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From Rails to Trails: Coordinating Effective and Sustainable Transport Infrastucture in Wales

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Abstract

Climate change is the biggest challenge humanity faces, and therefore, requires all efforts to mitigate it. As the transport industry accounts for one-fifth of the world's greenhouse gas emissions, significant efforts must be made to produce sustainable transport infrastructure all over the world. Furthermore, efficient and extensive transport infrastructure is essential for the economy and development of cities and regions. Although prosperous in its largest cities, Wales is a region that lacks cohesive economic growth and standards of living. Therefore, more efficient transport infrastructure must be implemented to make the nation an equal, economic hub. With a governance system that is complex and incohesive, the current transport infrastructure in Wales is neither effective nor sustainable. From chronic underinvestment, the infrastructure is inaccessible, ageing, and expensive. The plans to remedy these problems have sustainability as the focus, however, the question now is whether these plans will produce a more inclusive and efficient public transport service.

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List of Acronyms

DfT: Department for Transport

EU: European Union

G7: Group of Seven

GVA: Gross Added Value

HS2: High Speed Rail

MS: Member of the Senedd

OECD: Organisation for Economic Cooperation and Development

ORR: Office for Rail and Road

SDG: Sustainable Development Goals

TfW: Transport for Wales

UK: United Kingdom

UN: United Nations

List of Legislation

1930 Road Traffic Act: Licensing of buses

1947 Transport Act: Nationalisation of train services

1980 Transport Act: Deregulation of buses

1985 Transport Act: Abolition of service licensing

1993 Railways Act: Privatisation of train services

1998 Government of Wales Act: Established the Welsh Government and National Assembly

2006 Government of Wales Act: Established TfW

2013 Active Travel (Wales) Act: Set active travel priorities in Wales

2015 Well-Being of Future Generations (Wales) Act: Established sustainability focus for new Welsh Laws

2017 Wales Act: Current law governing the Welsh Government, implemented the Reserved Powers Model

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1. Introduction

This thesis aims to find if transport infrastructure can be effective and sustainable through an assessment of governance structures, current issues, and future strategies. The case of Wales will be presented, as a nation that has actively worked towards and committed to creating a more sustainable society but the likes of which have not transpired into the current transport infrastructure. The paper will examine the public transport sector, focussing on bus and rail governance, issues, and plans for improvement. From examining these issues, this thesis argues that the current transport infrastructure in Wales is both ineffective and unsustainable. Underinvestment has proliferated poor accessibility and connectivity, decaying structures, and expensive infrastructure costs. However, the future of Welsh transport seems more promising, with a strategy aimed at relieving these issues and investment in projects that practically improve these problems, to create a modern system that is both effective and sustainable.

1.1 Historiography of Transport in Wales

Wales has been a world leader in transport innovation for almost three centuries (TfW, 2020). The small country in the United Kingdom (UK) is home to the first railway bridge, the first successful steam train locomotive, the first passenger-paying rail service, and the oldest surviving rail company. As the use of private vehicles became more popular, many local stations became unprofitable in the twentieth century. This led to the government-sponsored "Beeching Report" (Herd, 2013). In 1963, the Government of the UK set out to reduce the debts seen amounted by the nationalised British Rail. Chemical company owner, Dr Richard Beeching was tasked with "The Reshaping of British Railways", the official title of the report. Due to this, 166 stations were proposed to close in Wales from the report, as well as another 166 that had been put forward prior. The drastic change led to the three mainlines that are seen today, running in the North, Mid, and South of Wales. Although some stations had been saved, with some even reopening, the reforms are recognised as the "doomsday" for British Rail, leading to the lack of connectivity in the country. The final major change to the rail industry was the privatisation of rail services in 1993 under the Railways Act, which replaced the 1947 Transport Act that nationalised the rail industry (Gunn, 2018:16).

Buses became more popular around the beginning of the twentieth century, as they replaced trams and were subject to licensing under the Road Traffic Act 1930 (Butcher, 2010:2). With the conservative party preferring privatisation for the transport sector, buses became largely deregulated in 1980 under the Transport Act, with regulations lifted on coach services. This was expanded in 1985, with the abolition of service licensing and the hopes of increasing competition. This is the framework that is still seen today.

