local economies. For example, the Cardiff and Vale University Health Board (UHB) reports that:

“The UHB is one of the largest NHS organisations in the UK. It employs approximately 14,500 staff and spends around £1.4 billion every year on providing health and wellbeing services to a population of around 490,000 in Cardiff and the Vale of Glamorgan” (Cardiff and Vale University Health Board 2020, p. 49).

The Netherlands had the highest percentage of spending, followed by Switzerland. Wales ranked third, a reflection of the country’s ageing population profile and relatively high levels of poverty and deprivation and long-term limiting illness as demonstrated in the Welsh Index of Multiple Deprivation (Statistics Wales, 2019b). The expenditure

percentage for Catalonia was for 2017 and came fourth. Scotland ranked fifth and Ireland had the lowest percentage of total health expenditure.

Governmental spending on health services whether they be directly provided, or through health insurance scheme is not just a deficit activity. The Sector employs large amounts of tax-paying people, 14.7 million, or 7% of the employed population in the EU in the fourth quarter of 2019 (Eurostat, 2020c). These figures are for medical professionals and do not include ancillary and support workers.

Table 4.12 Pupils Enrolled in Upper Secondary Education as a Percentage of Population 2018	
Netherlands	4.8
Switzerland	4.2
Catalonia	3.4
Ireland	5.3
Scotland	4.6
Wales	4.7
Population: Eurostat (2020a).	
Students: Eurostat (2021b).	

The two educational metrics were chosen as indicators of state investment in their populations and economies. Table 4.12 shows the percentage of secondary pupils enrolled for courses leading to school leaving examinations. In this case Ireland had the highest percentage followed by the Netherlands with. Wales was ranked third, with Scotland next. Switzerland was ranked fifth and then Catalonia sixth. The relatively low Swiss percentage is due to two thirds of pupils being recruited into the apprenticeship system (Leybold-Johnson, 2020). Regarding Catalonia the OECD (2010, p. 5) noted that:

“Challenges in tertiary education in Spain and Catalonia are partly linked to problems in the secondary education system which features high drop-out rates and poor learning outcomes.”

The importance of the secondary education sector is that it prepares pupils with the basic skills for the labour market, for employment training or for tertiary education.

Table 4.13 Students Enrolled in Tertiary Education as a Percentage of Population 2018	
Netherlands	5.2
Switzerland	3.6
Catalonia	4.9
Ireland	4.8
Scotland	5.3
Wales	3.9
Population: Eurostat (2020).	
Students: Eurostat (2021c).	

In Table 4.13 Scotland had the highest percentage of the population in tertiary education in 2018. The Netherlands was second and Catalonia third. Ireland was ranked fourth, Wales ranked fifth and Switzerland last. Again, the comments above for Table 4.12 about apprenticeship participation in Switzerland apply.

4.5 Conclusion

When comparing the data tables with the high, medium and low transport integration cases, the countries with high and medium transport integration displayed higher rates of GDP per Capita than low transport integration Scotland and Wales. Ireland had a rate next to Switzerland which related to their low rate of corporate taxation (O'Carroll, 2021), whilst Wales' rate was notably low in comparison with the other countries. There was a similar pattern for GVA per Capita. Again, Wales performed relatively badly on this measure also.

On Transport Expenditure Per Capita the Netherlands and Scotland displayed the highest rates. The Scottish rate was due to infrastructure expenditure on the Central Belt rail network by the Scottish Government. The Swiss ranked third and Wales fourth, both infrastructure investment-driven results, although Switzerland has benefited from sustained historical infrastructure investment and has a high level of transport infrastructure provision and operation, whilst Wales has a long-term investment deficit. The two countries with the lowest rates, both medium integration cases, were between infrastructure investment programmes. The revenue support element of transport expenditure can be expected to be fairly consistent over the years, except in cases of radical policy changes like the Beeching rail closures and

bus privatisation and deregulation, whilst infrastructure investment levels ebb and flow. Compared with the other five countries Wales has a poor quality and fragmented transport system which does not serve its economic development well.

The rates for Life Expectancy at Birth displayed differences between the countries. For males there was a life expectancy discrepancy of 4.8 years between males in Scotland and Switzerland, and a discrepancy of 5.1 years between females in Scotland and Catalonia. The lower life expectancy rates for Scotland and Wales reflected both poorer current socio-economic outcomes than the other countries.

The countries with high and medium transport integration had a comparable percentage of Social Protection Benefits as a Percentage of GDP as Wales. In the case of Wales the second ranking was an expression of the relatively high levels of People at Risk of Poverty or Social Exclusion in the country. The Netherlands and Switzerland, the high integration transport network countries, had the lowest percentages of people in this category. However, the Scottish percentage was also low. Wales had the highest percentage of people in this category.

The Total Health Expenditure as a Percentage of GDP was higher in the Netherlands and Switzerland, although this may be a function of the additional costs of their private insurance-based health systems. The Catalan, Scottish and Welsh public health services operate in similar ways and have similar percentages of GDP expended on them. The Irish hybrid healthcare system figure was a relatively low outlier.

The figures for Pupils Enrolled in Upper Secondary Education as a Percentage of the Population are broadly similar for the Netherlands, Switzerland, Scotland and Wales. Ireland displayed a relatively high percentage, and Catalonia a relatively low percentage. Scotland had the highest percentage of Students Enrolled in Tertiary Education as a Percentage of the Population followed by the Netherlands. Catalonia and Ireland both had a comparable percentage. Participation in Wales was next to lowest. Switzerland's lowest ranking was due to large scale recruitment into their apprenticeship system.

Table 4.14 Position of Wales in the Table Rankings		
Table 4.5	Economy: GDP	6/6
Table 4.6	Economy: GVA	6/6
Table 4.7	Economy: Transport Expenditure	4/6
Table 4.8	Demography: Life Expectancy i)	Male 5/6
Table 4.8	Demography: Life Expectancy ii)	Female 4/5*
Table 4.9	Social Protection: Social Protection Benefits	2/5*
Table 4.10	Social Protection: People at risk of Poverty or Social Exclusion	1/6
Table 4.11	Healthcare: Total health expenditure	3/6
Table 4.12	Education: Pupils Enrolled in Upper Secondary Education	3/6
Table 4.13	Education: Students Enrolled in Tertiary Education	5/6
* Contains two countries with equal rankings		

Table 4.14 broadly summarises the position of Wales in relation to the other five countries. The rankings provide only a general level of analysis and it should be emphasised that there are issues with them in that they may obscure the level of relative performance between each individual case. For this evidence reference should be made to the figures in each individual table. On the two main economic indicators Gross Domestic Product and Gross Value Added Wales ranked last out of the six countries indicating relatively weak economic performance. On the third economic indicator Transport Expenditure the fourth place was a result of historically high expenditure on the electrification of the South Wales Main Line from Cardiff Central to London Paddington, and the start of work on conversion of the Valleys Lines to the South Wales Metro. These projects should have considerable positive economic development effects for south east Wales.

Wales had the lowest rankings for males and females, except for Scotland, on the demographic indicator Life Expectancy at Birth. This was due to existing patterns of rural and urban poverty and deprivation and long-term limiting illness, a legacy of heavy industry in many areas of Wales.

The second place ranking of Wales in the 'Social Protection Benefits' was a measure of how many of the Welsh population were in sufficient material difficulty to need to

access the UK's benefits system, rather than an indication of the generosity of the system. This was reinforced by the first place of Wales out of the six in the People at Risk of Poverty or Social Exclusion category.

Wales had a third ranking of 9.7% in the Total Healthcare Expenditure as a Percentage of GDP metric. This was in comparison with the two other countries with comparable national health services, Catalonia at 9.1% and Scotland with 8.0%. For Wales this confirmed the need indicated in the social protection statistics.

Whilst the Welsh position of third out of six in the Pupils Enrolled in Upper Secondary Education category was relatively positive, the last but one ranking in Students Enrolled in Tertiary Education was not. Egan (2013) comments on the links between poverty and deprivation and low educational achievement in Wales.

The position of Wales in most of these rankings in relation to those countries in the high and medium transport integration bands is poor, providing an indication of the socio-economic disadvantage that the country experiences. The two countries in the high transport integrated cases, and to a lesser extent those in the medium integration category demonstrate better economic performance and lower levels of poverty and deprivation. Their better economic performance provides them with more resources for social, health and educational spending, and investment for economic development.

Whilst no causal link can be made there appears to be a positive associative link with the research question:

“Is there evidence that expenditure on integrated transport, promotes economic development?”

Chapter 5: Analysing the High Transport Integration Networks: The Netherlands and Switzerland

5.1 Introduction

In this Chapter, and in Chapters 6 and 7, it is argued that transport systems are initially shaped by the physical, political, mercantile, and industrial geography of the territories in which they are located, rather than by factors of social need and benefit. For example, Veenendaal (2001, pp. 26-38) explains how the state had to reluctantly intervene in the development of the Dutch railway system for the public good because that country's particular issues of riverine geography and relevant economic under-development made expansion of the network unattractive to entrepreneurial railway promoters. Railway network patterns were also dictated by internal modal politics, as companies constructed branch and cross-country lines, often with dubious commercial justification, to obstruct other companies from impinging on their territories. In the era of mass-road transport the removal of this uncommercial or duplicated capacity had deleterious social and economic consequences for the communities that lost their services, as well as bringing the value of the railway mode into question.

Road networks are of course more extensive and were not subject to same quantifiable economics as the railways since, until recently, the technical digital means to monitor, charge for, and evaluate their place in the transport system did not exist. The road networks developed from inter-settlement tracks, upgraded to paved highways, then added to as strategic roads servicing but by-passing settlements, and finally overlaid by high-speed motorway systems. The industrial and political interests that formed as a result of mass road transport, the road lobby as characterised by Hamilton and Potter (1985, pp. 50-52), had far-reaching consequences for public transport networks in the British Isles. This was not the general case on the Continent where governments seemed to be more content to maintain and modernise their rail networks, albeit with judicious pruning from time to time depending on the economic and political climate, as well as improving and expanding their road systems.

5.2 Analysis of Network Development

The choice of the five countries for comparison with Wales was governed by the maximum population country being no greater than six times that of Wales, in this case the Netherlands at 17.3 million, 5.6 times greater (p. 131, Table 4.1). In addition, the demographic, physical and political characteristics of the countries were well-documented and the transport systems involved could be described with confidence. Table 5.1 below lays out the factors involved.

Table 5.1 Network Development Factors	
Factor	Explanation
Integration Category	Levels of Network Integration (Table 2.1) derived from El-Rashdy's (2014, pp. 1-4) definition of system redundancy. Government levels from which services are delivered, extent of networks, and levels of intermodality (Newton, 2014, p. 1)
Network Description	Density of networks and the level of redundancy, i.e. the potential performance under adverse or extreme conditions. Referenced by data from documents such as the "Wales Route Utilisation Strategy" (Network Rail, 2008) and the "National Transport Strategy" (Transport Scotland, 2020, pp. 33-35)
Physical Constraints	A brief description of a country's physical constraints and the impacts on transport infrastructure
Conurbations	A brief description of the relevant conurbations. These have high population densities which require concentrations of transport infrastructure and services

The historical development of the six, together with the features of their contemporary operation such as annual passenger statistics, tonnes of freight lifted per annum, and route kilometres per 100,000 of population, was subjected to qualitative analysis to confirm that the three categories of high, medium and low integration were appropriate. The areas examined were then simplified to the factors of: i) the density of networks and public transport services, ii) the levels of network redundancy, i.e. the level to which alternative routes or additional on-line capacity was available in conditions of traffic or infrastructure disruption, as discussed by El-Rashidy in her research on road transport networks (2014, pp. 1-9), iii) physical constraints such as

waterways and mountains, and d) the major conurbations served. The resulting analysis criteria are set out in the 'networks development summary' tables at the end of each transport integration case.

5.3 Rail and Road kilometres per 100,000 of Population

Table 5.2 indicates there is considerable variability in rail and road route kilometres per hundred thousand of the population in each of the case countries. Factors include the density of networks in conurbations such as the Swiss Mittelland or the South Wales Valleys, and what level of reach networks need to connect main centres of population.

Transport networks display distinctive characteristics which are specific to the political and economic history and geography of their territory, and how they may, or may not, be adaptable to the needs of modern economies.

Table 5.2 Rail and Road km Per 100,000 of Population				
Country	Rail route km	Rail km per 100,000	Road route km	Road km per 100,000
Netherlands (NL)	3,200.0	18.5	141,361.0	817.9
Switzerland (CH)	5,342.0	62.5	73,000.0	854.3
Catalonia (CAT)	1,752.0	23.1	12,031.0	159.0
Ireland (IRL)	1,888.0	38.4	99,830.0	2,035.6
Scotland (SCO)	2,758.0	50.5	56,591.0	1,037.5
Wales Internal Rail (CYM) ¹	1,091.0	34.7	34,853.0	1,111.2
Wales W&B Rail (CYM) ²	1,350.2	43.0		
Population Eurostat NUTS 3 (2019)				
NL: Rail kms, UIC (2020); Road kms, CBS (2020)				
CH: Rail kms for 2015, Federal Statistical Office (2021c); Road kms for 2019, Swiss Federal Council (2019a)				
CAT: Rail kms, Idescat (2019a); Road kms, Idescat (2019b)				
IRL: Rail kms, UIC (2020); Road kms, McCarthy (2016)				
SCO: Rail kms, Transport Scotland (2020a); Road kms, Transport Scotland (2020a)				
CYM ¹ : Rail kms, Network Rail (2008); Road kms, Statistics Wales (2019a)				
CYM ² : Population of Wales only, i.e. not English border counties. Rail kms, Network Rail 2008 & TRACKMaps (2009)				

5.4 The Netherlands

With the dissolution of the brief union of the Netherlands and Belgium in November 1830 the Netherlands had lost its regions of industrial production, which as Mokyr (2000, pp. 508-516) observes effectively locked the rump state into its pattern of continuing relative economic decline compared with Britain, and newly independent Belgium. Significant industrialisation on the British or Belgian models did not occur until the last half of the nineteenth century. De Jong and Van Zanden (2014, p. 95) commented:

“... the period between 1845 and 1865 was characterised by a stagnation of the industrialisation process. After 1865, industrial growth was nevertheless quite rapid.”

They also observe that:

“The absence - until the 1860s and 1870s - of efficient railway connections with German and Belgian coalmines exacerbated the problem.”

Nevertheless, the Netherlands had a well-developed canal, waterway and road network, and formal water-borne and coaching public transport pre-dating the railway system. Verhoeven (2009, p. 78) noted:

“The seventeenth and eighteenth centuries witnessed pioneering work in the Dutch Republic ... An extensive network of freshly dug tow boat connections improved intercourse between cities in Holland and Flanders, and a web of newly paved roads boosted transport in Brabant.”

By the 1860s industrialisation in the Netherlands was gathering pace and needed to be serviced by means of communication of greater capacity and speed than was available by road or water. Fremdling (2000, p. 529) stated that:

“The traditional system of transportation had in any case achieved a level of transportation demand to create good preconditions for railway construction in the west of the country.”

This traditional network, together with the economic factors outlined above, resulted in a relatively late development of the Netherlands railway system compared with Britain where the first inter-city railway, the Liverpool & Manchester opened in 1830.

The first Dutch railway, the Holland Railway, opened between Amsterdam and Haarlem in 1839, and through to Rotterdam in 1847.

From 1860 the Rhenish Railway linked Amsterdam and Rotterdam via Utrecht and Arnhem to the Prussian Railways at Emmerich. In North Brabant the Antwerp-Rotterdam Railway had connected Antwerp in Belgium with Roosendaal where the line split for Breda and Moerdijk. Progress northwards to Rotterdam from Breda and Moerdijk was halted by the difficulty in bridging the Hollands Diep, part of the Rhine-Maas-Scheldt delta which separates North Brabant from South Holland. Although expanding, the network was still limited in comparison with Britain with only 335 kilometres of railway (Veenendaal 2001, p. 29). Development of the Dutch railway system was retarded by the need to frequently bridge the extensive waterways whilst maintaining water borne navigation.

Commercial interests considered the financial and engineering issues involved in the extension of the network, especially in bridging the great rivers, to be a risky proposition. Fremdling (2000, p. 531) stated that:

“The Dutch government realised that a nationwide railway network would hardly be achieved by private initiative alone.”

Consequently, the state used its powers under the ‘Spoorwegwet / Railway Law’ of 1860 (Netherlands States General, 1860) to plan and construct the strategic national railway network.

After 1918 the railways found themselves competing against the bus and road haulage industry. As the financial position of the railways deteriorated because of this competition, and the international financial crisis, it became clear that the government would have to take action and in 1937 the private companies were dissolved and replaced by a state-owned railway company ‘Nederlands Spoorwegen BV,’ usually known as NS.

Veenendaal (2001, p. 145) noted that:

“Around 1950 the government pruned the Netherlands Railways network of all unremunerative branches and regional lines, the first of the European countries to make such a move.”

This negative was counteracted by the reconstruction of the system to repair war damage and add capacity to the network. The inter-war period saw about 500 km of electrification but post-war a rolling programme was launched, in conjunction with colour light signalling, multi-tracking, flying junctions and rebuilt stations (Den Hollander, 1955, pp. 269-276). The current passenger railway system is shown below in map 6.

From 1970 onwards moves were made by the Dutch government to integrate the railways, bus and tram services through the following measures:

- the national, fixed and symmetrical rail transport timetable (1970)
- the national ticket and fare system for local and regional public transport (the 'Nationale Strippen Kaart,' 1980)
- the broad application of traffic signal pre-emption in favour of public transport
- the national public transport season ticket for all students age 18 and over (1991)
- one national telephone number for all public transport travel information (1992)

Netherlands Government: Ministry of Transport, Public Works and Water Management (2010, p.13).

The conurbations of Amsterdam and Rotterdam have metro, tram and bus systems. Den Haag has a tram network which is linked to Rotterdam by the 'RandstadRail' light rail system, and Utrecht has three light rail / tram lines.

Since 1995 some non-core rural rail services had been contracted out to private train operating companies and bus services have been tendered by the provinces. In some areas complementary road and rail services were contracted to the same company allowing operational integration. Because of the relative smallness of the Netherlands, and the density and frequency of the railways, intercity bus services are rare. However, a number operate in the north of the country, in Zuid Holland and between Utrecht to Oosterhout and Breda (Van de Velde et al, 2010, p. 4, p. 14, p. 67).

Netherlands Railway Network



Map 6: Netherlands Passenger Railways Network 2021. Nederlands Spoorwegen (2021).

A new 125 km High Speed Line South (HSL Zuid) opened in 2009 linking Amsterdam Schiphol Airport to Rotterdam and the Belgium border, with a branch to Breda. It relieved the existing and congested 'old main line' from Amsterdam to Rotterdam, created extra capacity and reduced journey times. HSL Zuid provided high speed internal services from Amsterdam to Rotterdam and Breda (Intercity Direct), and international services from Amsterdam CS, Amsterdam Schipol and Rotterdam CS to Antwerp and Brussels, Paris and London St Pancras (Railway Technology, 2021).

Another new strategic railway was the Betuweroute. Forming part of the of EU Trans-European Transport Network Rhine-Alpine corridor from Rotterdam Europoort to Emmerich, Germany, and Switzerland to Genoa. It was intended to give rail freight traffic from across Europe access to and from Europoort without the operating conflicts caused by the intense passenger operations on the NS (Railway Technology, 2020). Opened in mid-2007, like the HSL Zuid it is electrified at 25 kV ac and signalled using ERTMS2. It is a double track freight route with a capacity of 10 train pairs per hour. Although tunnels and bridges are high enough to allow the double stacking of containers on trains, as in the North American practice, the standard overhead line electrification heights currently used preclude this (Railway Technology, 2020).

A final recent 2012 strategic addition to the network was the 50 km Hanzelijn which links the new town of Lelystad on reclaimed Flevoland with Zwolle. Like HSL Zuid and the Betuweroute it is signalled using ERTMS2 (Balkenende, 2013). Built to access Flevoland, improve connectivity between Amsterdam and the north (journey times between Schiphol and Groningen fell by 15 minutes) and provide extra capacity through by-passing the congested Veluwelijn between Amersfoort and Zwolle (Balkenende, 2013).

Originally all-mode public transport tariff integration was based on the printed National Strippen Kaart / National Strip Card system, using standard zonal fare divisions across the country to calculate the distance travelled. This has now been replaced by the OV-Chipkaart / Public Transport Chipcard which is available for all Dutch public transport journeys. Public transport provision is devolved to 35 territorial authorities who work with the public transport operators. All Dutch public transport operators belong to the 'Cooperative of Public Transport Companies' which set up 'Translink' in 2001 to create, operate and develop the OV-Chipkaart system (Translink, Netherlands, 2021).

The OV Chipkaart charges for the distance, per kilometre, travelled, although there is some variation in cost as local fares are set by the relevant public transport operator (McKibbin, 2012, p. 4, paragraph 3.3). The card can be loaded via ticket machines or a website with a range of travel products. Casual users of NS services are issued by ticket machines and ticket offices with disposable chipkaarts for their journey which can end on public transport, but not begin on it. The OV-Chipkaart is activated by checking in on a gate or vehicle mounted card-reader at the start of a journey and checking out at the end. Failure to do so attracts a standard maximum fare.

Development of the Dutch road network (Map 7) has followed the international pattern of enhancement of existing roads, construction of inter-war bypasses and post-war motorways. Management, maintenance and extension of the road system is tri-partite with the municipalities controlling local networks, the provinces inter-municipality routes, and the Dutch state the national 'State Roads' network of expressways and motorways (CBS, 2020a). The expressway and motorway roads typically have two lanes for each direction and negotiate the many waterways by means of bridges and tunnels. Motorway traffic densities in the Randstad are heavy and peak-hour delays frequent. Traffic management on the network to deal with congestion is active and carried out by control centres using CCTV and dot-matrix overhead signage. Two features of the Dutch system are the use of variable speed limits and dynamic hard shoulders, which are opened / closed depending on congestion levels. These features have been adapted to UK conditions as part of the Smart Motorways initiative (RAC, 2020).

All Dutch roads, apart from the 'State Roads' have extensive separate provision for cyclists, either by on-road marked lanes or purpose-built urban and rural cycle lanes. The continuing 'Sustainable Safety' initiative (SWOV, 2018) focusses on a road safety culture change through design and organisational principles for cyclist priority, traffic calming measures and pedestrian/cyclist/vehicle shared spaces.

Visser (2009, p. 1) noted that the extensive waterways system exceeds 6,000 kilometres of which over 500 kilometres are 'main transport waterways.' These facilitate heavy freight transport from Rotterdam and Amsterdam to Belgium, Germany and Switzerland via broad waterways such as the River Waal, the Amsterdam-Rijnkanaal and the Schelde-Rijnkanaal. Another 900 kilometres are classified as 'main

waterways' carrying internal and international freight and interconnecting the provinces via rivers such as the Maas, Lek and IJssel and the internal 'sea' the IJsselmeer. In addition, because of the Netherlands' extensive river and canal system pedestrian/vehicle ferries still exist, for pedestrians these form part of the OV Chipkaart scheme.

The pattern of development in the Netherlands was distinctively Dutch and not replicated elsewhere. However, it is a strong exemplar of the demographic and physical context in which a transport network operates, and of the effects of economic and political ideology in shaping the network. The historical reliance of the Netherlands on water, and to a lesser extent on roads to transport goods has resulted in a rail network that evidences a distinct bias towards passenger transport. As previously mentioned, selective closures of railway lines have taken place. These were at a low level in comparison with Britain. The International Union of Railways (2020) reports that the Netherlands has a rail network of 3,200 km / 1,988 miles, of which about three-quarters is electrified. Three-quarters of the network is double or multiple track and one-third is single track, mainly in the north and east of the country. The concentration of international freight transport on the Rhine Delta to and from Germany has resulted in a relatively limited set of rail connections with neighbouring countries compared with Switzerland, which will be discussed next.



Map 7: Netherlands Road System 2009. 360° Com (2009).

5.5 Switzerland

With some similarity to the Dutch 'Randstad' pattern the Swiss transport network initially developed around the St Gallen-Zurich / Basel-Olten-Bern-Lausanne / Geneva urban 'crescent' in the Swiss sub-alpine 'Mittelland,' expanding much later into the trans-alpine Simplon and Gotthard corridors linking northern and southern Europe. Switzerland's role as a 'transit country' has justified and financed a density and quality of transport network that would not have been possible if the country, with a population of 8.5 million, did not lie across strategic European trade routes. As in the Netherlands the development of the railway system was initially restricted to the zone that entrepreneurs considered to offer the best commercial returns. Compared with the Dutch 'Randstad' the Mittelland's deep river valleys offered its own challenges to the builders of any transport routes.

Steinberg (1996, pp. 165-169) suggested that historically Swiss wealth was the result of steady and uninterrupted accumulation of agricultural, commercial and proto-industrial wealth over centuries of neutrality. Swiss failed to achieve the mass production status of the countries around it, particularly Germany. The factors involved in this included particularly Swiss political conditions which retarded the growth of a central government. In addition, poor internal and external transport links, the limited size of towns and cities, the mountainous terrain, and the absence of coal reserves were also major issues (Steinberg, 1996, pp. 169-170)

Büchel and Kyburz (2016, pp. 6-9) considered that before the 1848 Confederation settlement development of its railway network was 'retarded' because of the lack of a strong central government, a single currency and the existence of internal tariffs. Paradoxically, it seems that the very factors that produced the distinctive Swiss industrial economy were also the very ones that inhibited the growth of an effective, modern transport system to service it. As the loss of industry in Wallonia constrained and delayed the growth of the Dutch economy the Swiss economy remained essentially agricultural, mercantile and small-scale industrial until later than might have been expected.

Schueler (2008, p. 16) explained that, in contrast to the Netherlands, the political and economic failure of the Swiss Federal Council to implement the plan for a national railway network in the years after 1850 resulted in the cantons selling concessions to

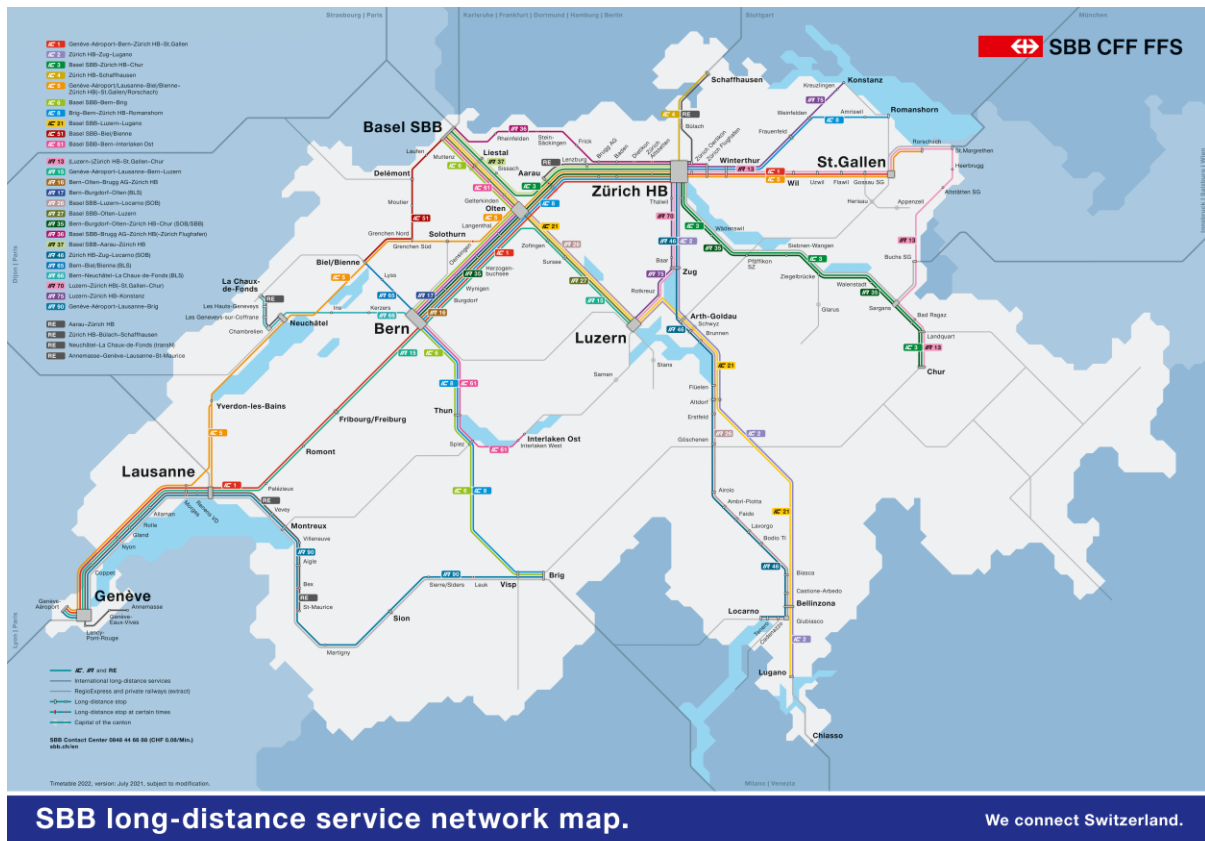
private companies, resulting in a structure that reflected private, regional and cantonal interests, rather than those of the federation.

Nevertheless, by the 1890s Switzerland had a privately financed and constructed railway system of over 3,700 kilometres linking:

“the rapidly industrialising cities of the ‘mittelland crescent’ with the rest of the country” (Büchel and Kyburz, 2018, pp. 157-158).

The technical and physical difficulties of tunnelling through the Alps were formidable. Consequently, the development of railways through and under the alps to connect the industrial conurbation of the Ruhr in Germany, the Mittelland and the northern Italian cities was relatively late. However, unlike completion of the Netherlands system, the first major Alpine crossing was privately financed, built, and operated by the Swiss Gotthardbahn Gesellschaft, which was opened in stages between 1872 and 1882,

Switzerland, with its difficult dissected plateau topography in the ‘Mittelland,’ and the challenge of tunnelling under the Alps, managed to sustain private sector finance and operation, at least on the Gotthard. The considerations were somewhat different on the later Simplon Tunnel, 1906, which involved a border with Italy and sensitivities over the security of the ‘patria’ resulted in the confederation completing the project. In both cases the development of the railway system provided substantial industrial employment in what were predominantly rural economies and allowed those economies to be incorporated within the developing industrial economies of both countries. As in the Netherlands although selective closures of railway lines have taken place these have been at a low level in comparison with Ireland, Scotland and Wales. In 2015 Switzerland had a rail network of 5,342 kms / 3,319 miles (Federal Statistical Office, 2021c), all of which is electrified. The main operators are the Swiss Federal Railways, the Bern, Lötschberg Simplon AG, and the Schweizerische Südostbahn AG. A significant part of the network, about 25%, in the Jura and the Alpine region is metre gauge, as are some suburban and rural branches in other areas. These railways are operated by regional and local companies in which the relevant cantons, local financial institutions, and sometimes the Federal Government, have a stake-holding. The predominant narrow-gauge railway is the Rhaetian Railway which operates a large network in Canton Graubünden in southeast Switzerland and down to Tirano in Italy. The current Swiss railway system is shown below on Map 8.



Map 8: SBB long-distance service network map. Swiss Federal Railways 2021

The 'Takfahrplan' of 1982 (Hughes, 2020, pp. 46-47) was a timetabling project to allow a regular interval interconnecting service of at least one fast train and one stopping train per hour throughout the country. Swiss Federal Railways marketed this change in each of the four official languages as 'Every hour, a train.' An evolution of the Takfahrplan' was 'Bahn 2000' launched in 1987. This was based on service patterns at the country's main rail hub of Zürich Hauptbahnhof and radiating out along the railway network to nine main hubs (Basel, Bern, Bienne, Chur, Lausanne, Luzern, St. Gallen, Olten and Zürich), branch lines and the regional narrow-gauge railways. Regional and local public transport at connecting hubs such as the Postbuses, local buses and trams were also coordinated with the rail service. Four intercity services, one regional and one S-Bahn lines gained half-hourly services from 1984. To achieve the enhanced timetable infrastructure had to be provided to allow journey times of less than one hour between each hub (Railway Technology, 2019). Between 2000 and 2016 this involved the construction of nine 'cut-off' lines / tunnels ranging from 1km to 14 km in length, totalling 64 km. Because of congestion on the existing main line between Olten and the federal capital Bern it was necessary to build a 52 km, 140

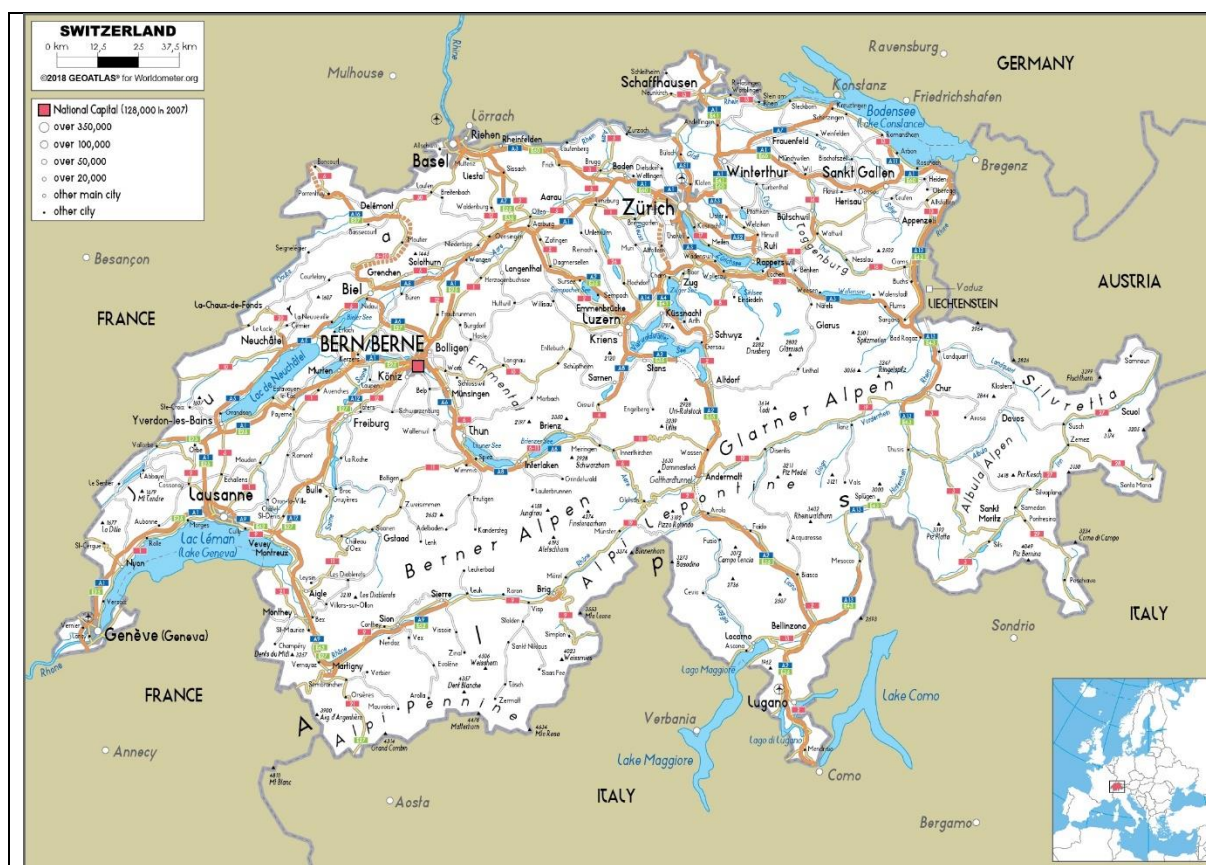
km/h capable high-speed line between Mattstetten and Rothrist signalled by ERTMS2 (Stalder, 2002). As in the Netherlands this points to the value of high-speed lines in providing extra capacity and faster journey times.

Swiss transport integration echoes the decentralised political traditions of the Confederation and is based on 22 independent regional tariff unions of transport operators, the 'Tarifverbund.' These cover most of the Mittelland, and almost all of the rest of the country, except for areas of the sparsely populated Alpine cantons.

As an exemplar of the system, the OSTWIND Tarifverbund covers the northeastern cantons of St. Gallen, Thurgau, Appenzell Ausserrhoden and Appenzell Innerrhoden. Extending 3,432 kilometres² and encompassing 196 municipalities and 746,000 residents, 100,000 of which are customers (Wittmer, 2007). Thirty road, rail and water public transport companies participate in OSTWIND including the federal and local railways. The union is divided into 81 zones with a uniform fare for each zone. Passengers have a free choice of mode to 2,500 stations and stops (Wittmer, 2007). The Abonnement Général allows unrestricted travel on any public transport mode across Switzerland for one month or a year. There is also a wide range of other intermodal products.

In addition to the infrastructure improvements required for 'Bahn2000' the Federal Government also launched the 'New Rail Link through the Alps' (NRLA) programme (Swiss Federal Railways, 2017) (Swiss Federal Office of Transport, 2020) to construct base tunnels on the Lötschberg-Simplon corridor (Herrenknecht AG, 2020), and through the Zimmerberg, Gotthard and Ceneri passes. A total of €42 billion has been provided for rail expansion. Both routes are forks of the EU's Trans-European Transport Network (TEN-T) 'Rhine-Alpine' corridor from Rotterdam to Genoa. At the time of writing the second bore of the Lötschberg Base Tunnel, although structurally complete since 2007, has yet to be fully commissioned by laying track, signalling and electrification equipment. Consequently, it is operating at reduced capacity because of financial constraints in completing it (Railway Technology, 2008). The Gotthard Base Tunnel, which at 57 km is the longest railway tunnel in the world, has been fully operational since December 2016 (Alp Transit AG, 2021). The complementary Zimmerberg I base tunnel between Zürich and Thalwil was completed in 2003 and is due to be extended to Zug as Zimmerberg II under the SFr 12.89 billion 'Step 2035'

rail expansion programme, which will facilitate increased inter-city and S-Bahn services and station improvements (Railway Gazette International, 2019). The base tunnels are intended to transfer trans-Alpine heavy road freight to rail. On the Gotthard corridor this includes structure gauge clearing on the approach rail routes for the transport of semi-trailers with a four-metre corner height, allowing through access to Northern Italian freight terminals (Swiss Federal Railways, 2017). They will also cut trans-Alpine passenger journey times and improve speeds and capacity on the Alpine routes.



Map 9: Switzerland Road System 2018. Geoatlas (2018).

The road system (Map 9) is paid for with a combination of vehicle and road taxes. For access to the dual carriageway / motorway national system an annual vignette, valid for 14 months, must be purchased for 40 CHF (Swiss Authorities Online, 2019). Like the Dutch system highway administration is tripartite. National roads comprise approximately 2.5% of the total, cantonal roads 25.4% and municipal roads 72.1%. Nearly three-quarters of voters in a federal referendum on the 23rd September 2018 on a turnout of 37.1% assented to giving the federal authorities more responsibility for coordinating and developing cycle paths throughout the state (O'Sullivan, 2018).

The Post Bus company has traditionally provided services in the rural areas beyond the railway network. It has 901 routes (some of which are contracted-out to other operators), 2,400 vehicles, 155 million passengers per annum and a network which exceeds 12,000 km. It is currently increasing its network into the cities and conurbations (Post Bus, 2020).

5.6 Conclusion

Table 5.3 below summarises the high integration network factors. The two high integration cases of the Netherlands and Switzerland both display complex road and rail networks with high levels of network redundancy which allows rapid recovery from accidents and incidents. They both operate frequent and high-capacity services. In the Netherlands networks and services are thinner in the less-populated north and east compared with the high density, high frequency services of the western Randstad. In Switzerland even the Alpine region has a relatively high level of road and rail infrastructure and services, in some cases for strategic defence reasons. Switzerland benefits from its location at the centre of the European transport network, although the need to counteract and limit environmental damage caused by road freight transport has required very substantial expenditure on the north-south trans-Alpine rail routes. In the Netherlands, the heavy freight flows from Rotterdam Europoort to Germany have required construction of the Betuwe freight-only line. The Netherlands railway system is less connected internationally than Switzerland for passenger traffic although services operate to Belgium, France, Britain, Germany, and Switzerland.

Internal public transport in both countries is of a high order with the co-ordination of long-distance, regional and local timetables irrespective of mode, which reduces journey times and increases reliability. The Dutch public transport system has the advantage of a uniform country-wide tariff system. The Swiss organise local fares through a network of 22 regional tariff unions, although some Alpine areas do not participate in these and so coverage is not total.

Table 5.3 Networks Development Summary: High Integration Networks

Country	Integration Category	Network Description	Physical Constraints	Conurbations
Netherlands	High: National and regional delivery. Extensive road and rail networks. National public transport service and tariff co-ordination	Dense rail and road network. High level of system redundancy	High: Water. The Country is a delta. 60% of land in north and west at risk of flooding. ¹ Negotiating rivers and flood defences a major factor for transport infrastructure	Randstadt conurbation of five major cities. Heavy concentration of transport facilities
Switzerland	High: National and regional delivery: Extensive road and rail networks. National public transport service co-ordination. Tariff co-ordination by regional public transport unions	Dense rail and road networks in Mittelland. High level of system redundancy	High: Mountains. The highly populated Mittelland plateau forming 30% of the country's area, has a hilly relief with numerous rivers and lakes. Alps form 60% of the area, the Jura 10%. ² Geography of the country requires extensive bridging and tunnelling for both road and rail routes	Mittelland east-west 'crescent' plateau north of Alps incorporating all major cities. Heavy concentration of transport infrastructure and services

1) Netherlands Government (2020); 2) Swiss Federal Council (2019b).

There are transport operating challenges in both countries resulting from the physical nature of the land. As has been explained, the development of the Dutch railways was inhibited by the delta and riverine nature of the country which necessitated extensive drainage works and bridging over the natural waterways and canals. Because bulk, lower value, and less time-sensitive freight predominantly used waterborne transport and traffic was heavy, railway bridges had to open at frequent intervals to facilitate the passage of shipping, with consequent delays and reduction in capacity for rail traffic. Replacement of these earlier bridges with higher structures or tunnels was financially challenging and added to the operating costs of the railways. The need to tunnel in

the Randstad also introduced additional costs and risks in the development of the motorway system in North and South Holland.

The Mittelland plateau of Switzerland is deeply dissected by rivers, lakes and broken up by low hills. This originally required considerable bridging works. As the network has been upgraded for greater capacity and speeds, the construction of new lines and tunnelling has been necessary. In the Alpine region the considerable civil engineering works necessary to climb, tunnel through, and descend the summits resulted in the relatively late construction of the Gotthard and Lötschberg routes. Their maintenance and operation was expensive and, both before and after electrification, the heavily graded nature of the routes inhibited operating performance. The two 'New Railway Link through the Alps project' (NRLA) base tunnels, with two associated tunnels, rail corridor signalling and loading gauge clearance works, will allow high-capacity rail freight, HGV road/rail 'piggy-back' transport, and high-speed passenger trains through the two corridors. The Swiss Federal Office of Transport (2020) estimated a total cost of 22.8 billion Swiss Francs at 2020 prices.

From the two high integration cases of the Netherlands and Switzerland it is now appropriate to consider the two medium integration cases of Catalonia and Ireland.

Chapter 6: Analysing the Medium Transport Integration Networks: Catalonia and Ireland

6.1 Introduction

Table 4.5, p. 140 demonstrates that of the six case countries the 2022 GDP of Ireland (£77.2 billions) ranked second, and that of Catalonia (£25.5 billions) fifth. Catalonia and Ireland have both spent centuries influenced by and then incorporated within larger states, in case of Catalonia by the Kingdom of Spain from 1714 after the War of the Spanish succession. Following 700 years of colonisation Ireland was incorporated into the (then) United Kingdom of Great Britain and Ireland in 1801. Neither country is similar in their geographic or economic structure, but both have significantly large capital cities with heavy concentrations of industry and commerce which influence the structure of the transport systems. Despite the marked disparity in GDP Catalonia is currently more advanced in terms of transport integration, although Ireland is making determined efforts to improve connectivity and integration.

6.2 Catalonia

Map 10 shows how the Catalan railway system is centred on the metropolitan area of Barcelona. It has a population of 4.9 million, 64.7% of the Catalan population (Eurostat NUTS3, 2020a). Bel (2011, p. 689) comments that the Spanish state has:

“a long-term policy that has used infrastructure for nation building, rather than as tool for creating a transportation system able to foster productivity and economic growth.”

This centralising policy emphasises links between the ‘peripheral’ centres and the political centre of the state at Madrid, be it by road building in the 18th Century or the modern high-speed AVE railways and motorways.

Consequently, the increasing productive capacity of the factory system which was in place by the 1850s needed better transport than the predominantly radial road system focussed on Madrid.



Map 10: Catalonia Passenger Railway System 2015 - Spain: Costa Brava. Ian Allan Publishing Ltd. (2015, p. 36).

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Keating (2001, p. 221) noted:

“Catalonia has long been one of the most advanced regions of Spain. A Mediterranean trading power in the Middle Ages, it experienced a second economic take-off from the 18th century when it was the first part of Spain to industrialize.”

Consequently, the increasing productive capacity of the factory system which was in place by the 1850s needed better transport than the predominantly radial road system focussed on Madrid.

The political preoccupation of the Madrid government with creating a railway system focussed on uniting the provincial capitals with Madrid which was unhelpful to Catalan business interests who wished to distribute their factory-produce as widely and rapidly as possible. Neither was it useful for those wishing to supply the newly industrial towns and cities of the Catalan coastal belt from the agricultural hinterland beyond the mountain ranges that separated these regions. Predictably, the first Catalan (and Spanish) railway opened in 1848 linked Barcelona with the small Mediterranean port of Mataró 29 kms to the north (Sundrià and Pascual, 1999, p. 131). This line produced a reliable annual return of 6.5-7.5%, compared with the erratic performance of Spanish Government bonds (Sundrià and Pascual, 1999, p. 131), and was the incentive to stimulate a series of similar schemes. The strategic pattern of the developing network was clear, to link Barcelona with additional regional centres, with Girona, Figueres and France in the north, to Lleida and Zaragoza (and on to Madrid) in the west, and with Tarragona, and Valencia in the south.

The modern Catalan railway system has three gauges. Secondary and some Barcelona suburban lines are metre gauge. Conventional mainlines are on the Iberian broad gauge of 1.668 metres, owned by the Spanish rail infrastructure Administrador de Infraestructuras Ferroviarias (ADIF). The European standard gauge of 1.435 metres is used on ADIF's high-speed line network to from Barcelona to Madrid, and from Barcelona to Girona, Figueres and Perpignan (for Paris).

The 'Mediterranean Corridor' high-speed line to the south to Valencia has been more problematical for reasons of political tension between the Catalan and Spanish governments. Prim (2017) reported that the president of the Valencian Association of Businessmen accused the Spanish government of “lack of political will” to forward the

project. Construction is now proceeding northwards from Valencia after a 20-year delay. From 2020 the 64 km rail bypass, which avoids the single track Vandellòs-Tarragona section, reduced Barcelona to Valencia journeys by 40 minutes.

The devolved Catalan Government (Generalitat de Catalunya) owns Ferrocarrils de la Generalitat de Catalunya (FGC) which operates 275 km of metro, suburban and inter-urban (Rodiales) lines in Greater Barcelona, Tarragona and Lleida together with other minor rail and some bus services, mainly on a gauge of 1,000 mm (FGC, 2021). During the 1970s two parallel RENFE (Spanish National Railways) broad gauge lines, which ran broadly north-south through central Barcelona in cuttings, were replaced by two tunnels: the Meridiana served the major interchange of Plaça de Catalunya in the east of the city centre (near the Barri Gòti, the old town) and the new main line station of Sants in the south of the centre; the Aragó served Passeig de Gràcia in the west of the centre with a branch to the former Paris services terminal station of França near the port, it also served the new Sants station. Both new tunnels were designed to support an extensive regular interval 'Rodiales de Catalunya' suburban system in the Barcelona region, good connectivity with the metro and FGC local lines, and it united the broad-gauge railway system throughout Catalonia by allowing a range of medium distance services throughout the country.

The high-speed AVE (Altoa Velocidad Española / Spanish High Speed) line from Madrid reached Barcelona Sants in February 2008. A third major tunnel, the Provença-Mallorca was then required to link with the Barcelona-Perpignan high-speed line, and the under-construction high-speed station of Barcelona Sagrera in the north of the city centre, to Sants station. The line opened in December 2013.

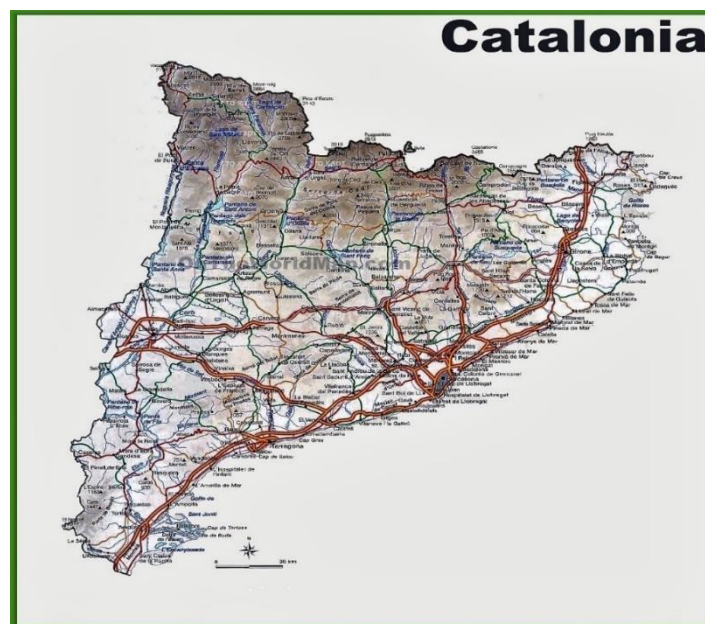
The Generalitat also operates networks of 40 high-quality inter-urban bus services, similar to the TrawsCymru network in Wales. However, these radiate to towns within each of the four metropolitan transport authorities (ATM) and do not connect between them. As mentioned above, Catalonia has four metropolitan transport authorities. They are:

- Barcelona: created March 1997, implementation of fares integration January 2001
- Girona: created August 2006, implementation of fares integration June 2008

- Lleida: created September 2005, implementation of fares integration March 2008
- Camp de Tarragona: created April 2003, implementation of fares integration October 2008 (Generalitat de Catalunya, 2013).