The transport sector is the third largest CO2 emitter, with cars, lorries, and buses filling the top three pollution spots (Department for Transport, 2023). This demonstrates the need to encourage more people to take public transport, as well as decarbonising the bus industry. Similar upgrades must be made to the Welsh rail infrastructure, as only 3.7% of the rail network is electrified (TfW, 2022). Both the Welsh and UK Governments have commitments to the UN Sustainable Development Goals (SDG), which holds sustainable infrastructure building, sustainable cities and communities, and climate action at numbers 9, 11, and 13 (Department for International Development, 2024; UN, 2024). Both institutions advocate the use of public transport as a sustainable alternative to private vehicle use and continue to invest in and plan new public transport schemes (Department for Transport, 2020).

Despite this, passenger numbers have been in decline. In 2022-23, the number of passenger journeys undertaken by local buses in Wales was 61 million, 33.5% less than pre-COVID levels (Welsh Government, 2024a). A similar story is observed in rail journeys, as 23.5 million passengers were seen in 2022-23, which was 21.5% lower than in 2019-20 (Welsh Government, 2024b). Moreover, 23% of the Welsh population do not have a private vehicle and therefore rely on public transport. While a large portion of the population lacks a private vehicle, Wales still holds the highest percentage for car ownership and usage than its fellow UK nations, with 75% of work journeys undertaken by car (Bennett, 2020:7). Furthermore, research conducted by Campaign for Better Transport (2023) saw that 79% of drivers in the UK would use public transport more, if it was better. This shows that for the national and sub-national authorities to achieve their goals of increased public transport use, and therefore more sustainable living, the quality of transport must increase. To improve transport services, the foundation of the industry must be studied, which is the infrastructure.

1.2 Measuring Effective and Sustainable Transport Infrastructure

Extensive and efficient transport infrastructure is essential for the economy and for the development of cities and regions (OECD, 2020). Transport infrastructure enables the exchange of goods at a reduced cost, and it creates better domestic trade opportunities. This paper understands effective transport infrastructure as given by the National Infrastructure Commission of the UK (2018), through volume, resilience, quality, cost, environment, and efficiency. Volume refers to the number of trips and passengers travelled per kilometre, with resilience including reliability. Quality relates to connectivity and satisfaction, and cost highlights the cost per passenger per kilometre. The environment category considers the emissions per passenger and transport, with air quality and noise also being considered. Efficiency refers more to road infrastructure and congestion. These factors will be considered when evaluating the effectiveness of transport infrastructure in Wales.

Climate change is the biggest challenge humanity faces, and therefore, requires all efforts to mitigate it (Flinders, 2023). Significant efforts must be made to produce sustainable transport infrastructure all over the world. The transport industry accounts for 21% of greenhouse gas emissions and consumes 64% of global oil. By producing more efficient and modern infrastructure, it is easier to monitor, manage, and maintain assets that facilitate sustainability across entire lifecycles. Similarly, increased availability, performance, and lifespans lead to smarter management and treatment of problems, avoiding costly shutdowns. In the same regard to measuring effective transport infrastructure, the National Infrastructure Commission (JBA Consulting, 2017:23) has set sustainability performance measures for the transport industry. There are two aspects to this: minimising environmental impacts, and decarbonisation. Using these key metrics of effective transport, and a sustainable infrastructure, this thesis will evaluate the current bus and rail infrastructure in Wales.

1.3 Roadmap

The first section will provide a theoretical framework for this thesis by discussing environmental governance, infrastructure theory, and sustainability theory. These concepts provide the foundation and credibility for the governance structures, infrastructure implementation, and drive towards sustainability. The following section

will discuss the methodology of this paper and that qualitative research was the most appropriate due to the lack of quantifiable examinations made. It will also justify the use of document analysis and interviews to conduct the research, mainly for accuracy, reliability, and expertise reasons.

The next three sections will discuss the key areas that are examined in this thesis: governance, current issues, and future strategies. The governance structure involves the UK Government, the Welsh Government, local authorities, the EU, and private companies. Different actors are involved in different areas of the transport sector, making a complex but collaborative system. This is followed by a discussion of the most pressing current issue of transport infrastructure; the historic and chronic underinvestment seen in Wales, which has led to poor connectivity routes, ageing infrastructure and maintenance backlogs, and high infrastructure costs. These have resultantly caused decreasing passenger numbers due to unreliability, inaccessibility, and unaffordability. The future strategies offer a promising outlook as record investment is being conducted in Wales through more focus on public transport, and new projects highlighting modernisation and enhancements.

The final parts of the thesis will include a discussion of the findings and recommendations. These suggest an ineffective governance structure that can be resolved through devolution of transport infrastructure, regulation for buses, and more data specific to Wales. It also finds the need for more efficient infrastructure planning, resolved through faster delivery, better planning of funds, and an increase of infrastructure. The concluding finding regarding future strategies sees the Llwybr Newydd as an ambitious and impressive plan that can improve through more engagement with rural and North Wales, more focus on public transport, and promoting public awareness of the new initiatives to boost usage. The conclusion reiterates that the planning of transport infrastructure can be both effective and sustainable, however, current infrastructure is neither effective nor sustainable.

2. Theoretical Background

This section will establish three important theories for this dissertation: multilevel environmental governance, infrastructure theory, and sustainability theory. These concepts will form the basis and reasoning behind this dissertation and will use them to build not only theoretical but also practical resolutions. Multilevel environmental governance will establish the governance framework regarding how nations, including the UK, deal with environmental problems, while infrastructure theory sets the economic advantages and the importance of transport infrastructure. The final part of this section will look at what sustainability is and how it can be applied to infrastructure.

2.1 Multilevel Environmental Governance

Governance is a concept that can describe a range of approaches and techniques for organising and coordinating different levels of society in the modern age (Vymetal, 2007). It is a flexible construct but leaves room for several interpretations. There are two basic definitions of governance, the first is the state of being governed, and the second is the action, manner, and scope of using the influence or system of governing (Collins Dictionary, 2020; Vymetal, 2007:7). It is also clear that the concepts of governance and government have some differentiations. On one hand, governance can be simplified to illustrate the procedure and structure of bodies, hierarchies, subjects, and authorities, while government refers to the organisational aspect and actors that form regimes and models of governance. Governance also regards the responsibility, accountability, and transparency of actors, as well as the interactions between subjects (Vymetal, 2007:9). The most encompassing and modern take of governance from the EU White Book (2001) describes governance as rules, processes, and behaviours that impact the way power is exercised. It also states that the purpose of governance is to find measures that effectively handle challenges to the "postmodern and post-industrial world". It applies to not only politicians but also to members of society, nation-states, and the international community. The concept of governance as a framework for rules and processes can be applied to how a society may tackle ecological problems.

Environmental governance is a theory that enables society to manage its surrounding environment (Fumikazu, 2012:77). It denotes a variety of actors partaking in and actively contributing to the conservation of the environment. The actors in this theory

are the proponents and opponents of the proposed actions to solve the environmental problems in alignment with support groups and third parties. Each of these actors has their core beliefs and interests which drive their actions. Environmental governance has often been sought as the solution to the technical, managerial, and behavioural aspects that environmental challenges pose (Bennett and Satterfield, 2017:1). It is largely considered that the goal of environmental governance is to increase or maintain ecosystem services. There are eight main notions of environmental governance, however the most important for this dissertation is multilevel governance.

The concept of environmental governance can be linked with the theory of multilevel governance. Multilevel or multilayer governance refers to the theory that authority can be dispersed amongst actors, which results in de-centralised decision-making processes (Saito-Jensen, 2015:2). Conceptually, it establishes the diverse arrangements, plethora of system coordination, and negotiation of "formally independent but functionally interdependent" entities (Piattoni, 2010:26). Pioneered by Gary Marks (1993), this theory examines the relationships between communities, regions, and national policies and the interconnectedness through governance. It has three branches: politics (political mobilisation), policy (policymaking), and state structures (polity). This is exemplified through supranational bodies, such as the EU, or sub-national governments, such as the Welsh Government. Multi-level governance illustrates how supranational, national, regional, and local governments are interlinked in policy frameworks and networks (Marks, 1993:403). This contains both vertical and horizontal levels of governance, meaning that there is an established hierarchy of governing bodies (vertical) that have interdependencies on state and non-state actors (horizontal) (Bache and Flinders, 2004:96). The concept of multilevel governance further explains that different state and non-state actors must align their beliefs to achieve their collective goals. This in turn creates complexities for mechanisms of control and challenges of accountability between governing bodies.