Travel by any mode is allowed within the specified zones but not between the integrated fares schemes of different ATMs. Like in the Netherlands credit can be loaded on to contactless smartcards which are either personalised or anonymous (ATM Camp de Tarragona, 2020).

Map 11 shows the Catalan highways system. There are two classifications for primary roads in Catalonia and Spain. The first group, autopistes in Catalan/autopistas in Castilian, are motorways. The second group are the autovia which correspond to expressways / dual carriageways / other trunk roads in the UK. Long distance strategic roads connect Catalonia with the rest of Spain, and with France via the motorway AP-7 E15. These strategic routes are managed and maintained by the Spanish state and are mainly toll roads, however Spanish law requires alternative routes to be available when tolls are charged on motorways. The Generalitat's network of motorways and trunk and all other roads broadly connects Barcelona with the three other provincial capitals, Tarragona, Lleida and Girona. The provincial capitals then connect to and within their hinterlands. There are no highways authorities below Generalitat level.



Map 11: Catalonia Road System 2022. theworldmap.com (2022).

6.3 Ireland

A system of turnpike roads spread out from the Dublin area from 1727 onwards. Although they improved the conditions of travel Broderick (2002) chronicles the same problems of corruption and inefficiency with the Irish turnpikes as with the Welsh ones. For heavy goods transport there was also coastal shipping, navigable waterways and three major canals connecting Dublin with the hinterland in the late eighteenth early nineteenth centuries.

Following Wolf Tone's unsuccessful 1798 uprising to secure independence for Ireland the 'Union with Ireland Act' (UK Parliament, 1800) and 'Act of Union (Ireland)' (Old Irish Parliament, 1800) absorbed the country into the United Kingdom. Consequently, communications between London and Dublin and Dublin and the hinterland became a political and military necessity.

Improvements in land and short sea communications between London and Dublin were the impetus for the Dublin & Kingstown Railway which opened to the port from today's Dublin Pearse station in December 1834 on the standard gauge (Ferris, 2008, p. 6). This railway is generally thought to be the first suburban railway in the world.

In a pre-emptive attempt to order the development of the Irish system the UK government appointed the 'Commissioners on a General System of Railways for Ireland.' After analysing traffic levels between the various Irish centres they reported in 1838 and recommended only four railways, Dublin to the southwest, the northwest, to Belfast via Navan and Armagh, and Limerick to Waterford. The Grand and Royal canals were thought to be sufficient communications for the west (Lloyd, 2019, p. 128).

To assist those unfamiliar with Irish geography Map 12 below shows the current main line railway network, and the main cities and towns.



Map 12: Ireland Passenger Railway System 2022. Iarnród Éireann (2022).

Future components in a Dublin to Belfast route, the Ulster Railway between Belfast and Lisburn opened in August 1839 on a gauge of 1.880 metres, followed by the Dublin & Drogheda Railway in May 1844 on a gauge of 1.600 metres (Ferris, 2008, p. 17). The Board of Trade intervened and the 'Act for Regulation the Gauge of Railways' (UK Parliament, 1846) set the Irish railway gauge at 1.600 metres, a decision which, it could be argued, has caused Irish railway companies much unnecessary inconvenience and expenditure ever since.

Whilst the gauge issue was being resolved, the Potato Famine of 1845 to 1849 occurred. The loss of between 20% to 46% of the population either through starvation, disease or emigration was socially and economically traumatic (Mokyr and Ó Gráda, 2002, p. 344) (Nusteling, 2009, p. 57, p. 76) and economic development suffered as a result. The major industrial centres were confined to Dublin, Belfast and Cork. Dublin and Cork were joined by rail by 1847 and Dublin and Belfast by 1855. Even a century later the so-called 'Beddy Report' (Irish Government, 1957) on Irish inland transport was commenting that the legacy transport facilities were too extensive vis a vis the population and its distribution.

Ferris (2008, p. 41) stated:

“... by 1880 the network had probably reached the greatest extent which conventional methods of railway promotion could have given in Ireland. This still left many areas of the country, especially in the poorer and more remote areas of the south and the west, without the benefit of access to a railway.”

Following the Famine UK government policy in Ireland turned from economic laissez faire to become more interventionist. In the absence of adequate road transport, the answer to this problem was the construction of broad-gauge light railways and sixteen narrow gauge lines through state finance and loans using the Light Railways (Ireland) Act (UK Parliament, 1889) and Railways (Ireland) Act (UK Parliament, 1896).

Excepting the Great Southern & Western and the Great Northern (Ireland) railways, which linked Ireland's three main cities, the financial state of many companies was comparatively fragile although they were operating in an environment in which there was no meaningful competition in either passenger or freight transport. The majority report of a Vice Regal commission (UK Government, 1907) into the state of the railway system had recommended public ownership, whilst the minority report had

recommended amalgamation within the private sector. A decision was delayed until after independence, partition, and the civil war of 1922-23 which wreaked considerable damage on the transport system (Ferris, 2008, p. 173).

After the new border with Northern Ireland became clear the Irish Government chose to amalgamate those railway companies operating wholly within the Free State into the Great Southern Railway (GSR) between 1924-25. Although nominally private with shareholders the GSR was de-facto a semi-state company with a public service policy (Ferris, 2008, p. 174). The new company was faced by not only by making good damage from the civil war and a maintenance backlog, but also the new phenomenon of competition from buses and lorries, road transport technology and reliability having been transformed during the First World War. In Northern Ireland the status-quo prevailed but on both sides of the new border customs checks disrupted traditional goods and passenger flows. In addition, long-established patterns of trade were disrupted; Derry / Londonderry was cut off from its hinterland in Donegal and this was the case along all the new border counties.

The 1920s and 30s were difficult times for the new state and money was short. In this financial environment duplicating transport services was not an option. The Railways (Road Motor Services) Act 1927 (Irish Parliament, 1927) allowed the GSR to run buses. This ultimately resulted in a high level of road / rail coordination rather than competition. In Northern Ireland, the opposite happened when the Northern Ireland Road Transport Board (NIRTB) was formed by Stormont in 1935. This compelled the railways, principally the Great Northern (Ireland) to hand over their buses and goods vehicles in return for shares in the NIRTB. In theory the Board was to coordinate road and rail services, in practice it became a major state-sponsored competitor to the railways.

The Irish government merged the GSR and Dublin United Transport Company into a new public company Córas Iompair Éireann (the transport company of Ireland) on 1st January 1945.

CIÉ management was aware that, in view of a massive backlog of infrastructure and rolling stock maintenance, fuel shortages, and rising wage levels all contributing to increasing operating deficits, their imperative was to close lightly used lines and replace steam with diesel traction. This was a political problem and to delay the

inevitable Sir James Milne of the British Great Western Railway was commissioned to produce the 1949 “Report into Transport in Ireland” (King, 1949). This largely supported the status-quo with the railways retained as the main element of an integrated transport system supported by ancillary passenger and freight services. It advocated the retention of loss-making branch lines as feeders to the mainlines, and the introduction of some diesel railcars to increase service levels as had been successfully done by the Great Northern (Ireland) Railway. One notable suggestion made by Milne, which was not implemented, was the transfer of the costs of maintaining the railways and canals to a central state body. King (1949, p. 58) said of the report:

“It is proposed that a Central Highways Authority be set up which would assume financial responsibility for the maintenance and renewal of the railway permanent way and works, of the canal banks, docks, bridges, etc., and of the roads.”

This proposal was similar to the contemporary organisation Trafikverket, the Swedish Transport Administration.

Milne recorded 2,400 railway route miles, 415 miles of canal and 29,000 miles of road in the Republic of Ireland (King, 1949, p. 60). This was to serve a population of 3 million, 0.5 million of whom resided in Dublin city. King notes that this infrastructure had been constructed to service a pre-Famine population of 6.5 million.

The government nationalised CIÉ in 1950 but continuing problems with the operating deficit, the problem of lightly used rural routes, and superannuated infrastructure and rolling stock prompted the Beddy Report (Irish Government, 1957). Headed by the eponymous economist its conclusions were the antitheses of the Milne report eight years earlier. It recommended the replacement of steam traction by diesel, closure of mainline stopping services, the branch lines and the remaining narrow-gauge railways. The closures were to be compensated for by greater coordination of rail and road services. The 1958 Act required CIÉ to operate within an annual payment of £1.75 million from 1959 to 1964. The 1964 Act increased the payment to £2 million per year from 1965 to 1969 (Irish Parliament, 1958 and 1964).

The necessary surgery was carried out by a new head of CIÉ, Dr C.S. Andrews, who, consequently, gained notoriety as the Irish precursor to Britain’s Dr Beeching. The

Irish Railway Record Society (2018a, p. 3) reported that by 1967 route mileage had fallen from 2,149 miles of route in 1959 to 1,334 miles. What remained was a network facilitating passenger and freight movements between Dublin and the major provincial centres, and commuter services in Dublin and Cork. Even so, throughout the 1970s the deficit continued to rise, reaching IR£39.8 million by 1979 (Irish Railway Record Society, 2018a, p. 5). The first of two reports by the management consultants McKinsey 'Defining the role of public transport in a changing environment' (Irish Government, 1971) concluded that the costs to the state over 25 years of closing-down the rail system were about the same as retaining it. If retention was decided, then investment would be needed to ensure operational efficiency.

A start on re-investment was made in 1972 when a fleet of seventy-two modern air-conditioned coaches was ordered from British Rail Engineering (BREL). In 1975 manually operated signalling on part of the Dublin to Cork line and branches was replaced with Centralised Traffic Control, operated from a signalling centre at Dublin Connolly station; this was the first part of a scheme to cover the entire network. A second report 'The transport challenge: the opportunity in the 1980s: a report for the Minister of Transport' (Irish Government, 1980) was doubtful about the prospects for increasing patronage on the railway network and recommended re-structuring of CIÉ to ensure clarity in the policy, operational and commercial roles of the different businesses which covered buses, canals, hotels as well as the railways.

Apart from the above interventions, investment continued to be sparse which potentially compromised safety. This situation culminated in the Buttevant accident of August 1980. Practices, which were non-compliant with the operating rule book, resulted in a Dublin to Cork express travelling at 113 km/h being diverted into a temporary engineering siding. Older wooden framed coaches were destroyed, and eighteen people travelling in them died. Newer metal framed coaches survived relatively undamaged and no passengers travelling in these were killed (Ferris, 2008, p. 213). A subsequent rear-end collision at Cherryville Junction, also on the Dublin to Cork line, in August 1983 repeated this pattern with seven fatalities. The response was to order over one hundred coaches with air conditioning and power doors to British Rail's Mark 3 design to allow the withdrawal of timber-framed rolling stock (Ferris, 2008, p. 213).

One positive development was the opening of DART, the Dublin Area Rapid Transit, in July 1984. This provided a frequent service of electric trains north-south across the city centre from Howth to Dublin Connolly, Dublin Pearse, Dún Laoghaire and Bray. Because of its success the service has since been expanded to Malahide in the north and to Greystones in the south. During the summer of 2020 the Government announced the DART Plus programme (National Transport Authority, 2020) which would extend the service north to Drogheda on the Belfast main line, northwest to M3 Parkway and Maynooth on the Sligo main line, southwest to Hazelhatch & Cellbridge on the Cork main line, and into to Dublin Docklands station to the northeast of the city centre. The programme involves considerable infrastructure and signalling works to enable the high-frequency service to interoperate with existing and additional inter-city and outer suburban 'Commuter' services.

As previously mentioned the 1980 McKinsey report 'The transport challenge: the opportunity in the 1980s: a report for the Minister of Transport' (Irish Government, 1980) 'recommended establishing CIÉ as a holding company with three subsidiaries. This was implemented in 1987 with Bus Éireann for long-distance, provincial city and rural bus services, Dublin Bus / Bus Átha Cliath and Iarnród Éireann / Irish Rail through the Transport (Re-organisation of Córas Iompair Éireann) Act 1986 (Irish Parliament, 1986). With the improvement of the Irish economy governmental attitudes to transport began to change from regarding services as a deficit activity to be contained, to how networks could be enhanced and developed as enablers of economic development. Ireland's 1973 membership of the then EEC was certainly a driver in this as funding became available. Programmes such as the Operational Programme on Peripherality of 1989 to 1993 and the Structural and Cohesion funds of 1994 to 1999 contributed IR£311 million to rail investment, and IR£623 million for road developments (IRRS, 2018b, p. 2). To manage these funding streams two bodies were created, the National Roads Authority in December 1993 and the Railway Procurement Agency in December 2001. These were significant because the two agencies were tasked with enhancing and expanding transport networks rather than trying to restrain deficits through route and service cuts as had been the case in the pre-World War 2 period. The two agencies were merged into Transport Infrastructure Ireland in August 2015 in a move to allow comparability between modal investment plans. The €34.4 billion Transport 21 infrastructure plan announced by the Government in November 2005

would have substantially increased the public transport and road networks over a ten-year period (Cullen, 2005). Elements of the plan were subsumed within the “National Recovery Plan 2011-2104” in 2010 following the collapse of the Irish banking system after the 2008 international financial crisis (Rail Users Ireland, 2010).

A further body *Údarás Náisiúnta Iompair* / National Transport Authority (NTA) was established in December 2009. It markets its public-facing activities under the brand name Transport for Ireland. Its original primary function was to strategically plan, secure the provision of public transport infrastructure (including active travel and cycling facilities) and develop the effective management of traffic and transport demand in the Greater Dublin Area. The NTA speedily developed and introduced the multi-modal public transport Leap Card in 2011. This is a similar touch in, touch out card as used by the Netherlands and some British conurbations. They can be charged with a range of ticketing products as well as being used for ordinary single fares which have a daily maximum fare cap. The Leap Card has since spread across the state as the NTA’s responsibilities have spread. In Dublin and Cork the card is available for suburban rail and bus services within a large city zone. It is also available on specified bus services in six other towns and cities. McCarthaigh (2019) reports that the NTA has launched a consultation with potential market suppliers to transition to an account-based ticketing system (ABT) and a location-based technology enhancement that would allow charging on ‘urban bus services’ to be achieved by passengers carrying a “charging-enabled item” to pay by simply boarding a vehicle at the start of a journey and disembarking from it at their destination.

The NTA’s national brief also includes developing public transport as a single brand, providing fares and public transport information, procuring services by means of public transport services contracts and licensing those bus services that are not covered by public services contracts. The Authority manages the Rural Transport Programme which provides 63 scheduled and 1,350 door to door on-demand rural community transport routes through a network of fifteen offices, and in 2018 2 million passenger journeys were made of which 1 million were made by concessionary travel passengers (National Transport Authority, 2019). NTA also provides bus infrastructure, including bus/rail interchanges such as that at Sligo, and the planned Galway City interchange. Other responsibilities of the NTA include the regulatory framework for taxis, hackneys, limousines and their drivers, preparing submissions to statutory land use plans,

regulating vehicle clamping operators, and various enforcement and data collecting duties under EU laws, including enforcing EU passenger rights.

Dublin has an expanding two-line 43 km standard gauge light rail system marketed as Luas, Irish for speed, which operates on street, and on its own segregated routes (Luas, 2021). The contracted operator is Transdev which operates the fleet of Alstom Citadis trams. Opened in 2004, and as further extended in 2017, the system originated from the final report of the Dublin Transportation Office “A Platform for Change” (2001), a predecessor of the NTA. The development and the contracting out of operation of the system was delegated to the former Railway Procurement Agency, now Transport Infrastructure Ireland.

In the north the Stormont Government nationalised Northern Ireland transport companies as the Ulster Transport Authority on 1st April 1948. The trend of operating losses which the NIRTB had experienced pre-war continued, Stormont politicians attributed this largely to the railways (Ferris, 2008, pp. 151-152).

By 1955 the policy was to close all cross-border lines except for the Dublin-Belfast main line, this meant that the continuation of the remainder of these routes in what was now the Republic of Ireland (since 1949) was impossible and closure by CIÉ followed depriving large areas on either side of the border of rail services. The Benson Report of 1963 (Irish Railway Record Society, 2018c) predicted a bleak outlook for the surviving railways in Northern Ireland but did advocate retaining the Belfast Central Railway and the lines from Belfast to Larne Harbour, Portadown (for the border and Dublin) and Bangor. Benson also advocated splitting the UTA's road and rail businesses into mode-based companies.

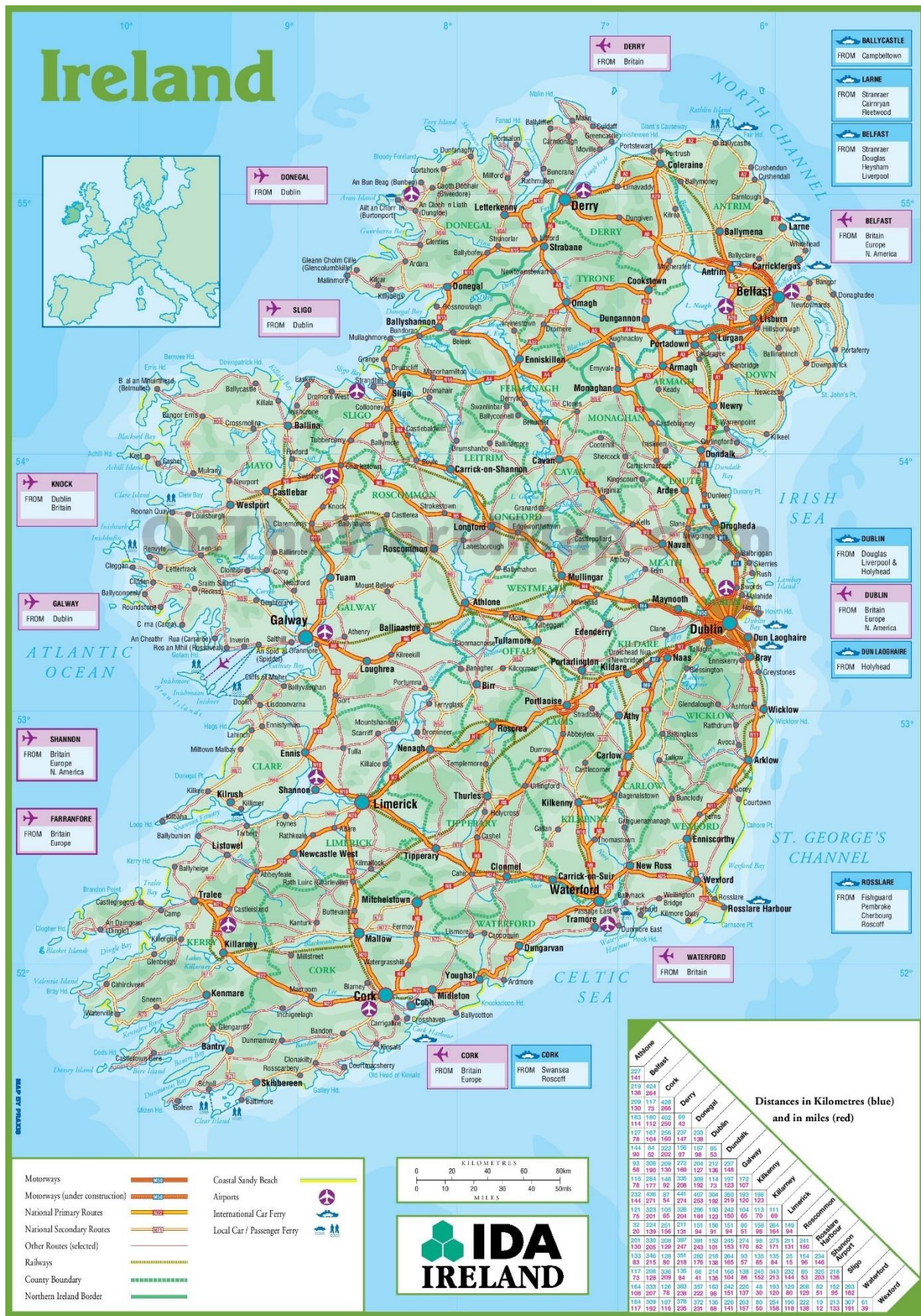
Northern Ireland Railways was formed in 1968 operating the rump network of five lines. Since 1995 a more constructive form of road/rail integration has been practised between the companies in the Northern Ireland Transport Holding Company's (NITHC) operating organisation Translink, which includes Northern Ireland Railways, Metro (Belfast city buses) and Ulsterbus.

The railways had reached near extinction through a lack of investment and poor connectivity in Belfast. However, the Northern Ireland Railways system had its fragmented termini in Belfast reconnected between 1994-95 to the new Belfast Central and rebuilt Belfast Great Victoria Street stations. The direct route from Belfast to Derry

/ Londonderry was restored saving twenty minutes on journeys and a new rolling stock fleet was introduced during 2004-05. NITHC's Annual Report and Accounts (2019, pp. 11-12) reported 'significant track works completed' on the Derry / Londonderry line, which was in poor condition, and on the Belfast-Portadown-Dublin line. Passenger journeys increased from 14.2 million in 2017 to 15 million in 2018 to 15.8 million in 2019. To promote modal integration bus / rail interchanges were constructed at Belfast Great Victoria Street, Coleraine and at Derry / Londonderry.

Map 13 clearly shows the developing Irish motorway system. As in most other countries, the Irish road network developed haphazardly to service local markets, ports, and to secure military objectives. From the mid-nineteenth century until after the First World War the railways were the main 'common carriers' of passengers and freight and consequently the demands of society on the road network were less than in the post-first world war era. Road vehicle technology advanced considerably during the conflict and ex-military vehicles became readily available for use as freight vehicles and buses. At the time of partition on the 3rd May 1921 the strategic highways structure linked all the major centres without reference to the new border, subsequently the two new jurisdictions had to develop their own networks.

In the new Free State finance for highways was limited and standards, whilst adequate, were constrained. Since traffic densities were comparatively low outside Dublin this was not problematic until economic development reached European levels in the 1980s. Roads were classified as national primary, regional and local/third class. From 1989 highway development principally involved the construction of a national radial motorway system linking Dublin with the border at Dundalk for Belfast (via the Northern Ireland A1), Waterford, Cork, Limerick and Galway, together with the M50 Dublin horseshoe-shaped orbital motorway. Finance was through the National Development Plans (NDP) with a mixture of state, public-private partnership (PPP), and EU funding. The NDP mechanism was replaced from January 2012 by the Capital Investment Plan. PPP stretches of the motorway system are tolled. To complement the radial network a 563 km transverse motorway the Atlantic Corridor is in course of construction (Irish Examiner, 2008). This is planned as an enabler of enhanced regional connectivity and economic development under the Project Ireland 2040 initiative in the corridor from Letterkenny (for Derry / Londonderry) to Sligo, Galway, Limerick, Cork and Waterford (McDonald, 2007).



Map 13: Ireland Road System 2021. Industrial Development Agency Ireland (2021).

The Northern Ireland road system uses the UK classification system of Motorway, A, B and C roads. The network is denser in the eastern counties of Antrim, Down and Armagh. The M1 motorway linking Belfast, Lisburn and Dungannon opened in stages between 1962 and 1968. South of Lisburn a junction with the A1 dual carriageway links with the Irish Republic's M1 at the border near Dundalk to Dublin. Beyond Dungannon the A4 links to Enniskillen and via the A5 to Omagh and Strabane. The M2 links Belfast with Antrim, a disconnected section bypassing Ballymena on the A26 which links to Coleraine. Also, from Antrim the M22 spur and A6 link to Derry / Londonderry. A combination of short urban motorways and 'A' roads connect the M1 and M2 in Belfast to form a reversed 'C' configuration to the north and south of Lough Neagh.

6.4 Conclusion

The two middle integration cases of Catalonia and Ireland differ in the characteristics of their transport systems as indicated by Table 6.1 below. The Catalan system initially developed on its own to facilitate industrial connectivity between the region and the capital city Barcelona. Connections to the greater Spanish system and Madrid came slightly later through a centrally planned strategy. Both the Catalan road and rail networks are dominated by the physical configuration of the country imposed by the Pyrenees Mountains which limits the main urban settlements into the coastal zone, the central depression and Ebro delta. Connections are northwards to the French border, southwards towards Valencia and westwards towards Madrid. Both networks are highly developed, the railways having a high level of electrification, connectivity and services through the rail tunnels built under Barcelona in the 1970s. The highways system, particularly around Barcelona, is a complex system of urban highways and long-distance motorways. Both systems display a medium level of redundancy, although the railways are hampered by some local railways being metre gauge, medium and long distance conventional lines being the Iberian broad gauge of 1668 mm, and the new high-speed lines to Madrid and France standard gauge.

Ireland's much reduced railway system, although beginning to expand again, is focussed on inter-city movements to and from Dublin and the provincial cities, and the Dublin commuter market. Inter-city services are still comparatively sparse but are

becoming more frequent and a major programme is in progress to upgrade and expand the Dublin Area Rapid Transport (DART) system. The railway in Northern Ireland is focussed on some commuter corridors in the Belfast region and two longer distance corridors to Derry / Londonderry and Dublin. Due to extensive closures in the 1960s neither Irish railway system has much redundancy in the event of incidents. The Irish north and south road systems are both extensive with strategic motorways. Like Catalonia they have a medium level of resilience having a reasonable choice of alternative routes.

Table 6.1 Networks Development Summary: Medium Integration Networks				
Country	Integration Category	Network Description	Physical Constraints	Conurbations
Catalonia	Medium: Spain, Catalonia, and regional delivery. Medium level of networks. Public transport service and tariff co-ordination in main cities only	Medium density road and rail networks. The rail system is fragmented by use of three different gauges. Roads: medium level of redundancy	High: Mountains. Transport corridors constrained by the diverse topography dominated by the Pyrenees which concentrates routes on the coastal strip, Central Depression, and the Ebro delta	Major conurbation centred on Barcelona and coastal strip. Concentration of transport infrastructure and services
Ireland	Medium: National and regional delivery: Medium level of road and rail networks, service and tariff co-ordination concentrated in the Greater Dublin region. Service and tariff co-ordination is now extending to other cities	Low density rail system with little redundancy and medium density road system with medium level of redundancy	Low: Undulating central plain surrounded by coastal highlands. Cities of Galway, Limerick and Waterford are on the periphery of the plain, Cork, Belfast, and Derry are in highland areas requiring heavier infrastructure works to access them.	Major conurbation centred on Dublin and coastal strip. Concentration of transport infrastructure and services

The Catalan networks operate in a mountainous and coastal environment with concomitant risks and expense. The Irish networks operate in a relatively benign environment although with Ireland's high rain fall flooding has historically been a problem for both road and rail.

Much of Catalonia's rail freight is maritime traffic originating in the ports of Barcelona, from which eight destinations are served, and Tarragona. In Ireland rail freight is currently limited although the ports of Dublin, Ballina and Waterford are rail connected.

Regional public transport in Barcelona is comprehensive with a dense and frequent network of bus, metro, regional and suburban (Rodalies de Catalunya) rail services. Timetable co-ordination is poor in rural areas and tends to focus on the needs of local markets. Tariff and service integration is limited to the four metropolitan transport authorities. In Ireland, the Dublin region has the benefit of a frequent integrated bus, DART and tram network using the Leap travelcard. Currently service and tariff integration outside Dublin is limited.

The Barcelona region experienced high levels of unplanned growth during the 1960s and 1970s and a regional authority has been formed to produce a more orderly approach to planning and transport issues. The Dublin region has also experienced considerable growth and the Eastern and Midland Regional Assembly has been established to manage this.

The next chapter looks at how UK state policy has affected the transport networks of Scotland and Wales, and at their networks as examples of low integration cases. The chapter concludes with a comparison of the six networks, and the conclusions that were drawn from the study of them.

Chapter 7: Analysing the Low Transport integration Networks: Scotland and Wales

7.1 Introduction:

This Chapter is tripartite. Part 1 discusses the effects on Scotland and Wales of the massive disinvestment in railway infrastructure and services that took place in Britain in the 1960s. This policy was a deviation from the European norm, with the exception of the cases of the Republic of Ireland and Northern Ireland which has been detailed in the previous chapter, and has contributed to the low transport integration status of Scotland and Wales. Part 2 is an analysis of the two networks on the lines of those for the High and Medium networks in Chapters 5 and 6. Part 3 summarises the evidence of the six studies in relation to the research question.

Part 1 The Effects of UK State Railway Policy on Network Development

7.2 Scotland and Wales: The Effects of UK State Railway Policy on Network Development

Since, until the early twenty-first century, Wales and Scotland had only a measure of administrative devolution to differentiate them from England, it is appropriate to summarise those changes of policy by the UK state which impacted on the development of both countries transport systems during the twentieth century. After the Second World War twentieth century European states were committed to the development of their railway systems, making only incremental cuts to seriously economically underperforming lines, a policy also followed in Great Britain between the world wars. In much of Europe modernisation, and often electrification, of the railways was a necessary factor in the post-Second World War reconstruction of state economies, and politically unproblematic.

Only in Britain and Ireland were programmes of radical 'disinvestment' undertaken. White (1986, p. 18) says that the greatest route extent of British railways was in 1914 at 37,723 km. Department for Transport statistics (Department of Transport, 2021c)

show that by 2021 this had fallen to 15,935 km (or 42.2%) of the maximum. These cuts had latterly taken place with the background of the Buchanan Report (1963) 'Traffic in Towns' and an unprecedented motorway and road building programme. Gunn (2011) discusses these factors in his paper 'The Buchanan Report, Environment and the Problem of Traffic in 1960s Britain.' This section looks at the processes involved.

Although railway company mergers had taken place on a large scale during the nineteenth century there were still about 120 companies prior to the railway grouping of 1923. In Scotland there were 5 'major strategic companies' that defined the shape of the network, in Wales there were three (two of which were English companies), and in England nine companies. During the First World War and afterwards, 1914-23, the railways were controlled by the UK government's Railway Executive Committee. This period demonstrated that competition between the small companies was wasteful and that unified administrative, operating and engineering standards would achieve economies of scale, solve the problem of under-capitalisation for investment, and make the railways better equipped to compete with the emerging problem of competition from road transport. After discussions in the UK Cabinet these factors were set out in a white paper, together with proposals for the grouping, 'the Geddes proposals' (UK Government, 1920). The 'Railways Act 1921' grouped the railways of Great Britain into four large companies with effect from 1st January 1923. These were the London Midland & Scottish Railway, the London & North Eastern Railway, the Great Western Railway and the Southern Railway. Nevertheless, the London Underground Group railways and about 50 minor railways remained independent (UK Parliament, 1921, pp. 69-72).

The railways continued to struggle against road competition in the 1920 and 30s and the 'big four,' as the new companies were known, engaged in a programme of pruning unremunerative lines and services. White (1986, p. 19) suggested that between 1923 and 1939 2,100 km of route was closed.

During the Second World War the railways were once again placed under the control of the Railway Executive Committee from 1st September 1939 until nationalisation in 1948. They emerged from the war with infrastructure damage from air raids, a serious issue between 1939 and 1945, and depleted motive power and rolling stock. Although

the extent and scale of damage was much less than on some continental railways there was an urgent need for rehabilitation and modernisation.

A commitment by the Labour government of 1945–51 to public ownership, resulted in the Transport Act 1947 (UK Parliament, 1947) and the creation of the British Transport Commission (BTC) on 1st January 1948 which took over the railways and their subsidiary businesses (such as bus operations, short-sea shipping, hotels and road haulage), London Transport, some non-municipal bus companies and private road hauliers, the canals and railway ports. The Act in part 1, 3.- (1) (UK Parliament, 1947), laid on the BTC a general duty to:

“provide, or secure or promote the provision of, an efficient, adequate, economical and properly integrated system of public inland transport and port facilities within Great Britain for passengers and goods.”

The BTC exercised its railway responsibilities through the Railways Executive which traded as British Railways. Whilst in the early 1950's the financial situation of British Railways was stable, increasing competition from other modes of transport as the decade progressed lead to a deterioration. In response to this between 1948 and 1962 the BTC closed 5,309 km of route (White, 1986, p. 67). Once the process of nationalisation and reorganisation had settled, the BTC published a policy document on the 'Modernisation and Re-equipment of British Railways' commonly known as the 1955 Modernisation Plan (British Transport Commission, 1954). The plan involved spending £1,200 million, £31.7 billion at 2019 prices (Bank of England, 2020), over fifteen years on the rehabilitation and re-equipping of the railway system across Britain. Most commentators consider it have been a failure. Buttle (2008, p. 2) considered that:

“...the slow progress of modernisation was less the consequence of government intervention, or of general economic conditions, than of deficiencies in railway management – division of authority, weak strategic planning, lack of financial control, ineffective implementation polices...”

The plan proposed to modernise the system on a like for like 1955 benchmark basis, regardless that it was already clear that the competitive pressures from the car, coach, and for the more affluent the aircraft, were ever increasing. The interventions proposed

could be said to be tactical rather than strategic with no higher-level view than the British Transport Commission's stated hope in the Modernisation Plan report that investment in passenger services would:

“... provide, fast, clean, regular and frequent services ... in all the great urban areas: inter-city, main-line trains will be accelerated and made more punctual; services on other routes will be made reasonably economic (sic), or be transferred to road.” (British Transport Commission, 1954, p. 7)

The end of the above paragraph foreshadows one of the policies of the Beeching Report “Reshaping of British Railways” (British Railways Board, 1963) of eight years later which can be said to be a direct consequence of the failure of the Modernisation Plan. Similar aspirations, which were never fulfilled, were expressed by the BTC that the wagonload freight business would be rejuvenated by the system of marshalling yards and the fitting of continuous braking on wagons (British Transport Commission, 1954, p. 23), even though it was clear from statistics at the time that these flows were being lost to road transport. The poor procurement of the Modernisation Plan not only included marshalling yards for dying traffic flows, but also about low powered locomotive types for trip working and shunting those diminishing flows. The hurried procurement of large numbers of diesel locomotives (1,200 shunters and 2,500 main line) and multiple units (2,500) involved the purchase of classes that transpired to have poor performance, or were operationally incompatible with other classes, or were surplus to requirements due to structural changes in the network (Railways Archive, 2007). The Railways Archive commentary on the Modernisation Plan noted:

“The diesel transition was poorly procured, with some types scrapped only 10 years after their introduction.”

With the BTC experiencing mounting losses in the late 1950s, mainly due to the financial situation of the railways resulting from the failure of the Modernisation Plan, the Macmillan government was particularly exercised by the escalating financial deficit. Inevitably, they embarked on a strategy to contain it. However, at the same time the UK Government, under its transport minister Ernest Marples, previous owner of the road-building company Marples Ridgeway, was making substantial investment in a significant road-building programme, including the M1 motorway (Jones, 2011, pp. 20-21)

The Transport Act 1962 (UK Parliament, 1962) broke up the British Transport Commission, writing off the debts incurred by the Modernisation Plan or transferring them to HM Treasury. The railways were placed under the management of a new British Railways Board with Dr Richard Beeching as its Chairman. The Act placed on the Board an obligation to conduct its business so that its operating profits: were “not less than sufficient” for covering running costs (UK Parliament, 1962, Section 22). The Act also made railway closures easier to carry out. This section of the Act (Section 56 (7)) was clearly drafted with the intention of achieving the rural and duplicate line closures of 8,000 km of railway through the Beeching Report, ‘The reshaping of British Railways’ (British Railways Board, 1963). The Report set out a severely deteriorating financial situation (British Railways Board, 1963, p. 3):

“The railways emerged from the war at a fairly high level of activity, but in a poor physical state. They were able to pay their way because road transport facilities were still limited, and they continued to do so until 1952. From then onwards, however, the surplus on operating account declined progressively. After 1953 it became too small to meet capital charges, after 1955 it disappeared, and by 1960 the annual loss on operating account had risen to £67.7 m. This rose further to £86.9 m. in 1961.”

Transport plays an important role in shaping the spatial economy and is typically targeted at places that are already growing. The laissez-faire development of the British railway system had resulted in an over-supply of duplicate lines, and lines built for the defence of railway company territories. Between 1950 and 1980 42% of route (nearly 13,000km of 31,000km) and nearly 60% of stations (3,700 of 6,400) were closed in an attempt to stem the deficit.

However, the socio-economic effects of ‘Beeching’ had not been systematically assessed before the study ‘The Spatial Impacts of a Massive Rail Disinvestment Program: The Beeching Axe’ (Gibbons et al., 2018). The study used census data by decade from 1901-2001, linked to historical GIS representations of the GB rail network. It asked if transport cuts in one location relative to another resulted in population changes in one place relative to another and what the overall effects on national productivity were. However, it did not look at the transport effects on national aggregate population, age or skills.

There were difficulties in distinguishing population decline caused by the cuts from already occurring decline, or by other structural events. Contemporaneous changes included the growth of towns due to planning, the motorways, and the Beeching rail cuts being directed at east-west rather than north-south lines.

There were seven major findings:

- i) Cuts in rail infrastructure caused population falls relative to less affected areas, there was a loss of educated and skilled workers, and an ageing population.
- ii) A 10% reduction in rail access was associated with 3% fall in population by 1981 relative to unaffected areas, or the 1 in 5 places that were most exposed to the cuts saw 24 percentage points less growth in population than the 1 in 5 places that were least exposed. Populations did not recover in subsequent decades.
- iii) The results indicated that rail infrastructure affects the spatial distribution of population, which is relevant to the role of transport in land use and the spatial structure of the economy.
- iv) In some cases, the effects of rail infrastructure development were temporary, the population re-adjusted once the infrastructure is removed. (NB: This appears to contradict the findings in i) and ii).
- v) In comparing the population of places with closed stations with when they were opened, Bogart et al. (2018) notes parishes with new stations between 1831 and 1841 show a 30% population increase, conversely on closure between 1951-1981 they lose 13 % of population, or nearly half of the original increase.
- vi) An additional finding was that growth in accessibility via the road network due to the construction of the motorways also affected population distribution. Places experiencing improvements in the motorway network were less affected by the rail cuts, but places losing rail access were not those targeted by improvements in road access. Consequently, the motorway network did not mitigate the effects of the cuts for those places worst affected by the loss of rail.
- vii) The study estimated that by cutting connectivity and access to economic activity there was a reduction in national productivity of 2%. However, this was mitigated by

migration to cities with a productivity gain of about 0.2%, giving a net fall in productivity of 1.8% (Gibbons et al., 2018, pp. 27-29)

To paraphrase, those places that were experiencing development, or were stable, were less likely to experience disadvantage from the Beeching cuts, but they were also less likely to experience the rail cuts, and more likely to benefit from road improvements. Places that were in decline were more likely to experience rail cuts, and less likely to receive road improvements. Consequently, they would be locked into a cycle of decline.

Of the 28,528 km of route in 1961 (British Railways Board, 1963, p. 9) by 1965 the new minister of transport, Barbara Castle was guaranteeing a core network of 16,000km, 56% of the 1961 figure (White, 1986, p. 90). Since then, the network has fallen to 15,935 km of which 6,645 km, or 38%, is electrified (Department of Transport, 2021c). Whilst the 'Beeching Report' is mainly remembered for line closures it did also recommend the development of those traffics which it believed the railways were best suited to perform, such as high speed inter-city, metropolitan commuter, and fast trainload and container freight services. The future network for these traffics was set out in a further report 'The Development of the Major Trunk Routes' (British Railways Board 1965), sometimes referred to as "Beeching 2." Following an analysis of trunk route traffic flows in 1964 this recommended a reduction in the route kilometres to an economically inadequate 4,800 km in 1984 (British Railways Board 1965, p. 48, p. 54, p. 74).

The incoming Labour government of 1964 decided that this was not a politically or economically acceptable further reduction of the railway system (White, 1986, p. 99) although most previously designated Beeching closures were allowed to proceed. However, Castle promoted the Transport Act 1968 (United Kingdom Parliament, 1968) which made provision for the funding of socially necessary but unremunerative railways. The Act also created passenger transport authorities, and their operational executives, in the five conurbations of West Midlands, Southeast Lancashire and Northeast Cheshire (now Greater Manchester), Merseyside, Tyneside and Greater Glasgow which were intended to integrate road and rail public transport. The nationalised National Bus Company in England and Wales and the Scottish Transport Group were also created by the Act.

Part 2 Scotland and Wales

7.3 Scotland

The country is split into three distinct geographical regions, the Highlands (which are sub-divided into the Grampian and North-western Highlands), the Central Lowlands (or Central Belt), and the Southern Uplands. A prevalence of mountainous land, together with a mainland coastline serrated by estuaries and surrounded by islands had made the development of a modern transport network challenging.

Most of Scotland's population lives in the Central Belt, a formerly volcanic rift valley extending in the north along a border with the Highland Boundary Fault from the Isle of Arran in the west, to Stonehaven on the east coast. To the south the border with the Southern Uplands Fault runs from near Girvan in the west to Dunbar on the east coast (Scottish Places, 2020). Human geography definitions of the region vary but usually restrict themselves to the Clyde-Firth of Forth region. This chapter uses the 'Smaller Central Belt' definition which includes the capital Edinburgh and the largest city Glasgow, both conurbations, and large towns such as Falkirk, Cumbernauld, Coatbridge, Motherwell, East Kilbride and Paisley (Murray, 2020).

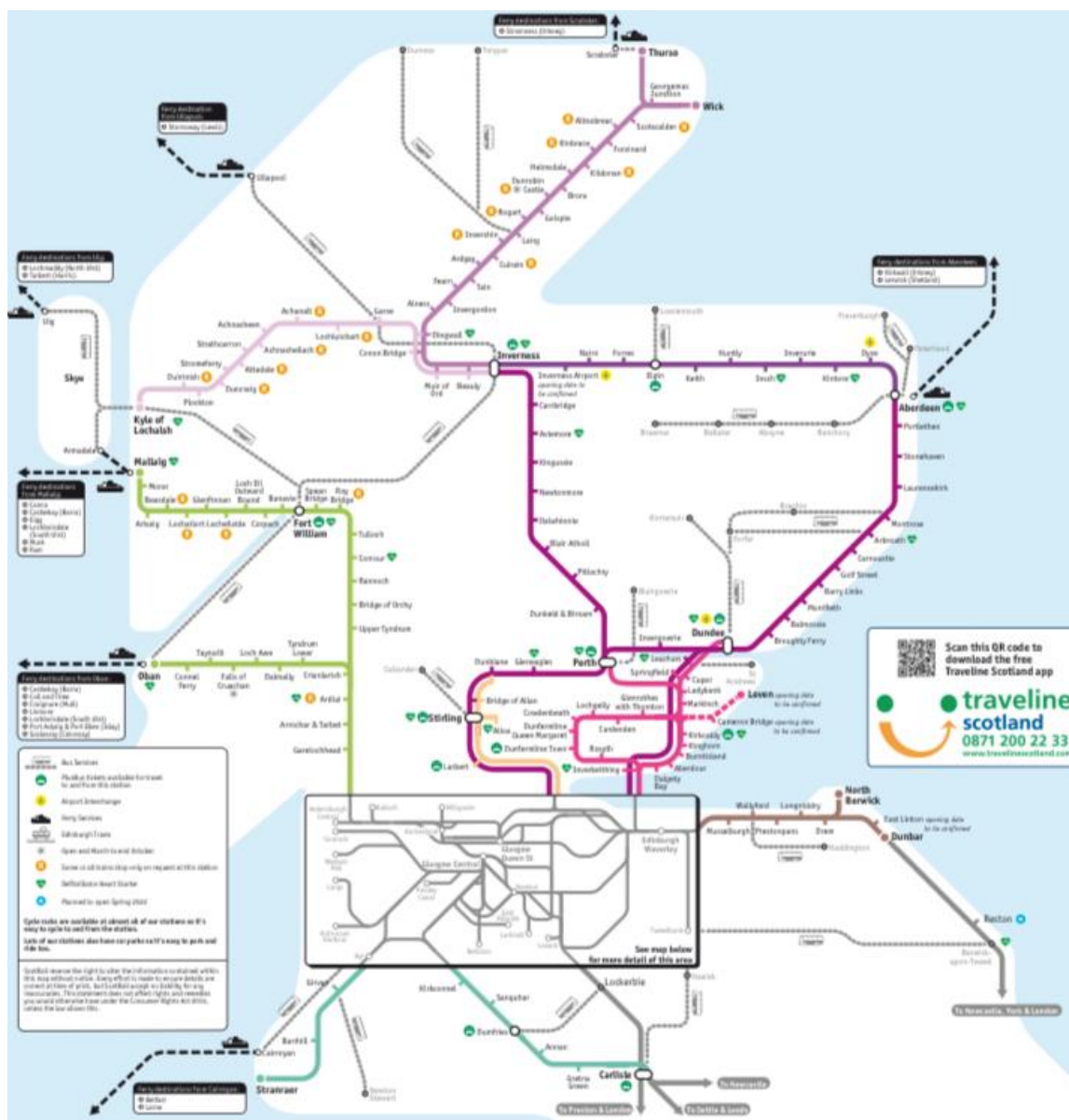
Because of its predominantly mountainous interior and absence of good roads early transport in Scotland relied on coastal shipping and water transport on the firths, sea lochs and rivers. Those travelling by land had to negotiate the state of those roads that existed. Smiles (1867, p. 23) said of eighteenth-century Scotland:

“The misery of the country was enormously aggravated by the wretched state of the roads. There were, indeed, scarcely made roads across the country. Hence the communication between one town and another was always difficult, especially in winter.”

Within the Central Belt the late 18th and early 19th century exploitation of the Lanarkshire coal field and increasing industrialisation led to the construction of three canals, the Clyde & Forth Canal (1791), the Monkland Canal (1794), and the Edinburgh and Glasgow Union Canal (1822) (Ransom, 2007, p. 16). The most significant non-lowland canal was the Caledonian of 1822, which saved shipping from having to negotiate the 'northern passage' off Cape Wrath and the Penland Firth. It

linked Fort William in the west and Inverness in the east, a distance of 97 km (Engineering Timelines, 2020).

The Scottish railway network had its genesis in the horse-drawn wooden-railed tram roads of the Central Lowlands coal mining industry (Ransom, 2007, pp. 15-21). The extent to which such early railways were later modernised as iron tramways and later incorporated into the main line system was unusual. The modern network is shown on Map 14.



Map 14: Scotland Passenger Railways (Diagrammatic) 2022. ScotRail (2022).

Scotland's first inter-city railway was the Edinburgh & Glasgow opened in 1842. Running between Glasgow Queen Street and Edinburgh Haymarket it was 74 km long with eleven intermediate stations. Substantial civil engineering structures were needed including embankments, cuttings, four viaducts and three tunnels; one of which, the 836 metre Cowlares Tunnel out of Glasgow Queen Street, was on a gradient of 2.38% requiring rope haulage to assist trains from the terminus to the top of the gradient until 1908 (RailScot, 2021).

On completion of the Edinburgh & Glasgow Railway the issue of connectivity with the English railways immediately arose as a through route existed from London Euston to Carlisle. The first direct cross-border line was the Caledonian Railway based in Glasgow which opened in 1848 (Ransom, 2007, p. 59). This ran from Glasgow and Motherwell to Carstairs where it was joined by the Company's Edinburgh line, then over Beattock Summit to the joint station at Carlisle and the London & North Western Railway to London Euston. From 1848 Partnership working on the Anglo-Scottish through services was established through the inter-company West Coast Conference for through services from London Euston to Glasgow, Edinburgh, and from 1867 to Aberdeen (Ransom, 2007, p. 65).

The second cross-border route of 1850 was the Glasgow & South Western Railway (G&SWR), also based in Glasgow. Running from Glasgow to Kilmarnock, over Polquharp Summit near New Cumnock, to Dumfries and Carlisle. The G&SWR had a partnership with the English Midland Railway (Ransom, 2007, p. 61, pp. 72-73).

The third cross-border company was the North British Railway, based at Edinburgh, which also opened in 1846 between Edinburgh and Berwick-upon-Tweed. Initially, services operated from London Euston to Edinburgh via an indirect route. With the completion of the Great Northern Railway's London King's Cross station, the Peterborough to Doncaster direct line, and the Royal Border Bridge in 1852, direct east coast services operated (Ransom, 2007, p. 59). The North British, attempting to protect its territory, a triangle between Edinburgh, Berwick-upon-Tweed and Carlisle, projected a fourth cross-border railway the Waverley Route from Edinburgh to Hawick (1849) and on to Carlisle (1862). On completion of the Settle & Carlisle line the Midland Railway also formed an alliance with the North British and their London St Pancras to Edinburgh traffic was routed over the Waverley line (Ransom, 2007, p. 79).

Once the framework of the system had been established between Edinburgh and Glasgow and the border, connectivity with and between the remaining five major centres of population became the next stage of network development. The Caledonian Railway had originally entered Glasgow from the southeast by purchasing the pioneering Glasgow, Garnkirk & Coatbridge Railway. Using running powers over another coalfield railway near Coatbridge, and new construction, the Caledonian projected itself northeast through Cumbernauld to Greenhill. This was a junction with both the Edinburgh and Glasgow and the start of the Scottish Central Railway to Dunblane, Stirling and Perth, which was to form a bridgehead for traffic to Aberdeen. For passengers from Edinburgh to Perth and Aberdeen a short line connected to the Edinburgh & Glasgow at Polmont (Ransom, 2007, p. 59).

Dundee, Scotland's fourth largest city, was connected to Perth via railway in 1849. A major problem on the obvious strategic route from Edinburgh and Dundee to Aberdeen was the presence of the two wide firths, or estuaries, of the rivers Forth and Tay. It was possible to travel between Edinburgh and Dundee, albeit via two ferries, and on to Aberdeen (Ransom, 2007, pp. 61-62).

The Tay was the first firth to be bridged by a 4.43 km long lattice work structure in 1878. On the 28th December 1879 the bridge collapsed during a strong gale as the 19:13 Burntisland to Dundee train was running over it, with the loss of seventy-four or seventy-five lives (UK Government, 1880, p. 9). A new bridge replaced it three years before the North British Railway opened the Forth Bridge, an internationally known iconic structure. On completion of that bridge in 1890 there was a direct east coast route from London and Edinburgh to Aberdeen (Forth Bridges, 2020) (Ransom, 2007, pp. 89-91).

Linking the Lowlands with the Central Highlands was a less protracted process than achieving connectivity along the east coast. Once the Scottish Central Railway was open to Perth in 1848 it took the Highland Railway ten years to link Perth to Inverness, via three route variants which successively reduced the distance involved. The current route from Aviemore over Slochd Summit to Inverness opened in 1898. Aberdeen and Inverness were also linked in 1858 over the Great North of Scotland and Highland Railways (Ransom, 2007, p. 66, p. 70).

The final additions to Scotland's strategic rail network were the deep rural Highland lines. The Highland Railway's 'Far North' line from Inverness and Dingwall opened to Wick and Thurso in 1874 (Ransom, 2007, p. 74) and the Kyle of Lochalsh line fully opened from Dingwall in 1897. In the West Highlands Oban was reached via Dunblane and Callender on the Caledonian Railway in 1880 (Stirling Council Archives Blog, 2015), Glasgow to Fort William in 1895 and the extension from Fort William to Mallaig in 1901 (Ransom, 2007, p. 74, p. 88).

The small companies that had initially built the Scottish railway system formed into larger groups which were then absorbed by the larger companies. By the end of the nineteenth century there were five main Scottish companies, the Caledonian Railway, the North British Railway, the Glasgow & South Western Railway, the Highland Railway, and the Great North of Scotland Railway. The Railways Act 1921 (UK Parliament, 2021, pp. 70-71) grouped the Caledonian, Glasgow & South Western and Highland railways into the London Midland & Scottish Railway, and the North British and Great North of Scotland railways into the London & North Eastern Railway effective from 1st January 1923.

Scotland was hit badly by the post-World War I industrial slump. Harvie (2008, p. 153) noted:

“The trauma of 1920-21 - from ‘Workshop of the World’ to “That Distressed Region” in a matter of months - was something that the nation, and its railways, never got over. 20% unemployment, 10% emigration ...”

Again under the war time control of the Railway Executive Committee from 1st September 1939 until nationalisation in 1948 the Scottish railways emerged from the war to be incorporated in the British Transport Commission (BTC) on 1st January 1948 (UK Parliament, 1947) the Scottish lines of the LMS and LNER were incorporated into the British Transport Commission Railway Executive's Scottish Region, the first time that the Scottish railway system had been unified, although the Region's purpose was primarily administrative and operational as the policy function lay with the BTC and Railways Executive.

The 1955 Modernisation Plan provided Scotland with a fleet of new diesel locomotives and multiple-unit trains. In the Glasgow suburban area, the 25 kV ac electric 'Blue

Trains' operated both north and south of Clyde, the precursor to much more extensive electrification in the region (Transport Scotland, 2021b).

Scotland's rural and duplicate lines were put at risk by the Beeching Report (British Railways Board, 1963). Despite Scottish Office approval of the proposal to close the Far North Line from Dingwall to Thurso and Wick a coalition of the local political parties, business and community organisations successfully fought the closure (Yellowlees, 2016). As a result of the case made for retention the other deep rural railways, the West Highland and Kyle of Lochalsh lines also escaped closure. However, there were major closures of branch lines. There were also strategic line closures. These were the Waverley route connecting Edinburgh with the two large borders towns of Galashiels, Hawick, and Carlisle. The 117 km line linking England to Northern Ireland via Dumfries and the port of Stranraer, and the lines connecting Aberdeen to Maud Junction, Fraserburgh and Peterhead. Although not recommended for closure by Beeching the direct Edinburgh to Perth main line via Cowdenbeath, Kinross and Glenfarg was closed in 1970 to accommodate construction of the M90 South Queensferry to Perth motorway. The Scottish Region's 1948 route extent was 5,834 km, by 2007 this had shrunk by 53% to 2,736 km (Ransom 2007, p. 12).

British Rail, as the British Railways Board started to market its services in 1965, designated its Scottish Region services as 'ScotRail' in 1983. The brand continued for the all-Scotland rail franchise on the break-up and privatisation of British Rail in 1997. From 2022 responsibility for the Scottish rail franchise, and the planning and funding of rail infrastructure, passed from the UK Government to the Scottish Government.² In September 2008 Transport Scotland announced that the franchise would permanently retain the 'ScotRail Scotland's Railway / Rèile na h-Alba' corporate identity, irrespective of franchisee (Transport Scotland, 2021a).

The benchmark for the current Scottish rail network is the "Network Rail Scotland Route Utilisation Strategy 2007" (Network Rail, 2007) which was updated by the "Scotland Route Study" (Network Rail, 2016) and the "Route Specifications 2020 Scotland" (Network Rail, 2020a). Between 2014 and 2019 the Scottish Government had undertaken 325 km of line electrification in the Central Belt between Edinburgh

² The Scottish Government was known as the Scottish Executive from the start of devolution in 1999 until 2007, when the change to 'Scottish Government' was made unofficially; this was confirmed by the Scotland Act 2012 (UK Parliament, 2012).

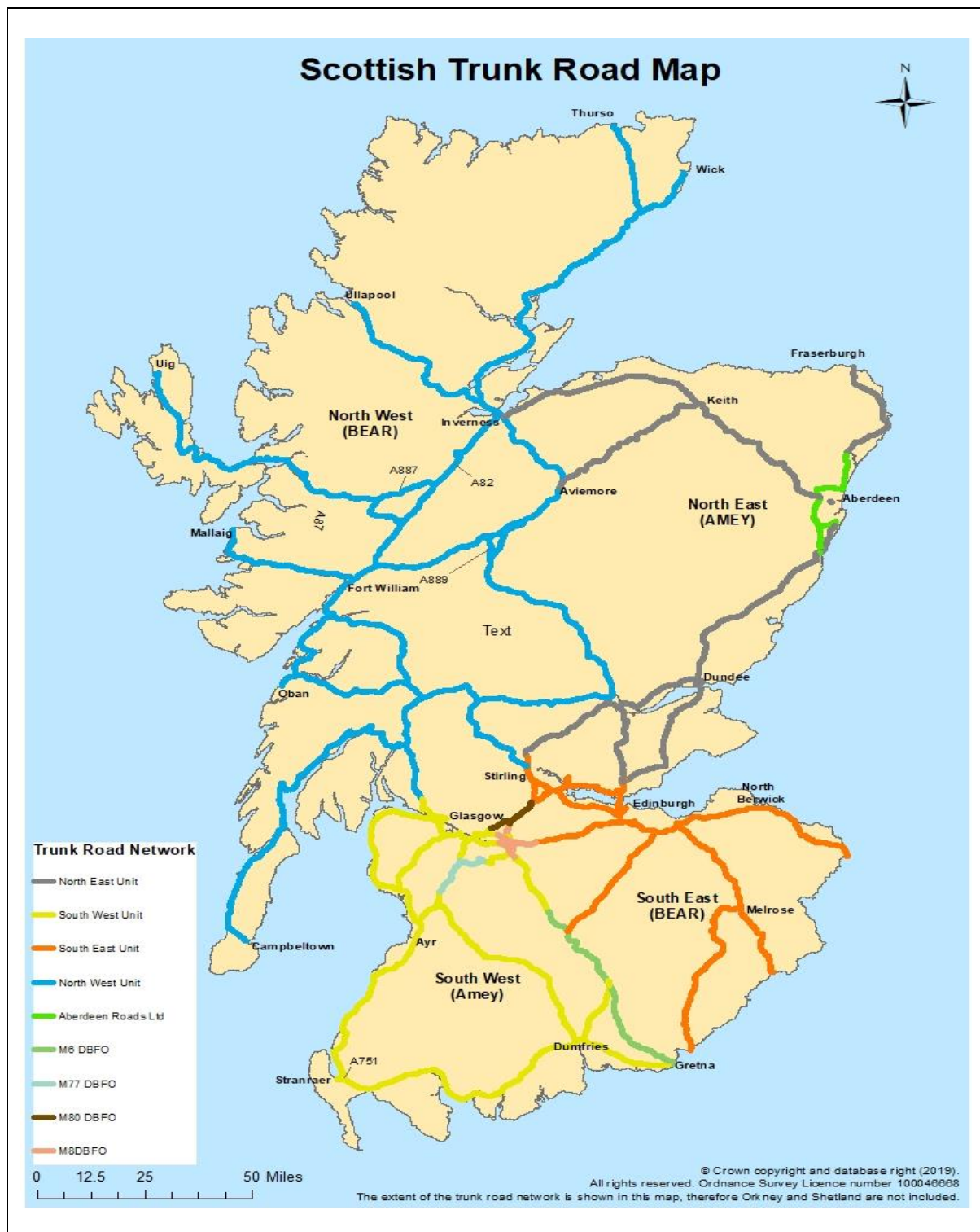
and Glasgow by all three routes (the main line, the reopened line through Drumgelloch and Bathgate, and via Shotts), and also between Edinburgh and Glasgow to Stirling and Dunblane and Alloa (Network Rail, 2020b). The Scottish Government's intention is to electrify the lines between all seven Scottish cities. Between 2008 and 2015, three routes were re-opened. These were Stirling to Alloa in 2008, Drumgelloch to Bathgate in 2010, and the northern end of the Borders Railway (or Waverley line) from Newtoncraighall to Tweedbank in 2015. In 2018/19 the route extent of the Scottish railways was 2,758 km, (Transport Scotland, 2020a, p. 107). This was 47.3% of the 1948 route extent although the use of the railways on the reduced network was much more intense and, before the Covid-19 pandemic of 2020-21, was rising.

The Scottish Government's organisation Transport Scotland is responsible for national bus policy, and best practice to be delivered by the operators, local government, the regional transport partnerships, and the regulatory authorities (2020b). As in the rest of Britain bus operation in the country is mainly carried out through commercial operations, with local authority support for services that would not be provided otherwise, as provided for by the Transport Act 1985 (UK Parliament, 1985).

The main operators are the Stagecoach Group plc of Perth and FirstGroup plc of Aberdeen (BusWeb, 2012). There are also smaller local operators. Scottish Citylink operates a network of inter-city routes between the seven cities, and to three deep-rural destinations. This company is jointly owned by Comfort Del Gro of Singapore (65%) and the Stagecoach Group (35%) (Citylink 2021). In the Edinburgh and Lothian region Lothian Buses is the main operator, this company is publicly owned by the Edinburgh City Council and the three other Lothian local authorities. Edinburgh City Council's transport subsidiary Transport for Edinburgh owns the city's expanding tram system (Transport for Edinburgh, 2021).

Between the local authorities and Transport Scotland lie seven strategic regional transport partnerships (RTP) which were formed under the 'Transport (Scotland) Act 2005' (Scottish Parliament, 2005) to prepare regional transport strategies and the delivery plans to implement regional transport strategy intervention. The RTPs are joint boards with local authority elected member and stakeholder representation (Transport Scotland (2015). The Strathclyde Regional Transport partnership, which covers greater Glasgow and the surrounding region, owns and operates bus stations and the

Glasgow Subway, a 1.219 metre (4ft) gauge circular underground railway (Strathclyde Partnership for Transport, 2021).



Map 15: Scotland Trunk Road Network 2019. Transport Scotland (2019).

Transport Scotland (2020a, p. 77) recorded 56,591 route km of road in Scotland in 2018 of which 1% was motorway, 6% other trunk roads (see Map 15 above), 13% non-trunk A roads and 80% minor roads. The road network pattern of the Scottish motorways and trunk roads network, which is managed by Transport Scotland, reflects the core railway system. The M8 extends across the Central Belt from Hermiston on A720 Edinburgh by-pass to central Glasgow, where it links into the A road urban network, through Renfrew and ending at Bishopton. South of the River Clyde the M8 is connected to the A74(M) which runs across the Southern Uplands to join the English M6 at the border at Gretna. It is also linked to the M77 at Pollockshaws running to Kilmarnock in the southwest. From a junction with the M8 in Glasgow, Cumbernauld and Stirling are linked by the M80 which continues northwards to Perth over the M90 and then to Aberdeen by the dual-carriageway A90, or to Inverness on the A9. This road is to be dual-laned over its complete length. Inverness is connected to Aberdeen by the A96. From a junction with the M8 at Ratho just outside Edinburgh the M9 links to the Perth / Inverness route at Stirling. Branching from the M9 north of Ratho the M90 crosses the Firth of Forth on the new Queensferry Crossing, on to Fife and then continues over the A92 and the Tay Bridge to Dundee and the A90. From the western side of the A720 Edinburgh by-pass the A1 runs south towards the border on a mixture of single and dual carriageway. The motorways and dual carriageways are complemented by a strategic trunk road network and county highway networks.

The first Scottish transport policy was published in 2006, concurrently with the formation of Transport Scotland as the national transport agency, with an update in 2016. The latest iteration “National Transport Strategy 2” was published by Transport Scotland in February 2020 (Transport Scotland, 2020c). This is a review and extension of the former. It forms the high-level strategic framework to inform the interventions across the Scottish transport network through the “National Transport Strategy 2 Delivery Plan.” These interventions have been assessed by the “Scottish Transport Appraisal Guidance (STAG)” (Transport Scotland, 2020d). The “National Transport Strategy 2” sets out four priorities, each with three sub-priorities that interventions should fulfil before being taken forward. These are:

“Reduces Inequalities: will provide fair access to services we need; will be easy to use for all; will be affordable for all. Takes Climate Action: will help to deliver our net-zero target; will adapt to the effects of climate change; will promote greener, cleaner choices. Helps deliver inclusive economic growth: will get people and goods to where they need to get to; will be reliable, efficient and high quality; will use beneficial innovation. Improves our Health and Well Being: will be safe and secure for all; will enable us to make healthy travel choices; will help make our communities great places to live” (Transport Scotland, 2020c, p. 4).

The policy document, which claims to be the result of wide engagement and collaborative working, crosses modal and institutional boundaries and is outcome and evidence based. In comparison with the consultation draft of the Welsh Government’s transport policy “Llwybr Newydd” (Welsh Government, 2020e) it lacks the clear outline of how it integrates with other Scottish Government socio-economic and environmental policies. Unlike the Welsh document there is an absence of an outline of modal interventions and how they are to be achieved:

“The Strategy does not identify or present specific projects, schemes, initiatives or interventions, but sets out the strategic framework within which future decisions on investment will be made.” (Transport Scotland, 2020c, p. 4).

Neither are the ambition goals for the five, and twenty-year horizons covered by the document. Unlike Wales, there currently appears to be no commitment to inter-modal timetabling and ticketing integration in Scotland beyond rolling out electronic payment.

7.4 Wales

Both the population distribution of Wales and the structure of the transport system is largely dictated by the topography of the country. Because of the central mountainous spine most major population centres are on the coast: e.g. Cardiff, Newport, Swansea, Aberystwyth, Bangor, Llandudno and Flint. Even inland centres are not far from the coast: Merthyr Tydfil in the Valleys is 36 kilometres from Cardiff Bay, Llandeilo, a market town in the Tywi Valley is 28 km from the coast at Llanelli, Lampeter, a university town in the Teifi Valley, is 20 km from the sea at Aberaeron. In the northwest

Llanberis is 10km from the Menai Strait at Caernarfon, and in the north east Corwen in the Dee Valley is 40 km from the Irish Sea at Rhyl.

Davies (1994, p. 379) noted that:

“Road improvement was central to the changes experienced by Welsh society between 1770 and 1850, but it was not trouble-free. The efforts of many of the trusts (NB: turnpike trusts) were feeble and a number of them were crippled by corruption or inefficiency.”

However, road transport was neither a viable nor feasible option for the heavy bulk loads produced by the new coal mines and iron foundries of the Glamorganshire and Monmouthshire coal fields. Before the railways, canals such as the Monmouthshire, Brecon and Abergavenny, Glamorganshire, Neath, and Swansea had opened between 1790 and 1794, or early horse-powered tramroads such as the Merthyr Tramroad, and the Sirhowy Tramroad connected industry to canals and harbours (Owen-Jones, 1997, p. 6). Accordingly, coastal and deep-sea shipping and their supporting trades were important components in the Welsh economy. The growth of both extractive and manufacturing industries across the country resulted in the need for a form of transport that had capacity for the output being produced. Briwnant-Jones and Dunstone (2000, p. 31) observed that most Welsh railways were built in the period between 1840 and 1870. Railway lines from the coal, iron and copper industrial areas of the Valleys to the coast were promoted in order to expedite the export of the finished products, often taking over the formations of predecessor tramways: the Taff Vale in 1840 (Briwnant-Jones and Dunstone, 2000, p. 7), and the Rhymney in 1858 (Kidner, 1995, p. 11), are examples. The first of the two Irish port mainlines, the Chester & Holyhead was completed to Holyhead in 1850 (Owen-Jones, 1997, p. 11), and then the South Wales Railway was to Neyland in 1856 (Owen-Jones, 1997, p. 12). These railways were constructed east to west across the relatively level terrain of the north and south coasts and were built to ensure rapid connectivity between London and Ireland for governance, military, and commercial reasons, serving Wales was a secondary consideration.

Both of the successor companies, the London & North Western and Great Western Railways, expanded from the two core main lines, particularly where sources of mineral wealth could be tapped as at Blaenau Ffestiniog and Bethesda for slate, and

'the valleys' for coal, or where market towns offered additional traffic. The route structure was primarily extractive and large areas of the country remained unserved. In mid Wales the Cambrian Railways, an amalgamation of smaller locally financed companies such as the Newtown & Llanidloes (1859), and the Aberystwyth & Welsh Coast (1863), eventually encompassed an area spreading from Pwllheli to Dolgellau, Aberystwyth, Welshpool, Wrexham, Oswestry and Whitchurch (in England), and Brecon. By 1864 the Cambrian Main Line formed the third major east to west railway artery across mid Wales from Aberystwyth with connections at Whitchurch to Crewe and at Welshpool to Shrewsbury.

The final two strategic east-west routes both opened in 1868. The Central Wales Railway ran south-westwards from the Crewe-Shrewsbury-Newport line at Craven Arms to Swansea Victoria station via Knighton, Llandrindod, Builth Road, Llanwrtyd, Llandovery, and Llandeilo. The route was intended as the London & North Western Railway's freight traffic cut-off from Swansea and south west Wales (predominantly Great Western Railway territory) to north west England, enabling the L&NWR to route this traffic over their own lines. In the late 19th and early 20th century the fashion for spa holidays also brought the line substantial passenger traffic to the resorts at Llandrindod, Builth and Llwrtyd.

The fifth strategic east-west route was the Great Western Railway's Ruabon-Dolgellau line (1868). This branched from the London Paddington to Birkenhead Woodside main line and was intended to siphon passenger traffic to and from the Cambrian coast through Llangollen, Bala Junction and Dolgellau.

A strategic north-south route was formed in 1867 when the Coast Line of the Cambrian Railways was linked to the Chester & Holyhead line via Afon Wen, Caernarfon and Menai Bridge. In the same year Aberystwyth was linked to the South Wales Railway at Carmarthen through Lampeter. A second north-south route was available from 1868 from Cardiff via Pontypridd and Merthyr Tydfil to Brecon, then via the Mid Wales Railway through Builth, Rhayader and Llanidloes to Moat Lane Junction on the Cambrian main line.

Like their Irish and Scottish counterparts, the smaller Welsh railway companies were amalgamated into larger units in the hope that merger would restore the railways to economic health. During the Railway Executive's imposition of government control

during the First World War, senior civil servants and railway managers noted the beneficial economies of scale and service delivery benefits gained through unified working practices. Consequently, the UK government proposed to consolidate the industry into four territorial companies from 1923 (UK Parliament, 1921).

Excepting the former London & North Western Railway lines in the north, which were merged into the London Midland & Scottish Railway group, the Cambrian Railways and the smaller Valleys companies were absorbed by the Great Western Railway. There was no Welsh dimension to the new groups which ran their new acquisitions as adjuncts of their English operations. This was also to be the case on the nationalisation of the four railway groups in 1948 into the British Transport Commission Railways Executive, and then from 1963 with the formation of the British Railways Board. Failure to form a Welsh Region maintained the status-quo through the London Midland and Western Regions as successors to the previous railway companies. As a result, there was no structural integrity to the Welsh railways, they were simply branches of the English system.

This was evidenced during the British Transport Commission period of control, and the subsequent Beeching reshaping, as line closures were made with no regard to the economic and social needs of Wales as a nation, or the transport problems posed by its geography. Whilst in Scotland proposals to close three significant deep rural railways were successfully resisted, in Wales there was no point of national focus to oppose the plans. Unlike the Scottish Office the Welsh Office which was established in 1965 (Welsh Parliament, 2021) had no responsibilities over railways and by the time it had gained them the closure programme was largely complete. The closure programme left Wales with three sections of predominantly east-west railway in the north, mid and south, the latter being the most comprehensive, connected through the border region by the Marches Line linking Newport, Hereford, Shrewsbury, Wrexham, Chester, seventy-five percent of which was in England and remote from the population centres of the west coast. It also left many significant settlements such as Caernarfon, Bala, Llangollen, Brecon, Lampeter and Cardigan dependent on road transport.

The presumption was that future demand for rail services would either be static or declining and that consequently infrastructure, motive power and rolling stock needed to be written-off accordingly to reduce operating and renewal costs. Much of the

network that was left was the Basic Railway' described by Fiennes (1968, pp. 161-166), with de-staffed stations with minimal passenger facilities, and lines that were reduced in their operational flexibility and capacity through signalling and track layout rationalisation.

After devolution in 1999 the UK Department of Transport (DfT) specified the Wales & Borders franchise in 2003 and the country had a nationally focussed rail network for the first time. Operated by Arriva Trains Wales a mix of regional interurban, (including new regular interval north-south services from Cardiff to Holyhead), south Wales commuter and rural services was provided. The popularity of rail had already been rising, making the DfT's decision of a no-growth franchise controversial. Passenger journeys doubled from 1995-96 to 29.3 million in 2014-15 (Auditor General of Wales, 2016, p. 7). Subsequently, in a £136.6 million programme between 2011 and 2016 to restore the network and stations to a reasonable standard, the Welsh Government contributed £54.22 million (39.7%) towards eleven different projects of capacity improvements, station enhancements and new stations, even though it had no formal responsibility for railway infrastructure. The European Union contributed £46.4 million (34%), Network Rail £26.8 million (19.6%) but the UK Department for Transport, which has formal responsibility for Welsh railway infrastructure, only £5.8 million (4.2%). Other funders made up the remaining 2.5%. From 2016 to 2019 a further eleven projects of capacity improvements, station enhancements and new stations, and two project designs, worth £155.85 million was invested in by the Welsh Government (Auditor General of Wales, 2016, pp. 73-77).

The current Welsh Government has indicated that it wishes to continue to develop the railway system. On the 10th September 2020 Ken Skates (2020), former Minister for Economy, Transport, and North Wales in the previous government, made a Cabinet Statement calling for the devolution of Welsh railway infrastructure and outlining an ambitious blueprint of railway enhancements. These included capacity and line speed improvements, line re-openings, light rail and new stations, all of which were identified as being necessary for economic development and environmental protection in the Welsh Government strategy paper 'The Rail Network in Wales: The case for Investment' (Barry, 2018). The Government wishes to electrify the South Wales Main Line beyond Cardiff, the North Wales Main Line to connect to HS2 at Crewe, and the Wrexham-Bidston Borderlands Line to connect into the third rail electrified Merseyrail

system to central Liverpool. Network Rail’s “Traction Decarbonisation Network Strategy” (2020c) envisages electrification at least to Carmarthen and the North Wales Main Line to Manchester and Crewe as core schemes. Other important connecting lines to England, the Marches, Crewe-Shrewsbury, and Severn Tunnel Junction-Chepstow-Gloucester-Birmingham routes are also identified as core to the strategy.



Map 16: Wales Railways (Diagrammatic) 2022. Transport for Wales Rail (2022).

Map 16 shows the current configuration of infrastructure and services on the Welsh railways network. The Welsh Government document “A Railway for Wales” (2019a, p. 16) identifies a north to south strategic connectivity corridor in the west. Its rail blueprint (Modern Railways, 2020, p. 17) would require two potential strategic railway re-openings. The first, from Porthmadog on new infrastructure to Bryncir (which could

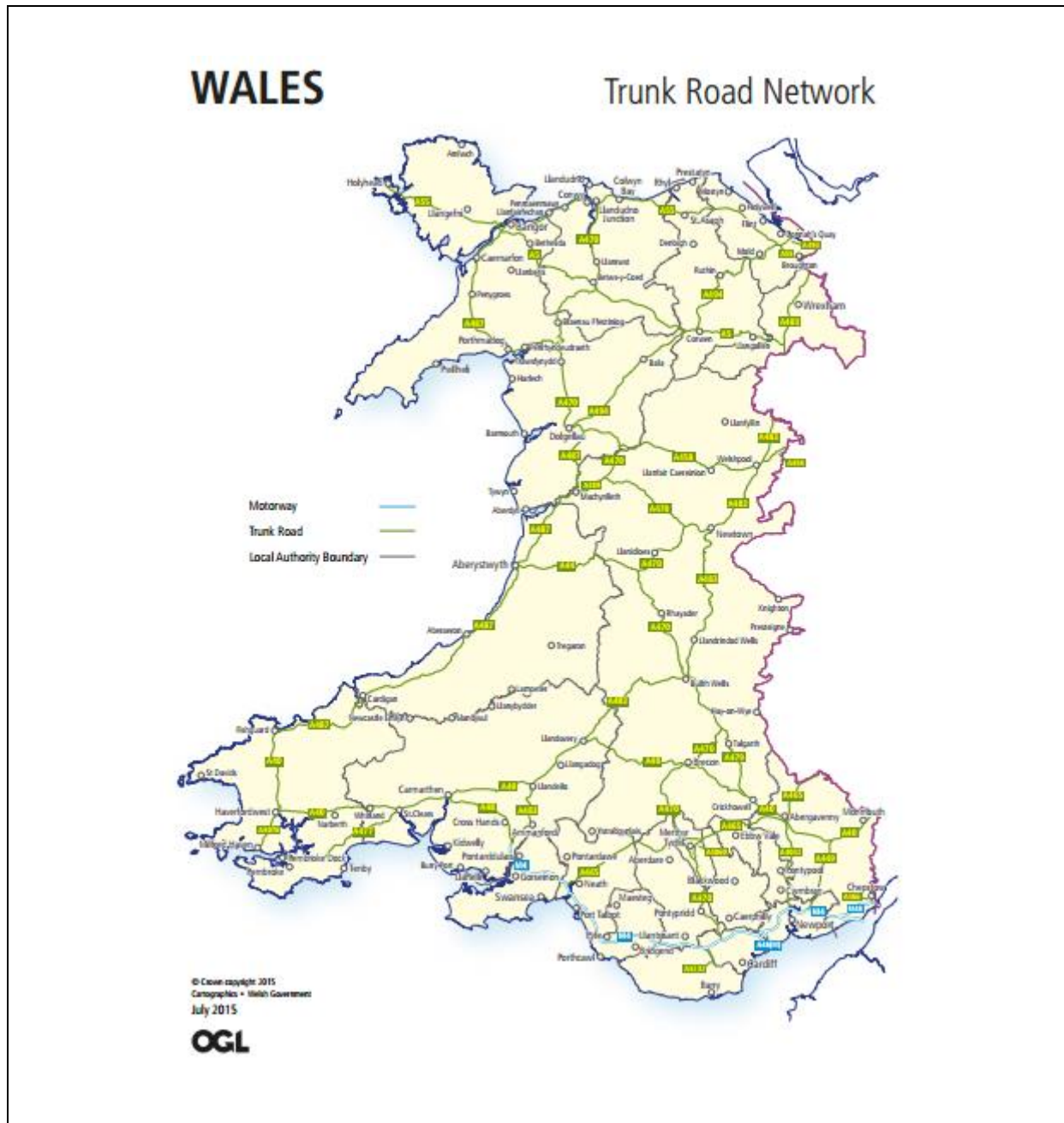
have synchronicity with improvements to the A487 trunk road), then on to Caernarfon and Bangor. The second from Aberystwyth to Carmarthen via Lampeter, has already been subject to a reopening assessment (Mott MacDonald for Transport for Wales, 2018). Together, these developments would re-unite the fragmented Welsh railway system along the western corridor. In the north, the Amlwch-Gaerwen line on Anglesey would be re-opened and through services provided to Bangor, Caernarfon and Porthmadog. In the south Aberbeeg would be reconnected to the Ebbw Vale line with through services to Abergavenny and Gloucester. Re-instatement is also proposed of the west to south chord linking the North Wales Main and Borderlands lines at Shotton. This would allow North-South services along the Marches Line to avoid reversing in Chester and reduce journey times, although integrating this hourly train with the proposed four trains per hour stopping service from Wrexham to Liverpool may prove to be operationally challenging.

The blueprint also envisages two light rail systems. One would link Newport railway station to the south of the city centre, the Royal Gwent Hospital, and then to Machen and Caerphilly. A light rail line, Cardiff Crossrail, would be a compliment to the Valleys Lines tram-train service, running east-west from a Park and Ride at M4 junction 33 west of the city, through the west Cardiff housing growth zone to join the Radyr-Cardiff City Line at Fairwater to Cardiff Central, down to the Bay and then north eastwards to an interchange station with the South Wales Main Line. The tram-trains would then join the relief lines to run to Newport and Severn Tunnel Junction.

The proposals face potential problems. The UK government has resisted the devolution of Welsh rail infrastructure, even though it cut back electrification of the South Wales Main Line from Swansea to Cardiff and has consistently underspent on the Wales & Borders network, which is eleven percent of Network Rail's system but, as Barry (2018, p. 5) noted, receives only one percent of central funding.

Barry estimated that the economic benefits of the projects set out in his report programme was worth £1.8 to £2.4 billion of direct benefits to transport users over sixty years at 2010 prices. Thomas (2018) questioned whether the UK Shared Prosperity Fund will fully replace the £680 million per annum of EU funding streams and, following the return of Welsh Labour as a minority government at the 2021

Senedd elections, it remains to be seen if the 'rail blueprint' becomes a fully costed and implemented programme.



Map 17: Wales Trunk Road Network 2015. Traffic Wales (2021).

As in other countries the road system developed to service market towns and the cattle droving routes to English livestock markets such as Smithfield in London. As in the rest of the British Isles the eighteenth-century turnpike road system grew out of necessity. Over 200 companies were authorised by parliament between 1753 and 1839. Davies (1994, p. 379). observed:

“The appalling condition of Welsh roads has already been noted. In Britain, unlike France the building of a network of roads was not considered the responsibility of the government, and therefore British roads developed piecemeal in response to local demand and initiative.”

An exception to this policy was the land and sea link to Ireland on which the government spent heavily, after the political union of Great Britain and Ireland in 1801, to expedite journey times between London and Dublin. Constructed by Thomas Telford between 1815 and 1826 the road, now broadly on the route of the A5, entered Wales at Chirk and connected Corwen, Betws-y-Coed, Bethesda, Bangor and Holyhead.

The modern Welsh Government trunk road system (Welsh Government, 2015b), Map 17, also demonstrates much of the piecemeal development of the turnpike system and echoes the problems of the railways in terms of lack of capacity at pinch points, predominantly single carriageway roads with lack of overtaking stretches, sharp bends and steep gradients. The network is managed and maintained on behalf of the Welsh Government through two agencies, the North & Mid Wales Trunk Road Agent and the South Wales Trunk Road Agent.

Multiple / dual carriageways are mainly limited to the south coast / valleys and north coast corridors. In the south the principal motorway, the M4, takes traffic from the southwest and south to Bristol and south east England, whilst the A465 Heads of the Valleys Road leads to the M50 / M5 for the West Midlands. There are number of local dual carriageway connectors in the Cardiff and Newport areas. The main issue on this corridor is the M4 at Brynglas Tunnels to the north of Newport. Here the three lanes in each direction reduces to two lanes without a hard shoulder through the area, causing considerable congestion and excess journey times at peak periods. For geological reasons it is not possible to increase the tunnels to three lanes in either direction. Plans for a relief motorway to the south of the city across the Gwent levels and the northern section of the port of Newport were rejected by the First Minister (Welsh Government, 2019c) on the grounds of high capital cost, the lack of Welsh Government resources to implement it, compulsory purchase order issues, and the environmental impacts on the Gwent levels sites of special scientific interest (SSSIs).

The primary highway on the northern west-east corridor from Holyhead to the border at Chester is the A55, the North Wales Expressway. This corridor connects via M56 to Manchester Airport, Manchester, and the Trans-Pennine M62, or via the M56 / M6 for Lancashire, Cumbria, Scotland, Cheshire and Staffordshire. The West Midlands and Birmingham Airport are connected to the A55 via the dual carriageway section of the A483 / A5 and M54 through Oswestry, Shrewsbury and Telford. Although dual carriageway for its entire length, except across the Britannia Bridge, the A55 is characterised by some inadequate slip road junctions, and difficult alignments of the eastbound carriageway around the Pen-y-Clip and Penmaenbach headlands where the westbound carriageway is tunnelled. There are also two steep inclines at Rhualt Hill, Junctions 29-28 and Holywell Summit, Junctions 33-31, which are problematical for traffic flow. In the northeast the A55 is connected to the M56 either directly by a south and east circuit of Chester, or via the dualled A550 / A494 to the west and north of Chester.

Three roads comprise the main north-south trunk links, the A470, the A487 and the A483. The main highway is the A470 from Cardiff Bay to Llandudno. This is dual carriageway between the M4 Gabalfa Interchange and Merthyr Tydfil where it becomes single carriageway until it bypasses Brecon on a joint dual carriageway bypass with the A40. On its route to Llandudno the road climbs over five mountain passes. At Builth and Rhayader it runs through the town centres. However, traffic levels at these locations are not usually problematic. Llanidloes was bypassed on a sunken section of road which was once the Mid Wales Railway station yard. At Cross Foxes to the south of Dolgellau the A470 joins the more westerly north-south road, the A487. Dolgellau is bypassed on the route of the former Ruabon-Morfa Mawddach railway. The two routes separate at a junction just south of Gellilydan. The A470 runs through Blaenau Ffestiniog before passing near to Betws-y-Coed, through Llanrwst, to end at Llandudno West Shore.

The A487 is the western north to south trunk route. From Fishguard it runs through the undulating north Pembrokeshire and Ceredigion coastal zone through Cardigan and Aberystwyth to Machynlleth via Corris, Dolgellau, Penrhyndeudraeth then bypassing Porthmadog and Caernarfon to terminate at A55 junction 9 in upper Bangor.

The third north to south trunk link, the A483, runs from the southwest at Pont Abraham, the western end of the M4, and northeastwards through Llandeilo, Llandrindod, over the Newtown and Welshpool bypasses to the 'Shropshire Corridor' in England, between Llanymynech and Chirk. It bypasses Wrexham on a dual carriageway ending at the A55 junction 38 just south of Chester.

In north and mid Wales there are four west-east trunk routes. Although Telford's A5 still runs on much of its original route from Holyhead to Chirk it does not become a trunk road until Bangor to the border. The A494 Barmouth-Queensferry links the Cambrian coast to north east Wales and Merseyside. From a junction with the A470 at Mallwyd the A458 links north west Wales and the West Midlands via Welshpool to the border at Middletown and the A5 at Shrewbury. Finally, the A44 from Aberystwyth links into the A470 at Llangurig and Rhayader, and the A483 at Crossgates near Llandrindod.

Like the railways, investment, mainly from the Welsh Government and the European Union, has improved the trunk road network considerably over the past twenty years. Both online-improvements, re-alignments and bypasses have been made where needed and the Welsh Government has a continuing programme of improvements and bypasses set out in the "National Transport Finance Plan 2018 Update." (Welsh Government, 2018b). However, by international standards the network is still poor. Ireland has constructed a motorway system between its main centres whilst road users in Wales negotiate a mainly single carriageway system which lacks capacity to allow overtaking and consequently suffers from unreliable journey times. Except along the M4 and A55 corridors active management of the system is minimal.

7.5 Conclusion: Scotland and Wales

Because of its geography Scotland has retained and developed a reasonable road and rail system although inter-modal integration is poor. Redundancy is medium for the transport network in the Central Belt but poor elsewhere. The Welsh railway network is fragmented into three sections by closures and relies on a line mainly in England for its Holyhead to Cardiff north-south traffic, there is no other example of this situation in Europe. Outside south Wales, the north Wales coast and Deeside / Wrexham the Welsh trunk road system is of poor quality. Both road and rail have a

low level of redundancy. The Welsh Government is developing a programme to integrate bus and rail services and tariffs, but the question of adequate transport infrastructure and connectivity still remains to be resolved, until it is the Welsh economy will not develop as well, or operate as efficiently, as it could.

7.6 Analysis of Low Integration Networks

Table 7.1 below summarises the characteristics of the Scottish and Welsh transport systems. There are similarities between the development of transport systems in the two low integration cases of Scotland and Wales. Pre-railway development of roads in Scotland outside the Central Belt was concentrated on establishing internal security in the Highlands following the rebellions against the Hanovarian monarchy, whereas in Wales the two main highway links (corresponding to the modern A5 and A40) were built across Wales from London to the Irish ports in the north and south. They were intended to facilitate rapid governmental and military access to Ireland. Coal mining was the main spur to both canal and early railway development in both the Scottish Central Belt and the South Wales valleys. In the next stage, access to the English railway system was the priority for the Caledonian and North British Railways, whilst in Wales Holyhead was connected to London via the Chester & Holyhead Railway and the south Wales and Haven ports via the South Wales Railway. In both cases branch lines were opened to penetrate adjacent local markets, particularly in the south Wales coalfield.

In Scotland, the two major companies absorbed local railways to achieve internal connections between the Central Belt towns and cities, and between these and Stirling, Perth, Dundee, Aberdeen and Inverness. In the Central Belt the developed motorway, trunk road and rail networks have a medium level of redundancy against failures and incidents, whilst outside this region redundancy is low. In Wales filling-in between the two coastal railway routes and their branches in mid and west Wales was mainly carried out by the locally financed Cambrian Railways, Mid Wales Railway and the Manchester & Milford Railway, together with the companies that formed the Central Wales Railway. Following the Beeching closures of the 1960s rail system redundancy is low. In north Wales the dual carriageway A55 North Wales Expressway links the port of Holyhead to the English motorway system, together with a number of

connecting dual carriageways in the northeast, whilst in the south the M4 and connecting dual carriageways offer some measure of route redundancy. However, even within the latter region there are considerable physical barriers between the Valleys and potential alternative routes. In both Scotland and Wales the effects of climate change have produced infrastructure failures and service disruption.

Compared with Wales the Scottish rail freight market is fairly active, with timber traffic and deep sea and food and drink intermodal traffic. Limited capacity on the mainly single-track Highland Main Line remains a problem. There is currently no rail freight from Scotland through the Channel Tunnel. In Wales, the port of Holyhead no longer receives any rail freight although there is some quarry traffic along the North Wales Main Line from Penmaenmawr. The Kronospan wood products factory at Chirk near Wrexham is supplied with timber by rail from various sources. However, most rail freight activity is in south Wales and includes intermodal food and drink traffic to Wentloog freightliner depot near Cardiff, steel production-related traffic from Llanwern near Newport, Port Talbot and Trostre near Llanelli, and petrochemicals from Milford Haven. There is steel flow from south Wales through the Channel Tunnel to Belgium.

Regional Scottish public transport on principal corridors is frequent, and in the Central Belt very frequent and comprehensive. Glasgow and the Strathclyde region has a large electrified suburban rail network and the Scottish Government intends to electrify the InterCity network between all of the country's cities. Timetable co-ordination is poor in rural areas and tends to focus on the needs of local markets. Tariff integration is mainly limited to travelcards for competing public transport modes in the main urban areas. Currently the situation in Wales is no better but, working through its Trafnidiaeth Cymru / Transport for Wales company, the Welsh Government has an objective of introducing service and tariff integration between its rail services, TrawsCymru long distance bus network, see Map 4, p. 71, and local bus operator partners.

Both capital cities, Edinburgh and Cardiff, have been experiencing economic development and population growth. The Scotsman (2019) reported that Edinburgh was first amongst the top ten British cities in property consultant Lambert, Smith & Hampton Ltd's "Vitality Index," which examines the prospects for economic growth in urban centres. Cardiff entered the top ten at number eight for the first time. Growth in

both Edinburgh and Cardiff has resulted in some overheating of peak hour demand for road space and public transport services.

Table 7.1 Networks Development Summary: Low Integration Networks				
Country	Integration Category	Network Description	Physical Constraints	Conurbations
Scotland	Low: UK, Scotland, and regional delivery. Road and rail network density low, excepting the Central Belt where there is medium rail and road density. Low level of co-ordination of public transport services and tariffs	Low density and level of redundancy in road and rail networks except in the Central Belt where it is medium	Medium: Mountains. The highly populated and undulating lowland Central Belt plateau is bordered to the north by the Highlands and to the south by the Southern uplands	Major conurbation centred on the Central Belt with a concentration of transport facilities, particularly motorways
Wales	Low: UK, Wales and regional delivery. Low rail and road density, excepting south Wales cities and the Valleys where there is medium rail and road density. Extensive 'South Wales Metro' system based on current 'Valleys Lines' under construction. Low level of public transport service and tariff co-ordination but Welsh Government implementing plans for national bus-rail service co-ordination and tariff integration	Low density and level of redundancy in road and rail networks except in south Wales where it is medium	Medium-Mountainous central core penetrated by populated river valleys. Main settlements in southern valleys and on coasts	Major conurbations centred on south Wales cities and Valleys with concentration of transport infrastructure and services, particularly roads

Part 3 Transport Integration Networks Comparisons and Conclusion

7.7 Transport Integration Networks Comparisons

All European countries experienced selective cutbacks in their rail networks during the twentieth century. Veenendaal (2001, p. 198) noted that many lines in the north and east of the Netherlands were replaced by buses as early as the late 1940s and early 1950s. However, in most cases the need for, and importance of, rail transport as a mode was not brought into question in the Netherlands, Switzerland, Catalonia, and most other European countries. Programmes of modernisation, usually coupled with electrification, and some new main line railways, were the European norm.

Consequently, it should be noted that Ireland, Scotland and Wales are outliers in that they experienced very extensive railway route closures in the 1960s and 1970s prompted by increasing competition from road hauliers and mass motoring for individuals. Government policy responded to this demand by a philosophy of 'predict and provide' in road building which further undermined rail transport and triggered an elusive search for a profitable core railway. The British Beeching rationalisation included main lines and secondary cross-country routes considered to duplicate other routes, as well as branch lines. In the Republic of Ireland, the Beddy report (Irish Government, 1957) had already recommended a drastic reduction of the railway system, especially of rural branches. The report's recommendations were implemented excepting the Mallow to Waterford cross country line linking Cork with Rosslare Harbour, it left the main line and cross-country structure broadly intact. In Northern Ireland the Ulster Transport Authority proved to be anti-railway and left only the five routes open from Belfast to Newry and through to Dublin, Bangor, Larne, Portrush and Derry / Londonderry.

7.8 Conclusion: Transport Networks Comparisons

To start to answer the research question laid out in the Introduction, Section 1.2, a criterion by which to assess transport systems was formulated, shown in Chapter 2, Section 2.7. Using this, the past three chapters have described the six national systems which were selected. These reflect different patterns of historical

development, and varying levels of political, economic, technical, and administrative commitment to plan, finance, construct and maintain transport systems for the good functioning of their economies and societies.

The two highest transport integration networks, Switzerland and the Netherlands, both have origins that were financially and politically difficult and constrained by the Alps in the former case, and by deltas, rivers and waterways in the latter case. They prove that it is possible to develop networks in difficult and / or sensitive environments if there is political will to do so. Consequently, both countries have well integrated transport networks which are at the heart of their wealthy national economies, and which display high levels of integration and redundancy.

Catalonia and Ireland, the medium integration cases, are different and display networks that are acceptable but which, with greater political will, could be more effective and better value for money for their economies. The physical nature of Catalonia is mountainous and constrained, whereas in Ireland the main transport routes operate in easier geography. Both countries have highly developed road networks, and in the case of Ireland a new motorway system. Railways are an important transport component in Catalonia, but less so in Ireland outside the Greater Dublin region. Although, as well as expanding the DART system, the electrification of the main lines to Cork, Galway and Belfast (Railway Gazette International, 2018) has been proposed. Integration and redundancy are less advanced than in Switzerland and the Netherlands but better than in Scotland and Wales.

Consequently, from the socio-economic and transport network evidence presented in the past four chapters it appears that there is a positive answer to the research question, and that an integrated transport system could indeed assist in addressing Wales' problems of poverty and deprivation, and low economic development.

In the following Chapters 8, 9, and 10 a range of data generated by the research questionnaire and semi-structured interview schedule is presented and discussed in relation to the research question and the current situation in Wales.

Chapter 8: Transport Policy in Wales

8.1 Introduction

The Welsh Government's transport policy formulation and project funding processes are key in the development of integrated transport in Wales. However, as was outlined previously, in Chapter 1, the governmental delivery structures for Welsh transport policy and operations have varied considerably during the current century. Marsden and May (2005, p. 786) in their study "Institutional Arrangements and Transport Policy" conclude that:

"There is evidence to support the idea that changes in organisation and responsibilities do negatively affect the ability to deliver policy as new relationships are formed and new powers are taken up. The costs of such disruption need to be fully justified by the benefits of the institutional changes proposed."

Both rail and bus policy are still in a state of flux after a considerable length of time and the instability engendered by this situation was reflected by some of the responses received. It is to be hoped that both the Welsh and United Kingdom governments will provide more stability in these areas.

The following three chapters are relevant to the research question because they ask how stakeholders view aspects of transport policy, poverty and deprivation, and economic development in the country, and if there is a demand for a more integrated model of transport governance and operation. It has previously been established in chapter 4 that there is empirical evidence that transport investment does contribute towards economic development (Johansson, 1993) (Ozbay et al., 2003), and in chapters 4, 5, and 6 that the countries with higher level of transport integration had higher levels of GDP and GVA. The following questionnaire and semi-structured interview-based research investigates whether respondents feel that better transport in Wales would improve socio-economic outcomes here. Jopson et al. (2003, p. 163) comment of transport policy instruments and strategies that:

"Implementation practice is also an area in which there is relatively little evidence-based research."

8.2 Transport Policy and Project Funding Documents

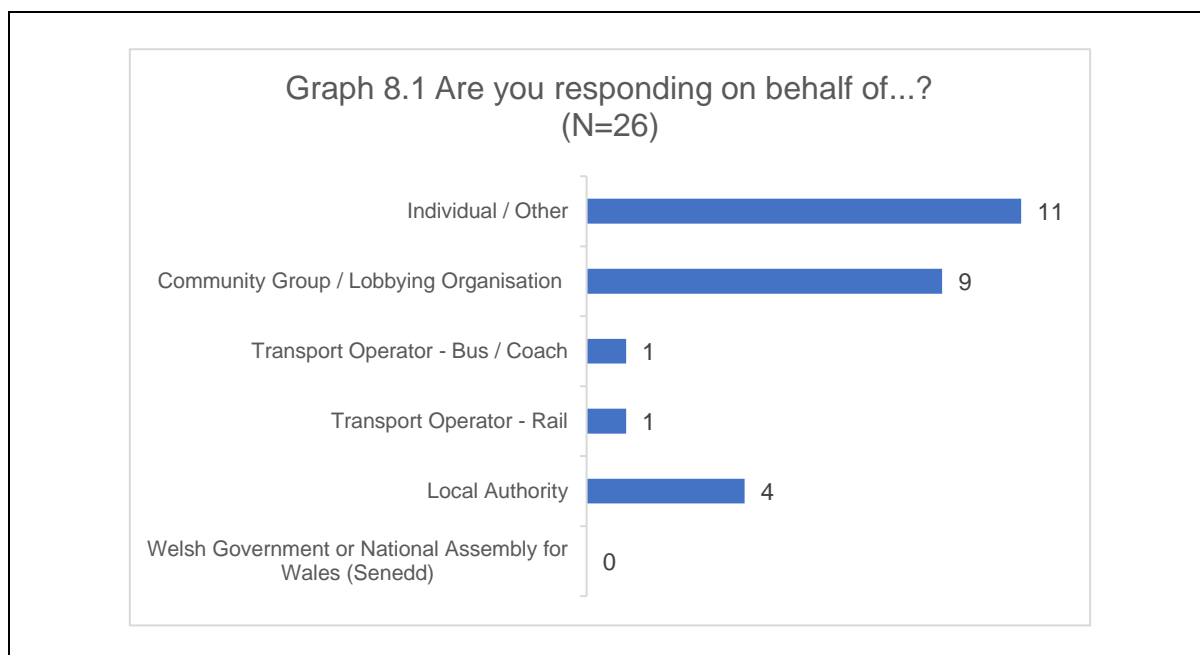
To gain some visibility of this field, the questionnaire elicited stakeholder respondents' views on Welsh Government transport policy and project funding application guidance, also models of public transport provision, the extent to which poverty and deprivation was a professional concern to respondents and which indicators, if any, they used in their work. It then moved on to which factors respondents considered to be relevant to economic development, and their opinions about the ten factors used in the questionnaire, their opinions on identifying transport challenges and solutions, and other issues that respondents wished to raise.

The semi-structure interview schedule covered these areas, except for transport policy as none of the interviewees were directly involved in the project bidding or consultation processes. However, in chapter 9 the interviewees made relevant responses through the lens of how transport initiatives can promote economic development, rather than from the point of view of responding to and participating in transport policy.

Respondents were asked "Are you responding on behalf of ... Welsh Government or the National Assembly for Wales?, A local respondents authority?, A transport operator (Rail, Bus or Coach)?, A community group / lobbying organisation?, or as an individual / or other description?"