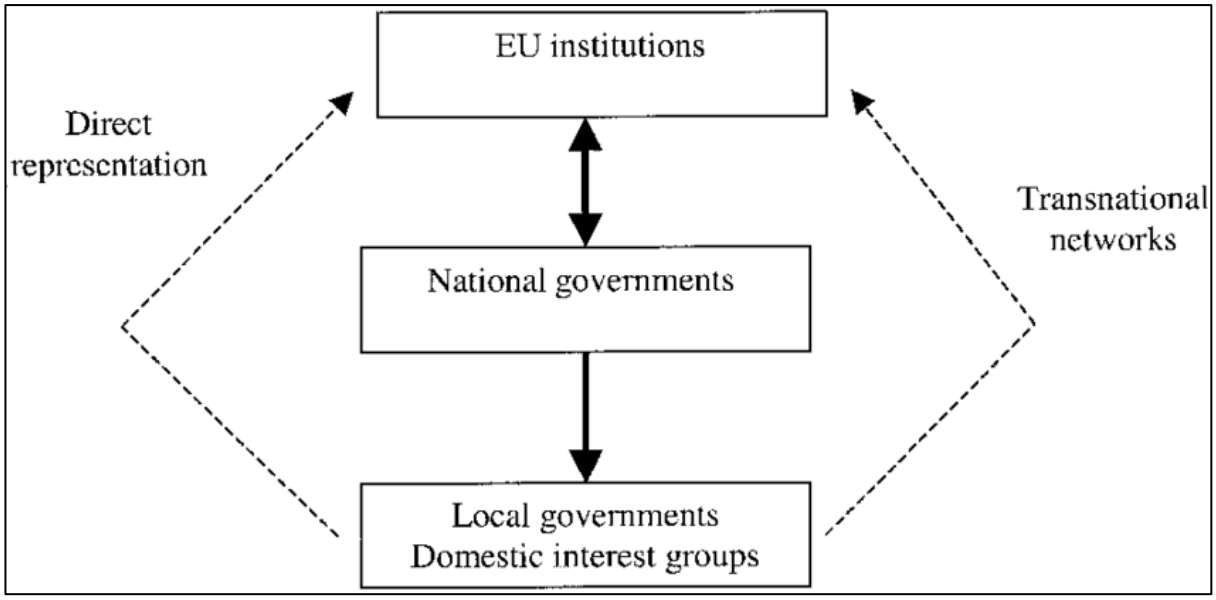

Figure 1: Type 1 Multilevel Governance Structure (Fairbrass and Jordan, 2001:501)

Multilevel environmental governance consequently is the emerging factor of these three theories. It recognises the multidimensional landscapes under which environmental policy operates and recognises the different levels of governance. Under multilevel governance, actors in the environmental policy space must respond to policies established by their superiors and are influenced by the intentions of higher-level authorities and horizontal partners (Yi et al., 2019:2). In the same regard, they are influenced by local conditions and needs. Multilevel environmental governance solutions can either be top-down, for example, national legislation that governs biodiversity, or bottom-up, for example coordinating smaller-scale resource coordination (Paavola, 2008:6). Top-down processes to resolve environmental problems are typically larger institutions that rely on smaller jurisdictions, known as "type 1" multi governance solutions as described by Hooghe and Marks (2003:236). This type of governance is also described as permanent and general-purpose, whereas "type 2" governance is non-permanent with special-purpose jurisdictions. These are likely to result from bottom-up negotiations. Type 2 governance structures are also believed to be polycentric, meaning there is no hierarchy of institutions and authoritative bodies are "horizontal actors", whereas Type 1 governance is monocentric, as there is a hierarchy, usually with national sovereignty. For this dissertation, it is important to highlight the UK hosts a monocentric multilevel

environmental governance structure as the Welsh Government produces and responds to policies and projects in alignment with the superior institution, the UK government.