The categories were intended to cover all the possible groups that a respondent might belong to, and to determine in the analysis of the questionnaire if there were significant differences between the views of respondent groups. Some respondents self-identified their own category, this produced some unexpected decisions that informal 'follow-up' discussions revealed to have two main motivations. The six respondents self-identified as an 'individual / or other description' either preferred to represent their own views, rather than that of their organisation, or said that they were unwilling to publicly criticise aspects of the Welsh Government's transport policies and / or project funding processes; in both cases this was despite my assurances that responses are anonymous and unattributable.

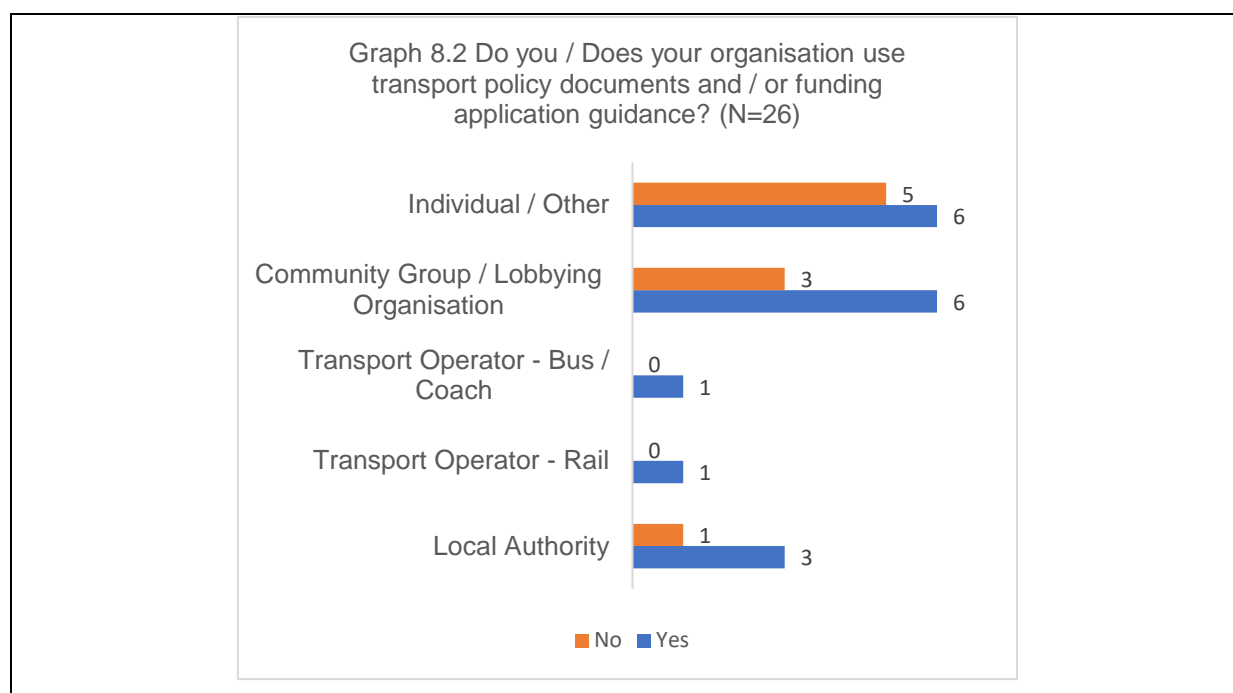
During analysis of the data these six respondents were monitored to see if their responses varied widely from others in their 'expected' category, but this turned out not to be the case to a significant level.



Graph 8.1 shows that Individual / Other category respondents formed 42.3% of all respondents, Community Group / Lobbying Organisations 34.6%, Transport Operator - Bus / Coach 3.8%, Transport Operator - Rail 3.8%, Local Authority 15.4%, and Welsh Government or National Assembly for Wales (Senedd) 0 %, all percentages have been rounded. This latter result was because respondents self-selected their own respondent category. This resulted in one Welsh Government / National Assembly for Wales (Senedd), one local authority, and four Community Group / Lobbying Organisation respondents self-classifying themselves in the Individual / Other category. Consequently, the Welsh Government or National Assembly for Wales (Senedd) category was excluded from the further tables.

The following questions asked respondents about use and attitudes towards Welsh Government transport policy and funding documents. May et al. (2003, p. 157) comment on the increased range of transport policy instruments which they suggest is due to the shift towards demand management policies (May et al., 2003, p. 158), as distinct from previous policies of meeting forecast demand, at least on the highway networks (Booth and Richardson, 2001, p. 141). Whilst this may be interpreted as an attempt by government to be more inclusive in its policy making, some respondents instanced their frustration at a lack of resources and expertise in their organisations to participate fully. May et al. (2003, p. 163) also comment that there is relatively little evidence-based work on policy implementation. The disquiet about the 'useability' and

effectiveness of policy and financial instruments registered by some respondents is an indication that this area is still a contested one.



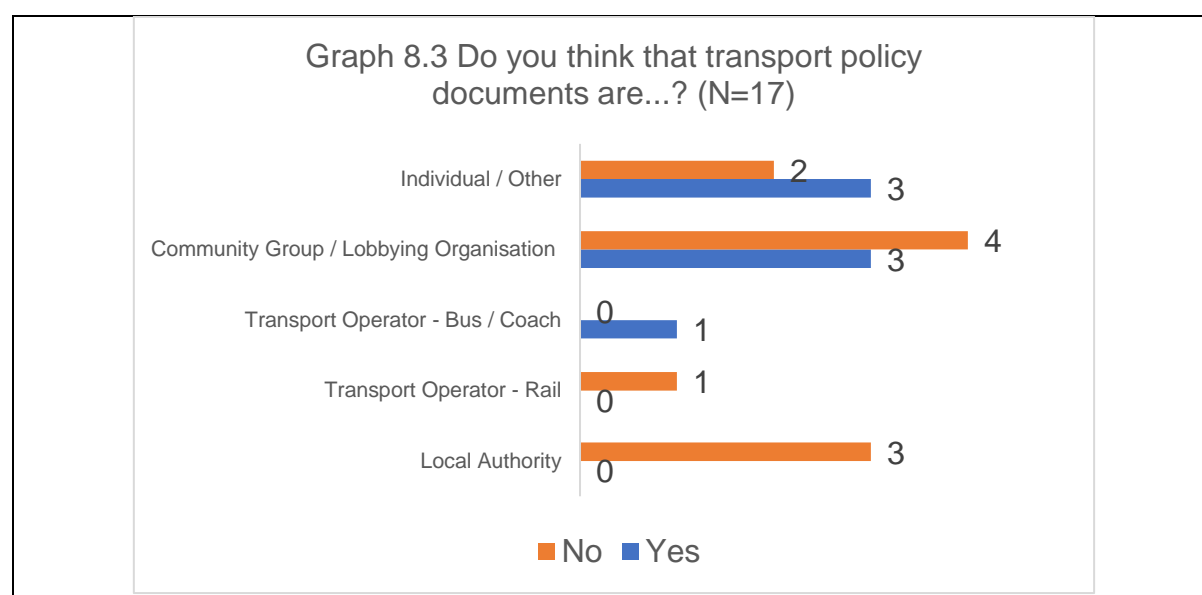
Welsh Government transport policy and project funding documents form the ‘gateway’ to major projects, and to the Local Transport Fund. This latter fund is important for smaller more localised integrated transport schemes, for example active travel routes, community transport services, and road ‘de-trunking’ schemes, where responsibility has passed from the Welsh Government to a county highways authority because of the opening of a bypass. The responses in Graph 8.2 were to a ‘sifting’ question. It was expected that Welsh Government / National Assembly and local authority respondents would almost certainly have had some experience of using transport policy documents and / or funding application guidance issued by government. It was thought likely that some transport operators and third sector organisations would have had some experience of these as well, but it was not expected that respondents in the ‘individual/other description’ category would have had.

The documents listed in the questionnaire were included because they form the basic ‘tool kit’ of a Welsh transport policymaker, planner, or funding applicant. The following paragraph was intended to give a nudge to respondents who might be unsure about this question:

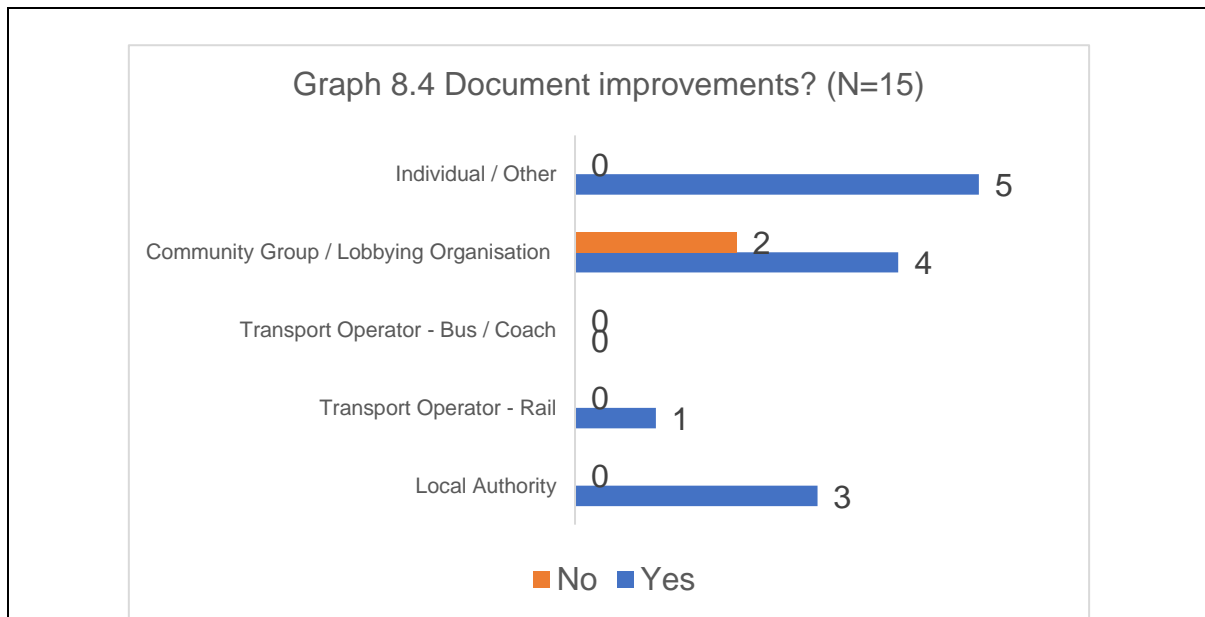
“To help you answer the next question I’m thinking about documents like: 1) ‘Wales Transport Strategy’ (Welsh Assembly Government, 2008a); 2) ‘Welsh Transport

Planning and Appraisal Guidance-WelTAG' (Welsh Assembly Government, 2008c); 3) 'Wales Transport Plan' (Welsh Assembly Government, 2010); 4) 'Active Travel (Wales) Act 2013,' (National Assembly for Wales, 2013); 5) 'Local Transport Fund Grant 2017-18 Guidance to Applicants' (Welsh Government, 2017d), and other relevant guidance, evidence base and impact assessment documents.”

It will be seen that most respondents, 65.4%, reported that they, or their organisation, used transport policy documents and/or funding application guidance issued by the Welsh Government indicating the importance of this suite of documents.



Respondents were then asked, “Do you think that the transport policy documents available are i) coherent, ii) up to date, ii) cross-cutting, and iv) provide a useful context and guidance.” Graph 8.3 indicates that of those who used the documents 41.2% of respondents thought they were useful in terms of the question, 58.8% disagreed.



Graph 8.4 shows that most of the respondents, 87 %, thought that the documents available were capable of improvements. Only 13 %, both from a 'community group/lobbying organisation,' did not think the documents available could be improved.

A majority, 65%, when asked to say how these documents could be improved offered views on this question. The main issues were around the lack of cross-policy integration:

"The National Transport Strategy does not mesh well with the National Transport Plan. The Active Travel Wales Act approach does not integrate well with wider transport strategies and seems to operate within its own bubble - the funding in particular seems to be an after-thought and is now being funded from within the wider transport grant pot. There is a lack of integration between Local Transport Plans and National plans - for the Local transport Plan, for example, local authorities were asked not to include any trunk road aspirations. There is a paucity of funding for local transport schemes, meaning that aspirations fall far short of the goals, and therefore a general "dubbing down" of transport provision." (Local Authority Officer)

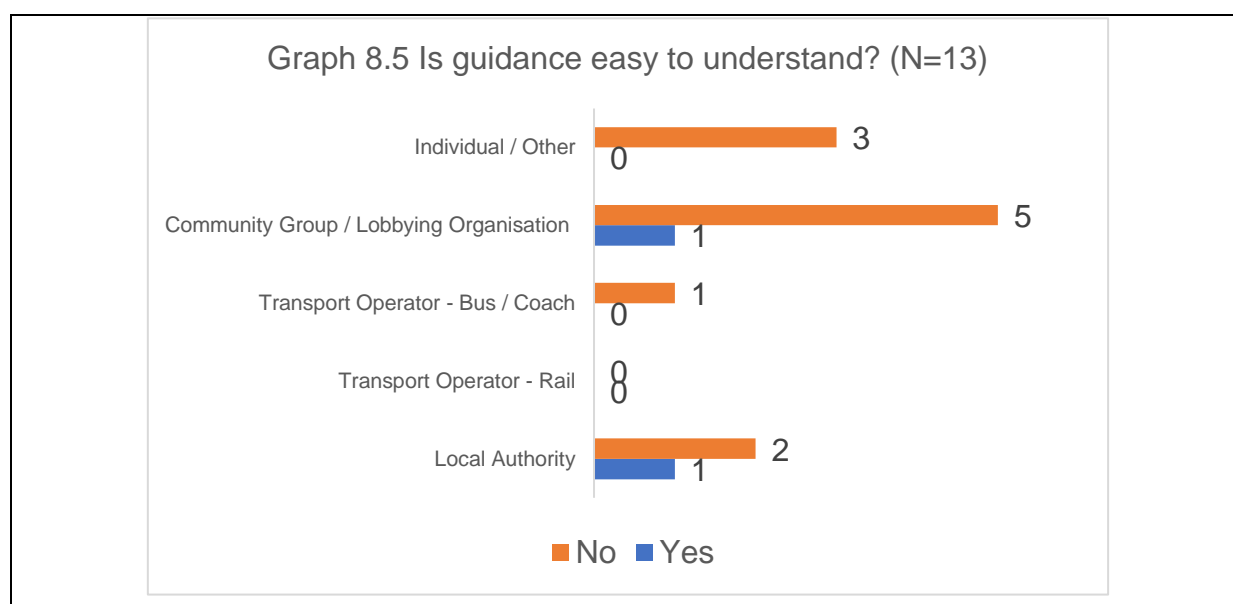
Another respondent commented:

“There should be cross departmental consistency so that the wider benefits of transport can be integrated across health, regeneration, economic development.” (Unidentified)

Concern was also registered about the ‘usability’ of the document suite, and a perceived tendency to prioritise certain types of mode over others:

“Documents are not very accessible / easy to understand for general users, and therefore many of our members. In addition, documents often forget community transport and so the range of transport solutions are not included.” (Community Transport Organisation Officer)

“National Transport Framework and National Transport Strategy documents tend to focus on detailed programmes for road schemes, some rail and public transport and very little detail on Active Travel, despite clear overarching policy messages. This exacerbates the gap between central (i.e. Welsh Government) and local government policy statements and the delivery of schemes and projects on the ground which should support a balanced approach. This also means transport funding across modes is disproportionately skewed towards roads, though recent changes may be starting to address this.” (Rail Advocacy Group Officer)



Responding to the Graph 8.5 question “Do you find the guidance documents like the 'Welsh Transport Appraisal Guidance-WeITAG (Welsh Assembly Government, 2008c)' and the annual 'Local Transport Fund Grant Guidance to Applicants' easy to

understand?" Only 15.4% of respondents thought that bidding and funding processes for new or upgraded infrastructure were easy to understand, 84.6% did not. This response was replicated when respondents were asked, 'Are the processes they set out easy to follow and implement?' In both cases five respondents said the question didn't apply to them.

Following on from the above question 46.2% of respondents said they thought that the processes was fair whilst 53.8% disagreed.

Asked how the process "could be improved / made fairer" respondents provided examples of why the current situation is unsatisfactory rather than suggesting improvements, although by inference these could be used to reform the process. One respondent was critical about the structure of WelTAG which, they thought, favoured larger projects. They were also critical of the way in which timescales and awards were implemented:

"The WelTAG is aimed at large projects generally-and is not so suitable for some smaller transport projects. In addition, it does not reference the "5 case" business model process (i.e. the UK public sector's best practice process for business case preparation). The timescales for submission of bids is very short, and in the past, awards have been very late, impacting on ability to deliver in a timely way - none of this is particularly fair. There is not that much transparency around the bid review process. The annual bidding process and lack of 3 to 5 year programme, as well as complete paucity of funding, makes it difficult to come up with anything longer term or more visionary." (Local Authority Officer)

Another respondent who had experience of supporting railway re-opening projects believed that the process privileged the highways mode over rail projects:

"The WelTAG 1 process was deeply biased in favour of a transport strategy originated in Ceredigion County Council. The building of new roads, the revision of bus services and the 'do nothing' option were favoured over rebuilding the railway and without any justifiable financial justification. The process was obviously the result of a box ticking process rather than a serious look at the options. As a result, the option to rebuild the railway was not recommended for WelTAG 2 whereas the other un-costed projects were recommended to go forward to the second stage." (Rail Advocacy Group Officer)

A perceived bias in favour of areas with higher population densities was also a concern:

“Much of the assessment favours population numbers...currently working on a more detailed appraisal framework, which would rebalance investment across the whole of the UK.” (Rural Development Consultant)

Such a bias is understandable in terms of policy implementation and the value for money of interventions, notwithstanding the argument that transport poverty can often have deeper effects in areas of low population and deep rurality.

The issue of the appropriateness of what the planning system produces was also raised:

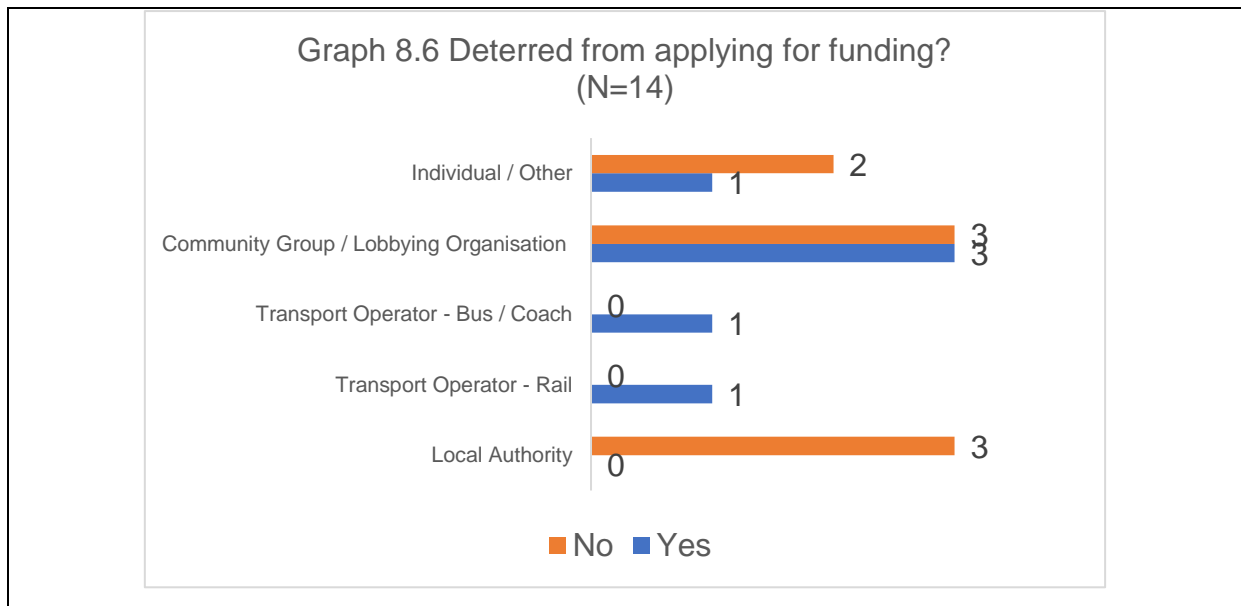
“Planning policy is too driven by housing targets and standardised models of delivery. The whole system needs to be more flexible in approaching land use planning to suit the needs of people, with appropriate local services and amenities.” (Individual / Other)

It was also suggested that project consultations should be conducted:

“within (the) community it serves.” (Third Sector Officer)

Although in consultations on project proposals Welsh Government makes considerable efforts to engage the local population it may be that this respondent's comments were prompted by an unsatisfactory experience at some stage.

This finding was of considerable import if applications for local interventions to contribute to transport integration were to be encouraged, and not just proposals for large schemes. Active travel and community transport initiatives are precisely the type of interventions that can integrate communities with existing transport services.



In the light of criticisms made about the complexity and opacity of the process when asked “Has your organisation been deterred from applying for government funding by the bidding or reporting processes?.” Graph 8.6 shows that 42.9% reported having been deterred from applying for funding. However, 57.1% had not been deterred. Unsurprisingly 75% of those who hadn’t been deterred were from the ‘local authority’ and the ‘community group / lobbying organisation’ categories both of which would be expected to have more familiarity with the process.

Regarding the reasons for being discouraged from applying for funding respondents instanced the complexity and demands of the process:

“The organisation has not been deterred but some of our members have been. The organisations we represent are small, community organisations which can be put off by complex, bureaucratic funding processes.” (Third Sector Officer)

“Our experience has been that any funding received from WG is so demanding of irrelevant information and non-essential requirements for statistics etc. that have little or no relevance to the grant.” (Local Authority Officer)

Whilst it may seem to an applicant that the process is onerous, Welsh Government has responsibility for assuring the appropriate assessment of applications and effective disbursing and tracking of funds. Across the country this amounts to very substantial amounts of public spending. However, respondents certainly thought that the bidding, funding, and reporting processes could be improved with 100 % supporting this proposition. The open question “please briefly say how it could be

improved?” prompted twelve responses. Respondents were critical of the timescales allowed, the design of the process and language of documents, the lack of transparency of the process and the lack of resources available for processing applications:

“There has always been a rush to get applications processed and returned. Deadlines are often unrealistic and there should be more consideration given to disseminating them to organisations well ahead of the deadline.” (Third Sector Officer)

“Suitable timescale for preparing bids - Base bidding process around 5 case model (NB: a standard public sector business case process³). Prompt and transparent feedback on bids. Allow sufficient resources so that bids have more chance of meeting aspirations. Develop a longer-term planning horizon. Allow for scheme development within bids, as well as delivery.” (Rural Development Consultant)

“Forms have not been updated holistically but added to piece meal. Many compulsory questions are not relevant and there is a lot of repetition.” (Local Authority Officer)

Some respondents questioned the efficiency of the annual bidding system which they believed to be inimical to obtaining contract efficiency and for allowing longer-term planning.

“The funding needs to be allocated for 5 years regionally, with outcomes results. Year on year bidding is not an effective use of resources and often project costs are more expensive, because of the need to issue contracts year on year for major schemes.” (Rural Development Consultant)

Summary: Most respondents had used Welsh Government transport policy documents and project finance guidance and a majority thought that they were capable of improvement. Respondents expressed concern about the lack of cross-cutting policy integration within the transport domain, one respondent suggested there was an bias towards road schemes, and a paucity of active travel schemes. It was also thought that the lack of cross-cutting policy integration was particularly marked in

³ Details in: <https://gov.wales/five-case-model-templates>.

areas that were outside the transport domain such as health, regeneration, economic development.

There were also concerns about the timeliness of the document suite, and its usability and accessibility, particularly for non-professional users; and a perceived tendency to prioritise certain transport modes over others. It should be emphasised that since the research was undertaken “One Wales: Connecting the Nation - The Wales Transport Strategy” of 2008 has been replaced by a revised version ‘Llwybr Newydd: the Wales transport strategy 2021’ (Welsh Government, 2021)

Comments suggest that some stakeholders struggled when making transport funding bids using the “Welsh Transport Planning and Appraisal Guidance (WeITAG)” (Welsh Government, 2008c) and the annual “Local Transport Fund Grant Guidance to Applicants,” although the procedure for smaller bids of less than £1 million has been simplified. There are also doubts stated about the fairness of funding allocations across the regions. Some third sector organisations expressed the view that the process is too time and resource heavy for them.

8.3 Transport Consultations

Consultations are an integral part of the transition towards transport integration. They are measures of the realism, acceptability, and ability to fulfil the policy and processes required for integration. Welsh Government consultations are of three types. Firstly, consultations on focussed interventions, for example town bypasses, that have a local and/or regional audience. Secondly, there are consultations on transport policies, such as the “National Transport Plan,” which are national in character. Thirdly, from time to time, Welsh Government undertakes a form of market testing to assess if methods of project assessment, such as WeITAG, and the way in which consultations are carried out, are considered acceptable and appropriate.

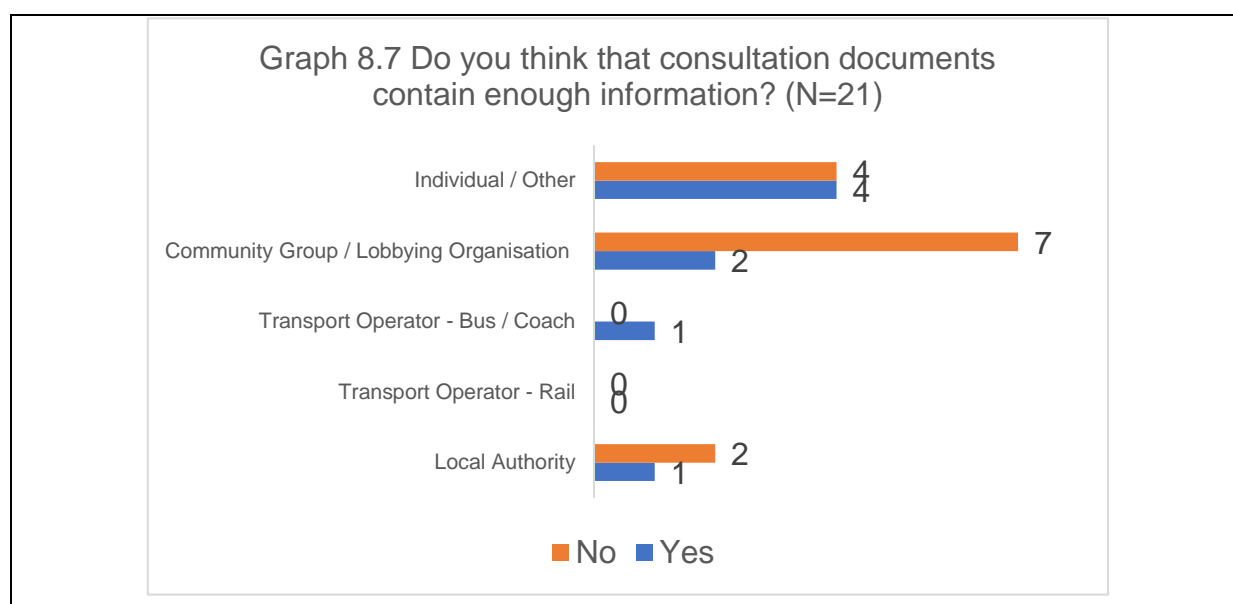
The next tranche of questions asked about the content and process of consultation. Booth and Richardson (2001, p. 141) date increased concern with consultation, and the legitimacy of policy and strategies in the area, back to the local transport plans of the late 1990s. The now defunct UK Department of the Environment, Transport and the Regions instructed that the new powers of local authorities:

“be used as part of clear transport strategies that have the backing of local communities” (DETR, 1998, chapter 1).

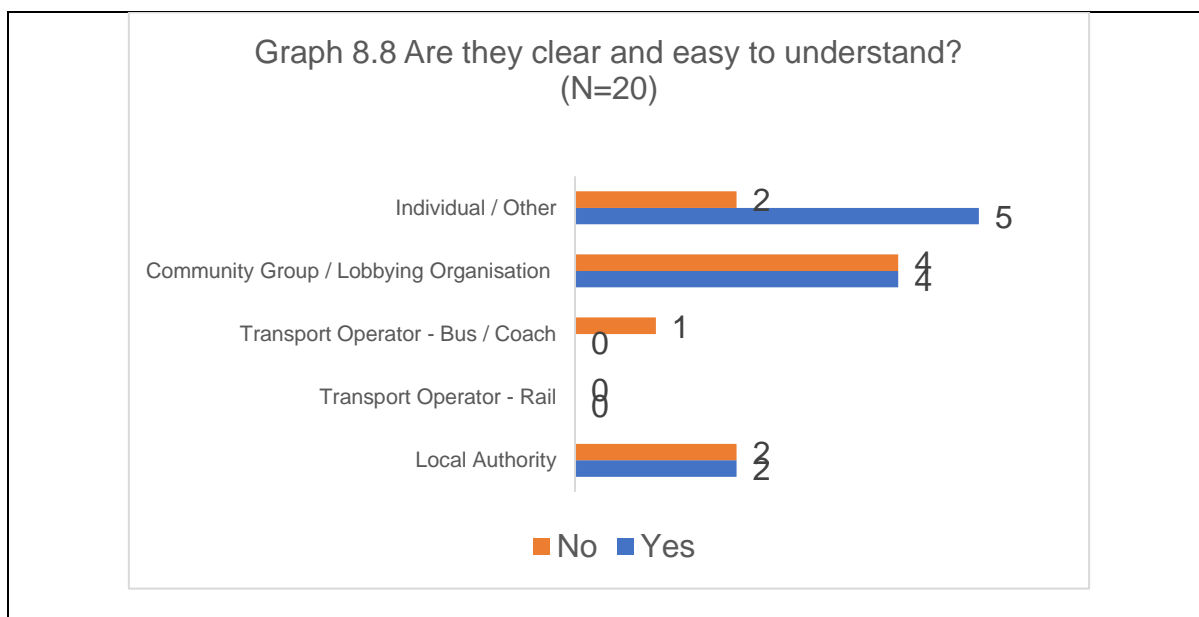
Booth and Richardson (2001, p. 149) conclude:

“But the wave of public consultation which has accompanied the new LTP framework has yet to be seen to move convincingly away from the top-down approach. At present, inclusivity is not being created: rather, exclusivity is being redefined.”

Twenty years later this is still a controversial issue which frequently depends on the personal expectations and past experiences of the consultee, and/or the corporate expectations and experiences of the organisation being consulted. Sometimes people feel that government consultations are skewed to obtain acceptable responses in that they seek to control the extent and depth of discussion through the type and amount of information provided, the language used, the questions asked and the modes of response. Another reaction is that consultations are rushed out and that response times are too short for organisations to involve all of those with relevant responsibilities in formulating the response. This series of questions was intended to test if these opinions had any basis, and if there was a feeling amongst respondents that the Welsh Government’s consultation processes needed to be reformed.



Graph 8.7 shows that only 38% of respondents thought that Welsh Government consultation documents contained enough information whilst 62% disagreed.



Graph 8.8 demonstrated that a majority of 55% found that the information included in consultation documents was clear and easy to understand, whilst 45% did not. A majority were also satisfied that they were encouraged to give their views fully and that the response times allowed were acceptable. Despite the relatively high levels of satisfaction expressed most respondents thought that the consultation process could be improved, and when asked “how could improvements be made?” A third of respondents made comments. As with the Local Transport Fund applications some felt that the amount of time allowed for responses was a concern and that the scope of consultations was too limited:

“More run up time allowed and with realistic deadlines.” (Local Authority Officer)

Some felt that consultations were structured in such way as to produce preferred outcomes:

“Often, the consultations come with very structured questions to respond to (e.g. through an online form). These can be constraining and make it difficult to give a fully formed argument.” (Individual / Other)

Other respondents thought that they produced unrealistic expectations from consultees:

“The consultative events encouraged attenders to voice a huge and probably unattainable set of requests, whilst the related documents were very generic: how they can have been properly analysed & used to prioritise is anyone’s guess.” (Third Sector Officer)

There was also concern that consultations were not reaching the right constituencies, or that they could be reaching more appropriate ones:

“There are a lot more people and organisations with both expertise (be it academic or service delivery) who could and should respond, but either don’t because they are not aware of it or don’t have the time / manpower to respond.” (Third Sector Officer)

“The centralised governance on transport means that local needs may not be communicated through consultations as many will not have the resources to submit views. When there were regional bodies for transport views could be collectively discussed and priorities highlighted. There was local input and local schemes were delivered to local priorities.” (Rail Partnership Officer)

Summary: Although there seemed to be considerable trust and engagement with Welsh Government’s current consultation system there were also, sometimes contradictory, opinions that the system could be improved. Whilst it is acknowledged that the Welsh Government has made efforts to consult on improvements in both the consultation and funding processes, and has made progress in reforming the relevant documents, it is to be hoped that these will continue to be made more accessible, and widely available, to improve participation.

8.4 Models of Public Transport Provision

The final transport policy questions presented three models of public transport provision. These questions were intended to test the preference for:

- Free-market *laissez faire* solutions
- Complete integration on the ‘London model,’ as run in most continental cities and many rural areas where competition is not viable, or

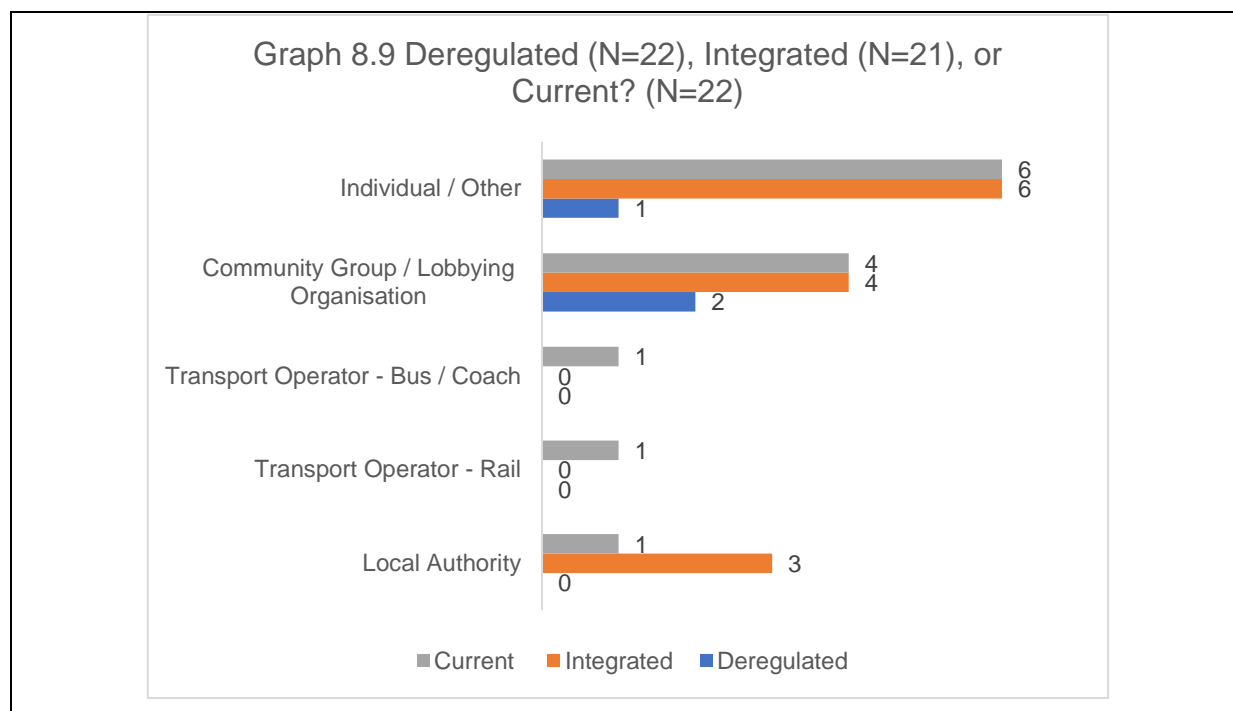
- The current public / private hybrid of models i) and ii). This model involves public authority regulation, and service funding in some cases, and has evolved as the drawbacks of the minimally regulated model became apparent.

These questions were also to investigate the prevailing orthodoxy in transport planning circles that integrated systems are the most effective in terms of convenience and performance for passengers and provide the best value for money for policy makers and transport planning practitioners. For example, there is evidence that co-ordinated public spending on small scale public transport schemes such as bus quality corridors, bus priority schemes, bus stations and interchanges, real time bus information for passengers, park and ride schemes, etc. can generate a return of £3.50 for every £1.00 spent (Jacobs 2011, p. i).

A factor in the instability which British transport policy has experienced since the 1980s is due to the competing ideological positions as to how public transport should be organised and provided. Hull (2005) explains how this has extended to the lack of strategic planning across the fields of transport integration, sustainability, and land-use planning. From a medium level of integration between predominantly publicly owned road and rail modes the Thatcher and Major Conservative governments of 1979 to 1990 and 1990 to 1996 promoted free market responses to the need for mobility. This involved selling off the state and local authority bus and state rail assets in Britain and allowing unrestricted bus competition outside Greater London, except for operator and services registration and safety requirements, and support for non-commercial services where local authorities felt that these were necessary for social reasons.

Nevertheless, whilst public transport was being freed from public control the Department of Transport was still involved in motorway and trunk road interventions in support of what the then Prime Minister Margaret Thatcher called the “great car economy.” Those opposed to this approach countered that not only was it a waste of a range of resources, but it also made impossible the formulation of policies for using the transport system to achieve social and sustainability objectives through timetable and fares integration within and between modes. Organisations such as Transport 2000 (now the Campaign for Better Transport) and the Passenger Transport Executive

Group (now the Urban Transport Group) and writers such as Hamilton and Potter (1985) and Wolmar (2016) are key opponents of the free-market approach.



Graph 8.9 is a hybrid of three questions, showing the preferred options of respondents. They were asked: “Thinking about models for organising transport. Do you think the most effective delivery model for users / passengers is:

“Model i) A completely deregulated free market model where modes compete with each other? Model ii) A regulated and integrated system specified by a public authority? Model iii) A hybrid of models i and ii which is broadly similar to the current situation?”

When questioned if they favoured the minimally regulated free market model, in which modes competed, 13.6% of 22 respondents agreed this was the best solution. A regulated and integrated transport system specified by a public authority was supported by 61.9% of 21 respondents. Asked if a hybrid of models i and ii, broadly similar to the current situation, would be preferable 59% of 22 respondents preferred this option.

Questioned as to why they responded as they did there was one comment supporting the free market deregulated option:

“As long as operators provide the best service that is integrated and reliable for the customer that is all that I think matters.” (Transport Operator)

Another comment was more qualified:

“There are some examples in public transport, where bus routes can operate on a market led basis and no need for subsidy; however, this does not always work, so some degree of oversight is needed.” (Local Authority Officer)

Support for regulation and integration focussed on the perceived failure of the current hybrid system:

“Mae angen cael trosolwg clir / di-duedd I gyd-drefnu.” Translation: “There is a need to have a clear / unbiased overview to co-ordinate.” (Local Authority Officer)

“Providing effective integration through a competitive, business-led approach (i.e. the current public transport provision models) is not effective, as there is no incentive for the operators to integrate their services or offer cost-effective travel options. An effective integrated transport system needs to be run on a non-profit basis to ensure all modes are considered equally and create a people-focussed system.” (Individual / Other)

“A fully organised transport strategy would see all transport options as important. In particular, the road network is expensive to maintain and is dangerous. The cost of accidents between Carmarthen and Aberystwyth in 2010 to 2015 was over £10 million per year (figures from Dyfed Powys Police).” (Rail Promotion Group Officer)

This latter comment draws attention to the external costs that are generated by the current system, and which it fails to take into account.

Of the 19 ‘free’ responses received, 26.3% specifically said that the current model wasn’t working. The evidence provided by respondents indicate a feeling that the current hybrid system of public transport provision fails to integrate modes, that it does not take account of externalities like the need to maximise road safety, that private transport providers / contractors are more focussed on profits than providing a service to the public and that they are prone to market failure; there have been a number of

bus company failures/service withdrawals in Wales that have left communities without public transport for extended periods:

“The current hybrid has failed to deliver what communities need, especially in rural areas.” (Local Authority Officer)

“The current model doesn't work. Locally we have lost two major commercial bus operators almost overnight. Communities have been left cut off with no provision. Bus and rail operate in silos.” (Local Authority Officer)

“The current system results in lack of integration between transport modes and operators which results in public transport users not having the best possible range of services, thereby resulting in less use of public transport than would otherwise be the case.” (Third Sector Officer)

“The current situation doesn't work. Private companies are only interested in making money, rather than providing a public service for the people who need to use the service.” (Local Authority Officer)

“The existing hybrid market is currently failing with companies folding. Open market would only operate in profitable urban areas thus penalising residents in rural areas.” (Individual / Other)

The responses to these questions indicate that a totally free market solution to transport provision is the least supported option. The current hybrid model and the full integration options were both supported by thirteen respondents, although the latter had a slightly greater percentage support because of different response rates to the individual questions.

In a question mirroring the previous one respondents were asked which of the three models they thought was “the most financially and policy effective model for government ...” This produced one less response in favour of a free market, unregulated regime than when asked if this was the best option for users / passengers at 10% out of 20 responses.

Of those believing that a regulated and integrated system specified, by a public authority, was the best outcome for government 68.4% out of 19 respondents favoured this option as being the most financially and policy effective model.

A hybrid of models i and ii, broadly as per the current situation, was thought to be less effective for government and finances, although it had marginally been the most favoured option for passengers / users. It was the most favoured option for 64.7% out of 17 respondents.

When asked why they thought as they did 19 responses were registered. One response specifically supported competition, either 'on the road' or through tendering services:

“By involving the private sector, the potential exists to bring competition (either in terms of services or tendering) which should help deliver value for money.”
(Individual / Other)

Respondents made points about the role of politics, and ideology, in the area:

“The variable you have excluded is 'politics' which, in reality, trumps everything else ...” (Local Authority Officer)

There was a lack of consensus as to how delivery should be achieved, and some feeling that one model fits all was not a route to go down, particularly in the case of the urban / rural split, and that perhaps there needed to be more innovation in service delivery. As there was a concern about lack of integration both within modes, and between them, in general respondents supported at least a measure of regulation by public authorities, although there were questions over what those authorities should be. Four comments were made that in view of continuing austerity in the public sector, this was prior to the 12th December 2019 general election, there were external benefits from the integration and regulation approaches that hadn't been captured, and these needed to be in order to justify it:

“The question is a bit leading I feel. The fundamental challenge is how to achieve 'personal and public good' in a time of protracted austerity. There will never be a period of public sector funding because there is no political or public consensus that this is a good idea. If funds are going to be permanently restricted, more inventive approaches need to be developed: e.g. public funding

for charitable transport schemes which volunteers or personal independence transport payments; or subsidisation of private sector companies.” (Local Authority Officer)

More hard-line responses, and those with experience of private sector operator failure, suggested that:

“Policy objectives should take precedence to give users the service they need.” (Local Authority Officer)

“Mae'r profiadau diweddar yng Ngwynedd wedi dangos y risgiau sy'n bodoli wrth ddefnyddio cwmnïau preifat. Cwmnïau wedi bod yn cymryd mantais o'r system pas bysiau ac wedi colli eu trwyddedau. Dros y blynyddoedd mae cwmnïau preifat wedi bod yn cystadlu yn erbyn ei gilydd nes gorfodi y cwmni gwanaf i roi'r gorau i'r gwasanaeth - cyn cymryd drosodd ac mewn ychydig cynyddu cost tocyn. (Son am ardal Bethesda). Mae nifer o ardaloedd difreintiedig nad ydynt yn cael gwasanaeth rheolaidd gan y system bresennol.” Translation: “Recent experiences in Gwynedd have shown the risks that exist in the use of private companies. Companies have been taking advantage of the bus pass system and lost their licenses. Over the years private companies have been competing against each other until they forced the company to stop the service - before taking over and in a little increased the cost of a ticket. (They are around Bethesda area). There are a number of disadvantaged areas that do not receive a regular service from the current system.” (Local Authority Officer)

Finally, there was support for Welsh Government, or its new planning and delivery agency, Transport for Wales to lead on an integrated system:

“We will never get a fully integrated public transport system in Wales (or the rest of the UK) without overall control by (in our case) the Welsh Government (not the counties, as that would lead to a fragmented approach, as happens at present in respect of local bus services).” (Individual / Other)

“Governance of an integrated system needs to allow central and local government a considerable level of control over delivery. This would be best

vested in an overarching transport body for Wales, Transport for Wales being the obvious candidate currently.” (Individual / Other)

Summary: Most respondents thought that either a regulated and integrated system specified by a public authority, or a version of the current public / private hybrid system were the best outcomes for passengers; there was little enthusiasm for unregulated free-market models. The most financially and policy effective model for government was also thought to be the fully integrated model, or a version of the current hybrid model. Again, there was minimal support for unregulated free-market models.

8.5 Identifying Transport Challenges and Solutions

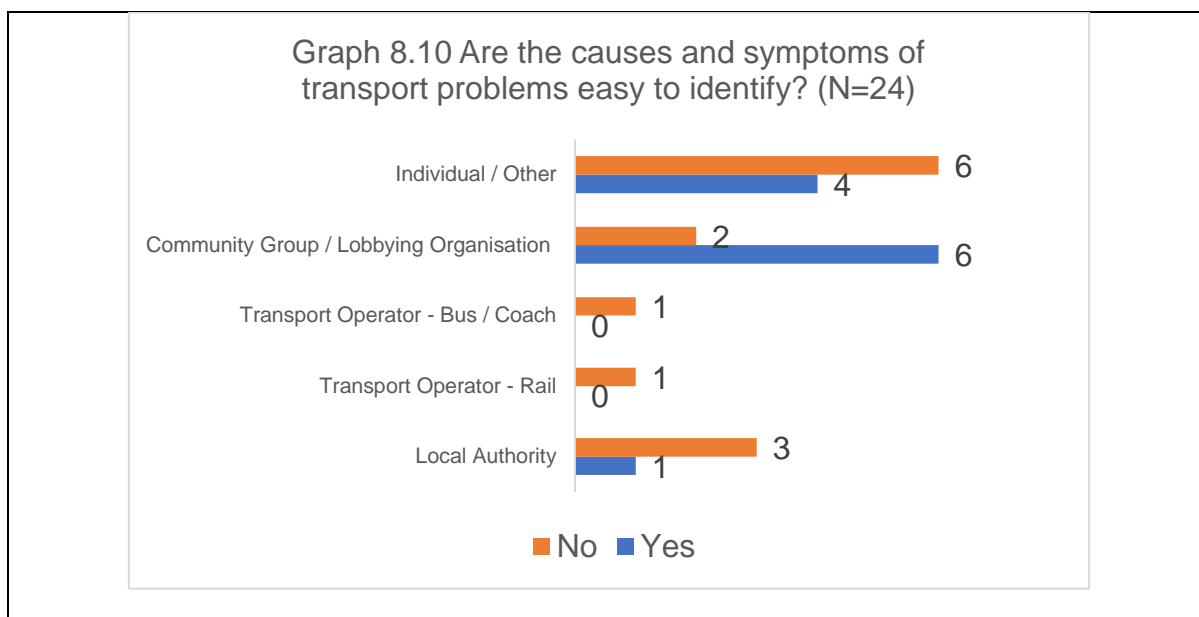
This section was intended as an opportunity for respondents to voice their own thoughts about Welsh transport services and the prospects for their development. It was expected that there would be some variation in comments to the open questions depending on the respondent’s area of concern, region and whether their location was rural or urban.

There were a number of responses to the question: “In a few words what would you say are the key problems facing the development and provision of transport infrastructure and services in Wales?” The replies below are typical of the concerns expressed by respondents which centred on financial issues, regional disparities, issues of vision and co-ordination and the identification of needs.

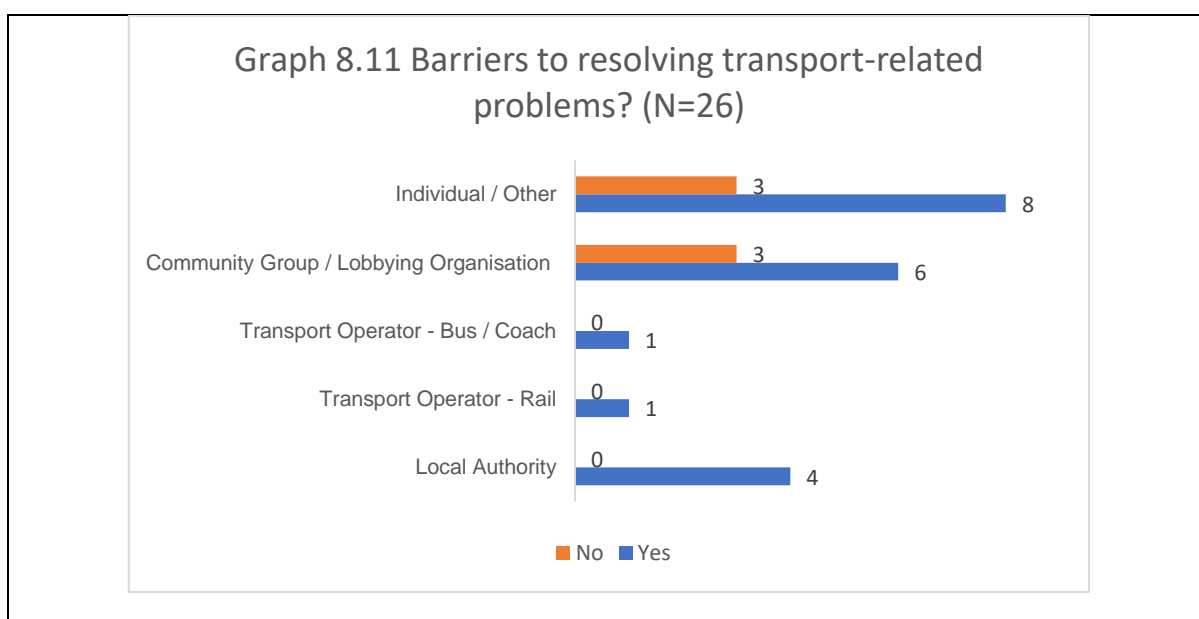
“No money. Topography. No clear vision on joining what, with, where and why?”
(Individual / Other)

“Lack of financial investment that is distributed fairly across all regions of Wales, Powys being the ‘poor relation,’ and a result, never being afforded the opportunity to achieve its full potential.” (Third Sector Officer)

“Agreeing priorities. Balancing the benefits north and south. Insufficient funds, insufficient expertise. Understanding that the real need may be to travel over the border into England. That growing capacity in Wales may not deliver benefits as there may be capacity constraints on or over the border.” (Rail Partnership Officer)



Graph 8.10 shows that when asked “Are causes and symptoms of transport problems easy to identify?” 45.8% respondents agreed and 54.2% disagreed. Most of the local authority and transport operator respondents thought that the causes and symptoms of transport problems were not easy to identify. Those answering “Yes” were asked to “briefly give examples of problems.” Their responses pointed to problems of infrastructure quality and quantity, the problems of serving a country with large ‘deep rural’ areas containing a small and dispersed population, and the political issues around obtaining sufficient investment for transport infrastructure and services.