2.2 Infrastructure Theory

Infrastructure is one of the most important aspects of modern society, boasting an ability for people to live, work, and connect in new and advanced ways (Institute for Government, 2023). As shown by Hirschman (1958), it is also a great proponent of economic growth and development and improves livelihood and well-being as it is a direct foundation for "productive activities". Economic theory in this regard points out that high infrastructure in a local area decreases the cost of productive activities, therefore, sponsoring economic development. In this way, infrastructure projects must be planned wisely as poor investment will lead to long delays, high costs, and waste. It is important for regional development that under-supply of infrastructure (bottlenecks) or over-supply (excess capacity) does not occur in this sense (Diamond and Spence, 1984:265). It is a balancing act that governments must correctly achieve, for example, creating excess infrastructure in expectation of economic development. Infrastructure development includes the fields of water and sanitation, technology, energy, and transportation (African Development Bank, 2024). In recent years, there has been a drive to introduce or upgrade existing infrastructure to align with the core values, such as the integration of sustainable development. This is highlighted by calls to refrain from building new infrastructure, such as new railways, but to optimise existing structures (PwC UK, 2024).

Transport infrastructure is considered to be a core component of infrastructure-led economic growth. Zhang and Cheng (2023) highlight the four reasons for this: expansion of labour and capital, cost savings, accelerated industrial accumulation, and changing aggregate market demands. The UK-specific study concluded that in the long run, investment in transportation infrastructure has a positive effect on economic growth. Transport infrastructure is separate from transport services (UK Government, 2023). Transportation infrastructure is the facilities that are designed to help people move, including cycle paths, pavements, and train stations. Transport services, on the other hand, physically move people from place to place, for example, trams, trains, or buses, meaning that transport services use the infrastructure. Furthermore, there are five constraints to transport infrastructure (Rodrigue, 2024). Physical and environmental constraints usually

shape how and where infrastructure is built, while demand constraints relate to capacity and the level of services provided. Financial constraints are often due to the capital-intensive nature of infrastructure development and maintenance, as construction and maintenance itself is a constraint as it reduces capacity and causes disruptions. Finally, government regulations impose restrictions on transport infrastructure, mainly through compliance with laws. All of these restraints cause the current issues that will be addressed in this dissertation.

Despite the positive effects of development, transport usually has negative consequences for the environment and ecosystems (Rodrigue, 2024). The environment can be thought of as an externality of transportation as the negative impacts of the industry are not fully realised by those causing them. An example of this is how a car user may not understand the harm it may cause to those in a surrounding environment due to the emission of pollution from the vehicle. Transport also has a direct impact on the environment through noise and carbon monoxide emissions, whereas the indirect or secondary impacts are health-related diseases that result from the particulates in a car's engine. Finally, the cumulative impact that transport has on the environment is its contribution to climate change. These harmful side-effects of transport infrastructure illustrate the shifting and complex priorities between environmental and economic public policy. This is further demonstrated by the evolution of transportation, as links between transport and the environment became evident through the commercial and widely accessible use of the automobile and aeroplane. This has enabled the infrastructure sector to become a key dimension of sustainability, from tackling vehicle emissions to producing a more eco-friendly supply chain. This illustrates the interconnectivity between transport infrastructure and sustainable development.

2.3 Sustainability theory

Sustainability is the capacity to maintain an entity or process over time (Basiago, 1998). When discussing its relation to the environment in the sense of sustainable development, it regards improving and maintaining a healthy economy, ecology, and social structure that allows development (Mensah, 2019:5). It also refers to equality and equity of resource sharing through inter-generational means. The concept of sustainability has three pillars: social, economic, and environmental. Social sustainability refers to a

system of social organisations that help tackle poverty (Littig and Grießler, 2005). It also connects poverty and social issues to environmental destruction, highlighting that social progress should neither negatively harm the environment nor economic growth. It is the ability to enable citizens to obtain their needs sustainably. Economic sustainability is the acknowledgement of economic growth while considering the impact of this growth on future generations. As there is a finite number of resources for development, there is a need for efficient allocation. In this sense, economic sustainability requires decisions that are equal yet fiscally sound and consider other aspects of sustainability (Zhai and Chang, 2019). Finally, environmental sustainability is the concept that the natural environment must continue to support human life. This means that the Earth's resources cannot be extracted faster than they regenerate, with waste being emitted slower so it can be fully absorbed by the environment (Diesendorf, 2000). This further demonstrates that the three pillars of sustainability are interconnected and must be carefully considered when establishing 'sustainable development'.