As illustrated by Graph 8.11, 76.9% of respondents agreed that when asked “Are there barriers to resolving the transport-related problems that you encounter in your work?” 23.1% disagreed. On being requested to “briefly give examples?” they again instanced the issues of deep rurality and centralisation of services, the lack of integration of policies and service provision, and insecure and short-term funding.

Having asked about problems and barriers faced by respondents the final questions in this section asked about solutions and opportunities: “Thinking about possible solutions to transport problems ... Do you think that there are solutions 'out there' that you think could help break down barriers to solving the transport problems that you face? e.g. econometrics, information technology, mathematical modelling, systems theory.” This was agreed by 100 % of the respondents. On giving examples not everyone who thought there were solutions were sure what they were:

“Yes, there must be solutions out there. What do other countries do? Are there examples of good practice we can emulate? Will self-drive hydrogen powered road vehicles make rail and bus unnecessary?” (Third Sector Officer)

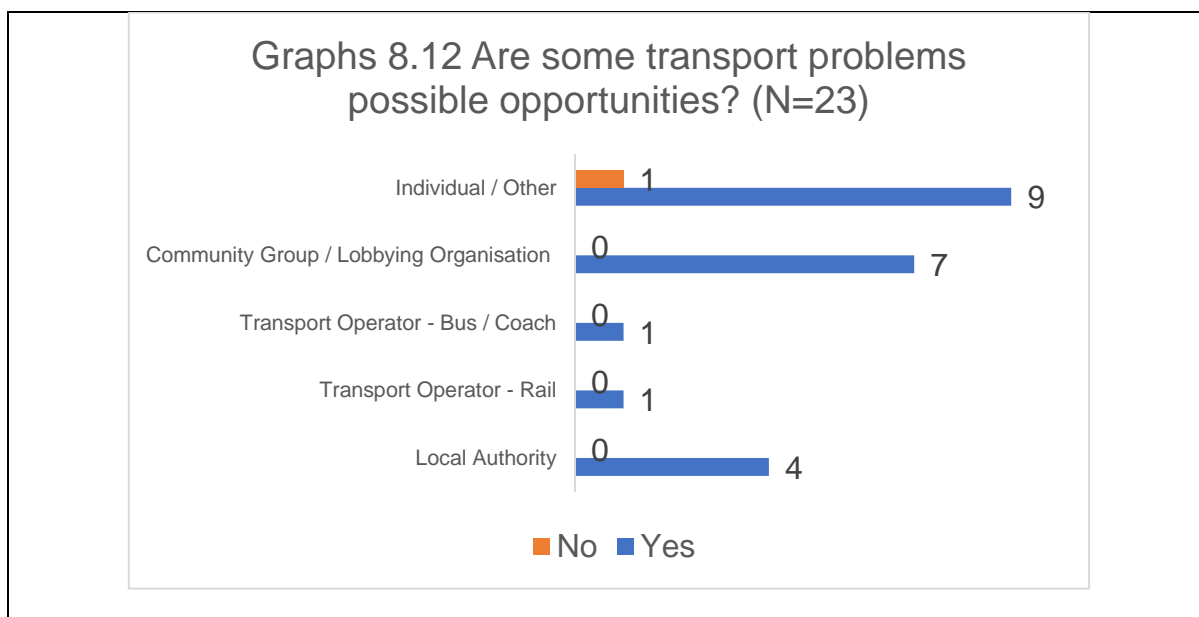
“Not sure. We need alternative models in rural areas - Bwcabus (NB: A demand responsive bus service operating in Ceredigion) is one. The most important thing is to develop the most appropriate model and then bring the technical methodologies to bear on its development.” (Local Authority Officer)

However, others were clear about what was required:

“Give Welsh Government powers to specify all public transport and resources to fund improvements adequately.” (Rural Development Consultant)

“Effective spatial planning linked to land use and modelling for all transport modes. Effective pre and post monitoring of transport interventions to understand the true impacts of projects on economic development and growth.” (Public Transport Promotion Group Officer)

“Greater use needs to be made of data to help inform decisions. Transport for Wales is starting this work and once its models for each region of Wales are complete, it will give a better picture as to how we travel in Wales. There’s also a need to reflect upon appraisal criteria to reflect the climate emergency.” (Individual / Other)



When asked “Are some transport problems possible opportunities?” Graph 8.12 indicates that 95.7% agreed including all local authority and transport operator respondents, with 4.3% disagreeing. There were 16 responses to the request “If ‘YES’ please briefly tell me about them.”

“Yes - to do things differently. Welsh Government could be more proactive and defined in what they are trying to deliver.” (Third Sector Officer)

“All transport problems provide an opportunity to holistically revisit the placemaking agenda and enable us the opportunity to rethink what we want the places we live and work in to look like.” (Local Authority Officer)

“Opportunities to work differently, meaning people spend more time closer to home which would benefit the family, local community, and the individual.” (Community Transport Organisation Officer)

A small majority of respondents disagreed with the question ‘Are the causes and symptoms of transport problems easy to identify?’ Those who thought that the causes and symptoms of problems were not easy to identify instanced a complex of issues which included poor road and rail infrastructure, the recurring issue of deep rurality in much of the country, and the late start and shortage of time and money in addressing Welsh transport issues. All respondents to the question said they experienced barriers

to resolving transport problems in their work. Again, deep rurality was raised together with the centralisation of services, and insecure and short-term funding.

Summary: All respondents thought that there are solutions to breaking down barriers 'out there' although some were unable to say what they are. Others suggested that Welsh Government should specify and fund transport services, that there should be effective integration of spatial and land-use planning with transport planning for all modes and that there should be greater development and use of data in transport planning.

Finally, a majority of respondents thought that some problems are opportunities. Welsh Government being more proactive and defined in transport delivery, and revisiting and developing the placemaking agenda (with a switch to localism involving people working locally, or at home) were raised as examples.

8.6 Other Issues Raised

This section was intended to give respondents the opportunity to raise any concerns or problems they had, in view of what had been previously asked and discussed. The questions were in line with the commitment towards action research, to not just ask questions, but also to invite respondents to express their views and reactions and for the researcher to learn from them.

On being asked "Are there any particular concerns or problems you would like to raise?" ten respondents had comments to make. The eight quotations below cover opinions on cross-discipline working, cross-border links, the continuity, appropriateness and flexibility of transport integration plans, the effects of existing policies and implementation strategies and funding cuts, and finally the issues of service quality and co-ordination:

"Joined-up working has to happen. I think across business, retail, education, transport and housing. Economic activity is a driver for higher revenues and if this cannot be achieved then there is a problem. It happens through integrating approaches to the above." (Individual / Other)

This respondent went on to observe that there are two main aspects to economic growth, aggregate demand (i.e. consumer and government spending, investment and exports-imports) and aggregate supply (i.e. productive capacity, efficiency of the economy and labour productivity). In a list of twelve factors for improving aggregate demand the importance of public spending investment to improve infrastructure is identified. Other respondents were concerned about planning continuity, links across the border to England and the need for regionally differentiated transport planning and appraisal policies within the country:

“Continuity. We need a long-term vision that fits in with our neighbours in England. Wales cannot work or plan alone.” (Rail Partnership Officer)

“Unlike Scotland, economic activity in Wales is more closely connected to England and therefore decisions on improving transport within Wales need to reflect the broad ‘travel to work area.’ Also, the requirements of rural Powys are very different to those of the Cardiff City Region. Therefore, a one size fits all approach to transport planning and appraisal may well not be effective in Wales.” (Individual / Other)

This latter concern was reflected by another respondent who complained of:

“Too much ‘centralist’ linking and not enough collaborative working with people who have detailed knowledge of their local area.” (Local Authority Officer)

Two respondents thought that existing policy and implementation behaviours and funding cuts had taken Welsh transport to a crisis point:

“I think Welsh transport is in crisis and we have to stop doing the same things, hopefully that will fix the problem.” (Community Transport Organisation Officer)

“The most serious and growing concern is the year on year reduction in the funding for transport, across the board.” (Public Transport Promotion Group Officer)

Service quality and co-ordination were also of concern:

“The quality of the provision will have an effect upon the people who use the services / provision therefore quality is important to ensure returned usage.” (Local Authority Officer)

“Integration of service times between different (bus) companies ... they should connect.” (Transport Operator)

Respondents were also asked if they wanted any particular concerns, or problems, incorporated in this research. This question attracted more responses than expected. Responses are followed by comments on how the area has been, or could be, incorporated in this research. One respondent was concerned that the research should be open to neo-liberal approaches to transport provision:

“You must have a critical and informed understanding for new private sector visions for the future. The public 'past' is past; and to keep your research fresh with a significant message for a future Wales; you cannot replicate paradigms of the past - but seek to imagine new ways of getting the job done.” (Individual / Other)

Whilst there is a major role for the private sector in public transport operation in Wales, and this research has been informed by developments in both the private and public sectors, it will be recalled that when respondents were asked if they favoured a free-market, deregulated response to planning and service provision they said they either preferred a system similar to the current public/private hybrid system, or a public body specified, fully integrated system.

“Getting politicians to prioritise the needs of areas of low population...Could identification and delivery of smaller transport schemes be best delivered locally, maybe through community rail?” (Third Sector Officer)

The transport needs of deep rural Wales have been a recurring theme in responses and were discussed at some length in the five semi-structured interviews. To some extent they have been addressed by an extension of routes and services on Welsh Government's TrawsCymru medium to long distance bus system, and by white paper proposals for the reform of bus services and taxi and private hire vehicles. Morgan (2020, p. 1) commented:

“It is expected that the Bus Services (Wales) Bill will be introduced in Spring 2020.”

However, in his July 2019 statement the Minister announced that regarding taxis and private hire vehicles:

“a considerable amount of work is still required before Welsh Government can bring forward legislation.”

A bill still had not been presented to the Senedd at the time of writing in February 2023.

Since being incorporated within the Transport for Wales Rail Services: Wales and Borders Franchise the community rail officers appear to be taking an advocacy and liaison role with Welsh Government, rather than their previously community-based role, consequently it is likely that smaller transport schemes will continue to be more delivered by the local authorities under the Local Transport Fund mechanism.

“It would be useful to explore the economic benefits of designing well connected desirable places to live and work. What were the benefits for residents / businesses / economy. Can these be quantified from real life examples. (Holland, Denmark, New York). At the moment there seems to be a lot of anecdotal / qualitative data but little in the way of quantitative data.” (Local Authority Officer)

Although this interesting suggestion is outside the scope of this research although it does have a bearing on the connectivity and agglomeration effects related to economic development. ‘A local built and natural environment that is pleasant to be in’ was rated as being either moderately, very or extremely important by a majority of respondents in the economic development section, see table 10.1. Connectivity was also seen as being important:

“The rebuilding of the railways between Carmarthen and Aberystwyth and Afon Wen and Bangor so that there is a North / South rail transport system in Wales.” (Rail Promotion Group Officer)

This proposal, and others, to restore north-south rail connectivity is discussed in part 3 of Chapter 10 with reference to the costs and benefits of restoring the Galway to Limerick railway as the first part of the ‘Western Rail Corridor’ scheme to re-link Sligo and Limerick, and also the costs and benefits of the re-building of the Borders Railway to Tweedbank.

Major rural interventions such as north-south rail may not appear to perform well in terms of conventional business case cost / benefit analysis. However, in alternative

forms of analysis, for example based on the well-being duties in The Well-being of Future Generations (Wales) Act 2015 (National Assembly for Wales, 2015), there could be opportunities to argue for interventions promoting inclusive and sustainable growth. Rural interventions also benefit urban residents and visitors to the country.

A meeting was held with a consultant for the Dyfodol Gwledig Cymru / Rural Futures Wales programme to brief on and discuss deep rural transport connectivity and economic development. One organisation in the respondent sample is actively involved in advocating some of the interventions needed:

“... there's an opportunity to look at the 10 communities under the Rural Future programme which will give you further insight.” (Rural Development Consultant)

The secretary of a rural transport forum set out their objectives:

“My response is made, as the Secretary of the (Redacted) Transport Forum. An independent voluntary group, we work for the provision of effective integrated transport, promote the benefits of public transport and work towards the greater use of public transport systems. The Forum supports strategic objectives that:

- Provide for the greater integration and interchange between different modes of transport.
- Put in place public transport services that meet the needs of individuals and communities.
- Promote social inclusion by means of an affordable, accessible public transport system that works to remove access and mobility barriers for all public transport users.
- Encourage more sustainable modes of transport and reduce the need for travel by car. From our point of view, we would encourage any research that would be carried out with regard to these matters.” (Public Transport Promotion Group Officer)

The importance of the local dimension is reinforced by the final three responses which advocate active travel and the development of active travel networks, opportunities for

community transport organisations, and the use of social value in local authority procurement policies such as the Preston Model (Manley, 2017).

“Consider the role of Active Travel modes and local networks in helping mitigate economic problems from the current system.” (Public Transport Promotion Group Officer)

“Sustainability of and opportunities for community transport. Also, how we can encourage a different way of working that is better for families, individuals, employers, and the planet!” (Community Transport Organisation Officer)

“How it could be possible to force CC’s (NB: county councils) such as ours to appreciate the importance of transport to the survival and economic prosperity in their management of the council’s affairs. If pressure from WAG and UK authorities could be brought to bear to force CC's and other purchasing authorities to ACTIVELY (NB: respondent’s emphasis) and wholeheartedly incorporate the concept of social value into purchasing of services and a much closer collaboration and consultation with CT and commercial operators when setting in place long term plans for the transport infrastructure of the area.” (Community Transport Organisation Officer)

Summary: The above suggestions and comments gave confidence that the issues which were being incorporated in the research were relevant to respondents and covered their concerns and problems. They also provided suggestions for areas where future research would be useful.

8.7 Transport Policy: Conclusion

The Welsh Government’s moves towards an integrated transport system had support from the stakeholder sample. These findings supported the transition towards a more integrated transport model in Wales, although many respondents expressed concerns about various aspects of the means, the instruments, and the processes necessary to achieve it. This supported the assertion that that:

“the prevailing organisational culture of transport planning has long been a top-down, one way process, expert driven and technocentric” (Booth and Richardson, 2001, p. 148).

Respondent’s concerns about of a cross-cutting policy approaches pointed towards an awareness that transport investment has wider socio-economic implications, for good or ill, than just improved mobility, and which permeate throughout society.

These various factors all form components in the integrated transport model, and feed into the research question as being indicators of a real life demand for the concept of integrated transport in Wales.

Chapter 9: Poverty and Deprivation in Wales

Part 1 The Questionnaire

9.1 Introduction

The link between transport poverty and poverty and deprivation is a widely accepted one. In their report 'Transport and Inequality: An Evidence Review for the Department of Transport' Gates et al. (2019, p. 2) found that there were three main drivers:

- “1. The first relates to how people are distributed geographically, and specifically the distribution of people of different social classes. People with more money have more options in both where to live and how to travel and transport links are a key component of land value and housing costs.
2. The second relates to how *opportunities* are distributed, including employment opportunities. Concentration of jobs and amenities is often facilitated by transport links, meaning access to these transport links is necessary for accessing those opportunities.
3. The third related to how accessible the *transport system* itself is, in terms of its cost, its geographic accessibility and the scheduling of transport options

These factors are related to each other and can affect one another.”

The distribution of different social groups is an important determinant of transport deprivation and lack of access to goods and services. Power (2012) argues that the post-World War 2 concentration of low-income groups on geographically peripheral housing estates, and the subsequent development of middle-class car-dependant suburbs, has polarised urban settlement patterns on social class lines and monopolised road-space for private traffic, to the detriment of public transport. She asks for the development of more central, higher density mixed use districts to resolve the problem of spatial separation, lack of sustainable transport, and transport poverty.

Certainly, the problems of the geographical structure (in terms of where public transport services operate, and the gaps in the network), the temporal structure (in

terms of the operating day) and the cost structure (the level of fares) of the Welsh transport system tends to reinforce the problems of poverty and deprivation, both urban and rural.

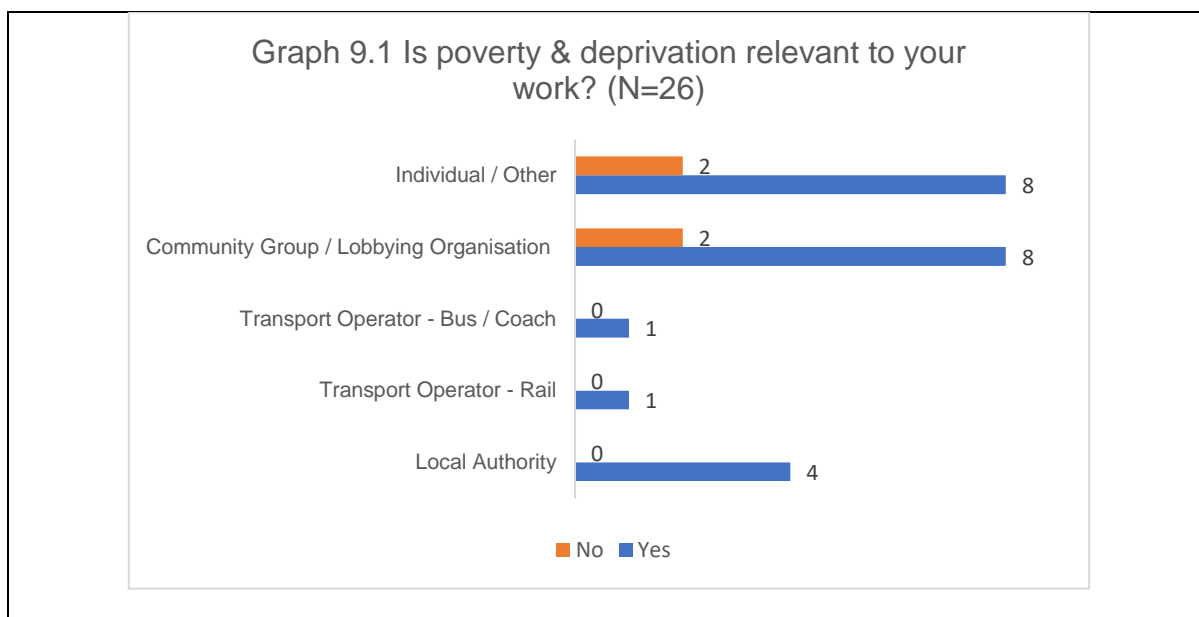
Reference is made below to the Welsh Index of Multiple Deprivation. This important indicator is used extensively by UK Government, Welsh Government, and Welsh local government to assess levels of poverty and deprivation. High levels of relative poverty (i.e. lack of financial resources) and deprivation (i.e. experiencing unmet needs for resources and opportunities) in Wales are an important social issue in the country and a major driver of Welsh Government policies. In 2018 23% of the population were estimated to be living in poverty with a rise to 27% forecast by 2021-22 (Pearce et al., 2018, p. 1). The latest release of the Welsh Index of Multiple Deprivation (WIMD), (Welsh Government, 2019d), confirms this trend. WIMD is composed of eight separate weighted domains of deprivation which includes 'access to services.' WIMD ranks relative deprivation in the eight domains across 1,909 Lower Layer Super Output Areas (LSOA), each with an average population of 1,600 people.

Each LSOA is ranked, with 1 being the most deprived and 1,909 the least deprived. Using the WIMD rankings most poverty and deprivation in the country is concentrated in the south Wales cities and towns, the valleys, the north coast, and north east towns LSOAs which fall within the 20% most deprived LSOAs. These are ranked from 1-382. Respondents to this research have pointed out that WIMD does not adequately capture poverty and deprivation in rural areas. (Welsh Government, 2019d, pp. 12-23, p. 28, Table 4).

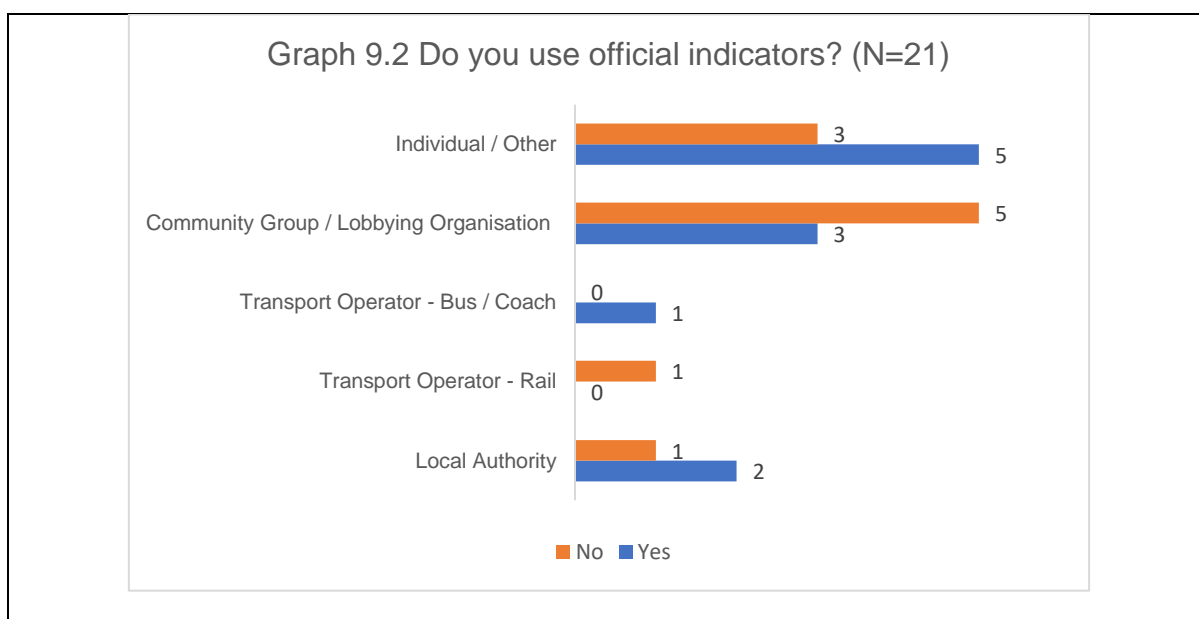
9.2 Poverty and Deprivation: The Questionnaire Findings

Respondents were asked the screening question "Do you think that poverty and deprivation are relevant in your area of work?" This was to test if those working in relevant areas had an awareness of the issues and/or felt that they had an obligation to consider them as part of their work.

Graph 9.1 shows a majority, 84.6%, agreed that they thought that the areas were relevant to their professional lives, indicating that this area of concern is now a consideration in services which deal with the public.



Respondents were then asked the filter question “If you have answered 'YES' do you use official indicators to measure poverty and deprivation in your work?”



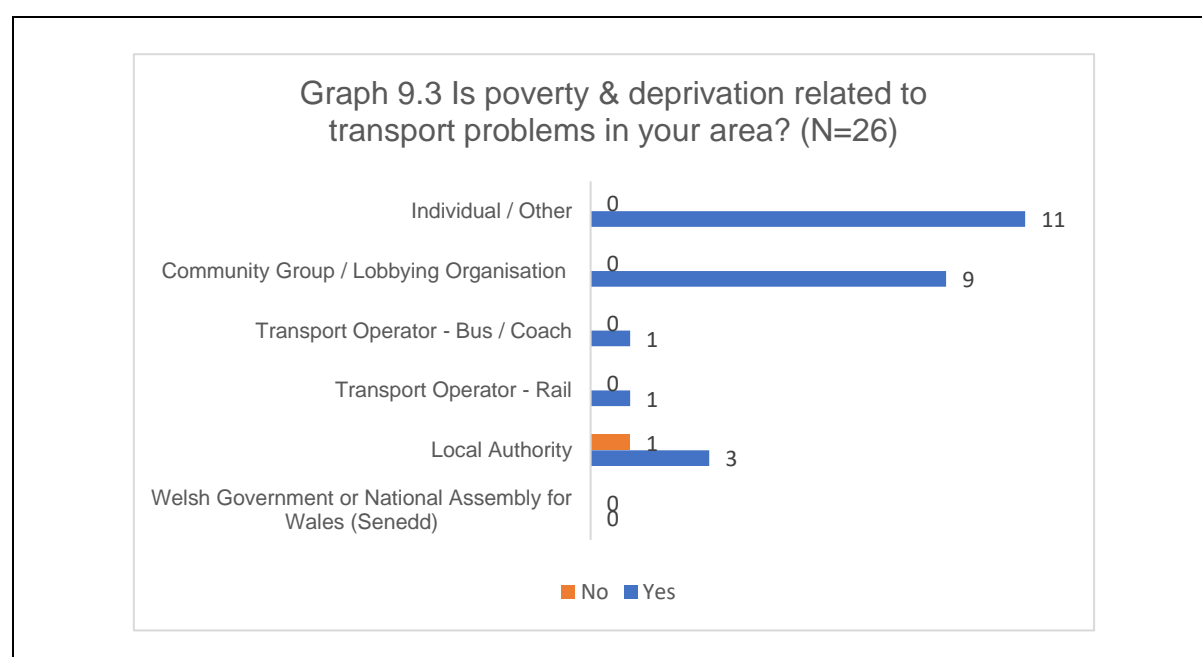
As indicated in Graph 9.2, of the 21 respondents replying 52.4% reported using official poverty and deprivation indicators. The extent to which those respondents who said they used official indicators would cite the Welsh Index of Multiple Deprivation, UK census results, and administrative statistics, as being relevant in their work was of interest. The question “Which indicators do you use?” was intended to test the type of level of official indicator use and to see if any other sources were instanced. 91% of

indicator using respondents reported that Welsh and UK government data sources were used, together with those from relevant ‘third sector’ organisations. There also appeared to be some use of data from policy documents. Only one respondent said that they used administrative data (on hospital visits), and demographic statistics. Only one respondent mentioned the ten-yearly UK Census, and no one mentioned Eurostat data.

Some respondents reported that their use of sources was quite extensive:

“WIMD and other Statistics Wales figures, but as we work across Wales these indicators tend to mask rural poverty.” (Third Sector Officer)

“WIMD, Census Data. Under the ‘Rural Futures’ programme we are also working with Prof Paul Milbourne, an acknowledged expert in rural poverty.” (Rural Development Consultant)



The question for Graph 9.3 asked if respondents thought that “poverty and deprivation was related to problems with transport in your area?” 96.2 % agreed and 73.1% offered opinions when asked “What would you say these problems are?” These questions were intended to test awareness of the link between poverty and deprivation and transport, or the lack of transport.

The range of comments made it clear that the problem was not an urban versus rural one as comments identified issues in cities as well as the countryside, although services in urban areas are more likely to be reasonably accessible for able-bodied people than in rural ones:

“There are no railway stations and only poor bus connections in the east and west of Cardiff. The City Centre is by and large prosperous as are the areas to the north. If people can't afford a car and have no/limited access to public transport then what chance do they have of getting a job, increasing their social mobility and bettering their lives?” (Third Sector Officer)

“Expensive public transport relative to low incomes (e.g. a £4 day bus ticket is £20 over the course of a week!). Infrequent services: e.g. services which have reduced hours after 7pm for example.” (Third Sector Officer)

“Connectivity is one element that can contribute to addressing issues with poverty and deprivation. If you look at SE Wales, then addressing issues of inequality are an underlying assumption behind the investment in Metro.” (Individual / Other)

However, most comments were about the situation in rural Wales. Comments make it clear that poor rural transport makes the impacts of other forms of disadvantage more severe:

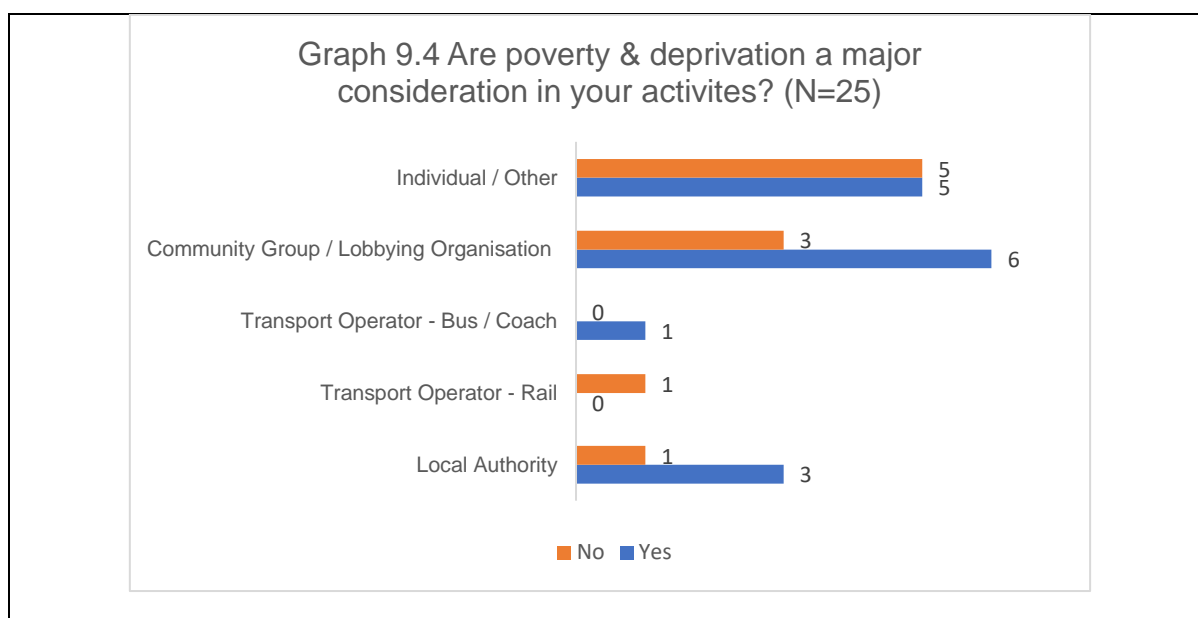
“The high ownership of cars in Powys is testimony to the inadequate transport services in some rural areas. People are deprived if they cannot access jobs and services, resulting to an extent of poverty and isolation.” (Local Authority Officer)

“Mae byw yn ngefn gwlad yn ddud! Oherwydd diffyg trafnidiaeth gyhoeddus ddigonol mae'n ofynnol i unigolion a theuluoedd gael car er mwyn cael mynediad at wasanaethau ac at gyflogaeth. Rwy'n gweithio gyda pobl ddall a phobl gyda nam ar y golwg - sy'n ddibynnol iawn ar gludiant cyhoeddus.”
Translation: “Living in the countryside is expensive! Lack of adequate public transport requires individuals and families to have access to a car in order to access services and employment. I work with blind and visually impaired people - who are heavily dependent on public transport.” (Local Authority Officer)

“Access to services, for social purposes etc. are all unavailable to people if they are poor and deprived. The area served by the Heart of Wales line has many older people who cannot drive (for a variety of reasons) and need a good level of public transport to be able to have a 'civilised' lifestyle.” (Third Sector Officer)

“Rural communities being depopulated as they are unable to connect to the rail network to access health, employment and education from their family homes.” (Individual / Other)

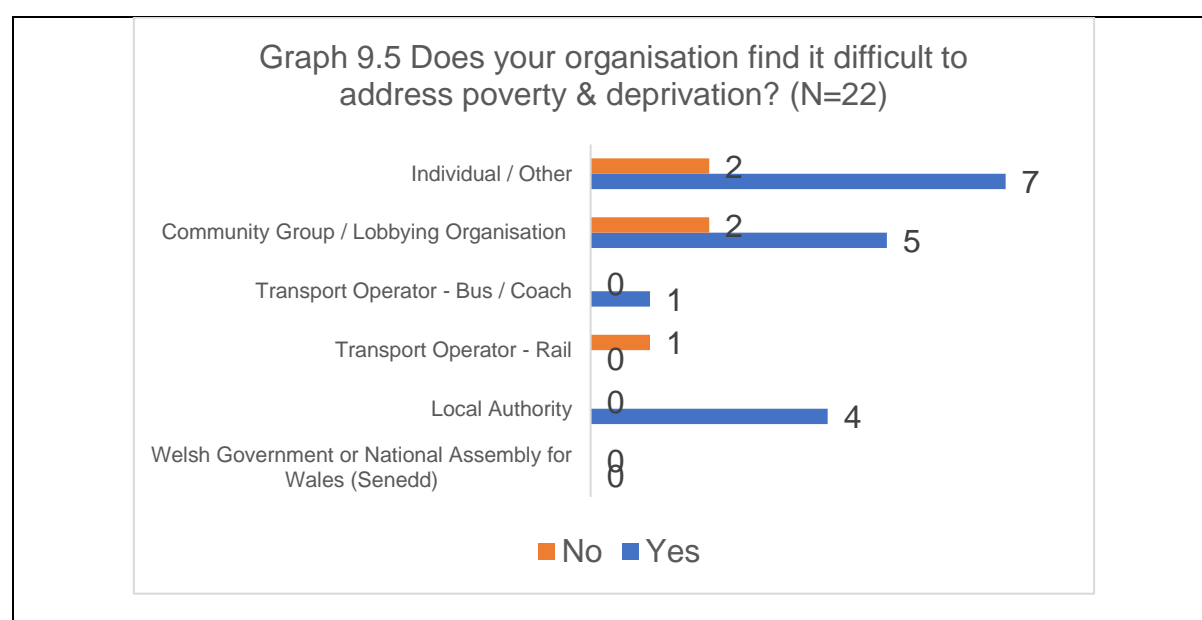
The questionnaire responses indicated a relatively limited use of official poverty and deprivation statistics but a strong feeling that expensive and / or poor public transport, and in rural areas the contingent need to own a car to access services, was deepening poverty and deprivation in Wales.



In view of the scale of poverty and deprivation in Wales, and the emphasis laid on their elimination by the Welsh Government, respondents were asked “Are poverty & deprivation a major consideration in your activities?” This was to find out to what extent respondents thought that it was an important issue, and from which sectors they came. 60% of respondents agreed that poverty and deprivation was a major consideration to them. Graph 9.4 demonstrates that this broke down to 75% of the participants from the local authority group (a somewhat surprising result as it would be expected that poverty and deprivation was a consideration in everything that local authority officers

do), 50% of transport operators, 66.7% in the community groups / lobbying organisations category and 50% of the respondents in the individual / other group.

When asked ‘Does your organisation have specific policies/projects to address poverty & deprivation?’ 48% of the respondents replied that their organisations did. Again, and surprisingly only 75% of the local authority group, 50% of the transport operators, only 28.6% in the community groups / lobbying organisations category and 60% of the individual / other description group. In considering the apparently low proportion of organisations in the community groups/lobbying organisations category it should be remembered that respondents from 4 of these organisations self-identified as being in the individual / other group which accounts for the apparent disparity in the existence of specific policies and / or projects between the two categories.



Graph 9.5 shows most respondents, 77.3% believed that their organisations found ‘it difficult to address poverty and deprivation.’ When asked the same percentage felt that improvements could be made in the assessment of poverty and deprivation. Nearly all respondents, 91.3% (N=23) thought that improvements could be made in practice in these areas.

Summary: Most respondents felt that the issues of poverty and deprivation were relevant to their work and half of these used official indicators with the leading source being the Welsh Index of Multiple Deprivation. Statistics Wales data series were also instanced together with data from Welsh Government policy documents and third

sector sources such as the Joseph Rowntree Foundation. One respondent said they used data from the UK Census.

The institution of a Welsh Government one stop data portal allowing access to a wide range of poverty and deprivation data sources might be beneficial, perhaps with sections aligned to specific tasks such as Local Transport Fund Grant applications, especially for community group / lobbying organisations whose awareness of official data sources might be more limited.

All respondents agreed that poverty and deprivation was related to transport problems in their areas whether urban or rural. Most comments centred on the cost and availability of public transport, in terms of routes existing and the spread of service hours. In rural areas the extra cost to already constrained budgets of having to run one or more motor vehicles to access employment and services was mentioned as a factor in deepening poverty.

Most respondents agreed that poverty and deprivation was a major consideration in their activities. The organisations of just under half of respondents had policies / projects to address poverty and deprivation. Again, most respondents thought their organisations found it difficult to address poverty and deprivation, and that improvements could be made in the assessment of these issues. Almost all respondents believed that improvements could be made in the practice of addressing poverty and deprivation.

Part 2 The Semi-Structured Interviews

9.3 Introduction

The Semi-Structured Interview Schedule was intended to allow the main themes of the questionnaire to be explored in greater depth. Because it was decided that the Questionnaire Section 1 would generate enough information on respondent's views on transport policy, and none of the interviewees had direct experience of process and implementation, it was decided to exclude this from the interviews and to concentrate

on the following areas: Poverty and Deprivation, Economic Development, Identifying Transport Challenges and Solutions, and Other Concerns.

73% of the questionnaire respondents had said they were willing to participate in face to face (i.e. semi-structured) interviews. It was decided to conduct 5 semi-structured interviews, one from each of the questionnaire respondent categories. Only one participant had completed the questionnaire.

The five interviewees participating were:

Respondent A: Welsh Government Transport Services Manager
(Category: Welsh Government)

Respondent B: Service Directorate Director (Category: Local Authority)

Respondent C: Railway Station Manager (Category: Transport Operator)

Respondent D: Third Sector County Coordinating Organisation Officer
(Category: Third Sector)

Respondent E: Tourism Organisation Commercial Manager
(Category: Individual / Other)

9.4 Poverty and Deprivation: The Semi-Structured Interview Findings

Interviewees were asked a series of questions on levels of poverty and deprivation in their geographical areas of responsibility, which indicators, if any, they used, and the extent to which transport problems were a contributory problem to the level of poverty and deprivation in general.

Interviewees responded to “How would you say that the issues of poverty and deprivation are relevant in your area of work? Is it a major consideration in your activities?” Four out of the five agreed with the question, with only the tourism organisation commercial manager (Respondent E) saying that it wasn’t a major consideration for her organisation.

The Welsh Government transport manager thought that poverty and deprivation was “certainly” an issue for him. He said that whilst it was a:

“consideration, an important aspect, it wasn’t a ‘prime driver.’”

However, his department did take account of deprivation levels when planning new services and improving services.

The local authority director (Respondent B) explained that the directorate he headed covered a wide range of areas including transport and highways, recycling, regeneration, economic development and planning which had a ‘significant degree of impact’ on the public. His council has an elected member who works as:

“an anti-poverty champion and we work closely with that member who’s independent of the cabinet (and) provides degrees of scrutiny, but also support, advice and observation.”

The third sector officer (Respondent D) demonstrated a more direct contact with the day-to-day issues around poverty and deprivation because her role involved representing and promoting third sector community services with Welsh Government, the county council and the health board:

“because of that I go out quite often and talk to people on the ground and I see what is happening ... you only have to look at the development or the prevalence of our foodbanks in this county, and the needs around that, (it) is both appalling and shocking that we actually need that ... homelessness, again those kinds of increases. People who are actually in debt, or (who) need debt management advice the increases in that...people who’ve got mental health issues increasing ... I would say it’s very prevalent.”

During the conversation in this area, it was also agreed that there was a major issue around rural isolation. As well as poverty in the farming community, as their margins get tighter and tighter, some children of farming families are experiencing social deprivation through the lack of social and other developmental opportunities because once they are delivered by the school bus back home it is unlikely that they will see anybody outside their family members until the next day at school.

The two other respondents who were not directly involved in poverty and deprivation issues were focussed on the pay rates of their staff and the lack of permanent employment in their areas. The railway station manager (Respondent C) spoke about working poverty:

“People that work for us even on a living wage would be struggling, as any person would, to make ends meet...it’s hard not to bring it into work and you see it in the whole area. I think Gwynedd is one of the most deprived parts of Wales ...”

He also talked about the characteristics of his local labour market and the high level of seasonal employment. He had recently undertaken a recruitment campaign for jobs at his railway station:

“They’re permanent (jobs) and as soon as you say ‘permanent, that is why we had over 300 applicants for the six jobs.”

Respondent E (tourism organisation commercial manager) worked in a sector where poverty and deprivation was not seen as an issue of such an immediate concern. However, there was an awareness of the issue:

“I don’t think it’s a big one, because I work in the tourist sector, so obviously we are aware of it and we are aware of how this affects the visitors that come to us, but it’s not something that we actually think about on a daily basis. Although we do work to try and make sure that our workforce are properly paid, and that we try and look after them as well as we can.”

9.5 Is Poverty and Deprivation Relevant In Your Area of Work?

Understandably, in view of their specialised format and uses, the use of indicators to measure poverty & deprivation in the work of respondents was restricted to the interviewees working in Welsh Government (A), local government (B) and the third sector D). The sources they instanced were Gross Value Added statistics, the Welsh Index of Multiple Deprivation, health board data and local authority generated statistics. The local authority respondent (B) pointed out that some statistics can give a perverse sense of what the real situation is:

“If one took car ownership as an indicator of poverty, one would struggle to an extent because it’s usually used as an indicator of prosperity. Of course, within a county such as Powys and other similar counties, if you don’t have a car, you’re possibly economically inactive and don’t have any ability to get out of a certain situation.”

He thought that there were hidden factors in the poverty and deprivation indicators that colours Welsh Government’s attitudes to funding for his deep rural county:

“When there’s a comparison drawn on the basis of a whole suite of indicators, then probably (anonymised) comes down to, not a prosperous county, but not a county with significant difficulties. So, when one looks at indicators such as the price of housing ... it’s the sixth highest housing cost in terms of sales, in terms of housing values. They look at the number of claimants, they look at the number of unemployed, there’s an indicator around weekly wages, which is a problem but actually, (but) a large proportion of people are in work. They can be in work and in poverty, of course, but the fact is they’re in work. If you add all those together, then I can see that when compared with other parts of Wales, particularly urban parts of Wales then politically, it’s quite easy to say it’s not such an issue.”

9.6 Indicators to Measure Poverty and Deprivation

All five interviewees agreed that poverty and deprivation was an issue in the geographical areas of their responsibility. Based on his professional experience the Welsh Government transport manager (Respondent A) thought that:

“I would say it is (the widespread prevalence of poverty and deprivation), it depends on what source material you use, but I suspect it’s more widespread than we think ... that’s a key point of the project really, to link up rural settlements and we suspect that there’s a fair amount of hidden poverty out there.”

The local authority director was asked “was there a problem with rural poverty and deprivation not being sufficiently acknowledged by Welsh Government? Did hidden

factors in the poverty and deprivation indicators colour Welsh Government's attitudes to funding for his county?" He agreed.

Respondent D (third sector manager) pointed to concentrations in market towns but also expressed concern about the lack of deep rural data. This concern demonstrates the conflict between the need for deep rural data and considerations of personal privacy in data publishing:

"I think it's concentrated. Look at the main market towns you, for example, there are pockets of deprivation in (town name). You know, (town name), (town name) even ... but I think it's the rural kind of deprivation that really is misunderstood or not understood enough. Because, you know, if you start going out into certain areas, and again it's the prevalence of hill farms, or those real rural kind of aspects, that we just don't know enough about."

The tourist enterprise commercial manager (Respondent D) instanced the nature of the employment market in the tourist areas of north Wales as being a contributory factor:

"I think it does affect us, because I certainly notice it as somebody who interviews people...the amount of jobs most people have had, so they're moving around a lot and I think that's because they find it hard to find full-time jobs that either satisfy them, or that there's something available. And a lot of them are actually very poorly qualified, or their job applications are very poorly written, and you think actually they're not being helped to go forward in the workforce."

9.7 Poverty and Deprivation Effects

When asked if they thought that poverty and deprivation was related to problems with transport all five respondents agreed that it was. The necessity to own a car in the absence of adequate public transport to access employment, which was not necessarily well paid, and increasingly centralised goods and services were quoted as being particularly problematic. The Welsh Government transport manager (A) explained that in the light of problems of access they had taken steps to provide a strategic bus network:

“Something we find is if we, the Welsh Government, weren’t standing in and providing additional support to provide the network across Wales on key strategic routes, the service levels wouldn’t be as good ... because you wouldn’t get the service provided commercially by bus companies. It isn’t like the local authorities have the resources to lay on equivalent services. So, it was a specific decision taken by Welsh ministers to invest further in core strategic bus routes across Wales, especially on those corridors which aren’t served by rail.”

Interviewee B (local authority director) considered how cuts in local authority funding for public transport had affected those residents experiencing poverty and deprivation:

“So, there are lots of things I could reference around evidence, the access to public services is, I think, accepted universally now to be a real problem in rural areas. Those below a certain point are the ones who have the impact most of all, in my view. That can be evidenced by, for example, when we have cut budgets, and we’ve cut budgets in terms of public transport, we have not considered how that’s going to impact on those who are at the lowest end of the scale in terms of deprivation or poverty. And I don’t mean it hasn’t passed our consciousness, but what it hasn’t done is it hasn’t influenced practically what it is that we’ve ended up doing.”

Local bus services into towns that interconnected with other services, and good connections to local railway stations were identified as being important to combat poverty and deprivation by the railway station manager (C).

The third sector respondent (D) talked about the importance in combatting deprivation of being able to access social opportunities for the young and those with mental health problems:

“When you start looking at it from a whole population perspective, do children have, teens even, the opportunity to go somewhere where they can have a social activity and then get home? No. So that’s the same case for adults. I have got feedback directly from people who use mental health services, they can’t get to where they need to get to. So, let’s say there’s a centre in town, you know, I’m thinking about (charitable organisation), puts on lots of activities, lots of really good things to counter social isolation, but people cannot get there or get home, because they live off the beaten track where there’s no transport.”

She explained about patient's experiences of inadequate access to hospitals by public transport, and she also expressed concern about the sustainability of community transport because of funding by councils and changes in the regulation regime:

"You could say, okay, we're investing in community transport, so the council has a, a (sic) policy for investing in community transport, you know, social journeys and so on, but there's no increase in the funding there. And there are new regulations coming in around quality assurance and so on. So, you're targeting the third sector in terms of community transport, most of them are not going be able to meet the needs there and go out of business."

The Tourism Commercial Manager (E) found that an additional source of stress upon unemployed people was the failure of Job Centres to assess the effectiveness of public transport access to vacancies when requiring people to apply:

"... as an employer taking staff on ... we get people who are being forced from a long distance away to apply for a job with us, and actually, it's completely unviable on both sides, not for us to employ them, not for them to be employed. And I think, you know, there needs to be a lot more thought gone into this in a rural area ... because they're being made to apply for things that are just not suitable for them, it's not possible for them to get there."

9.8 Poverty and Deprivation Data: Assessment and Practice

The Welsh Government transport manager (A) found issues around accessing data for the WelTAG (the Welsh Government mechanism for assessing cost / benefits of transport projects) a problem:

"I'm aware we've got WelTAG and we try to use that, or reflect on that, when we're planning new services. But it depends on the source data and what data you're using. I think there's probably a lot more we could do to improve on that. It's very complicated and it's actually getting hold of the right information as well, especially if an awful lot of it's hidden. I've been doing this project for ten years now and I couldn't really give you an honest answer that I know where to go to try and get some of that information. The Welsh Index of Multiple

Deprivation (work) we do, tends to be mapping. So, I tend to use maps that are prepared by our cartographics team, which already sifts some of this out.”

Respondent B (local authority director) had a lot to say on this issue, based on his experience of running services related to poverty and deprivation relief, and budget-making for them. He felt that a major contribution to addressing practice would be a return to the principle of universalism:

“I could go on for a long time about those sorts of issues. I think the primary issue for me - and it’s based on analysis and evidence and so on but it’s also based on experience - is that it’s the universalism of services at a high quality, consistent and high provision rate that actually benefits those who are deprived more than quite a lot - not everything - but quite a lot of things. Leaving aside benefits and so on and so forth and supplements and so on, when you take away universal service, it tends to impact on those who are least able to access those services in the first place.”

Although he was concerned about the restricted availability of social benefits and services, he was also worried by what he saw as greater levels of deprivation in care and support:

“I think the evidence, and I know we’re talking here about (county name) in particular, but the evidence seems to be growing across the United Kingdom in similar economies that actually display the diversity, and the polarization, between those who are provided with very strong support in growing up as opposed to those who are not, seems to be getting bigger in terms of a gap. So, in a rural economy and talking about the issue we’re here to talk about today in terms of poverty, I think it can be poverty of different things; poverty of finance and income but it can also be poverty of care and support.”

This respondent related his concerns above to the experience of social isolation deprivation that young people living on farms experience because of the limitations of school and public transport. Much the same circumstances would apply to those with long-term limiting illness, and / or the elderly without access to cars:

“It’s not produced in a report, in a research, evidence-based approach but we know that (farm) children become very isolated, that they don’t have the same

opportunities or don't take the same opportunities that their other peer group have and the reality is, it's very practical - if a child is taken home from school by public transport, dropped at the end of their lane or picked up at the end of their lane, then that's a very fixed approach-afterschool clubs, all those sorts of things are generally not available-and they walk up the lane to their house and that's where they live their lives outside of school really."

The third sector interviewee (D) drew attention to the problems of multi-agency co-production of community transport services in circumstances where funding responsibilities were siloed:

"If you look at the way community transport is set up, you've got the council who are responsible for community transport, but only for social needs. You've got the health board who fund non-emergency patient transport, but now Welsh Ambulance is doing that. And then you've got the health board giving a little bit of money towards the community transport for some health needs. So, you've got different agencies, and then you've got a whole other tranche of information around mobility, which in terms of access and how that works ... where's the feedback coming from a (user) voice perspective? Disability (place name removed) is starting to set up some groups around that, but they're not there yet."

She also felt that multi-agency working in this, and other, areas, was not efficient and this impacted on service users:

"I don't think co-production is something that we do very well at all really. If I was to ask my colleague in the council 'when was the last time you really spoke to people who are struggling with transport', I think she would say 'I haven't spoken to them for a while.' I think there's more that could be done about co-production and, directly in touch with service users who are experiencing the pain of it."

Respondent E (Tourism Organisation) reiterated her concerns about the Job Centre network not preparing candidates to make good job applications, and the problem of physically accessing employment opportunities:

“Some of the job applications that we see are so poor and it’s a shame, because often when you do interview the people, actually they are better than their job application. I think that they’re not being helped to, to be able to get off this ladder (i.e. unemployment) ... we will take on different people, but they’ve got to actually get here to be able to prove themselves to us. Often the job applications just get thrown out because they’ve perhaps left school early, they’ve not got good qualifications, they’ve not been shown how to sell themselves properly.”

Summary: The views expressed by the five respondents were dependent on the nature of their jobs but there was commonality in the broad agreement that the extent of poverty and deprivation were issues, and a consideration that impacted on their work, if only obliquely.

Three interviewees, from Welsh Government, local government and the third sector all used official indicators but there was a feeling that they were difficult to access and interpret. The various domains of the Welsh Index of Multiple Deprivation were a focus of confusion. Consequently, a re-think on how people are ‘educated’ in the use of this index would be useful considering its importance as a source of data for Welsh Government funding documents, as well as the assessment of poverty and deprivation.

Two interviewees (local authority and third sector) expressed concerns about the effects of poor public transport on the mental welfare of young people and the farming community, and the latter respondent talked about the problems some patients and visitors had in accessing hospitals.

All the respondents discussed the issue of poor public transport access to employment, goods and services. Concern was expressed that insufficient physical and temporal access to town centres was available through local bus services. One interviewee was concerned the UK Department of Work and Pensions Job Centre network was not taking the problems of ‘travel to work’ by rural public transport into account when sending people for job interviews.

9.9 Poverty and Deprivation: Conclusion

The responses to the poverty and deprivation questions in both research instruments confirmed the data in Table 4.10 “People at Risk of Poverty or Social Exclusion as a Percentage of the Population 2017,” this showed that Wales had the highest relative rate in this category at 24% out of the six study countries.

Dealing with poverty and deprivation was thought to be an important aspect in the work of many respondents but the evidence is that the issue was thought to be an intractable one, and one that was increasing. The effects of poverty and deprivation were seen as being exacerbated by poor transport provision and deep rurality, as evidenced by the findings in Chapter 8 “Transport Policy in Wales.” Respondents instanced concerns about the effects on young people, city social sector housing-estate residents, and the farming community in particular.

Chapter 10: Economic Development in Wales

10.1 Introduction

Parts 1 and 2 reviews the respondents' responses to the research questions on economic development. Part 3 below discusses economic development, the investment prioritisation cost / benefit analysis process, and presents an outline economic development case for restoring rail services on the west coast corridor from Bangor to Aberystwyth and Carmarthen.

Part 1 The Questionnaire

10.2 Questionnaire Introduction

This section was intended to find out which transport, and other, interventions to achieve economic development were thought to be important by respondents, and what level of importance was attached to them. In view of transport interventions usually being welcomed as a positive thing, respondents were also asked if they could think of any downsides relating to these. A question was included on the effectiveness of planning policies in locating industry and business for good access to transport networks. A further question tested for awareness of the National Infrastructure Commission for Wales (Welsh Government, 2019e) and its potential effectiveness. The final question in the section asked respondents if they thought there should be a return to the abolished regional transport consortiums.

Two issues about economic development emerged during the research, one is with regard to doubts, mainly in academia, about the efficacy of transport infrastructure in promoting economic development, and the second is regarding the problem of attracting trainees for working skills training in rural areas. The link between transport investment and economic development is a contested one, despite empirical studies indicating that there is a positive link, see pages 133-134. Banister (2012, p. 1) in a review of three papers on the subject comments:

“There has always been an assumed link between the quality of transport infrastructure and economic growth, yet that link has been difficult to demonstrate after more than fifty years of research (Banister and Berechman, 2000).”

This difficulty seems to be because of concerns over whether such economic growth is new or displaced from elsewhere. He goes on to explain:

“There are many issues arising from the potential link between transport investment and economic growth, namely as to whether any economic development is new or merely a transfer from elsewhere, and whether productivity increases are taken by companies as additional profit or passed on to their workforces” (Banister, 2012, p. 1).

Nevertheless, the belief that infrastructure development does promote economic development is deep-rooted. He also instances the importance of political factors which drive economic development-aligned investment such as the high-speed railway HS2 between London Euston, Birmingham Curzon Street, Manchester Piccadilly and East Midlands Parkway” (Banister, 2012, p. 1). I would suggest that such a major project would, of itself, create increased employment and workforce skills in planning, consultation, construction and operation even before any external benefits to the wider economy.

In considering human capital, an important factor in reducing poverty and deprivation is raising skills levels amongst potential workers. This maximises levels of skills in the workforce, contributes to economic development, and therefore employment. Consequently, the state has additional taxation income for health, social security and other related public expenditure.

Owen et al. (2012, p. 92) conclude from their research into skills training uptake in east Lincolnshire:

“Traditionally, economic development policy has emphasised the need to make physical and human capital investments in those knowledge-based industries expected to generate future high skilled, high waged work. This has been a challenge for rural areas - even where there were subsidies to facilitate the

travel of learners to centres of provision able to deliver the skills associated with these growth centres.”

The willingness of people in rural areas to travel to training centres may be impeded by inadequate public transport, long journey times and inconvenient connections, and lack of familiarity with how the public transport system works. For people with disabilities, all of these problems are compounded by their disability. Where possible training in rural areas should be as decentralised as possible, and the curriculum and hours of attendance flexible enough to deal with the need for trainees to travel at reasonable times.

10.3 Economic Development: The Questionnaire Findings

Regarding factors that promote economic development, respondents were asked to rank ten variables in five levels of importance: “not important, slightly important, moderately important, very important, and extremely important.” The ten factors selected for this were the result of consultation with official and third sector agencies and were designed to be the most useful to have respondent’s opinions on without making the list too long and un-manageable. It was decided not to force a consecutive ranking as in some cases respondents might feel that some factors were as important, or unimportant, as each other. In this section respondents were asked to rate 10 variables ranking them in order of importance. The variables were:

Agglomeration effects, i.e. businesses of the same type benefitting from being close to each other;

Access to airports and seaports;

Availability of an educated and skilled workforce;

A local built and natural environment that is pleasant to be in;

Access to further and higher education institutions for staff training and / or expert / technical advice / consultancy;

Access to a good standard of housing with a variety of tenures available;

Good IT connectivity;

Access to a wide choice of good quality business premises;

Access to the railway system, and

Access to the trunk road and motorway networks.

Responses ranking a factor as being of any significance at all to economic development are shown below in Table 10.1.

The equal and near-equal ranking of the factors for economic development was unexpected but may indicate that the various factors are interdependent on each other, rather than some being capable of being prioritised over others. Although it was expected that ‘access to the trunk road and motorway networks’ would be a prime requirement it was surprising that “Agglomeration effects, Access to a good standard of housing with a variety of tenures available,” and “Access to a wide choice of good quality business premises” came slightly ahead of the requirements for an “educated and skilled workforce” and “Good IT connectivity” which were expected to be considered as important as road access.

Table 10.1 Economic Development Factors	Responses
Access to trunk road and motorway networks	22
Agglomeration effects	21
Access to a good standard of housing	21
Access to a wide choice of business premises	21
Access to airports and seaports	20
Educated and skilled workforce	20
Pleasant built and natural environment	20
Access to further and higher education institutions	20
Good IT connectivity	20
Access to the railway system	20

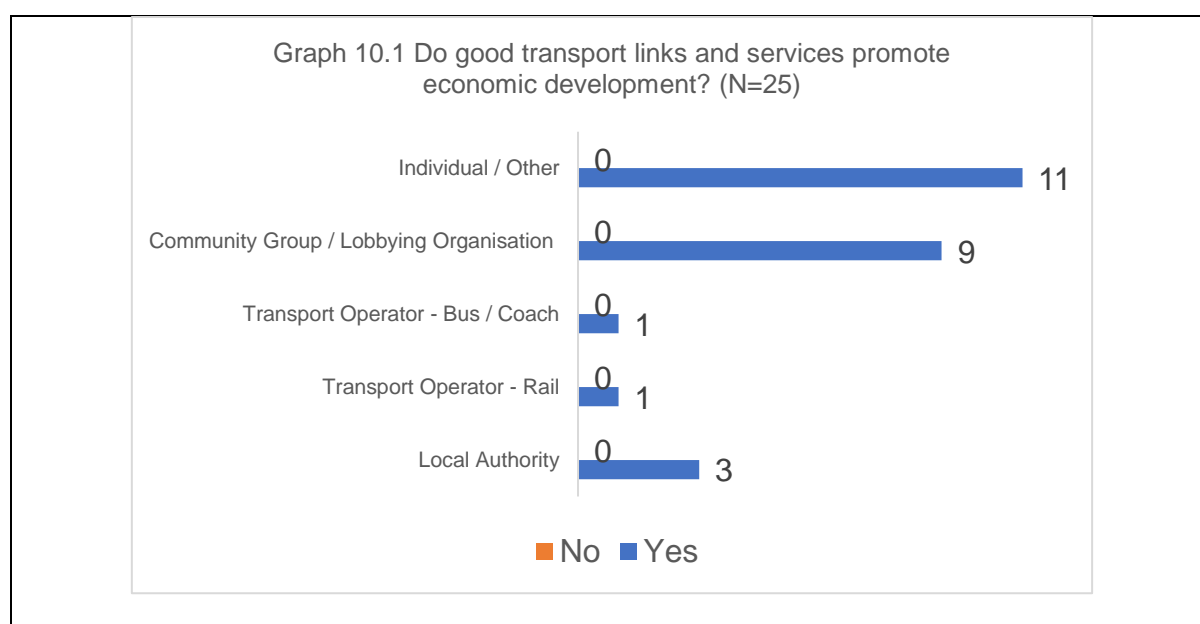
When asked “Do you have any comments on, or additions to, the factors listed?” respondents gave a varied range of views. One respondent felt that:

“Rural transport (Road or Rail) important to the economic needs of the area.”
(Individual / Other)

“Should have included access to the public bus network, which is as important as access to the railway system.” (Rural Development Consultant)

“The response would vary depending on the location, so it’s hard to generalise. One suggestion would be to look at the 10 communities we are currently engaged with under the Rural Futures programme. This would tie into our research and approach.” (Rural Development Consultant) (NB: The Dyfodol Gwleddeg / Rural Futures programme is intended to increase the capacity of community groups to address deep-rooted and complex socio-economic problems associated with rural poverty.)

From the comments made by respondents on the factors to promote economic development it seems likely that these are more likely to be location and / or region specific. Further research into the specific economic development requirements of communities is likely to be useful.



Graph 10.1 demonstrates that all respondents all thought that good transport links and services promote economic development, excepting one in the local authority category who did not answer the question. The question is an important one in the perception of the role of transport in economic development. It was asked in view of an awareness that, counterintuitively, after completion of the A55 North Wales Expressway some

organisations, including Royal Mail, had moved from the north coast strip to the Chester area (Griffiths, 1998).

However, studies disprove assertions that after completion of the Paris-Lyon high speed line some companies had migrated away from the city to Paris. Vickerman (2006, p. 6) notes of the Plassard and Cointet-Pinell Paris-Lyon study of 1986:

“There was no overall net impact on the economies of either of the major cities, but a general tendency towards the concentration of economic activity towards these major cities from the regional hinterland ...”

Consequently, it appears that major transport interventions can, in some cases, damage local economies by displacing economic activity. Conversely, regional economic activity may become centralised at nodes along major interventions, be they road or rail. In order to probe what mechanisms were thought to be involved in how improved transport links promoted economic development, and to ascertain if respondents were aware that there could be adverse effects (as instanced above), as well as positive ones, respondents were asked “How do you think they do this, can you think of any downsides?” This attracted a considerable and considered level of responses:

Positives:

“Without good transport links, and services it is very difficult to attract businesses and entrepreneurs to invest in the area. Workforce availability and training is also vital. Grants and better infrastructure are being used to encourage enterprises to remain in England and deprives Powys of new development.” (Local Government Officer)

“This is really a ‘duh’ question. No economy can ever be successful without connectivity.” (Third Sector Officer)

“I can only think of positive outcomes. Allowing people to travel easily to access employment means that they bring value into the rural communities.”
(Rail Partnership Officer)

“Make possible recruitment of workforce and access to markets. Allows businesses to meet to discuss issues which they have in common.” (Rural Development Consultant)

“In areas such as ours the lack of good reliable transport networks makes it extremely difficult, if not impossible, to run any medium to large manufacturing or service industries.” (Individual / Other)

Qualified positives:

“Transport connectivity is a key driver for economic prosperity. Good road/rail and airport links are essential for both businesses and people who need reliable transport to move freight, people and access work and services. However, many of the longer distance solutions for transport come with associated health, noise and environmental impacts that do adversely affect the lives of residents. It is essential this is mitigated by ensuring that places where people live, and work, are attractive places with good facilities for Active Travel for local journeys and that issues such as noise and air quality are managed appropriately. Designing places around people with Active Travel embedded creates desirable localities that attract highly qualified / skilled workers and businesses, but these areas also need good transport links with the wider country/world in order to prosper.” (Local Authority Officer)

“Dibynnol ar y math o ddatblygiad wrth gwrs. Mae hanes yn dangos bod diwydiannau yn datblygu' mewn mannau sy'n nes at gysylltadau trafndiaeth da. Ar y llaw arall nid yw hyrwyddo datblygiadau mawr yn cyd fynd â pholisiau Cynllunio cefn gwlad - gallai gael effaith negyddol ar yr iaith Gymraeg er enghraifft.” Translation: “Depending on the type of development of course. History shows that industries are developing 'in places closer to good transport links.' On the other hand, the promotion of major developments does not accord with countryside planning policies - it could have a negative impact on the Welsh language for example.” (Local Authority Officer)

“By being able to get goods to market and raw materials to factories, being able to meet with people in your supply chain and potential customers, reduction in costs and time spent travelling. Potential downsides - more transport

infrastructure costs money - where would it come from?" (Rural Development Consultant)

"Effective links between supply and demand is essential. However, too much emphasis is placed on global and strategic access, such that economic growth becomes synonymous with large scale transport infrastructure, mostly new roads. I think the case of large-scale road infrastructure supporting business is often overstated, especially relating to jobs created, and an emphasis on local supply and demand with denser integrated local transport networks would be more effective, especially for a country like Wales with challenging topography and widely differing regional characteristics." (Public Transport Promotion Group Officer)

"They do this by enabling the efficient movement of people and goods. The biggest downside nowadays is the environmental impact, because of the reliance on transport modes with high carbon emissions (air / road)." (Individual / Other)

Downsides:

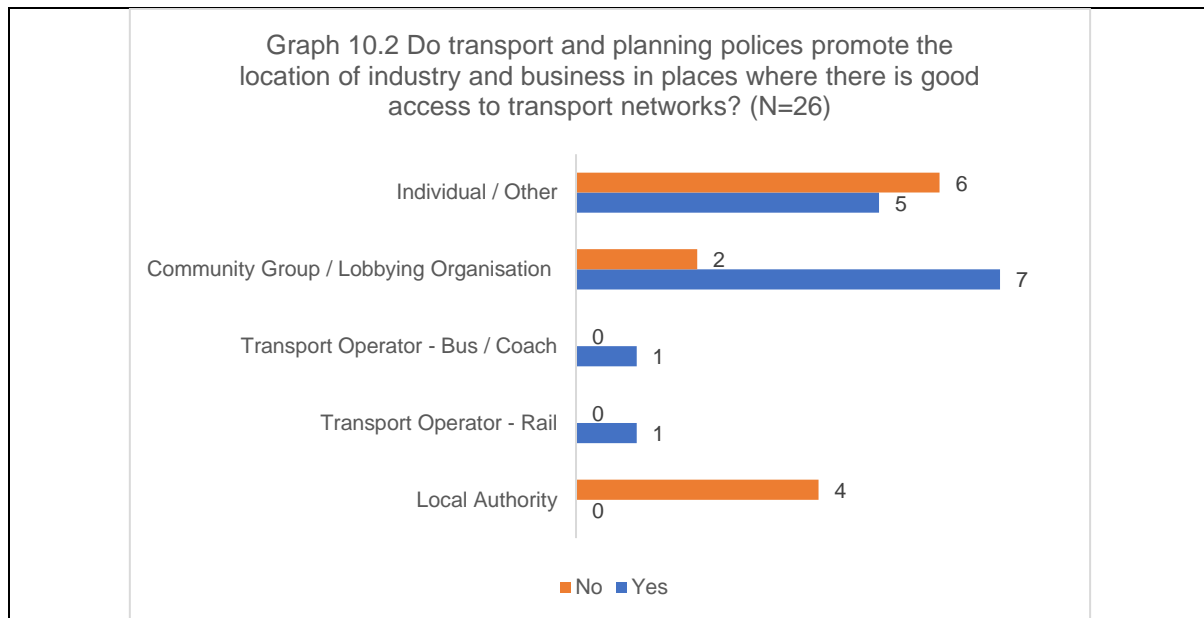
"Fast transport, particularly by road, leads to rural areas becoming accommodation providers for commuters as well as encouraging the inflow of goods and services from outside, rather than encouraging a more self-sufficient economy. A road has two directions of flow!" (Local Authority Officer)

"The downside of improved roads is greater pollution from traffic which always increases as roads improve. Investment in railways is of huge benefit to the environment by comparison." (Rail Promotion Group Officer)

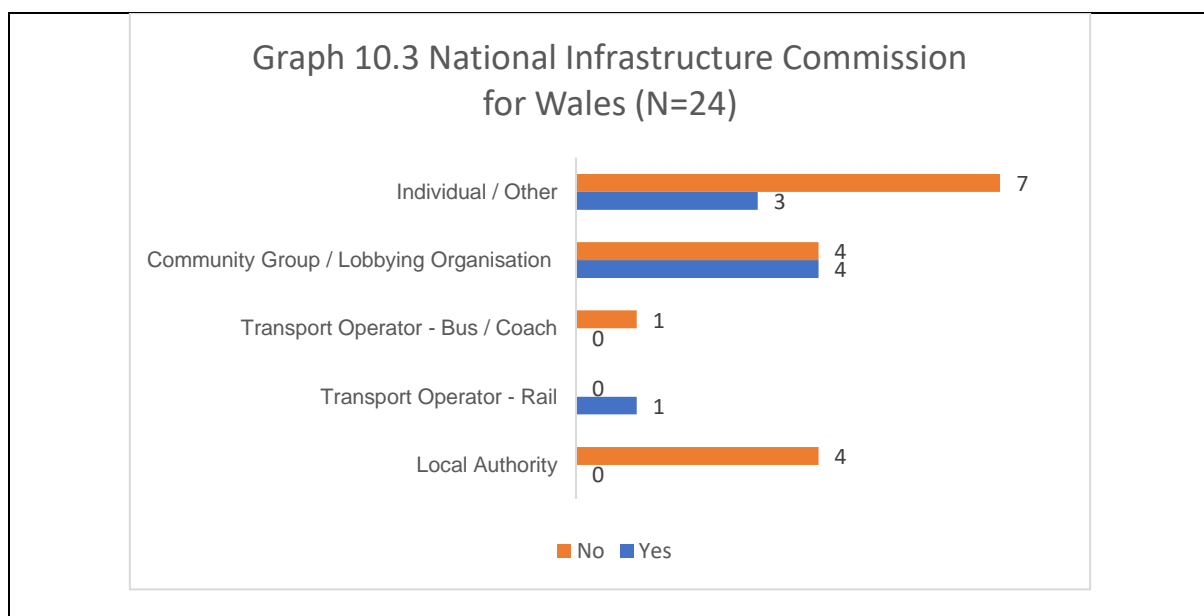
"This is a complicated question and there are downsides. For instance, the A55 Expressway in North Wales brought economic markets closer to NW Wales, but the road also increased house prices as 'outsiders' moved into rural villages changing the culture and reducing the stock of affordable housing." (Rural Development Consultant)

Whilst many respondents felt that transport interventions were beneficial for economic development there was concern at issues caused by improvements to the road system such as increased traffic, and consequent increased environment pollution. There was

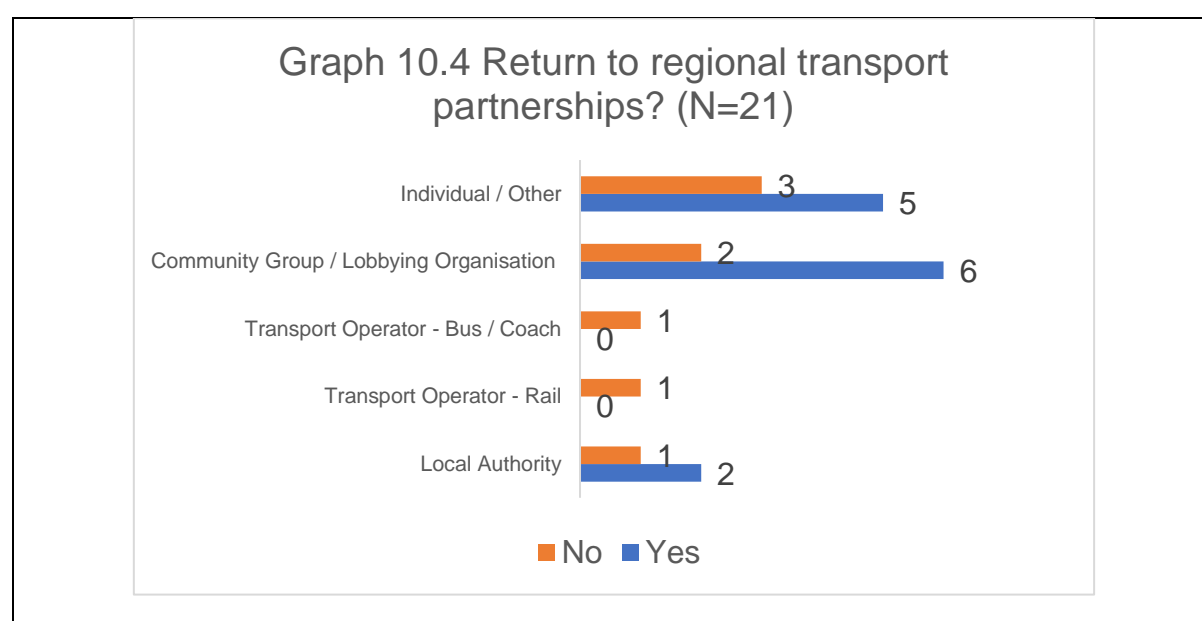
also an awareness of secondary issues such as house prices rising and putting them out of reach of local people, of rural communities becoming dormitories, linked to which was anxiety that in Welsh-speaking areas this would erode the position of the language. There was also concern that road improvements stimulated road-based retail and housing developments.



Respondents were then asked, “Do you think that transport and planning policies promote the location of industry and business in places where there is good access to transport networks?” Graph 10.2 indicates that 53.8% of respondents agreed, including the two transport operators, whilst 46.2% disagreed, including all 4 local authority respondents.



Graph 10.3 shows the responses to the question “Do you think that the new National Infrastructure Commission for Wales (NICW) will be effective for promoting an integrated approach to infrastructure, planning, economic development, environmental protection, land use and transport?” The NICW’s remit includes high-level advice on infrastructure improvements and innovations in the energy, transport, water and sewerage, drainage, waste, digital communications, flood and coastal erosion management sectors (Skates, 2018) (Welsh Government, 2019e). This question was prompted by a desire to find out if there was awareness of the NICW, which was established in December 2018. Because the profile of NICW hasn’t been high in the media it was surprising to receive 24 responses to the question, one third of which were positive about the potential effectiveness of the NICW and two thirds of which were not.



The final question in this section asked respondents who didn’t think that the National Infrastructure Commission for Wales would be effective, if a return to the regional transport consortia / partnerships, which previously planned transport infrastructure and services, would be a viable solution? The consortia were abolished in a controversial move in April 2014 by former Cabinet Secretary for Economy and Transport Edwina Hart, resulting in a *de facto* centralisation of many transport planning and service functions either in county council partnerships or in the Welsh Government. As it was NICfW supporters also answered this question, an indication of strong feeling on the matter perhaps? Graph 10.4 shows that 61.9% of respondents

agreed that there should be a return to the regional transport partnerships whilst 38.1% disagreed.

Currently there isn't much visibility about how the NICW will take its tasks forward and how it will interact with other bodies such as Transport for Wales, Natural Resources Wales, Dŵr Cymru, the two trunk road agencies and the local authorities. However, the question was included as the Commission could potentially be a game changer in terms of Welsh transport infrastructure and economic development. There appeared to be an appetite amongst respondents for the restoration of the four regional transport partnerships. Although these were always under-resourced it may be that with additional powers, they would be a democratic and regionally responsive answer that could harness the expertise and the national oversight of NICW.

Summary: The ranking of the ten factors for economic development produced a near tie indicating that there are no factors that could be said to be outstanding incentives for economic development and that all of those listed are as important, or nearly important, as the others. There was a feeling amongst some respondents that factors may depend on the characteristics of specific locations and that research into the requirements of specific locations, regions, and enterprises either already at them, or considering a move to them, is likely to be useful.

In general, good transport links were thought to encourage economic development and respondents identified positives, qualified positives, but also some downsides. Slightly more respondents reported confidence in the ability of the planning system to locate business at locations with good transport access than did not. Slightly fewer respondents thought that the National Infrastructure Commission for Wales would be effective than those who thought it would not be. A majority of respondents preferred the restoration of the four regional transport consortiums. As previously mentioned, these were joint local authority bodies that planned and implemented regional level transport interventions, prior to the withdrawal of their funding by Welsh Government in 2014.

Part 2 The Semi-Structured Interviews

10.3 Promoting Economic Development

This section asked interviewees if they thought that there are particular ways in which good transport links and services promote economic development, if they felt that current policies inhibit good access, and if they were aware of the new National Infrastructure Commission for Wales (Welsh Government, 2019e). It should be noted that these questions were asked from an economic development, rather than a transport policy, standpoint. Consequently, where responses support those made in chapter 7, these indicate a cross-cutting of factors, or interventions, between transport policy and economic development.

Respondent A, the Welsh Government transport manager, agreed with the question 'are there particular ways in which good transport links and services promote economic development?' but pointed out that there was often a time lag between an intervention being introduced and the realisation of its benefits in the wider economy. He also pointed out that the multiplier effects for investment were likely to be less in rural Wales than in a large city due to the lower economic baseline:

"I think answering that question depends what the scheme is, what the objectives of the scheme are, and which part of Wales or the UK that investment is in. Because that's a bigger discussion at the moment about whether or not a pound spent on, for example, rail or bus improvements in the London area, has the same multiplier effects in the regions. If you spend £500,000 on a new bus route in London, you'd probably get a more immediate multiplier effect than you would do spending £500,000 on a new bus route in rural west Wales."

I responded that the requirement for interventions is triggered by human needs that are still 'needs' regardless of where they occur. He agreed with this observation and explained that he had had problems in quantifying wider benefits in the context of business cases, especially where the duty to either do no harm or improve the situation under the Well Being of Future Generations (Wales) Act 2015 (Welsh Assembly Government, 2015) applied.

The local authority director (B) explained his authority's approach of obtaining additional social benefits through the construction of infrastructure projects, as well as a result of them, but he felt that this was damaged by the poor level of public transport services in his deep-rural county:

"We've commissioned a lot of infrastructure projects over the last 10 years and as part of the commissioning process, we've had social benefits as being part of those contracts ... some of that is around apprenticeships, when I go out and talk to the contractors ... the consistent message that's come back has been that outside of the biggest towns, and even the biggest towns aren't big towns, the general comment is that 'actually we have had interest but the young people can't get here and they can't get home, and they just haven't been able to take up the apprenticeships' and that's dreadful. You know, that is a terrible indictment really of the issue around transport. And the bus services have been decreased and decreased and they are probably going to be further decreased, so that will just make that situation worse."

He was also concerned that the economic development of his county would be damaged by the effects of the Welsh city deals for Cardiff and Swansea and English city partnerships for the West Midlands and the North surrounding it, all of which currently have better transport infrastructure and services:

"As a county ... we are surrounded by what are going to be, over the next five to 10 years, potentially very significant levels of investments and a draw on skills and expertise. If we don't have a counterbalance to that, then what we're already seeing in our demographics, I mean the older population, the lower level of economically active families and so on, and the impact on schools ... if one was really negative about it is there a future for rural economy in rural communities in Mid Wales? That's extreme and one wouldn't say there isn't, because that would be going too far, but if we didn't have a counterbalance and all that investment is taking place elsewhere and the natural magnetic impact that that has is potentially going to weaken the Mid Wales economy as opposed to strengthen it."

The railway station manager (interviewee C) thought that a road bypass was a broadly positive factor for his local economy but that public transport services using the new

infrastructure should be aligned towards delivering both strategic and local connectivity:

“The (road) is exactly the right idea but from working up here, I notice more that ... the tourists don’t drive. So, you’ve got to have that good link. You’ve got to have the fast buses that can go straight down the bypass and the ones that come into town because that’s where your business is. It (i.e. North Wales tourism) took about £3.2 billion last year⁴. If you want that to keep going up and the local economy to do well out of it (i.e. tourism) you’ve got to give the tourists the opportunity to be able to have good transport links.”

The tourism organisation commercial manager (E) also agreed that good transport links and services promote economic development. She also gave a wider perspective to the above comments, but doubted if improvements were being communicated to potential visitors. This is an important point in view of the need to divert visitors to public transport, and to ‘open up’ Wales to visitors who cannot, or would rather not, drive:

“I think also it’s a perception, particularly up here in north Wales, it’s difficult to get to us ... Whereas you’ve got through trains from London, you can get to the Junction (i.e. Llandudno Junction) in three hours, you can get from Manchester airport straight through, they’ve done the Halton Curve (NB: allows direct North Wales to Liverpool Lime Street trains). So, all those things have actually made us much easier to get to and from the North Wales coast I think has made huge improvements. But, how well known it is by the outside world, I don’t know. And I think sometimes we don’t tell people when we made improvements in our transport systems.”

The main points that respondents made were that there needs to be recognition that the benefits of infrastructure interventions experience a time-lag between opening and the benefits being felt, also in rural areas it needs to be understood that although the multiplier effects are less than in cities, they are still fulfilling the same human and economic needs.

The way in which a project fulfils the requirements of the Well Being of Future Generations (Wales) Act 2015, and how this can be reflected in the cost / benefit

⁴ The tourism industry in North Wales employed 42,000 people in 2018 (Jones, 2019).

factors of WelTAG, needs better communication and explanation by the Welsh Government.

In its funding for infrastructure projects and bus services the Welsh Government should take into account the additional social benefits generated by the training opportunities that such projects offer, it also needs to ensure that these opportunities are physically accessible to potential trainees.

Welsh Government should recognise the potentially deleterious effects that City Deals might have on adjacent rural economies as they experience these revived centres of economic activity impacting on demand and capacity in their local economies.

The planning process for new town bypasses should also consider the wider strategic and local public transport service effects as well as the benefits of de-classified former A roads.

Although road and rail access to tourist areas is improving as a result of infrastructure and public transport service interventions, the marketing of these to potential tourists has been poor and has not affected the perceptions of poor accessibility which may deter them.

10.5 Views on the National Infrastructure Commission for Wales

The National Infrastructure Commission for Wales is a non-statutory, advisory panel intended to facilitate economic development by providing the Welsh Government with expert impartial advice on infrastructure across a range of areas including transport Skates, 2018) (Welsh Government, 2019e). Despite its importance, to date its public profile has been limited. Only the Welsh Government manager (A) was aware of it and its remit:

“It will help and it’s definitely the right way to go if it brings key players together, as long as it doesn’t become a talking shop ... and whatever reports they come up (with) should get implemented. I know roughly what they’re doing. My concern is it just becomes a talking shop and gets abolished by the next government.”

The railway station manager (C) had not heard of the commission but when its role was explained to him was enthusiastic and thought that a strategic view of what infrastructure was needed would be of benefit to the nation and its economy.

Summary: Despite its potential importance for radically developing all kinds of new infrastructure in Wales the National Infrastructure Commission for Wales had no recognition outside the official respondents.

10.6 Identifying Transport Challenges and Solutions

This section was intended to identify respondents' views of transport problems, their priorities for improvements of the transport system and any suggestions that they had for solutions to improve the interface between transport and economic development.

The Welsh Government transport manager (A) considered that public transport infrastructure and services were a factor for employers but that the availability of relevant skills in the labour market, location and good logistics were key factors:

“I think they're a factor to help get staff into work, but think there's other bigger considerations involved. I think where businesses see public transport links, it's not the prime driver, (but) I suspect it's more like where they can get the skills or close to market for the movement of freight and stuff like that, you know, it's important factor.”

Good IT infrastructure was thought to be of greater importance by the local government director (B). This is a continuing issue in some parts of rural Wales, Ofcom (2018) reports that 10% of Wales' landmass has no 4G coverage, 31% of homes and businesses do not have good indoor 4G coverage and an estimated 7,000 premises have no 'decent' broadband or 'good' 4G coverage:

“I think the infrastructure issue is important, but I think in terms of the 21st century, it's probably less important around the infrastructure for doing business, particularly around technology. So, the fact that somebody could be living in a very rural, physically isolated part of Powys but still conducting a business, I think is probably more important than it is for them to be able to get out maybe once or twice a week to go and visit their clients and so on, because

I think that can be generally overcome but what can't be overcome is if they have very poor access to superfast broadband, they can't function."

However, he was positive about the socio-economic effects of the increase of train services on the Cambrian Main Line between Aberystwyth and Shrewsbury although he expressed concern about the costs of rail infrastructure:

"I think the problem with infrastructure, particularly around rail, is that it is so incredibly expensive to put it in again if it's been taken out ... the line they talk about between Aberystwyth and Carmarthen ... whether it ever comes to anything, who knows, but (costs) will probably be unsurmountable I would've thought."

Another issue raised by the station manager (C) was the extended planning process for infrastructure projects which he thought could be a choke on economic development. Speaking about the Caernarfon bypass he said:

"I think everything here, at the moment, inhibits itself because people just take too long to make a decision. By which time business might have decided to move because their access and linkages aren't good enough. Look how long it took to decide to start doing the bypass, for instance."

The third sector interviewee (D) was sceptical about both the strategic planning and economic development processes:

"What planning? Sorry to be a bit blunt ... I hear about Vision 25 and I hear about the Mid-Wales Growth Deal, but actually I can't see any change, or anything, happening. I think it's a lot of talk and a lot of hot air, to be honest, if I'm frank."

Consequently, I asked "Can I ask you frankly if you feel that, particularly the county council feels it has to make the right noises to the Welsh Government?" This elicited this response:

"Oh totally. Because we've seen it in the newspapers quite recently where Councillor (name) has gone 'we're talking to the minister, the minister is listening to us' and so on. I think it's just they have to ... maybe you've got to give it to them on some level, there is a skill in being heard and being listened

to, but I don't think there's any traction there at all. And I think what it is, is that we talk a lot and we've got the same (situation). If I'm really frank, I think we've got some of the same people (i.e. county council officers) who've been in the same jobs where things have gone wrong in the past, or not happened, and those same people are redeployed, maybe they're in different roles, I don't know, but nothing seems to transform and really change actually. I think we're going round in circles ..."

The tourist organisation commercial manager continued her focus on access, in this case to transport hubs. Like the previous respondent she was also sceptical about the efficacy of the planning system and its ability to integrate larger issues:

"I think there is a lot to be said for improving the linkages around (the region), and parking as well. Machynlleth, for instance, is quite a hub for people to get on the train, and yet it's quite difficult to park there. I know they've tried to work on it, but they're not thinking of the joined-up thing, are they? They want people to do these things, but they don't make it easy for people to do it. I think the planning is done in sort of small bite size pieces, rather than looking at the whole picture."

I suggested that this was a symptom of the 'silo working' issue and that planners were often carrying out the objectives they had been charged with by elected members. She responded:

"Yes ... it doesn't run together and often you get this clash."

Summary: Respondents expressed concern about the lack of transport infrastructure and services, and IT infrastructure, needed to support economic development in Wales.

The cost of infrastructure initiatives, particularly for rail, was instanced and the extended timescales needed for the planning process and decision-making. Doubt was expressed about the effectiveness of the strategic planning processes, such as the Mid-Wales Growth Deal, and the ability to integrate larger issues, silo working was thought to still be a problem.

10.7 Identifying Transport Problems

Respondents were asked if they felt that the causes and symptoms of transport problems were easy to identify, and could they give examples? The Welsh Government manager (A) was concerned about the condition of the country's transport infrastructure. He also thought that the issue of good internal north-south links should be restored to the priority accorded to it by previous governments:

"I would say ... I'm coming from a transport perspective ... There's a huge legacy of under invested infrastructure provision on key routes. So, Wales is going to have to play catch up in terms of the quality of its infrastructure. And I know that poses unique challenges. I think we've gone, on the bus side of things, a fair way to provide a good core network of routes on corridors that aren't served by rail. But it needs a whole lot of investment. And I still think there's a hell of a lot of north-south improvements needed as well. Obviously, we had that Labour-Plaid coalition government that had a big focus on north-south. The current government has got more of a focus on metros within city regions. North-south discussions seems to have dropped down the pecking order a bit in recent years. I mean that's fine if that's a political decision government has made that everything needs prioritising, but I think for Wales to function as a geographical unit they mustn't keep their eye off the north to south ball."

The local authority director (B) felt that the sustainability of road transport infrastructure was about to become an issue:

"I think there might be a tipping point coming in not more than a couple of years around where the infrastructure that we rely on day to day is actually not going to be sustainable and that's just the condition of our roads."

The railway station manager (C) talked about the limits to road improvements, which raised the importance of alternative models of road transport or modal transfer.

"The roads can't be widened any more than they have been because there just isn't the room because of the environment they're running through ... If you look down the coast, down the Llŷn Peninsula, it's still like the 1950s when you drive around there."

The delivery of local connectivity was the objective wanted by the tourist organisation commercial manager who was thinking about access to employment and the employment of staff (E):

“I think looking at this final mile is actually a really big part of it, because just going back to what we were talking about before with car parking and things, if you could solve that final mile bit of it, you would actually solve that. So, by making it so that people could get to and from villages easily and would make it easier for them to use public transport.”

Summary: The sustainability of current transport infrastructure was raised as a major problem by both the Welsh Government manager and the local authority director.

Both the railway station manager and the tourist organisation commercial manager discussed the importance of alternative models of road transport, modal transfer, and ‘last mile’ initiatives to allow people in rural areas to access the transport network.

10.8 Barriers to Resolving Transport Problems Encountered

When asked about the barriers to resolving transport problems encountered the Welsh Government transport manager (A) talked about the problem of dealing with funding on a ‘year to year’ basis, the success of the free weekend travel experiment on the TrawsCymru network, and the trend of dis-investment in the privatised bus companies whilst suppressed demand for bus travel is unmet:

“In terms of the bus world funding is a key ... Revenue funding tends to be determined on a ‘year to year’ basis by central government. That can act as a real barrier to help public agencies plan and procure services. So, I think as part of a refocus of transport provision, we ought to move towards a multi-year funding settlement for bus services, that’s right across the UK really.”

“Weekend free travel, where we’ve trialled removing the costs of travel to the passenger and that has generated something like 65% growth in passenger numbers on a weekend. A high proportion of those passengers are young people and (they have) told us that the experience on using public transport on a weekend has encouraged them to consider using the bus during the week to

travel to work or college or education. So, taking out or reducing the cost of travel to the user, to more affordable or attractive fares, I think can go a fair way of improving economic activity rates, helping the environment, reducing traffic congestion.”

“Because the return on investments (NB: in bus companies) now is lower than it traditionally has been, of course, then people are saying, ‘we’re better off taking our money out and investing in something else that’s got a, a better return.’ Well, it’s been a structural decline in the UK. Having said that, we have seen a growth in use on the TrawsCymru network. That’s just very specific to TrawsCymru and the routes that we serve. There’s an inherent latent demand that was unmet before we put that investment in. But, it just shows that if you provide a decent service for people, the frequency is attractive, the fares are reasonably affordable, the whole thing looks as though it’s part of a unified network, you can gradually turn the tide, and build passenger numbers up. Obviously, it can help the smaller settlements as well, it can help the Brecons and the Cardigans (NB: the names of towns) that don’t have a rail service. So, I think there’s quite a good argument to maintain the network, you know.”

The station manager (C) pointed out that whilst transport providers claimed they were offering passenger-focussed services, he thought that their primary driver was profit:

“We’re always hearing, aren’t we, in the sort of mixed transport economy how it’s all passenger focussed. It’s not my experience and I don’t think it’s the experience of a lot of other people that I’ve talked to, it’s actually finance-driven.”

Issues of poor public transport reliability and its impact on the tourism industry concerned respondent E (tourism organisation commercial manager):

“I think that’s a tricky one, I really do. I think somehow the rot has got to be stopped, hasn’t it? People have got very poor thoughts about public transport generally round here at the moment. We work with a firm called (company name) who promote green travel, and I was speaking to them the other day and they were saying, you know, are you going to be part of the Good Journey thing? I said, well I’m not sure whether hand on heart, actually, I feel that I can support it at the moment because if I say to people ‘oh it’s great, come here by

public transport, it's absolutely fine,' I'm not sure I believe it myself at the moment."

Summary: The annual funding for transport service support was cited as being a problem in planning and procuring services. A move to multi-year funding would resolve this issue.

Claims by transport companies to be passenger-focussed were doubted by the railway station manager who thought that profit was the main objective. Linked to this the poor time keeping and reliability of some public transport services. Better management would improve this situation.

10.9 Ideas about Possible Solutions to Transport Related Problems

On thinking about this area the Welsh Government manager (A) advocated inter-modal integration:

"I would say that it'd be good to integrate, fully integrate TrawsCymru into the rail service, so that both rail and strategic bus network feel as though they're part of one network, with proper through ticketing, properly timed connecting services, affordable fares on both modes, good information on both modes as well, so it becomes part of a single network."

The local authority director (B) discussed what he felt was the over-centralisation of local decision-making and service provision and wondered if the way forward was to establish service delivery groupings of town / community councils to deliver services. This could be a more responsive way of procuring local bus services although there would probably be issues around the capacity of combinations to deliver and greater costs.

"There seems to have been a loss over a sustained period of time, several decades, of the responsibility locally to do things and the reliance on others to do them for them. And that's been unhealthy in a whole range of ways, I mean physically and mentally unhealthy, and I think there's probably an awful lot to be gained in Wales from a different approach where people do feel more

brought into their local community, have a greater level of responsibility to their neighbour, for want of a better expression, and each other.”

The potential impacts of a possible solution in the shape of self-driving Connected and Autonomous Vehicles (CAVS) were a consideration for the railway station manager (C), involved as he was in accessing onward bus and taxi connections for passengers. He was primarily concerned about the secondary, and potentially undesirable, employment and social implications. He instanced how public service vehicle drivers would be made unemployed in a local environment of limited full-time and permanent vacancies, and how passengers would be deprived of the security and sociability of a driven vehicle. The wider implications of CADs are summarised by the UK Government Actuary’s Department (2017) but concentrated on the areas of road traffic accidents, insurance, and risk and liability issues rather than the possible environmental benefits.

Having talked about the problems caused by the disconnectedness of Welsh public transport in comparison with Ireland the third sector officer (D) wanted the:

“Joined up infrastructure, that makes it easier for us to attract people in, because they know they’re going to be able to get reliable transport when they need it, how they need it, and it takes them to where they need to get to. Could we have some transport that actually doesn’t stop, can we not have a, a few night buses?”

The tourism commercial manager (E) saw the transport gateway / park and ride interventions as a solution to tourist traffic:

“We would rather people didn’t (drive) ... If they could leave them (cars) behind and go out on public transport, I believe that they actually have a nicer time because they’re not worrying about the state (of roads) or (parking) where they’re going to get to, or are they going to get lost. Look at the problems that they get about parking for people going up Eryri (Snowdonia) ... The Sherpa buses (a summer-only tourist bus service around Eryri) are still there, but the service isn’t what it was a few years ago ... when the service was better more people used it and they would leave their cars at the hotels ... it’s back to this gateway thing, isn’t it? If you’ve got good gateway parking where there’s regular

(public transport) services. We've seen how it works for places like Shrewsbury, or York ... people wouldn't dream of taking their cars in."

Summary: The lack of inter-modal integration of timetabling, ticketing, and information of train and bus services was considered to be problematic. The third sector officer made an unfavourable comparison between Wales and Ireland in this area, whilst it was also thought that an integrated network with gateway park and ride facilities could be a solution to road congestion caused by tourist traffic.

There was concern about the over-centralisation of local decision-making and services. One respondent thought service delivery groups of town / community councils might be a viable way of procuring local services, including local public transport.

The issue of Connected and Autonomous Vehicles (CAV) was also raised from the viewpoint of possible job losses in the private hire and public service vehicle sectors.

10.10 Respondents' Vision for the Welsh Transport System

Interviewees were asked what their vision for the Welsh transport system was over a twenty to thirty-year horizon. Having already set out his vision of a totally integrated Welsh rail and strategic bus system, the Welsh Government transport manager (A) hoped that the Government's bus planning effort would continue on connecting the railheads to the key settlements in Wales that don't have a rail service. When the conversation moved to discussing the Swiss Post Bus system, additional ways in which the Welsh strategic bus network could deliver extended 'value for money' were considered:

"We don't have like a parcel carriage service or anything. We haven't really got into that, the logistics side, which could be a potential revenue. People are using logistic services all the time and that's something that we haven't really got into in Wales since the National Bus Company was folded. The National Bus Company used to move parcels around...with buses running across Wales, why can't we reach some sort of agreement with Royal Mail or, or DHL, or whoever's out there to move some of their parcels up and down?"

Although earlier commercial iterations of the TrawsCymru service had carried bicycles on external racks this practice was abandoned for staff health and safety reasons:

“The thinking now is actually carrying the bikes on board the buses themselves; we were looking at a scheme whereby we could do it as a trial, making a couple of spaces available on certain bike friendly buses across the network so people can carry cycles on board the bus.”

Whilst the local authority director (B) was preoccupied with the difficulty of just retaining the current bus network in his county, the issue of an internal north to south rail link was raised by the station manager (C). This link was often mentioned during the research, although I had avoided asking specific questions on the aspiration, to see if it was brought up by respondents spontaneously. Respondent C, like others, also wanted timetable integration:

“I think the north to south rail link is a big one to look at. I know the plans are there ... a good link between the north and the south just is something that needs to be done (although) I think the A470 is much better than it used to be. I (also) think the transport providers need to link the services ... It makes such a big difference to the public, and (also) promoting the idea of using the service.”

The third sector respondent (D) wanted a greater long-term focus on how transport expenditure could reduce expenditure in the health and welfare sectors by promoting mobility, access to social opportunities, goods and services and so combatting rural isolation:

“If you were using that (public transport) in a way that helps to promote access, then you wouldn’t need it in other areas...Looking at those kinds of things, it’s not just happening in community transport, I think it’s happening across the board where there are ways of looking at where you invest here, (and) the need goes down in other areas. I think we’re getting better at that. I think there’s still quite ways to go, but I think there is kind of an acknowledgment now ... that shifting investment needs to happen.”

For respondent E (the tourist organisation commercial manager) the ease of innovations to achieve behaviour modification was of importance in achieving modal shift. Good connectivity in public transport timetables was also an issue she thought

needed addressing. And she was particularly exercised by the lack of clarity in being able to influence public transport timetables to ensure connectivity. She also thought there was an element of 'corporate knowledge loss' in this field which affected the ability of operators to effectively consult with business on connectivity and timetable changes.

"We all want people to leave their cars behind ... We want them to not use fuel, we want to be greener ... I think, you know, most people want to be greener, but most people want it to be easy to be green. They don't want to have to put themselves out too much to do it. Somehow, you've got to address that by making it easy for them to do it. People will do it, as long as it's easy for them. My main concern is connectivity, but I think it is getting through to some of the people how important this connectivity is. Some channels don't seem to be very clear; they seem to be getting blurred and it's harder now. When we were working with Arriva (Trains Wales), we had very clear channels ... Every time there's a change, we lose that ability to work with them (transport operators), and it takes such a long time to bring it back again."

The long-term ambitions expressed by interviewees for the 20-30 year horizon were quite modest, although as they had previously discussed the need for a fully integrated transport system and railway re-openings, this was probably inevitable.

It was hoped that Welsh Government would continue to support and develop the strategic bus network of railhead and main town connections within the context of an integrated transport system. It was considered that there was potential for 'added value' through the transport of parcels and bicycles on the network. However, at the same time concern was expressed about the difficulty in maintaining the existing deep-rural Powys bus network

The restoration of north-south rail along the west coast corridor from Bangor to Aberystwyth and Carmarthen was raised.

The targeting of transport expenditure to reduce health and social security expenditure was an aspiration.

It was thought that modal shift behaviours should be encouraged through developing good network connectivity but that transport service and network change consultations needed to be clear and from bottom-upwards, not top-downwards.

10.11 Other Concerns

The issues and range of the interviews was shaped by the semi-structured Interview schedule and consequently, in order to give the respondents the opportunity to discuss their own concerns in the area of Welsh transport, I asked if they had further concerns. By the end of the interview most of the major issues had been explored, nevertheless a number of useful residual points were made.