In line with the Brundtland report (UN, 1987), sustainable development is a concept and a comprehensive approach that can serve the needs of the current generation without compromising the future of the next generation; sustainable development centres around the environment and ecological systems. The shift away from the use of environment, which revolves around human effects, to ecology, which affects all nature systems is a turning point in the Brundtland report as it recognises the impact on non-human beings. It requires responsible stewardship of natural resources and ecosystems and involves conserving biodiversity and mitigating pollution, and climate change. This is done through sustainable practices such as renewable energy and resource management. Positive progress in ecological conditions cannot occur without changes to the current economic circumstances. There is a need to improve both economic policies and government institutions, while also promoting growth which does not exhaust our resources and undermine market stability. It involves fostering innovation, investing in infrastructure, and creating opportunities for employment and entrepreneurship while ensuring fair distribution of resources and wealth. A holistic approach is necessary to integrate environmental policies and development. All governments, at every level, must cooperate to combat this issue. The challenges we face are interdependent and integrated, therefore, sustainable development cannot be achieved through piecemeal strategies.

Ultimately, sustainable development is about fostering harmony between people and the planet, ensuring prosperity and well-being for present and future generations. Sustainable development is a key issue for this dissertation topic as it gives a guiding principle on how to develop infrastructure sustainably.

Sustainability theory then is the model proposed to sustain human, environmental, and economic growth. There are three models of sustainability: economic model, ecological model, and political model (Jenkins, 2009). The economic models suggest maintaining opportunity, usually with capital. Sustainability is seen as an investment and the use of resources should be seen as returns that can create new opportunities better than previously formed. Therefore, there is little regard for the social or environmental impacts so long as economic activity is sustained. Ecological models on the other hand wish to sustain biodiversity and integrity of ecological systems. It focuses directly on the management of the planet to guarantee its long and healthy existence. From an anthropogenic view, the environment must be sustained due to its resources, but from an ecological perspective, it must be maintained due to its intrinsic value. The political models support social or human maintenance. These focus on sustaining the environment for human benefit, from cultural conditions to ecological personhood. This essay will take these models into account, as it has established the need for environmental conservation, through sustainable development that will benefit human life and continue economic growth. The following section will demonstrate how these theories will guide the research.

3. Methodology

This section will lay out what research design has been selected to conduct the research for this thesis, and how this research was carried out. The research design implemented was qualitative, due to the specificity of the case study. The methodology carried out was document analysis and interviews with industry experts.

3.1 Research Design

Qualitative research is the assessment of entities, with a basis of processes and meanings that are measured in terms of quality and not experimentally examined or measured by amount, intensity, or frequency (Denzin and Lincoln, 2005:10). With the research question: “Can transport infrastructure be effective and sustainable? A Case Study of Wales”, qualitative research was necessary due to the lack of quantifiable information. Three areas define qualitative research: the design, the collection of data, and the analysis. The design orchestrates the research to be a real-world situation, with possible emerging factors regarding a study that is “information rich”. This thesis takes the study of insufficient transport infrastructure in Wales as new schemes are being presented to enhance these failing areas. The collection of data includes carefully conducted case studies and a review of media. For this reason, the collection of data will be conducted through interviews with industry experts and document analysis. Finally, the analysis is the details, exploration, interdependencies, and context of the case. The research will thus discover a range of areas to discuss. As this thesis aims to find the effectiveness of transport infrastructure through sustainable means, qualitative research has been selected to carry out the research.

3.2 Research Methodology

Document analyses and interviews will be used for this thesis. Examining government reports, government body research, and documents from credible businesses offers the best way to achieve information that is accurate and reliable. Government reports present a good document analysis as transport infrastructure is largely governed by national and sub-national authorities; therefore, these documents would derive straight from the source. Furthermore, government agencies often provide oversight and reviews of these structures, which provide more of an in-depth analysis surrounding specific areas

of transport infrastructure. Finally, infrastructure building and consultancy companies often provide an unbiased, realistic description and criticism of the transport industry.