Respondents were asked if they had any other issues to discuss. The Welsh Government transport manager (A) was gratified that importance of the bus network was being recognised by the research. Although bus journeys have been in secular decline for years the bus is still the most used public transport mode in Wales with 99.6m journeys in 2016-17 (Welsh Government, 2018):

“Thanks for considering the bus in all of this. I do think we need to have a bit clearer vision in Wales where we see the bus going. I think, I think there’s an awful lot of chatter going on about what buses could do. But we think we need a firmer vision (of) what buses should actually do, you know, what role they’ve got in the integrated network.”

Respondent B (local authority director) compared the decision-making process within his authority with that of the local health board. Consequently, he thought that his authority needed to take more decisions that were evidence based in all areas, including transport, particularly where gap-analysis was required to identify the need for further research. Large amounts of data and research are available via the internet and advice is available through the Welsh Local Government Association. However, continuing reductions in local authority financing for policy and research professionals have reduced the capacity of public sector organisations to identify, locate, analyse and use data appropriately:

“I think that what I would be really interested in is the academic research and where it tells us how improvements can be made. The one thing that I do worry about is that, and I’ve worked very closely and for many years with the health board and the health system, and understand within the health system you do not do anything unless you have an evidence base. And that almost applies to the exception so that if you don’t have any information on something, you therefore don’t do anything about it. And I think that’s a gap in the system. So in the same way, if there isn’t evidence to show how we can address some of the challenges that I’ve talked about today we need to take up that challenge and find evidence that shows we can do something about it.’ So, if that comes out of your work, I’d be really interested to hear about it.”

The railway station manager (C) welcomed the opportunity to discuss transport and economic development issues that were beyond his usual remit. He thought that in view of transport issues affecting the entire population that consultation mechanisms should be more accessible to the public:

“I think it’s just interesting opening your mind to thinking about these things because it affects everyone. So, it affects me as a person, it affects me as a family man taking my goddaughter out somewhere because you don’t always want to drive. It affects me as a professional and I think more people should put their opinions across because the more that people have an input into it, the more people will get lobbied to do something about it ... They actually need to get in contact formally. I think there needs to be a platform from the transport providers themselves to ask people, “What do you think of the service?” and take it seriously. That’s the difference. Don’t just ask them. You’ve actually then got to do something positive with the information.”

Having talked about the problems of rural isolation caused by the lack of bus services respondent D (third sector officer) was also concerned about the level of bus fares and the barrier to the use of public transport that high fares present to poorer members of the community. In this context it is worth noting that as bus passenger journey numbers fall operators increase fares to compensate and this leads to a further fall in passenger numbers, causing a malignant circle of decline.

“We didn’t talk about funding for buses and how much it costs (i.e. fares). And I just think that that could be a barrier for people who are on very low incomes, or older people (without a pass). I know the bus pass is hugely useful and I know that the kind of level of need around that, or the kind of use of that, goes up in the wintertime ... So, are there areas where transport could become more financially available to people?”

Respondent E (tourism organisation commercial manager) concluded by agreeing with the railway station manager (C) saying that more transparency was needed about consultation routes when public transport timetables and service patterns were to be changed:

“... doing the consultation with the small operators, rather than starting at the top and work your way down.”

Summary: The Welsh Government transport manager was pleased that this research acknowledged the importance of bus services, the most-used public transport mode, to the Welsh transport mix. A clearer vision was needed of the role of the bus in the future integrated network. The third sector officer expressed concerns about the barrier that high bus fares presented to poorer members of the community. Fares increases caused patronage to fall setting off a “malignant circle of decline.”

Research into gap analysis and evidence-based decision making was needed in all areas of local authority activity to determine where improvements were needed. The local authority director commented that the NHS local health board makes no interventions without evidence to support them. Reductions in funding had reduced the ability of local authorities to employ policy and research professionals. This had “reduced the capacity of public sector organisations to identify, locate, analyse and use data appropriately.” The railway station manager also raised this issue and thought that there should be a platform for transport organisations to consult the public on their services, with the proviso that the responses would be taken seriously, and that action would be taken as a result. The tourist organisation commercial manager agreed with this approach and wanted more transparency on consultation when timetables and service patterns were to be changed.

10.12 Questionnaire and Semi-Structured Interview Responses: Conclusion

Both questionnaire and semi-structured interviewees thought that good transport links promoted economic development, and that whilst there were problems with the planning system a majority supported it. Both categories of respondents welcomed the opportunity to discuss those public transport and economic development issues that were beyond their usual remit.

The findings feed into the research question providing evidence of a desire for a more regulated transport system that can help achieve broader socio-economic and environmental objectives.

Part 3 Economic Development, Transport Infrastructure Investment, and Cost / Benefit Analysis

10.13 Economic Development

This part discusses economic development, transport infrastructure investment and the way in which proposals are evaluated. It also presents a draft proposal for promoting economic development in northwest and west Wales by restoring rail links between the major centres of Bangor, Aberystwyth, and Carmarthen.

Economic development could be defined as the formulation and continuing application of initiatives by policy makers, businesses, the third sector and community representatives to improve the economic activity, and by doing so the standard of living, of a particular country, region or district. In view of climate change and environmental degradation it is axiomatic that any development should accord with the principle of environmental sustainability, known as sustainable development (Brutland 1987). There has also been an emphasis on the beneficial impacts of agglomeration effects on economic development. Ahlfeldt and Feddersen (2017, p. 1-2) observed that:

“The strong belief that economic agents benefit from the ease of interaction has always motivated large (public) expenditures into transport infrastructures, e.g. ports, airports, highways or railways.”

They found an economically positive effect of the investment in the Cologne to Frankfurt high speed railway on three smaller towns, Limburg, Montabaur and Siegburg, and their counties, which unusually for such comparatively small communities, had intermediate stations on the line. In comparison with a group of synthetic counterfactual counties the GDP of the actual counties exceeded 8.5% with an elasticity of 12.5% and a productivity elasticity of 10% per capita. It should be noted that these counties were adjacent to the cities of Cologne and Frankfurt rather than being 'deep rural.' (Ahlfeldt and Feddersen, 2017, pp. 1-2, p. 3, p. 4)

However, there are also those who express scepticism about the socio-economic benefits of major infrastructure interventions. Lang (2016) quite reasonably asks what is the proof of economic benefits of major infrastructure projects and who benefits from them? He is a supporter of the Foundation Economy school which advocates directing development resources towards fulfilling the basic housing, retail and services needs of local communities. These comprise 44% of Welsh GVA output and 49% of employment (Buchanan et al. 2020, p. 13). This approach also requires looking at the relationship between citizens, local and regional government and economic development agencies in new ways, for example the 'Preston Model' in which the local authority, and 'anchor institutions' such as hospitals and universities, maximise their purchasing power for goods and services by using local companies and so bolster their local economies as described by O'Neil (2021, pp. 69-78) and Brown (2021). However, it can be argued that the foundational economy is insufficient to produce the technology and innovation that is needed to address society's equality and sustainability problems.

Overall, the data in Chapter 4 do not support the expectation behind the third research question in Chapter I "Can transport investment lever government expenditure on health and social security for other sectors such as economic development?" However, those countries with higher levels of economic performance, and therefore public expenditure, are those with high and medium levels of transport integration. Whilst a causal link cannot be made between higher levels of transport integration and economic performance there does seem to be an association between transport interconnectivity and greater economic development. There are exceptions in the case of Ireland's GDP and GVA, a reflection of the country's current low corporate tax regime, and in other areas concerning Catalonia, Ireland and Scotland, some of which

can be accounted for and some of which cannot be. What is constant is Wales' relatively low ranking in the most positive indicators as shown in Table 4.14.

10.14 Cost / Benefit Analysis

Regarding interventions to improve the position of the Welsh economy. Lang's (2016) belief that there is a lack of robust methodological approaches to prove the link between transport investment and social and economic outcomes is overstated and contradicted by empirical studies (Johansson, 1993) (Ozbay et al. 2003). However, it is suggested that there is an over-emphasis on the results of the well-established cost / benefit (COBA) appraisal process for projects that concern public spending, as set as out in HM Treasury's Green Book. This is not the intention of the UK government. HM Treasury (2020, p. 3) states that:

“The Green Book is technical guidance. Aimed at helping officials provide advice to decision makers about how to achieve a specific policy objective and maximise social value ... The Green Book does not set policy objectives, nor does it determine decisions.”

Practitioners in the area have argued that the emphasis on the current economic data of a region, rather than producing consistency of spending benefits, tends to benefit areas with stronger economies to the detriment of those that need 'levelling up' the most (Turner, 2020). To address these concerns a 2018 revision of the Green Book incorporated better guidance on environmental appraisal, more focus on distributional impacts, and further guidelines on monitoring and evaluating policies. The further 2020 review decided that the current appraisal practice could undermine the UK government's intention to level up poorer regions. As mentioned above it was felt that project proposers of interventions that were strategically weak became overly fixated on the monetary benefits of the cost / benefit ratios, which was sometimes artificially inflated, to the exclusion of well-rounded appraisals (Turner, 2020, p. 4). One might mention that some of those who grant public funding also share this fixation.

The misalignment of the process not only seems to privilege wealthier regions above poorer ones but also urban areas above rural ones as the process is better aligned to large populations and levels of transport demand. The business case process for rural

transport projects appears to have consistently under-estimated the traffic attracted by those projects that have opened, despite discouraging cost / benefit results. The danger is that projects which could bring substantial mobility and socio-economic benefits to rural areas are not being progressed as a result.

10.15 Infrastructure for Economic Development: The West Wales Corridor

In Wales, the universities working with the private sector and government are significant drivers of technology and innovation. Reid (2020) looks at the opportunities for collaboration and innovation between Welsh Universities. Following on from this paper Universities Wales (2020) announced that its members were committed to implementing Reid's recommendations by establishing a single voice in the area, and by the various partners combining efforts in research and innovation. Lydon in a web article "Welsh universities will support economic and social recovery" (Universities Wales, 2020, p. 2) commented on the wider societal implications of the decision:

"These proposals set out an approach that will not only better enable us to collaborate with each other, but also with public authorities, businesses and charities. This will strengthen Wales' ability to address the regional and social challenges we face and ensure that the benefits of research and innovation are felt across the whole of Wales."

Research and Innovation income in 2018-19 was greatest for Cardiff University, with Swansea ranking second, Bangor third, Aberystwyth fourth, the University of South Wales fifth, Cardiff Metropolitan sixth, and the University of Wales central functions seventh. Glyndŵr University and University of Wales Trinity St David reported negligible R&I income for these years (Reid, 2020, p. 17, figure 5).

The West Coast Corridor between the two universities at Bangor (with its partner M-SParc science park at Gaerwen on Anglesey) and Aberystwyth, and the two University of Wales colleges at Lampeter and Carmarthen contains the highest percentages of Welsh speakers in the country (Williams and Walters, 2019, p. 8, chart 8). Gwynedd 77.1% / Isle of Anglesey 67.9%, Ceredigion 60.1% and Carmarthenshire 52.5%. Since retention and expansion of the Welsh-speaking population is a central Welsh Government policy (Welsh Government, 2017c) the provision of sufficient and

appropriate levels of employment necessary to support this is a major economic development objective, particularly for young people and the well-qualified in this deep rural region. The corridor lacks employment in high value services such as finance, business services and research and development having a high dependency on the foundational economy and tourism. Consequently, the role of the universities in 'pump-priming' the economy of West Wales to promote agglomeration effects could be decisive in supporting regional economic development.

The physical environment of the Corridor is also challenging. In the north from Bangor to Caernarfon the corridor runs between the northern edge of the Yr Wyddfa (Snowdon) range and the Menai Strait. It then climbs across the Llŷn Peninsular to Cardigan Bay the coastal strip of which is bounded by the western edges of the Snowdon, Rhinog and Cader Idris mountain ranges. There are major river estuary crossings at Porthmadog: Afon Glaslyn, Penrhyndeudraeth: Afon Dwyrhyd, Barmouth: Afon Mawddach, Tonfanau: Afon Dysynni and Dyfi Junction: Afon Dyfi, of which the Afon Mawddach, Afon Dysynni and Afon Dyfi crossings are rail only. South of the Dyfi in west Wales the terrain of Ceredigion and Carmarthenshire is undulating with transport routes negotiating river valleys running from the Cambrian Mountains and Brechfa Forest towards the west and south coasts. Consequently, substantially improving existing roads or building new roads, particularly on the coastal strip of Cardigan Bay, but also through the region in general, would be difficult and environmentally problematic.

The Welsh Government has already expressed an aspiration to the Williams-Shapps Rail Review to consider the West Coast Line, which would include the restoration of rail services between Bangor to Porthmadog and Aberystwyth to Carmarthen, as a key strategic corridor and have commissioned Transport for Wales to undertake a feasibility study on innovative ways to operate such a service (Williams, 2020). Bowyer and Holzinger (2021, Table 1) point out that between 2013-14 and 2019-20 local authority spending on roads and transport fell by just over 20%, and on planning and economic development by just under 50%. To partially redress the balance of these reductions, and as an alternative to road improvements or new construction, the development of a West Coast Rail Corridor should be considered by the Welsh Government as being an integrated component of a series of urban hub-based economic development programmes, and together with research and innovation

programmes for the four universities in the corridor. Such a strategy would also assist in the development of better-quality tourism, in Switzerland the railway system is promoted as part of the tourism offering and the 'Swiss Travel Pass' for foreign visitors is an important source of revenue. In 2014 transport services amounted to 24.9% of Swiss tourism revenue (Federal Statistical Office, 2018).

The Cambrian railway system currently links the 106 km between Aberystwyth, Dyfi Junction, Tywyn, Barmouth, Harlech, Porthmadog and Afon Wen near Pwllheli. The solums of two Beeching era closures link the northern end of the Cambrian Coast Line at Afon Wen via Caernarfon to the North Wales Main Line near Bangor (41 km), and the southern end of the Cambrian Main Line at Aberystwyth via Lampeter and the South Wales Main Line at Carmarthen (91 km). The Welsh Government sponsored feasibility study on reinstatement of the Aberystwyth to Carmarthen line produced a low cost / benefit ratio of 0.43:1 for a cost of £834 million in 2021 prices. The estimate was based on traffic projections in the proposed corridor only (Mott Macdonald / Transport for Wales, 2018, pp. 2-3), and not on benefits which would accrue on connecting the South Wales main line, Cambrian lines, and North Wales Coast line corridors.

Two re-openings that could serve as analogues for the West Coast Rail Corridor have exceeded their business case traffic projections. One is the 2010 restoration of 58 km of de-commissioned railway between Athenry and Ennis which enabled direct links between the two major Irish university cities of Galway and Limerick via six intermediate stations in the counties of Galway and Clare. The population served by the Western Rail Corridor: Phase 1 is about 356,000 and the cost was £125 million (Railway Technology, 2010). In Scotland, the 2015 Borders Railway reopening of 56 km links Tweedbank with the East Coast Main Line at the Scottish capital Edinburgh via eight intermediate stations in the counties of Borders and Midlothian. The project had a final 2013 cost / benefit ratio of 0.5:1 (Spaven, 2017, p. 221) and cost £355 million in 2021 prices (Borders Railway, 2021). It serves an on-line population of 35,000 people with another 35,000 people in the catchment area of the railway (Spaven, 2017, p. 95).

The intention behind both projects was improving access to and developing the two respective regional economies. In the case of the Borders Railway because of the

region's vicinity to Edinburgh, the second most visited city in Britain, tourism is an important source of traffic and revenue. Spaven (2017, p. 263) notes that within two years:

“Visitor days at hotels and bed & breakfasts in the Borders had risen by 27% since the arrival of the railway, and visitor spend on food and drink was up by 20%. CGI, the information technology company had announced 200 new jobs at its Tweedbank base, facilitated by the connectivity provided by the railway, and the latter had also encouraged growing retail activity in the centre of Gala (i.e. Galashiels).”

In both cases passenger numbers have substantially exceeded the original business case estimates. The Irish Western Rail Corridor lobby group West On Track reported that by 2015 the Athenry to Ennis section was carrying 102,000 passengers, double the year before and exceeding the Iarnród Éireann (Irish Rail) business case forecasts. The complete Galway to Limerick route carried more than 300,000 passengers in 2015 (West On Track, 2015). Regarding the Scottish Borders line the Welsh west coast rail lobbying group Trawslink Cymru (2021) reported that:

“Passengers numbers for the first year of operation (2015-16) were 1,267,599, almost double the official forecast when the railway was opened. and this figure increased to 1,387,819 in the second year.”

Clearly there is an under-forecasting issue in passenger demand modelling for rural rail projects, this will also affect the level of cost/benefit ratios. Table 10.2 below shows comparative details for the Irish and Scottish project in 2021 prices, indicative costs for the West Wales Rail Corridor, and comparative costs for the recent constructed Newtown road bypass.

The table also shows the notional estimates for re-instating the Aberystwyth-Carmarthen and Afon Wen-Bangor links, and upgrading the existing Cambrian Main and Coast lines between Aberystwyth-Dyfi Junction and Afon Wen. Some works are already scheduled by Network Rail for the Cambrian Coast Line such as the refurbishment of Barmouth Bridge.

Table 10.2 Western Rail Corridor, Borders Railway, and West Wales Rail Corridor Cost Per Route km			
Projects	Cost 2021 Prices	Route km	Cost per route km
Western Rail Corridor Ireland	£124,916,180	58	£2,153,727
% of Aberystwyth-Carmarthen costings	35%		23.6%
Borders Railways Scotland	£355,000,000	35	£10,142,857
% of Aberystwyth-Carmarthen costings	43%		111.1%
A) Aberystwyth-Carmarthen rail reinstatement	£834,000,000	91	£9,125,725
B) Bangor-Afon Wen rail reinstatement based on Aberystwyth-Carmarthen costings	£378,261,298	41	£9,125,725
i) A & B reinstatement works	£1,212,261,298	133	£9,125,725
C) Cambrian lines rail upgrade Aberystwyth-Dyfi Junction-Afon Wen	Cost of reinstatement works A & B *0.33%	Route km	Cost per Route km
	£400,046,228	106	£3,781,513
Optimism Bias 20%	£80,009,246		
ii) Subtotal Cambrian upgrade	£480,055,474	106	£4,528,825
i) & ii) Totals	£1,692,316,772	239	£7,091,802
	Cost 2021 Prices	Route km	Cost per route km
<i>Newtown Trunk Road Bypass (2019)</i>	£96,000,000	6.3	£15,238,095
<p>“Western Rail Corridor Ireland,” Ralway Technology (2010); www.exchangerates.org (2010). 'Euro to British Pound. Historical Exchange Rates on 30th March 2010; www.bank of england.co.uk/monetarypolicy/inflation/inflation-calculator (2010-2020)</p> <p>Borders Railways Scotland: www.bordersrailway.co.uk (2021); www.bank of england.co.uk/monetarypolicy/inflation/inflation-calculator (2012-2020)</p> <p>Aberystwyth-Carmarthen: Mott Macdonald / Transport fof Wales (2018)</p> <p>Newtown Trunk Road Bypass: Drury (2019)</p>			

It will be noted that whilst the outturn costs for the Borders Railway and the estimated costs for the Aberystwyth-Carmarthen line are similar, it is not clear why the outturn costs for the Western Rail Corridor-Phase 1, the Atherry-Ennis reinstatement, are only 35% of the estimate for Aberystwyth-Carmarthen, despite the WRC being a 'state of the art' reconstructed single line railway with centralised traffic control and having benefited from extensive flood defence works in some sections. Within the British railway industry and relevant government departments there have been widespread discussions about how infrastructure project cost inflation, and how it can be contained to make projects affordable. The UK National Audit Office report 'A financial overview of the rail system in England' (2021, p. 11) stated that:

“In total, renewal expenditure in Control Period 5 was £1 billion more than planned. The largest overspend by asset was on the track, which the Office of Road and Rail (the rail industry regulator) attributed to Network Rail not achieving planned efficiency improvements.”

The Railway Industry Association reported that they believe electrification could be delivered for 33%-50% of costs for recent projects (2019, p. 3). On viewing photographs of some of the infrastructure works on the Borders Railway there is evidence of an inappropriate standards overkill by Network Rail with main line standards being applied to a secondary railway. The broader issue of whether light rail / metro project delivery costs would be better contained by public / private partnership (PPP) vehicles or public sector funding was comprehensively considered by Gannon and Smith in 2009. These procurement issues are the same for heavy rail and light rail. They concluded that:

“In future effective and sustainable procurement strategies are needed possibly focussing on public sector funding for the capital expenditure and private or private / public funding for service provision.” Gannon and Smith (2009, p. 10)

The evidence from Ireland and Scotland suggests that a unified and devolved Welsh railway system could be developed and delivered more appropriately and less expensively than within the current system. The benefits are worthy of achievement. Barry (2018, p. 11) identifies direct transport user benefits from £1.8 billion to up to £2.4 billion over 60 years from the rail enhancement programme set out in his report for enhancing the Wales and Borders railway network.

Table 10.3 West Wales Rail Corridor: Office for National Statistics Population Mid-Year Estimates 2019		
Community Council	Population Estimate	Comments
Bangor	16,383	Urban Hub: University, North Wales Main Line to Chester, Buses, Tourism Centre
Y Felinheli	2,465	
Caernarfon	10,215	County town: Narrow Gauge Railway, Buses, Tourism Centre
Bontnewydd	1,123	
Llanwnda	2,132	
Penygroes, Llanllyfni Community Council	4,359	
Afon Wen Junction		Cambrian Coast Line to Pwllheli
(Pwllheli)	4,356	Adjacent town
Cricieth	1,788	Tourism Centre
Porthmadog	4,134	Urban Hub: Narrow Gauge Railways, Buses, Tourism Centre
Penrhyndeudraeth	2,155	
Harlech	1,324	Tourism Centre
Dyffryn Ardudwy	1,549	Tourism Centre
Barmouth	2,467	Urban Hub: Buses, Tourism Centre
Tywyn	3,268	Narrow Gauge Railway, Buses
Aberdyfi	724	Tourism Centre
Dyfi Junction		Cambrian Coast & Cambrian Main Lines to Machynlleth & Shrewsbury
(Machynlleth)	2,248	Adjacent town
Y Borth	1,356	Tourism Centre
Bow Street, Tirmynach	1,830	
Aberystwyth	10,756	Urban Hub: County town, University, Cambrian Main Line to Shrewsbury, Narrow Gauge Railway, Buses Tourism Centre
Llanilar	1,100	
Ystrad Fflur	682	Tourism Centre
Tregaron	1,228	
Lampeter	2,926	Urban Hub: University Buses
Llanybydder	1,573	
Pencader - Llanfihangel-ar-Arth Community Council	2,184	Narrow Gauge Railway
Llanpumpsaint	721	
Cynwyl Elfed	1,038	
Carmarthen	14,591	Urban Hub: County town, University, South Wales Main Line, Buses, Tourism Centre
Total	100,675	

10.16 West Wales Corridor Economic Development Locations

Table 10.3 above provides 2019 mid-year population estimates (ONS, 2020a) along the proposed route of the West Coast Rail Corridor, a total of just over 100,000 people, together with comments on the location of possible economic development urban hubs, universities, transport interchanges and tourism centres. In the case of the principal university centres, Bangor, Aberystwyth, Lampeter, and Carmarthen, the substantial temporary student populations are not included in the in the mid-year estimates.

10.17 Economic Development: Conclusion

Concerning the redistribution of financial resources for economic development. Overall, the data in Chapter 4, Section 4.4 “The Socio-Economic Comparisons” do not support the expectation behind the third research question in Chapter 1 “Can transport investment lever government expenditure on health and social security for other sectors such as economic development?” However, those countries with higher levels of economic performance, and therefore public expenditure, are those with high and medium levels of transport integration. Whilst a causal link cannot be made between higher levels of transport integration and economic performance there does seem to be an association between transport interconnectivity and greater economic development. There are exceptions in the case of Ireland’s GDP and GVA, a reflection of the country’s current low corporate tax regime, and in other areas concerning Catalonia, Ireland and Scotland, some of which can be accounted for and some of which cannot be. What is constant is Wales’ relatively low ranking in the most positive indicators as shown in Table 4.14.

Regarding interventions to improve the position of the Welsh economy. Lang’s (2016) belief that there is a lack of robust methodological approaches to prove the link between transport investment and social and economic outcomes is contradicted by the empirical research results of Johansson (1993) and Ozbay et al. (2003) outlined in Chapter 4, Section 4.3. However, it is accepted that the well-established appraisal process for projects that concern public spending, as set as out in HM Treasury’s Green Book, is contested.

Practitioners in the area have argued that the emphasis on the current economic data of a region, rather than producing consistency of spending benefits, tends to benefit areas with stronger economies to the detriment of those that need levelling up the most (Turner, 2020). To address these concerns a 2018 revision of the Green Book incorporated better guidance on environmental appraisal, more focus on distributional impacts, and further guidelines on monitoring and evaluating policies. The further 2020 review decided that the current appraisal practice could undermine the UK government's intention to economically level up poorer regions. It was felt that project proposers of interventions that were strategically weak became overly fixated on the monetary benefits of the benefit / cost ratios, which was sometimes artificially inflated, to the confounding of well-rounded appraisals (Turner, 2020, p. 4). One might mention that some of those who grant public funding also share this fixation.

The misalignment of the process not only seems to privilege wealthier regions above poorer ones but also urban areas above rural ones as the process is better aligned to large populations and levels of transport demand. The business case process for rural transport projects appears to have consistently under-estimated the traffic attracted by those projects that have opened, despite discouraging benefit/cost results. The danger is that projects which could bring substantial mobility and socio-economic benefits to rural areas are not being progressed as a result.

There needs to be recognition that the benefits of infrastructure interventions experience a time-lag between opening and the benefits being felt, also in rural areas it needs to be understood that although the multiplier effects are less than in cities, they are still fulfilling the same human and economic needs.

The way in which a project fulfils the requirements of the Well Being of Future Generations (Wales) Act 2015, and how this can be reflected in the cost / benefit factors of WelTAG, needs better communication and explanation by the Welsh Government.

In its funding for infrastructure projects and bus services the Welsh Government should take into account the additional social benefits generated by the employment training opportunities that such projects offer, it also needs to ensure that these opportunities are physically accessible to potential trainees.

Conclusion: Making Connections: Findings and Recommendations

C.1 Introduction

At the core of this conclusion is the research question which tests if a Welsh integrated transport system could reduce poverty and deprivation, and promote economic development (Section I.2, p. 18). This was supported by three related research objectives asking whether transport investment produced wider socio-economic benefits (Section I.3, p. 19).

The means of testing these propositions were comparisons between socio-economic and case study data between the high integration countries, the medium integration countries, and the low integration countries.

This chapter integrates and summarises the main research findings under a number of issue headings. Based on the findings are recommendations for the Welsh Government and stakeholders to consider. These arise directly from the research, and particularly from the questionnaire and semi-structured interview findings. They are referenced to the appropriate section of this thesis.

C.2 Applying Findings from the Research Question: Recommendations 1-3

The evidence from other small European states indicated that integrated transport systems can address issues of economic performance. The four countries with high and medium levels of transport integration, The Netherlands, Switzerland, Catalonia and Ireland, all have better levels of economic performance than Scotland and Wales. Whilst it is not suggested that levels of transport infrastructure, services and integration are a direct causal influence in economic development and performance, it arguably facilitates these by allowing faster, better quality in terms of capacity and redundancy, and more reliable physical links between markets and nodes of economic performance. Terluin (2003, p. 337) in her study of economic development in more and less successful European rural regions concludes that:

“Although in general it can be said that well-developed road infrastructure may contribute to an efficient trade of services and goods, and that it forms and

attractive location for firms, evidence from the case studies suggests that the management of transport infrastructure is crucial. The more transport infrastructure is integrated in a broader development plan and accompanied by complementary incentives such as the construction of well-equipped business sites, the more transport infrastructure can trigger economic development.”

Consequently, it appears that any improvement in the current level of Welsh transport integration and economic development would need to be mutually dependent in order to enable better access to employment, goods, and services, and through these stimulating further economic activity. In themselves transport systems are also generators of economic activity through their planning, construction, maintenance, and operation. In view of its contested validity there is a need for further research into the relationship between economic development and transport.

In considering what a Welsh integrated transport system would “... look like and how would it operate?” three models of integration from the high and medium integration cases were examined: i) the Dutch ‘national’ system (the developing Irish system looks as if it may be similar when fully implemented), ii) the Swiss (and German) regional tariff and integration partnerships, and iii) the four predominantly urban Catalan transport authorities.

Recommendation 1 (Reference Chapter 8, Sections 8.6 - 8.7)

It is recommended that a version of the Dutch system, which combines a high level of inter-modal service integration with a national public transport smart card that charges passengers per kilometre travelled, be adopted for Wales. The smart card is rechargeable from bank accounts by standing orders or direct debits, through an internet site, or by on-site ticket machines. Given the lack of public transport-related capacity in some of the twenty-two existing Welsh counties, as a minimum the restoration of the four regional transport consortia would be appropriate to specify and monitor the performance of regional bus services, and to ensure bus to bus and rail to bus connections. However, since Welsh transport operators do not have a history of cooperation with each other, Transport for Wales appears to be the appropriate body to exercise national strategic oversight of an integrated network and fares system, and to be the ‘controlling mind’ of public transport in the country. Transport for Wales may

wish to either establish an integrated ticketing company, such as Translink in the Netherlands, or run such a system itself.

No hard evidence was found to support a positive answer to the question ‘does transport investment free government expenditure for other sectors of the economy?’ However, as was noted above, since economic activity was higher in those jurisdictions with high and medium integration it appears that more resources were available for other sectors of the economy because of the higher levels of economic activity in the Netherlands, Switzerland, Catalonia and Ireland.

The British deregulated free market bus model has experienced a considerable drop in patronage in contrast to the publicly specified and integrated London model. As Jeffrey (2019, p. 6) noted passenger numbers on the Tyne and Wear Metro fell after the deregulation of connecting bus routes, see Chapter 2, Section 2.6. This effectively prevented the maximisation of the socio-economic and environmental benefits of investment in the Metro which was designed as an integrated system. The operational and organisational atomisation of the railway system, and the abolition of the Strategic Rail Authority, left this mode without a controlling mind, which resulted in the industry being restricted in its responses to obtaining wider societal benefits from its infrastructure and services. There were not definite positive indications in response to the question: “Are integrated public transport systems an effective way of minimising capital and revenue expenditure on transport?” However, there was evidence that expenditure on integrated systems was effective in achieving planning, social, economic development and environmental objectives which were not possible to capture in a deregulated transport environment because of ownership issues and lack of service stability.

Regarding the research question: “What would an integrated public transport system look like and how would it be organised?” It was clear from comments made in response to the questionnaire and semi-structured interviews that a one size fits all approach to public transport provision is not effective. Not only strategic and regional services are needed but also tertiary local level services connecting villages with each other and market towns, and / or at times of the day when conventional services do not operate. Consequently, an integrated network would incorporate high levels of demand responsive services. This presupposes that the four re-instated regional

transport partnerships would ensure effective route planning through detailed local knowledge whilst Transport for Wales would cover strategic planning, integrated ticketing and timetables.

Recommendation 2 (Reference Chapter 8, Sections 8.6 - 8.7 and Chapter 10, Sections 10.10 - 10.11)

Tertiary, or very local, public transport services should be prioritised where market testing indicates there is a demand. This should particularly be aimed at giving access to employment opportunities. Such services are likely to be demand responsive using telematic-based control systems with small buses or larger taxi-like vehicles. This service already exists in the Netherlands and is marketed as 'Regio Taxi' (Rural Shared Mobility, 2019).

Recommendation 3 (Reference Chapter 8, Section 8.6 – 8.7)

It is recommended that rail transport should be expanded where this is necessary and appropriate. A west Wales rail corridor should be developed from Bangor to Aberystwyth and Carmarthen with the specific objective of promoting economic development in this predominantly Welsh speaking zone. This would be to promote economic development as discussed in Chapter 10, Part 3, to safeguard and develop the Welsh language in its heartland, to ensure environmental protection, and to reunite the fractured Welsh railway structure. This currently forms a Welsh Government policy objective (Welsh Government, 2019, p. 16) (Modern Railways, October 2020, p. 17) but the wide implications for the railways, the public transport network and the strategic highways network need to be examined and fully assessed.

Where larger Welsh regional centres, and high demand transport corridors elsewhere, could not support the cost of conventional light rail transit, it is recommended that they be assessed for very light rail.

The wider research objectives informed three sub-objectives. The first asked: "Are railways an appropriate core of integrated transport systems?" The international comparison cases all had robust rail systems, in the continental countries the rail service represented the primary, longer distance, level of public transport. In the

Netherlands, and Switzerland, the second level of regional and local bus / tram services was consciously integrated with the rail service through physical interchanges, integrated ticketing, and timetabling. In Catalonia, and Ireland, the emphasis was more on the hard integration provision of physical interchanges, although soft integration (ticketing and timetabling integration) was spreading in these two networks. This was also the case in Scotland and in Wales, although currently to a less developed extent.

Given that rail is an expensive mode to build, operate and maintain, it is necessary for its unique characteristics of a dedicated right of way that is capable of carrying high volumes of people and freight at relatively high speeds should be exploited to the maximum. Consequently, integration enables the hinterland of the rail system to be expanded and passenger loadings maximised. The rise, decline, and partial re-emergence of the Wales and Borders railway system as the framework for an integrated system was reviewed in the light of the international comparisons. Because of the physical difficulty of upgrading, and the impacts on an upland environment of outstanding environmental quality, making the Welsh trunk road system even acceptably 'fit for purpose' would be extremely difficult, and would probably stimulate more road traffic with related pollution impacts.

Rail technology ranges from the emerging very light rail for urban transport, Small (2020, pp. 340-343) reports that the English city of Coventry is developing a system using battery electric trams and a light but durable track system that does not need extensive excavations and utility diversions to install it, to conventional light rail for larger conurbations, through to heavy rail for regional, inter-regional, and inter-city corridors. Any of the rail modes can be used where they are appropriate for the passenger demand in a corridor, and where wider factors, such as promoting connectivity, avoiding interchange penalties, and complying with government transport policy, make them suitable.

Consideration of the second sub-objective question: "What models are there for a potential Welsh integrated transport system?" has already been answered by Recommendation 1. The 'Netherlands Model' would benefit the travelling public by reducing journey times and making public transport easier to use. The non-public transport travelling public, industry and the commercial sectors could benefit from

integration as road use at peak times falls, so improving journey times and reliability through reduced congestion. The procurement and monitoring of an integrated system at regional level with a broad system specification, ticketing and timetable information organised at national level would allow a certain amount of organisational flexibility. Regional partnership input would prevent the system from becoming too centralised. To indicate the service levels that should be aimed at McKibbin (2012, p. 4) notes that service levels in the Netherlands are:

- Urban: every 10-15 minutes
- Suburban: every 15-30 minutes
- Rural: every 30-60 minutes

The costs of setting up an integrated system would initially be high. The regional transport partnerships would need to be re-established. Changes would also need to be made to the organisational structure of Transport for Wales, and the software and equipment for integrated ticketing would need to be phased in, although parts of this are already in place for the Welsh Concessionary Travelcard scheme. Increased public transport use is likely to reduce road traffic accidents, pollution, and congestion costs. It is possible that there will be some reductions in unemployment and NHS costs as access to work increases and social isolation lowers.

There was no direct evidence to support the question “Would an integrated system raise GDP / GVA, improve the quality and breadth of employment and social opportunities, and stimulate financial transfers from the health, welfare and social security budgets to create a virtuous circle of investment in the productive Welsh economy?” However, as previously mentioned, the highest cases of transport integration, the Netherlands and Switzerland, had high levels of economic activity but also higher levels of social spending. As regards monitoring, if a Welsh integrated system was to be created, then a programme of rigorous ‘before and after’ research on the socio-economic costs / benefits using social protection benefits, health, and transport data, as well as user and non-user surveys, would be essential.

C.3 Transport System Development

This stream of the research examined the way in which transport systems develop. Whilst having broad areas of comparability between countries, the type of development tends to be the result of local geographical, political, and socio-economic conditions. The two highest integration networks, the Netherlands and Switzerland, both have origins that were financially difficult and constrained by the deltas, rivers, and waterways in the former case, and by the Mittelland Plateau and the alps in the latter case. They prove that it is possible to develop networks in difficult and sensitive environments if there is the political will, and/or the necessity to do so. Both countries have well integrated transport networks which are at the heart of their wealthy national economies, and which display high levels of integration and redundancy.

Catalonia and Ireland, the medium integration cases, have networks that are acceptable but which, with greater political will, could be more effective and better value for money for their economies. The physical nature of Catalonia is mountainous and constrained, whereas in Ireland the main transport routes operate in easier geography. Both countries have highly developed road networks, and in the case of Ireland a new motorway system. Integration and redundancy are poorer than in Switzerland and the Netherlands but better than in Scotland and Wales.

Because of its geography Scotland has retained and developed a reasonable road and rail system although inter-modal integration is still developing. There is medium redundancy in the transport network in the Central Belt but it is poor elsewhere. The Welsh railway network is fragmented into three sections by closures and relies on the Marches Line, mainly in England, which is remote from the west coast population centres, for the Holyhead to Cardiff north to south Wales traffic; there is no other example of this situation in Europe. Outside the south Wales, north Wales coast and the Deeside / Wrexham regions, the Welsh trunk road system is of poor quality. Both road and rail have a low level of redundancy.

The issue of restoring a north-south rail service within the country has risen frequently during this research. In Chapter 10, Section 10.15 I make a strategic proposal for the Bangor-Aberystwyth-Carmarthen corridor, primarily on the grounds of promoting economic development. In his blog “North-South Rail (& bus) in Wales!” Barry (2022) makes the following points:

“Most people in Wales, the vast majority in fact, live in the southeast, the northeast and in / around Swansea Bay, probably 2.5M of Wales 3.2M population.

Most trips in Wales are intra-regional, over 80% in fact, very few are between regions or cross the border into England.”

Barry advocates enhancements of the existing Marches (Newport-Hereford-Shrewsbury-Wrexham-Chester), Borderlands (Wrexham-Shotton-Bidston), and North Wales (Chester-Shotton-Holyhead) lines which reflect the population distribution he describes. However, he also suggests an internal route from Bangor to Swansea which minimises the amount of re-instated railway needed. This would require 85 km of rebuilt and new railway from Bangor to Porthmadog, and from Moat Lane Junction on the Cambrian main line near Newtown to Builth Road on the Central Wales line. The Cambrian and Central Wales lines would be upgraded. He estimates that this route would maximise connectivity across north, mid and southwest Wales population centres at an estimated cost of £1 billion.

The Welsh Government is continuing to develop a programme to integrate bus and rail services and tariffs, but the question of adequate strategic transport infrastructure and connectivity remains to be resolved.

C.4 Transport Integration

Within their limited commercial remit, the main private bus groups have operated acceptable services, but have concentrated on their main profitable routes, and with a shrinking customer base. Privately owned transport services can be components of an integrated transport system as effectively as publicly owned ones. However, it is apparent from their resistance to participation in Statutory Quality Contract schemes (SQC) that the owners of private transport assets in Britain prefer to exercise their ownership, and their commercial freedom, outside of partnership structures with local authorities. The challenging nature of bus legislation to enable the combination of privately owned bus operators with local democratic control over route networks, timetables, integrated ticketing and service standards is so challenging that few local

authorities, or combinations of authorities, have been prepared to engage with the process.

Where private operators have entered the public transport sector there have been examples of both functional and financial instability, examples are the collapse of Railtrack plc in 2001, the removal of the franchise from East Coast main line train operator GNER in December 2006 and the collapse of bus operators such as Express Motors of Penygroes in 2017.

The broad policy intention of the Welsh Government to integrate public transport has been made clear in “Llwybr Newydd” (Welsh Government, 2020e), as is the intention to ensure that Welsh transport companies have the capacity to play their part in Welsh national integrated transport policies. During the Covid-19 pandemic the Welsh Government took control of Transport for Wales Rail Services, the Wales and Borders train operating franchise, which will assist in this objective.

Questionnaire respondents and Semi-Structured Interviewees considered that either a regulated and integrated system specified by a public authority, or a version of the current public / private hybrid system, were considered the best outcomes for passengers. The most financially and policy effective model for government was thought to be the fully integrated model, with the current hybrid system slightly less effective for government in terms of finances and policy effectiveness.

C.5 Socio-Economic Indicators

On the two main economic indicators of Gross Domestic Product and Gross Value Added (pp. 140-141) Wales ranked last out of the six countries indicating relatively weak economic performance. On the third economic indicator Transport Expenditure (pp. 142-144) the country's fourth place was a result of expenditure on the electrification of the South Wales Main Line from Cardiff Central to London Paddington, and the start of work on conversion of the Valleys Lines to the South Wales Metro. Although this project should have considerable positive economic development effects for south east Wales, UK government rail spending in Wales and the Borders, eleven percent of Network Rail, is disproportionately low, receiving only one per cent of central funding (p.214).

The position of Wales in most of the socio-economic data rankings (pp. 144-153 in relation to those countries in the high and medium transport integration bands is poor, providing an indication of the socio-economic disadvantage that the country experiences.

C.6 Welsh Government Transport Policy and Funding Documents:

Recommendations 4 and 5

Most questionnaire respondents had used Welsh Government transport policy documents and project finance guidance and a majority thought that they were capable of improvement. There was concern about the lack of cross-cutting policy integration within the transport domain. It was also thought that there was a lack of cross-cutting policy integration outside the transport domain to areas such as health, regeneration, economic development. There were also concerns about the timeliness of the document suite, and its usability and accessibility, particularly for non-professional users. There was also perceived bias by some respondents to prioritise the road transport mode over others.

Some respondents struggled when making transport funding bids using the “Welsh Transport Planning and Appraisal Guidance (WelTAG)” (Welsh Assembly Government, 2008c), the annual “Local Transport Fund (LTF) Grant Guidance to Applicants” (Welsh Government, 2017d). Some found difficulty in using the Welsh Index of Multiple Deprivation (WIMD) (Welsh Government, 2019d) as a data source to support WelTAG and LTF applications. Others expressed doubts about the fairness of funding allocations across the regions. Some third sector organisations expressed the view that the time frames for funding applications are too short and monitoring processes are too resource heavy for them.

Recommendation 4 (Reference Chapter 8, Sections 8.2 - 8.3)

The Welsh Government should review the utility of the current policy document and transport funding suite in deeper consultation with actual and potential users in all sectors. Welsh Government should also consider making access to the local transport grant process easier by establishing a one stop portal for applications. This would have easy access links to the range of appropriate and relevant data sources required to support applications.

Recommendation 5 (Reference Chapter 8, Sections 8.6 - 8.7)

Welsh Government, regional economic development bodies and local authorities should work to assess the costs, and economic development and social benefits, of an integrated transport system for Wales, how finances should be allocated, and how powers should be granted and exercised.

C.7 Poverty and Deprivation: Recommendations 6 and 7

Most respondents felt that the issues of poverty and deprivation were relevant to their work and half of these used official indicators, with the leading source being the Welsh Index of Multiple Deprivation. Institution of a Welsh Government integrated data portal allowing access to a wide range of poverty and deprivation data sources is likely to be beneficial, especially for community group / lobbying organisations whose awareness of official data sources might be more limited.

All respondents agreed that poverty and deprivation was related to transport problems in their areas, whether urban or rural, because of the cost of public transport, the lack of it, in terms of available routes, and the limited spread of service hours. Some Interviewees expressed strong concerns about the effects of poor public transport on the mental welfare of rural young people and members of the farming community. All the respondents discussed the issue of poor public transport access to employment, goods and services. Several respondents pointed to the extra cost to already constrained rural household budgets of having to run one or more motor vehicles to access employment and services.

Most respondents agreed that poverty and deprivation was a major consideration in the activities of their organisations. The organisations of just under half of respondents had policies / projects to address these issues. Most respondents thought their organisations found it difficult to address poverty and deprivation and that improvements could be made in the assessment of these issues. Almost all respondents believed that improvements could be made in the practice of addressing poverty and deprivation.

Recommendation 6 (Reference Chapter 9)

In view of the difficulties reported by respondents in chapter 9 in assessing poverty and deprivation and accessing relevant statistics, it is recommended that a national standing anti-poverty commission should be instituted comprising the Welsh Government, the Well-being of Future Generations Commissioner, the National Infrastructure Commission for Wales, and third sector and other civil society bodies. This would constantly review the impacts of transport, amongst other factors, upon poverty and deprivation, how it should be assessed, how it can be addressed through transport improvements, and what interventions these should be. Another major output would be the production of a frequent and accessible flow of data for the use of stakeholders which would back up the Welsh Index of Multiple Deprivation.

Recommendation 7 (Reference Chapter 9)

To establish a baseline the Welsh Government should lead a national inquiry, together with relevant UK government departments and agencies and the third sector, to assess the cost / benefit impacts of spending on public transport and other initiatives to relieve poverty and deprivation.

C.8 Economic Development: Recommendations 8-10

The ranking of the ten questionnaire factors for economic development produced a near tie indicating that there are no factors that could be said to be outstanding enablers for economic development. There was a feeling amongst some questionnaire respondents and interviewees that in some cases the potential location of developments was more important than other factors. Good public transport links for

employees to access sites were seen as being a secondary consideration, which contradicted some of the other opinions expressed.

In general, good transport links were thought to encourage economic development and respondents identified positives, qualified positives, but also some downsides. There needs to be recognition that the benefits of infrastructure interventions experience a time-lag between the decision and the development stages, and between opening and the benefits being felt. In rural areas it needs to be understood that because of lower population and economic activity levels the multiplier effects are less than in cities. Slightly more questionnaire respondents reported confidence in the planning system than did not.

Although road and rail access to tourist areas is improving, as a result of infrastructure and public transport service improvements, the marketing of these to potential tourists has been poor and respondents felt that perceptions of poor accessibility may deter tourists.

Some respondents thought that assessing the way in which a project fulfils the requirements of the Well-being of Future Generations (Wales) Act 2015 (National Assembly for Wales, 2015), and how this can be reflected in the cost / benefit factors of WelTAG, needs better communication and explanation by the Welsh Government. In its appraisal and funding for infrastructure projects and bus services the Welsh Government should take greater account of the additional social benefits generated by the training opportunities that such projects offer, it also needs to ensure that these opportunities are physically accessible to potential trainees.

Respondents believed that the planning process for new town bypasses should also consider the wider strategic and local public transport service effects as well as the benefits of declassified former A roads.

A majority of questionnaire respondents and interviewees supported the restoration of the four regional transport consortiums that had implemented planned transport interventions prior to the withdrawal of their funding by the Welsh Government in 2014. Despite its potential importance for radically improving all kinds of infrastructure provision in Wales the National Infrastructure Commission for Wales had no recognition amongst the respondents and interviewees outside of the Welsh

Government and local authorities. This suggested that the Commission needs a higher public profile.

Recommendation 8 (Reference Chapter 10, Section 10.2)

There needs to be greater identification of which locations in Wales are most likely to be those successful for economic development. Further research is also needed on which factors for economic development are generic and which ones are likely to be location specific in the Welsh context.

A majority of questionnaire respondents disagreed with the question “Are the causes and symptoms of transport problems easy to identify?” Respondents who thought that they were easy to identify evidenced a combination of poor road and rail infrastructure, the recurring issue of deep rurality in much of the country, and the late start and shortage of time and money in addressing Welsh transport issues. All respondents said they experienced barriers to resolving transport problems in their work. Again, deep rurality was raised together with the centralisation of services, and insecure and short-term funding.

All respondents thought that there are solutions to breaking down barriers “out there,” although some were unable to say what they are. It was acknowledged that there was a long-standing commitment to the integration of spatial and land-use planning and transport, but it was felt that this was often discounted because of local factors and that there needed to be more effective integration of the two. Some thought that the greater development and use of data in transport planning would assist in this objective. It was also thought that the Welsh Government should be more proactive in transport delivery, and in revisiting and developing the ‘placemaking’ agenda, with a switch to localism and people working where they live.

Recommendation 9 (Reference Chapter 10, Sections 10.2 - 10.4)

There should be further moves to meaningfully integrate spatial and land use planning with transport planning. Local political and planning issues should not be allowed to divert from, or dilute, this objective.

Recommendation 10 (Reference Chapter 10, Sections 10.2 - 10.4)

Experimental centres should be designated to develop economic localism, employing the Preston Model (O'Neil, 2016) (Brown, 2021) in the location of employment, the procurement of local authority goods and services, and the promotion of locally based food production, food and drink and retail.

C.9 North to South Issues: Recommendations 11-13

There was concern that the previous policy focus on north to south infrastructure and services of the One Wales coalition government had been lost and respondents thought it should be restored and developed. The binary policy emphasis on either north to south or east to west corridors was thought to be illogical and damaging.

On barriers to resolving transport problems the replacement of the existing annual bus funding process was put forward as an important factor for effective strategic planning. It was also pointed out that private bus operator company dis-investment was occurring whilst suppressed passenger demand is unmet. Related to this latter point it was thought that private transport operators were concentrating on providing services that benefitted their finances, whilst claiming to be passenger focussed. Allied to this, poor public transport service reliability was believed to be a major problem in some areas of the country which damaged public transport use and modal transfer.

The long-term (20 to 30 years) ambitions expressed by interviewees were quite modest, although as they had previously discussed the need for a fully integrated transport system and railway re-openings, this was probably inevitable. Restoring internal north to south rail connections was raised again and it was hoped that the Welsh Government would continue to support the strategic TrawsCymru bus network of railhead and main town connections. There was a wish for transport expenditure to be targeted to reduce health and social security expenditure. It was thought that modal shift behaviours should be encouraged through developing good network connectivity. Transport service and network change consultations should be clear and from the bottom-upwards, and not from the top-downwards.

The intention behind both the Irish Western Rail Corridor and Scottish Borders Railway projects was improving access to, and developing, the two respective regional

economies. In both cases passenger numbers have substantially exceeded the original business case estimates. Clearly there is an under-forecasting issue in business cases in passenger demand modelling for rural rail projects, this will also affect the level of the cost / benefit ratio for projects. The evidence suggests that a unified and devolved Welsh railway system could be developed and delivered more appropriately and less expensively than within the current system. The benefits are worthy of achievement as Barry (2018, p. 11) identifies direct transport user benefits from £1.8 bn to up to £2.4 bn over 60 years from the rail enhancement programme set out in his report.

Recommendation 11 (Reference Chapter 10, Sections 10.9 - 10.12)

The Welsh Government should continue to support and develop the TrawsCymru strategic bus network, it should also tackle the issues of annualised funding, operator instability and service unreliability through Transport for Wales, where local authorities are unable to successfully address these issues.

Recommendation 12 (Reference Chapter 10, Sections 10.9 - 10.10)

The current binary policy on development of north to south or east to west transport corridors should be replaced by a vision that acknowledges that many north to south journeys start on east to west corridors, and vice versa. Proposals for improving north to south transport links, either by restoring or constructing new internal rail links, and/or improving or providing new road links, will be controversial for reasons of environmental protection, climate change issues, and cost. In view of these factors, the far-reaching socio-economic impacts, and the need to obtain an optimal integrated transport network Welsh Government should instigate a national conversation about the most appropriate corridors for railway re-openings, and where necessary for road improvements, and the form of such interventions.

Recommendation 13 (Reference Chapter 7, Sections 7.4 - 7.5)

Although Welsh Government takes considerable pains to undertake valid transport project and transport change consultations the current societal diffusion of these is still too limited and they draw on a too restricted pool of expertise. A review should be conducted on how strategic and local consultations can improve participation and widen the expertise base of contributions.

C.10 Findings and Recommendations: Conclusion

The evidence from this research indicates that there are socio-economic benefits to be gained from integrated transport systems, and that in Wales there is an appetite for such a system. However, away from the core positives of improved and more reliable journey times, improved economic and social cohesion, and the reduction of road traffic and therefore of noise, congestion, pollution and community severance, the wider economic benefits may not be directly identifiable. Direct evidence was not found that integrated transport systems improve social conditions in a way that enables the release of government social protection and health expenditure for other areas of the economy, such as economic development. However, those countries compared with Wales from the high and medium transport integration categories all displayed better economic performance which generated greater resources for public spending.

The research also showed that the definition of integrated transport needed to go beyond conventional boundaries of integrating modes, timetables, and ticketing. Transport providers such as bus companies needed to have effective management and engineering systems to ensure that they were able to effectively cooperate with public transport integration authorities in order to operate efficiently and reliably within an integrated system. All the bodies concerned in a Welsh integrated transport system should consider that their mission is the provision of services that the public need, and particularly disabled and vulnerable members of the public. Consequently, much more active interaction between service users, the policy level and operators would be crucial in producing an all-Wales integrated transport system that is safe, reliable, convenient, accessible, and which justifies the public investment in it by being used by as many members of the public as possible.

C.11 Thesis Evaluation

The intention of this research was to investigate how and why the current stage in the development of Welsh transport policy has been reached, and to formulate recommendations on how transport policies can be carried forwards.

The underpinning theoretical basis of the work was the New Mobilities Paradigm (Sheller and Urry, 2006, pp. 207-226), a fairly recent multi-disciplinary approach to the

complexities of studying the multiple aspects of modern mobility by air, land and water. This was discussed in Chapter 3, p.p. 111-112. In line with the paradigm the commitment within this research was particularly towards the integration of transport studies, social policy studies and sociology.

The wide range of the research work has required a broader brush approach in which the various components and methods could be combined to create a comparative narrative between Wales and the other five research countries, Gunn (2011, p. 528) comments of the Buchanan Report "Traffic in Towns" (1963):

"The Buchanan Report was novel less in the ideas it contained than in their synthesis."

The analysis of the historical, institutional, and legislative development of Welsh devolution was essential to provide an understanding of the contemporary context of Welsh governance.

The concept of the three integration categories of high, medium, and low, was chosen as the research indicated that the medium and high stages of system development were models that Wales, and Scotland, should aspire to, in developing their own networks to be economically effective and environmentally sustainable. The socio-economic comparisons, although based on a limited number of comparators, were valuable in indicting that countries with more integrated transport systems performed better economically, and on a number of social indicators, than Wales.

The predominantly qualitative analysis of the questionnaire responses is a function of the inability to obtain a representative sample of respondents from the limited constituency to which the questionnaire was addressed. Whilst responses were quantitatively analysed the free comments made became the main focus of the research. The opinions expressed by the questionnaire respondents were triangulated by reviewing the relevant literature and by comparison with the responses in the semi-structured interviews.

In its later stages this research was complicated by the shifting context of transport policy at both Welsh and UK levels. Transport companies experienced a catastrophic drop in passenger use caused by the Covid-19 pandemic. To prevent the collapse of operators, previous governmental policies on bus and rail service delivery swung away

from the previous emphasis on *laissez faire* policies and towards more regulation. London-type transport integration was looking more likely in the English conurbations. In Wales developing partnership working between the previous Welsh Government and bus operators was tentatively moving in this direction too (Welsh Government, 2021). The UK government was also changing from franchising national rail network train operating companies towards management contracts. These may be let by a proposed new railway controlling mind for policy, Great British Railways, which will also be the infrastructure owner and operator. Consequently, it seems that at least some elements of transport re-integration may return.

This thesis looks at the development and current condition of Welsh transport infrastructure and services in a wider context than is usual, and produces a range of recommendations of interest to government and stakeholders. To extend the research findings presented here it is suggested that further research be carried out on what deprived communities want and need from transport services. This would require qualitative and quantitative research in urban and rural communities across Wales. Further development of the quantitative analysis of economic development factors would support this strand of research.

In view of the importance of the issue, and its persistence both in this research and Welsh public discourse, there should be a thorough investigation of the potential impacts of internal north to south services on the Welsh transport system, rail, road and air. This would be supported by consideration of what further development is needed on the quantitative analysis of transport network development factors.

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Appendix 1: Letter of Authorisation from Bangor University CBLESS Ethics Committee

COLEG BUSNES, Y GYFRAITH, ADDYSG A GWYDDORAU CYMDEITHAS
COLLEGE OF BUSINESS, LAW, EDUCATION AND SOCIAL SCIENCES



26/10/17

Annwyl/ Dear Marc Lewis

Yng/ Re: 'Making connections – The potential socio-economic impacts of an all-Wales integrated transport system':

Diolch am eich cais diweddar i Bwyllgor Ymchwil Moeseg CBLESS.

Mae'r pwyllgor wedi ystyried eich cais, ac fe wyf yn awr mewn sefyllfa i roi caniatâd, ar ran y Pwyllgor Ymchwil Moeseg CBLESS, i chi gychwyn eich prosiect ymchwil.

Dymunaf yn dda i chi gyda'ch ymchwil.

Thank you for your recent application to the CBLESS Research Ethics Committee. The Committee has considered your application and I am now able to give permission, on behalf of the CBLESS Research Ethics Committee, for the commencement of your research project.

I wish you well with your research.

Yn gywir iawn/ Yours sincerely

Dr. Marguerite Hoerger
Chair, CBLESS Research Ethics Committee
Cadair, Pwyllgor Ymchwil Moeseg CBLESS

Cc: Goruchwyliwr/ Pennaeth Ysgol
Supervisor/Head of School

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YR ATHRO/PROFESSOR PHIL MOLYNEUX BA, M.Phil., PhD
DEON Y COLEG/DEAN OF COLLEGE

Registered charity number: 1141565

www.bangor.ac.uk

Appendix 2: Bangor University CBLESS Ethics Committee: Risk Register for Questionnaire and Semi-Structured Interview Schedule

<p style="text-align: center;">Marc Lewis - PhD research project: 'Making connections - The potential socio-economic impacts of an all-Wales integrated transport system.' Risk Register for Questionnaire and Semi-Structured Interview Schedule</p>
<p><u>Section A: Categorisation of research risks:</u> Category A) Potential personal / professional harm to respondent and /or others through breach of ethical / professional behaviour and / or other malpractice; Category B) Conflicts of respondent / researcher interests; Category C) Research instruments 'not fit for purpose' - potential failure to meet research objectives. <u>Likelihood of risk:</u> High = red fill; Medium = orange fill; Low = green fill. <u>Impacts of risk:</u> High; Medium; Low.</p>
<p>Risk 1 - Category A) A respondent discloses illegal / unethical practices in government / employment organisation / other party. Domains - Professional & Service User Representatives. Risk - Low. Impact - High.</p>
<p>Issues: As a researcher and as a Fellow of the Chartered Institute of Logistics and Transport I have an obligation to address these risks. Mitigation/s: Should a really serious issue present, I would consult with Professor Machura and Dr Gwilym before notifying the relevant employer and / or the authorities as a last resort.</p>
<p>Risk 2 - Category A) A respondent expressing views contrary to current equalities, health and safety or safeguarding legislation and / or professional practices. This is unlikely but there is a need to record view/s and protect respondent. Domains - Professional & Service User Representatives. Risk - Low. Impact - High.</p>
<p>Issues: This opportunity could be cathartic for the respondent and positive in terms of the research material disclosed. However, the researcher may need to manage expressions of the respondent's anger and/or frustration and use diplomacy in final presentation of the finding/s. Professionals & Service User Representative Organisations. Mitigation/s: Confidentiality / anonymity process. Option of not including view/s if this is thought to be necessary.</p>
<p>Risk 3 - Category A) A respondent presenting with issues to government / employer such as areas that formal consultation processes and normal working 'line management' arrangements are not picking up. Domains - Professionals & Service User Representative Organisations. Risk - Low. Impact - Low.</p>

Issues: This opportunity could be cathartic for the respondent and positive in terms of the research material disclosed. However, the researcher may need to manage expressions of the respondent's anger and/or frustration and use diplomacy in final presentation of the finding/s. Professionals & Service User Representative Organisations.

Mitigation/s: Confidentiality / anonymity process. Option of not including view/s if this is thought to be necessary.

Risk 4 - Category A) A respondent expressing views that could be construed as 'blue sky thinking' and /or contrary to the dominant professional discourse. Consequently, in this situation there will be a need to protect the respondent's professional credibility and / or reputation. Domain - Professional. Risk - Low. Impact - Medium.

Issues: This opportunity could be cathartic for the respondent and positive in terms of the research material disclosed. However, the researcher may need to manage expressions of the respondent's anger and / or frustration and use diplomacy in final presentation of the finding/s. Professionals & Service User Representative Organisations.

Mitigation/s: Confidentiality / anonymity process. Option of not including view/s if this is thought to be necessary.

Risk 5 - Categories A & B) Researcher has doubts / information about a respondent's bona fides and / or role / status in 'employing' organisation. Domains - Professional & Service User Representatives. Risk - Low. Impact on respondent - Low; Impact on research - High.

Issues: This risk is significant because it potentially affects the veracity and quality of the responses obtained.

Mitigation/s: After making discreet enquiries inform the respondent of the issue and give them the opportunity to correct information. If unsuccessful discard interview.

Risk 6 - Category A) Respondent using interview to express views on / to government / employer that they would usually feel inhibited in expressing for reasons of professional credibility, propriety and / or the need to preserve good working relations. Domains - Professionals & Stakeholder Representatives. Risk - Moderate. Impact - Moderate.

Issues: This opportunity could be cathartic for the respondent and positive in terms of the research material disclosed. However, the researcher may need to manage expressions of the respondent's anger and/or frustration and use diplomacy in final presentation of the finding/s. Professionals & Service User Representative Organisations.

Mitigation/s: Confidentiality / anonymity process. Option of not including view/s if this is thought to be necessary.

Risk 7 - Category B) Action research. A respondent requests inclusion of an 'area of interest' in the research that may conflict with the core research. Domains - Professional, Service User Representatives, Researcher. Risk - Medium. Impact - Medium.

Issues: Need to accommodate the request to the satisfaction of both parties in a way that does not compromise the core research.

Mitigation/s: Issue respondent with a letter of confirmation detailing: a) 'Heads of agreement,' b) frequency of contact with respondent, c) use of any research by either party.

Risk 8 - Category C) Researcher puts acceptance of semi-structured interview schedules and / or allied documents by College of Business, Law, Education and Social Sciences Academic Research Ethics Committee at risk by unacceptable approach to ethical issues. Domain - Researcher. Risk - Medium. Impact on research - High.

Issues: Lack of appropriate awareness of guidance on ethical issues, lack of adherence to ethical guidance, potential ethical risks in research instruments and / or documents and / or lack of suitable mitigation/s.

Mitigations: Consult Bangor University and Economic & Social Research Council guidance on ethical research practice. Before submission to College of Business, Legal, Education and Social Sciences (CBLESS) Ethics Committee test research instruments and allied documents on researcher's 'review panel' of policy / research / administration professionals - of which five are from a 'non-transport' background and one from a 'transport' background (**see 'Section B' below for 'review panel' members**).

Risk 9 - Category C) Interview schedule not effective in prompting data, not 'fit for purpose.' Domain - Researcher. Risk - Medium. Impact on research - High.

Issues: Possible researcher bias prevents development of effective research instruments.

Mitigation/s: 'Reverse draft' research instruments by reviewing questions in the light of expected responses. Test semi-structured interview schedules on the 'review panel' of six policy / research / administration professionals.

Risk 10 - Interview schedule omits core issues through researcher bias. Domain - Researcher. Risk Medium - Impact of research - High.

Issues: Possible researcher bias leads to omission of core issues from research instruments.

Mitigation/s: 'Reverse draft' research instruments by reviewing questions in the light of expected responses. Test semi-structured interview schedules on the 'review panel' of six policy / research / administration professionals.

Risk 11 - Research programme slips due to problems in obtaining interview appointments with potential respondents. Domain - Researcher. Risk Medium - Impact of research - Medium.

Section B: Review Panel for Semi-Structured Interview Schedules A & B (and allied documents):

- 1) Anthea Jones BA, Transport Officer, Cyngor Sir Powys / Powys County Council, Llandrindod.
- 2) Dr Steven Mallon, Geneva Business School – Barcelona Campus, Barcelona.
- 3) Mr Vincent Manning, Chair of Catholics for AIDS Protection & Support (CAPS), London.
- 4) Dr Valentcir Mendes, Fundació Jaume Bofill, Universitat Politècnica de Catalunya, Barcelona.
- 5) John Picken, Governance Officer, Bar Standards Board, London.
- 6) John Thornhill MA, STM, FCIH. Bursar and Administrator for the Congregation of the Passion, Birmingham (formerly Senior Policy & Practice Officer, Chartered Institute of Housing, Coventry)

Appendix 3: Letter of Invitation to Potential Respondents (English Version)

Coleg Busnes, y Gyfraith, Addysg a Gwyddorau Cymdeithas, Prifysgol Bangor

College of Business, Law, Education and Social Sciences, Bangor University



Gwynedd LL57 2DG

Elusen Gofrestrig Rhif/Registered charity 1141565

(Welsh version – see above / Fersiwn Gymraeg – Gweler uchod)

Dear Sir / Madam,

PhD research project: 'Making connections – The potential socio-economic impacts of an all-Wales integrated transport system.'

Thank you very much for taking the time to read this letter. I am writing to you as you are someone with an acknowledged commitment to, and understanding of, society and government in Wales.

I am the researcher, Marc Lewis. I have many years of experience in transport policy, planning, projects and operation, and as a public policy and social researcher. I would like to invite you to share your knowledge by participating in this research through completing a questionnaire (please see the link below) and / or being interviewed.

The research is looking at the impacts of transport policy on economic development and levels of poverty and deprivation in Wales. It is also intended to develop an evidence base that can be used to justify and promote transport investment in Wales as a means of stimulating economic development and so reducing poverty and deprivation. Your expertise would be an invaluable contribution to this.

Before you decide whether to participate it is important for you to understand why the questionnaire and interviews are being undertaken and what they will involve. To help you with this I enclose an Information Sheet about the project.

It is entirely up to you to decide whether you would like to participate in the questionnaire or the interviews. Any information you share will be treated as strictly confidential and you will not be identified in any reports or outputs arising from this research.

The questionnaire asks you about your opinions on aspects of transport policy, poverty and deprivation, economic development and transport problems and solutions in Wales. There is also an opportunity for you to request the inclusion of relevant issues of interest to you in the research and for you to add comments and concerns. Please remember to tick the consent section at the head of the questionnaire.

The 'face to face' interviews will explore some of the questionnaire issues in more depth and will involve talking to me about your opinions and experiences in the areas of poverty and deprivation, economic development, and transport problems and solutions. There will also be an opportunity for you to request the inclusion of relevant issues of interest to you in the research and for you to add comments and concerns. The interviews will be recorded so that transcripts can be produced, you will not be identified in these. Please find attached the interview schedule for your information.

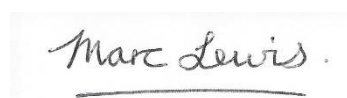
The interviews will last about an hour and will be arranged at a place and time and time that suits you.

If you decide that you would like to participate, please sign the enclosed consent form and e-mail it back to me.

If you have any questions or would like to know more about this research, please contact me by email at sop890@bangor.ac.uk

Thank you again for taking the time to read this letter and I look forward to hearing from you.

Yours faithfully,

A handwritten signature in cursive script that reads "Marc Lewis." The signature is written in dark ink on a light-colored background. Below the signature, there is a thin horizontal line.

Appendix 4: Participant Information Sheet (English Version)

Coleg Busnes, y Gyfraith, Addysg a Gwyddorau Cymdeithas, Prifysgol Bangor

College of Business, Law, Education and Social Sciences, Bangor University

Gwynedd LL57 2DG

Elusen Gofrestrig Rhif/Registered charity 1141565



(Welsh version – see above / Fersiwn Gymraeg – gweler uchod)

PhD research project: ‘Making connections – The potential socio-economic impacts of an all-Wales integrated transport system.’

PARTICIPANT INFORMATION SHEET

Introduction:

You are invited to take part in a questionnaire and / or an anonymous ‘face to face’ interview as part of the above PhD research project. This is looking at the impacts of transport policy on economic development and the levels of poverty and deprivation in Wales. It is also examining possible models of future Welsh transport systems as a means of promoting economic development and reducing poverty and deprivation. Before you decide whether to participate it is important for you to understand why the semi-structured interview is being undertaken and what it will involve. Please take the time to read the following information.

Who is conducting this research?

I am conducting this research, Marc Lewis BSc (Hons), MSc, FCILT. I have many years of experience in transport policy, planning, projects and operation, and as a public policy and social researcher. I am currently a PhD student in the School of Social Sciences, Prifysgol Bangor / Bangor University, Gwynedd, Cymru / Wales, LL57 2DG. My university e-mail address is: sop890@bangor.ac.uk

What is the purpose of this study?

i) To investigate evidence that transport investment produces positive economic and social outcomes. It will ask can transport investment transfer expenditure on health and social security to economic development? Is an integrated transport system an effective way of minimising capital and revenue expenditure on transport, what would an integrated public transport system look like and how

would it be organised? The aim is to provide a solid evidence base for government that an ambitious programme of transport spending would reduce poverty and deprivation and 'kick-start a virtuous circle' by promoting economic development.

ii) The questionnaire and the 'face to face' interviews seek to understand the views of professionals and stakeholder representatives about aspects of transport policy, poverty and deprivation, economic development, and identifying transport challenges and solutions. There is also the opportunity for you to request the inclusion of relevant issues of interest to you in the research and to add your comments and concerns.

iii) The full study is intended to inform a wider academic, professional and public audience on the above issues.

Why have I been chosen?

Because you are someone with an acknowledged commitment to, and understanding of, society and government in Wales in either a professional or stakeholder representative capacity. The questionnaire and 'face to face' interview will give you a chance to state your opinions, and in the case of the interview discuss your experiences on the areas under consideration in more depth. Your views would be very valuable evidence in the research.

Do I have to take part?

No, it is entirely up to you to decide whether you would like to participate. If you do decide to participate you can decline to answer any of the questions in the questionnaire or the interview schedule as you wish. Your decision will not affect you in any way. Any information you share will be treated as strictly confidential and you will not be identified in any reports or outputs arising from this research. Please keep this information sheet.

What happens if I decide to participate?

If you decide to participate in the questionnaire you will be asked questions about five areas of concern to the research, i.e. i) transport policy, ii) poverty and deprivation, iii) economic development, iv) identifying transport challenges and solutions, and v) any other related issues you may wish to raise and / or see incorporated in the research. Please click on the link provided and remember to read and tick the consent section.

If you decide to participate in a 'face to face' interview with me you will be asked to discuss four areas from the questionnaire but in more depth, i.e. i) poverty and deprivation, ii) economic development, iii) identifying transport challenges and solutions, and iv) any other

related issues you may wish to raise and / or see incorporated in the research. Please read and complete the attached consent form and e-mail it back to me at sop890@bangor.ac.uk

The interview will last about an hour and will be arranged on a date and at a time and place that is convenient for you. The interview will be recorded to allow a transcript to be made

Will my taking part in this research be kept confidential?

Yes, all the information you share will be treated in conformity with data security legislation, data storage best practice, and in strict confidence. You will not be identified in any report or document whatsoever. The identification details that you are asked at the start of the questionnaire and interview will be kept securely on a central Bangor University file (a 'U-drive'). Access to this will only be allowed by myself, the researcher, my two academic supervisors, and my viva voce (i.e. the verbal PhD examination) examiner. My notes of the interview and the transcript of the recording will only be identified by a number.

What will happen with the results of the semi-structured interview?

The general findings will be published in my PhD thesis.

What if I have any concerns about this request, the research or the researcher?

If you have any concerns about any aspect of this request, the research itself, or the bona fides of myself as the researcher please contact Professor Stefan Machura, School of Social Sciences, Bangor University, Gwynedd, Cymru / Wales, LL57 2DG. His email address is: s.machura@bangor.ac.uk and his telephone number is +44 (0) 1248 382214.

What if I want further information?

If you require further information please contact me at: sop890@bangor.ac.uk

What happens next?

If you are willing to participate please tick the consent section at the head of the questionnaire, or fill in the attached form indicating that you consent both to participating in the interview, and to the recording of the interview for transcription. Please return this to my university e-mail address: sop890@bangor.ac.uk I will then contact you to arrange to conduct the interview on a date and at a time and place that is convenient for you.

Thank you very much for taking the time to read this information sheet and I hope that you will wish to participate.

Appendix 5: The Questionnaire:

HOLIADUR - Marc Lewis Project Ymchwil PhD: 'Gwneud cysylltiadau - Effeithiau economaidd-gymdeithasol posibl system drafnidiaeth integredig Cymru gyfan' /

QUESTIONNAIRE - Marc Lewis PhD Research project: 'Making connections - The potential socio-economic impacts of an all-Wales integrated transport system'

Mae'r ymchwil yn edrych ar effeithiau polisi trafndiaeth ar ddatblygiad economaidd a lefelau tlodi ac amddifadedd yng Nghymru. Mae hefyd yn fwriad i ddatblygu sylfaen dystiolaeth y gellir ei ddefnyddio i gyfiawnhau ac i hyrwyddo buddsoddi mewn trafndiaeth yng Nghymru fel ffordd o ysgogi datblygiad economaidd ac felly leihau tlodi ac amddifadedd. Byddai eich arbenigedd yn gyfraniad gwerthfawr iawn yn hyn o beth.

Bydd yr holiadur yn gofyn am eich barn am agweddau o bolisi trafndiaeth, tlodi ac amddifadedd, datblygiad economaidd a phroblemau ac atebion trafndiaeth yng Nghymru. Mae cyfle hefyd i chi ofyn am gynnwys materion perthnasol sydd o ddiddordeb i chi yn rhan o'r ymchwil ac ychwanegu sylwadau neu bryderon.

Dylai'r holiadur gymryd tua 20 munud i chi ei chwblhau. Cofiwch dicio'r adran gydsynio ar frig yr holiadur /

The research is looking at the impacts of transport policy on economic development and levels of poverty and deprivation in Wales. It is also intended to develop an evidence base that can be used to justify and promote transport investment in Wales as a means of stimulating economic development and so reducing poverty and deprivation. Your expertise would be an invaluable contribution to this.

The questionnaire asks you about your opinions on aspects of transport policy, poverty and deprivation, economic development and transport problems and solutions in Wales. There is also an opportunity for you to request the inclusion of relevant issues of interest to you in the research and for you to add comments and concerns.

The questionnaire should take about 20 minutes for you to complete. Please remember to tick the consent section at the head of the questionnaire.

CYDSYNIAD I GYMRYD RHAN YN YR HOLIADUR HWN: / CONSENT TO PARTICIPATE IN THIS QUESTIONNAIRE:

1) Rwy'n cydsynio i gymryd rhan yn yr holiadur hwn ar gyfer yr ymchwil uchod a fydd yn cael ei ddefnyddio at y dibenion a esboniwyd i mi yn y llythyr gwahoddiad ac yn y daflen wybodaeth i gyfranogwyr. Rwy'n deall y bydd yr holl wybodaeth y byddaf yn ei darparu yn cael ei thrin yn hollol gyfrinachol ac na fydd fy enw yn cael ei ddefnyddio un unrhyw un o ddogfennau'r ymchwil /

I consent to take part in this questionnaire for the above research which will be used for the purposes that have been explained to me in the accompanying invitation letter and participant information sheet. I understand that all the information I provide will be treated as strictly confidential and that I will remain anonymous in any research document/s

[] YDW / YES

2) Ydych chi yn ymateb ar ran... /

Are you responding on behalf of...

Llywodraeth Cymru neu'r Cynulliad Cenedlaethol Cymru? / Are you responding on behalf of:

Welsh Government or the National Assembly for Wales?

[] YDW / YES

Awdurdod lleol? /

A local authority?

[] YDW / YES

Gweithredwr cludiant - rheilffordd? /

A transport operator - Rail?

[] YDW / YES

Gweithredwr cludiant - Bws / Bws Moethus? /

A transport operator / Bus or Coach?

[] YDW / YES

Grŵp cymunedol / sefydliad lobïo? /

A community group / lobbying organisation?

[] YDW / YES

Fel unigolyn / neu disgrifiad arall? /

As an individual / or other description?

[] YDW / YES

Adran 1: Polisi Trafnidiaeth: /

Section 1: Transport Policy:

3) Ydych chi / a yw eich sefydliad yn defnyddio dogfennau polisi trafndiaeth ac / neu ganllawiau gwneud cais am gyllid a gyhoeddwyd gan y llywodraeth? /

Do you / does your organisation use transport policy documents and / or funding application guidance issued by government?

[] YDW/YDY / YES [] NAC YDW/NAC YDY / NO

'Ydw/Ydy' - ewch ymlaen i gwestiwn 4, 5, ac 6 ; 'Nac ydw/Nac ydy' ewch i gwestiwn 7 /

'Yes' - go to questions 4, 5 and 6; 'No' go to question 7

I'ch helpu i ateb y cwestiwn nesaf, dyma'r math o ddogfennau sydd gen i mewn golwg: 1) 'Strategaeth Drafnidiaeth Cymru' (2008), 2) 'Arweiniad ar Arfarnu a Chynllunio Trafnidiaeth Cymru' (2008), 3) 'Cynllun Trafnidiaeth Cymru' (1af, 2010-15), 4) 'Deddf Teithio Llesol (Cymru) 2013,' 5) (Llywodraeth Cymru) 'Grant y Gronfa Drafnidiaeth Leol Canllaw i Ymgeiswyr - 2017-18,' a chanllawiau perthnasol eraill, sylfaen dystiolaeth a dogfennau asesu effaith /

To help you answer the next question I'm thinking about documents like: 1) 'Wales Transport Strategy' (2008), 2) 'Welsh Transport Planning and Appraisal Guidance - WelTAG' (2008), 3) 'Wales Transport Plan' (1st, 2010-15), 4) 'Active Travel (Wales) Act 2013,' 5) (Welsh Government) 'Local Transport Fund Grant Guidance to Applicants - 2017-18,' and other relevant guidance, evidence base and impact assessment documents

4) Ydych chi o'r farn bod y dogfennau polisi trafnidiaeth sydd ar gael i) yn ddealladwy, ii) yn gyfoes, iii) yn drawsbynciol ac iv) yn darparu cyd-destun a chanllawiau defnyddiol? /

Do you feel that the transport policy documents available are i) coherent, ii) up to date, iii) cross-cutting and iv) provide a useful context and guidance?

[] YDW / YES [] NAC YDW / NO

5) Yn eich profiad chi / ym mhrofiad eich sefydliad o'r rhain a ydych o'r farn y gellid eu gwella? /

From your / your organisation's experiences of these and do you think they could be improved?

[] YDW / YES [] NAC YDW / NO

5a) Os 'YDW' nodwch yn gryno sut y gellid eu gwella / If 'YES' please briefly say how it could be improved:

6) Wrth feddwl am y prosesau ar gyfer ariannu a gwneud cynigion am seilwaith newydd neu am welliannau o dan gylch y Gronfa Trafnidiaeth Leol...

A yw canllawiau megis 'Arweiniad ar Arfarnu a Chynllunio Trafnidiaeth Cymru (2008)' a chanllawiau blynyddol Grant y Gronfa Drafnidiaeth Leol i ymgeiswyr yn hawdd eu deall? /

Thinking about bidding and funding processes for new or upgraded infrastructure under the Local Transport Fund round...

Do you find the guidance documents like the 'Welsh Transport Planning and Appraisal Guidance - WelTAG (2008)' and the annual 'Local Transport Fund Grant Guidance to Applicants' easy to understand?

☐ YDYN / YES ☐ NAC YDYN / NO ☐ Amh / N/A

6a) A yw'r prosesau sy'n cael eu hamlinellu ynddynt yn hawdd eu deall a'u rhoi ar waith? /

Are the processes they set out easy to follow and implement?

☐ YDYN / YES ☐ NAC YDYN / NO ☐ Amh / N/A

6b) Ydych chi o'r farn bod y broses yn deg? /

Do you think the process is fair?

☐ YDYN / YES ☐ NAC YDYN / NO ☐ Amh / N/A

6c) Os 'NAC YDW' nodwch yn gryno sut y gellid ei gwella / ei gwneud yn decach... / If 'NO' please briefly say how it could be improved / made fairer...

6d) A yw eich sefydliad wedi cael ei rwystro rhag gwneud cais am gyllid gan y llywodraeth oherwydd y prosesau ar gyfer gwneud cais neu'r prosesau adrodd? /

Has your organisation been deterred from applying for government funding by the bidding or reporting processes?

☐ YDYN / YES ☐ NAC YDYN / NO ☐ Amh / N/A

6e) Os 'YDY' nodwch yn gryno pam? / If 'YES' please briefly say why?

6f) A ellid gwella ar y prosesau ar gyfer cynnig, ariannu ac adrodd? /

Could the bidding, funding and reporting processes be improved?

☐ GELLID / YES ☐ NA ELLID / NO ☐ Amh / N/A

6g) Os 'GELLID' nodwch yn gryno sut y gellid eu gwella? / If 'YES' please briefly say how it could be improved?

7) Beth yw eich barn am y ffordd y mae'r Llywodraeth Cymru yn ymgynghori wrth lunio polisiau trafnidiaeth a pholisïau sy'n gysylltiedig â thrafnidiaeth?...

Ydych chi o'r farn bod dogfennau ymgynghori yn cynnwys digon o wybodaeth? /
What are your views on the way the Welsh Government consults on formulating
transport and transport-related policies?...

Do you think that consultation documents contain enough information?

☐ YDW / YES ☐ NAC YDW / NO ☐ Amh / N/A

7a) A ydynt yn glir ac yn hawdd eu deall? /

Are they clear and easy to understand?

[] YDYN / YES [] NAC YDYN / NO [] Amh / N/A

7b) A ydych yn cael eich annog i roi eich safbwyntiau yn llawn? /

Are you encouraged to give your views fully?

[] YDW / YES [] NAC YDW / NO [] Amh / N/A

7c) A yw'r cyfnodau ar gyfer ymateb yn ddigon hir i'ch sefydliad? /

Are response times are long enough for your organisation?

[] YDYN / YES [] NAC YDYN / NO [] Amh / N/A

7d) Ydych chi'n meddwl y gellid gwneud gwelliannau? /

Do you think improvements could be made?

☐ YDW / YES ☐ NAC YDW / NO ☐ Amh / N/A

7e) Os 'YDW' nodwch yn fras sut y gellid gwneud gwelliannau? / If 'YES' please briefly state how improvements could be made?

8) Gan feddwl am fodelau ar gyfer trefnu trafnidiaeth. Ydych chi'n meddwl mai'r model darparu mwyaf effeithiol ar gyfer defnyddwyr/teithwyr yw...

Model i - Model marchnad rydd wedi ei ddad-reoleiddio yn llwyr lle mae moddau yn cystadlu â'i gilydd?... /

Thinking about models for organising transport. Do you think that the most effective delivery model for users/passengers is...

Model i) - A completely deregulated free market model where modes compete with each other?...

☐ YDW / YES ☐ NAC YDW / NO

8a) Model ii - System integredig wedi ei rheoleiddio a bennir gan awdurdod cyhoeddus?, neu... /

Model ii - A regulated and integrated system specified by a public authority?, or...

☐ YDW / YES ☐ NAC YDW / NO

8b) Cyfuniad o fodelau i) a ii) sy'n debyg yn fras i'r sefyllfa bresennol? /

A hybrid of models i and ii which is broadly similar to the current situation?
<input type="checkbox"/> YDW / YES <input type="checkbox"/> NAC YDW / NO
8c) Dywedwch wrthyf yn fras pam eich bod yn meddwl hynny? / Please briefly tell me why you think this?
8d) Eto, gan feddwl am fodelau ar gyfer trefnu trafnidiaeth. Ydych chi'n meddwl mai'r model mwyaf effeithio i'r llywodraeth o ran ariannu a pholisi yw...
Model i - Model marchnad rydd wedi ei ddadreoledio yn llwyr lle mae moddau yn cystadlu â'i gilydd?... /
Again, thinking about models for organising transport. Do you think that the most financially and policy effective model for government is...
Model i) - A completely deregulated free market model where modes compete with each other?...
<input type="checkbox"/> YDW / YES <input type="checkbox"/> NAC YDW / NO
8e) Model ii - System integredig wedi ei rheoleiddio a bennir gan awdurdod cyhoeddus?, neu... /
Model ii - A regulated and integrated system specified by a public authority?, or...
<input type="checkbox"/> YDW / YES <input type="checkbox"/> NAC YDW / NO
8f) Cyfuniad o fodelau i) a ii) sy'n debyg yn fras i'r sefyllfa bresennol? /
A hybrid of models i and ii which is broadly similar to the current situation?
<input type="checkbox"/> YDW / YES <input type="checkbox"/> NAC YDW / NO
8g) Eto, dywedwch wrthyf yn fras pam eich bod yn meddwl hynny? / Again, please briefly tell me why you think this?
Adran 2: Tlodi ac Amddifadedd: /
Section 2: Poverty and Deprivation:
9) Ydych chi'n meddwl fod tlodi ac amddifadedd yn berthnasol i'ch maes gwaith chi? /
Do you think that poverty and deprivation are relevant in your area of work?
<input type="checkbox"/> BYDDWN / YES <input type="checkbox"/> NA FYDDWN / NO
'Byddwn' - ewch i 10; 'Na fyddwn' ewch i 11 /
'Yes' - go to 10; 'No' go to 11

10) Os ateboch 'BYDDWN' a ydych yn defnyddio dangosyddion swyddogol i fesur tlodi ac amddifadedd yn eich gwaith? /

If you have answered 'YES' do you use official indicators to measure poverty & deprivation in your work?

[☐ YDW / YES [☐ NAC YDW / NO

10a) Pa ddangosyddion ydych chi'n defnyddio? / Which indicators do you use?

11) Ydych chi'n meddwl fod tlodi ac amddifadedd yn gysylltiedig â phroblemau gyda thrafnidiaeth yn eich ardal chi? /

Do you think poverty and deprivation is related to problems with transport in your area?

[☐ YDW / YES [☐ NAC YDW / NO

11a) Os 'YDW' beth fydddech chi'n ei ddweud yw'r problemau hynny? / If 'YES,' briefly what would you say these problems are?

12) A yw tlodi ac amddifadedd yn ystyriaeth bwysig yn eich gweithgareddau? /
Are poverty & deprivation a major consideration in your activities?

[☐ YDY / YES [☐ NAC YDY / NO

12a) Gan feddwl am bolisïau / prosiectau i fynd i'r afael â thlodi ac amddifadedd...
A oes gan eich sefydliad bolisïau / projectau penodol i fynd i'r afael â thlodi ac amddifadedd? /

Thinking about policies / projects to address poverty & deprivation...

Does your organisation have specific policies / projects to address poverty & deprivation?

[☐ OES / YES [☐ NAC OES / NO

12b) A yw eich sefydliad yn ei chael yn anodd mynd i'r afael â thlodi ac amddifadedd? /
Does your organisation find it difficult to address poverty and deprivation?

[☐ YDY / YES [☐ NAC YDY / NO

12c) A ellid gwneud gwelliannau wrth asesu tlodi ac amddifadedd? /
Could improvements be made in the assessment of poverty and deprivation?

[☐ GELLID / YES [☐ NA ELLID / NO

12d) A ellid gwneud gwelliannau yn ymarferol yn y meysydd hyn? / Could improvements be made in practice in these areas?
[] GELLID / YES [] NA ELLID / NO
Adran 3: Datblygu Economaidd: / Section 3: Economic Development:
13) Gan feddwl am ffactorau cadarnhaol ar gyfer hyrwyddo datblygiad economaidd gosodwch y canlynol yn nhrefn pwysigrwydd, <u>gydag 1 y pwysicaf a 5 y lleiaf pwysig</u> : Thinking about positive factors for promoting economic development please rank the following in order of importance, <u>1 being the most important and 5 the least important</u> :
Effeithiau cydgrynhoi - h.y. busnesau o'r un math yn cael budd o fod yn agos at ei gilydd / Agglomeration effects - i.e. businesses of the same type benefitting from being close to each other
[1 - 2 - 3 - 4 - 5]
Mynediad at feysydd awyr a phorthladdoedd / Access to airports and sea ports
[1 - 2 - 3 - 4 - 5]
Gweithlu medrus ac addysgedig ar gael / Availability of an educated and skilled workforce
[1 - 2 - 3 - 4 - 5]
Amgylchedd adeiledig a naturiol lleol sy'n ddymunol bod ynddo / A local built and natural environment that is pleasant to be in
[1 - 2 - 3 - 4 - 5]
Mynediad at sefydliadau addysg bellach ac addysg uwch er mwyn hyfforddi staff ac / neu fynediad at arbenigwyr / cyngor technegol / cwmnïau ymgynghorol / Access to further and higher education institutions for staff training and / or expert / technical advice / consultancy
[1 - 2 - 3 - 4 - 5]
Mynediad at dai o safon gydag amrywiaeth o ddaliadaethau ar gael / Access to a good standard of housing with a variety of tenures available
[1 - 2 - 3 - 4 - 5]
Cysylltedd TG da / Good IT connectivity
[1 - 2 - 3 - 4 - 5]
Mynediad at ddewis eang o adeiladau busnes o ansawdd da / Access to a wide choice of good quality business premises
[1 - 2 - 3 - 4 - 5]
Mynediad i'r system rheilffordd / Access to the railway system
[1 - 2 - 3 - 4 - 5]

Mynediad at rwydweithiau cefnffyrdd a thraffyrdd / Access to the trunk road and motorway networks
[1 - 2 - 3 - 4 - 5]
13a) A oes gennych unrhyw sylwadau am y ffactorau sydd wedi eu rhestru, neu ychwanegiadau atynt? / Do you have any comments on, or additions to, the factors listed?
14) Ydych chi'n meddwl fod cysylltiadau a gwasanaethau trafnidiaeth da yn hyrwyddo datblygiad economaidd? / Do you think that good transport links and services promote economic development?
[] YDW / YES [] NAC YDW / NO
14a) Sut maen nhw'n gwneud hyn yn eich barn chi, ac a fedrwch feddl am unrhyw agweddau negyddol i hynny? / How do you think they do this, can you think of any downsides?
14b) Ydych chi'n meddwl fodpolisiâu trafnidiaeth a chynllunio yn hyrwyddo diwydiannau a busnesau i leoli eu hunain mewn mannau lle ceir mynediad da at rwydweithiau trafnidiaeth? / Do you think that that transport and planning policies promote the location of industry and business in places where there is good access to transport networks?
[] BYDDWN / YES [] NA FYDDWN / NO
15) A ydych yn credu y bydd Comisiwn Seilwaith Cenedlaethol newydd yn effeithiol wrth hyrwyddo dull integredig o edrych ar gynllunio seilwaith, datblygu economaidd, diogelu'r amgylchedd, defnydd tir a thrafnidiaeth? / Do you think that the new National Infrastructure Commission for Wales (NICfW) will be effective for promoting an integrated approach to infrastructure planning, economic development, environmental protection, land use and transport?
[] YDW / YES [] NAC YDW / NO
15a) Os nad ydych yn meddwl y bydd y Comisiwn Seilwaith Cenedlaethol yn effeithiol a ydych yn meddwl y byddai dychwelyd at bartneriaethau trafnidiaeth rhanbarthol megis Taith, TraCC, SWWITCH a SEWTA yn ateb hyfyw? / If you don't think the National Infrastructure Commission will be effective do your think that a return to regional transport partnerships such as Taith, TraCC, SWWITCH and SEWTA would be a viable solution?
[] YDW / YES [] NAC YDW / NO

Adran 4: Adnabod heriau ac atebion trafndiaeth: /

Section 4: Identifying transport challenges and solutions:

16) Mewn ychydig eiriau beth fydddech chi yn ei ddweud yw'r problemau allweddol sy'n wynebu datblygu a darparu seilwaith a gwasanaethau trafndiaeth yng Nghymru? /

In a few words what would you say are the key problems facing the development and provision of transport infrastructure and services in Wales?

16a) Gan feddwl am y 'problemau allweddol' hyn...

A yw achosion a symptomau problemau trafndiaeth yn hawdd i'w hadnabod? /

Thinking about these 'key problems'...

Are causes and symptoms of transport problems easy to identify?

☐ YDYNT / YES ☐ NAC YDYNT / NO

16b) Os 'YDYNT' fedrwch chi yn gryno roi enghreifftiau i mi? / If 'YES' can you briefly give me examples?

16c) A oes rhwystrau y dewch ar eu traws wrth eich gwaith sy'n eich atal rhag datrys y problemau sy'n gysylltiedig â thrafnidiaeth? /

Are there barriers to resolving the transport-related problems that you encounter in your work?

☐ OES / YES ☐ NAC OES / NO

16d) Os 'OES' fedrwch chi yn gryno roi enghreifftiau i mi? / If 'YES' can you briefly give me examples?

17) Gan feddwl am atebion posibl i broblemau trafndiaeth...

Ydych chi'n meddwl bod atebion 'allan yna' a allai, yn eich barn chi, helpu i oresgyn y rhwystrau er mwyn datrys y problemau trafndiaeth yr ydych yn eu hwynebu?, e.e. econometregau, technoleg gwybodaeth, modelu mathemategol, theori systemau... /

Thinking about possible solutions to transport problems...

Do you think that there are solutions 'out there' that you think could help break down barriers to solving the transport problems that you face?, e.g. econometrics, information technology, mathematical modelling, systems theory...

[☐] YDW / YES [☐] NAC YDW / NO

17a) Os 'YDW' fedrwch chi yn gryno roi enghreifftiau i mi? / If 'YES' please will you briefly give me examples?

17b) A yw rhai trafndiaeth problemau yn gyfleoedd posibl? /

Are some transport problems possible opportunities?

[☐] YDYN / YES [☐] NAC YDYN / NO

17c) Os 'YDYN' soniwch wrthyf i amdany'n nhw yn gryno... / If 'YES' please briefly tell me about them...

**Adran 5: Unrhyw faterion eraill yr ydych yn ymwybodol ohonynt / Casgliad: /
Section 5: Any other issues you may have / Conclusion:**

18) Gan feddwl am yr hyn yr ydym wedi ei drafod. A oes unrhyw bryderon neu broblemau penodol yr hoffech eu codi? /

Thinking about what we've discussed. Are there any particular concerns or problems you would like to raise?

[☐] OES / YES [☐] NAC OES / NO

18a) Os 'OES' dwedwch wrthyf i amdanynt yn gryno... / If 'YES' please briefly tell me about them...

19) A oes unrhyw bryderon neu broblemau penodol yr hoffech i mi eu hymgorffori yn rhan o fy ymchwil? /

Are there any particular concerns or problems you would like me to incorporate in my research?

[☐] OES / YES [☐] NAC OES / NO

19a) Os 'OES' dywedwch wrthyf yn gryno beth ydynt... / If 'YES' please briefly tell me what they are...

19b) Rhowch eich enw a'ch cyfeiriad e-bost er mwyn i mi fedru cysylltu â chi i drafod y trefniadau ar gyfer yr uchod... / Please enter your name and email address so I can contact you to discuss the above...

20) Fyddech chi'n fodlon cymryd rhan mewn cyfweiliad 'wyneb yn wyneb' gyda fi yn rhoi sylw i rai o'r materion sy'n codi yn yr holiadur, ond mewn rhagor o ddyfnder? Bydd y cyfweiliad yn para rhyw awr ac fe'i trefnir mewn lleoliad ac ar adeg sy'n gyfleus i chi /

Would you be willing to participate in a 'face to face' interview with me covering some of the questionnaire issues, but in more depth? The interview will last about an hour and will be arranged at a place and time to suit you

[] BYDDWN / YES [] NA FYDDWN / NO

20a) Rhowch eich enw a'ch cyfeiriad e-bost er mwyn i mi fedru cysylltu â chi i drafod y trefniadau ar gyfer yr uchod... / Please enter your name and email address so I can contact you to discuss the arrangements for the above...

20b) Yn olaf, oes gennych chi unrhyw sylwadau eraill neu faterion yr hoffech eu codi? /
Finally, do you have any other further comments to make or issues to raise?

[] OES / YES [] NAC OES / NO

20c) Os 'OES' dywedwch wrthyf yn gryno beth ydynt... / If 'YES' please briefly tell me what they are...

Dyna ddiwedd yr holiadur. Diolch yn fawr iawn! / That's the end of the questionnaire. Thank you very much!

Appendix 6: The Semi-Structured Interview Schedule

<p align="center">Marc Lewis: PhD research project: 'Making connections – The potential socio-economic impacts of an all-Wales integrated transport system.'</p> <p align="center">Semi-Structured Interview Schedule</p>
Section A: Request personal & professional details and <u>record separately</u>:
Interview reference no. & date:
(Name...)
(Organisation...)
(Position in organisation...)
(Email...)
Section 1: Poverty & deprivation:
1a) How would you say that the issues of poverty and deprivation are relevant in your area of work? Is it a major consideration in your activities?
1b) Which indicators do you use to measure poverty & deprivation in your work, do you think they are useful or could they be improved?
1c) Thinking about the level and spread of poverty & deprivation in your area of responsibility...
...i) How do you think poverty and deprivation affects your area of responsibility in comparison with other parts of Wales? Do you think poverty and deprivation in your area is concentrated or widespread? How would you evidence your reply?
...ii) In general, do you think poverty and deprivation is related to problems with transport and what would you say they are?
1d) Thinking about policies / projects to address poverty & deprivation...from your / your staff's experiences what do you think could be done to improve assessment of the issues and practice in these areas?
1e) What do you think could be done to improve assessment of the issues and practice in these areas?
Interviewer's prompt: Welsh Index of Multiple Deprivation > Census data > Administrative data > 3rd Sector Organisation data.
Section 2: Economic Development:
2a) Do you think that there are particular ways in which good transport links and services promote economic development? How do you think they do this? Can you think of any downsides?

Interviewer's prompt: Positives - local highways links > trunk roads/Motorways > buses/trams > metros > national rail > reduced journey times/logistics costs; Negatives - Displacement of business to distant centres > better transport services raising private / commercial property costs > reduction of access to 'low cost' labour market.

2b) Would you say that current transport and planning policies promote or inhibit the location of industry and business at places where there is good access to transport networks? How do they do this?

2c) If you feel that policies do inhibit good access what interventions do you think can improve the situation?

Interviewer's prompt: Modal switch > active travel > parking policies > Zonal planning policies > Housing / Industrial estates / business parks / retail parks.

2d) Do you think that the new National Infrastructure Commission for Wales (NICfW) will be effective for promoting an integrated approach to infrastructure planning, economic development, environmental protection, land use and transport? If not, how would you recommend that this be achieved?

Interviewer's prompt: Cross-cutting policy and planning enablement. Inter-agency working.

Section 3: Identifying transport challenges and solutions:

3a) Thinking about the key issues facing the development and provision of infrastructure and services in Wales...

...i) What do you think these 'key issues' are? Please tell me about them.

...ii) Are causes and symptoms of transport problems easy to identify? Can you give me examples?

...iii) Do some causes present as symptoms, and vice versa? If so what are they?

...iv) What would you say are the barriers to resolving transport problems that you encounter in your work? Are they easy or difficult to resolve?

Interviewer's prompt: Political issues > Institutional issues > Financial issues. Malfunctioning of transport services caused by infrastructure failure > infrastructure / service failure caused by political / institutional / financial issues.

3b) Thinking about possible solutions to transport -related problems...

...i) Can you tell me about solutions 'out there' that you think could help break down barriers to solving the problems that you face?

...ii) Are some things that present as problems possible opportunities? If so please tell me about them.

...iii) Thinking about a twenty to thirty year time horizon. What would be your optimum vision for the Welsh transport system?

Interviewer's prompt: Solutions from other organisations / sectors > breaking down silos. Innovating thinking > problems trigger beneficial reassessment of policy / infrastructure / service.

Section 4: Any other issues you may have / Conclusion:

4a) Thinking about what we've discussed. Are there any particular issues or concerns you would like to raise?

4b) Are there any particular issues or concerns you would like me to incorporate in my research?

4c) Finally, do you have any further comments to make or issues to raise? That's the end! Thank you very much! / Diolch yn fawr iawn!

Interviewer's Prompt: 4b) Discuss 'action research' issues / continuing contact and feedback process.

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