Interviews are a further source of information regarding qualitative research. Interviews with individuals directly involved in the transport industry will provide accounts of the current and historical state of the field, as well as illustrate expert opinion on matters of governance, current issues, and future strategies. The six experts interviewed in this thesis are:

1. Mark Barry: Geography Planning Expert and Pioneer of the South Wales Metro
2. Darren Millar: MS for Clwyd, North Wales
3. Alison Thomas: Head of Policy and Engagement for Transport in the Welsh Government
4. Tim Butler: Head of Commercial for Amey
5. Lee Waters: MS for Llanelli, Deputy Minister for Climate Change, former Minister for Transport, and former Director for Sustrans Cymru
6. Dan Tipper: Chief Officer for Infrastructure for Transport for Wales
7. Emma Collins: Station Manager of the Core Valley Lines for Transport for Wales Rail

These individuals have provided information from their professional experience in this sector.

The research methodology that will be employed in this thesis is document analysis and expert interviews. Document analyses are a good research methodology for this case as they offer comprehensive and accurate policies and plans that provide insight into the plans and priorities of the government. It also provides the policy frameworks necessary for understanding and critiquing the governance structure. Documents also lay out the strategic direction for transport infrastructure and create reliable sources as they are relayed from reputable and authoritative sources. Interviews propel this information through in-depth insights, providing clarification and detailed material. It also gives access to expertise and diverse opinions regarding the three key matters studied in this paper. Resultantly, these research methods will derive the best result for the desired outcome. The next section will employ these methods and discuss the first key issue of governance structures in Welsh transport infrastructure.

4. Governance

As previously mentioned, the United Kingdom operates under a multilevel governance framework in distributing the building of transport infrastructure and environmental conservation. The UK is a sovereign state with the Government and Parliament of the UK being hosted in London, England, with representatives from across the state. Wales has a devolved Government and Parliament (Senedd) that can legislate on areas not reserved by the UK Parliament, with transport infrastructure being reserved at the UK level. There are also local councils that play an active role in transportation infrastructure establishment, with funding also previously being received from the supranational level of the EU. This section will explore how these entities are intertwined to roll out effective transport infrastructure and critique the disjointed and confusing system that has been put in place. An in-depth discussion about the governance structure regarding transport in Wales through the multilevel governance system will follow.

4.1 UK Government

The UK upholds the doctrine of parliamentary sovereignty, meaning that there is devolution in the UK as powers have been shared from the Westminster Parliament to sub-national, devolved administrations (UK Government, 2019:46). In terms of infrastructure, the UK Parliament has responsibility for the whole transport sector, including providing policy, guidance, and funding specifically to English local authorities (UK Government, 2024). The Department for Transport (DfT) sets the "strategic direction" for rail infrastructure in England and Wales through investing in Network Rail, managing franchises, and regulating fares (National Audit Office, 2023:4). Also at the UK level for bus infrastructure is the statutory framework for the bus industry, although this is mainly managed by local authorities. The UK Government collaborates with all actors in this structure as it is the central and sovereign state and the main regulator of transport infrastructure. It interacts with the EU as the main negotiating body in an organisation made up of member states. It interacts with the Welsh Government through funding and project management, with similar a relationship to local authorities. Finally, the UK Government collaborates with private rail companies through franchise management.

Network Rail is a UK Government-owned company that owns and maintains the national rail infrastructure network in England, Scotland, and Wales (UK Government, 2019:2). However, Network Rail Limited is the private sector subsidiary of the company, but is still classified as a central government body. The Secretary of State for Transport is accountable to the UK Parliament for the performance and operations of Network Rail, as well as the Accounting Officer (Chief Executive) who acts as a Permanent Secretary in Network Rail to Parliament. Network Rail is monitored by another UK Government body, the Office for Rail and Road (ORR). The ORR regulates the rail industry's health and safety performance, and holds Network Rail to account, ensuring that it is competitive and fair (ORR, 2017:1). Transport Focus is the body which monitors the private rail and bus industry performance, and is a public body sponsored by the DfT.

Alongside setting the provisions for transport in Wales, the UK Government also provides a pot of funding for the Welsh Government. Using the Barnett formula, the Westminster Government allocates funding to the devolved governments either by spending UK-wide or by providing a share of funding. The devolved institutions are then left to spend their budgets as they wish, often investing in projects or infrastructure of their own. The Barnett formula allocates a regional budget based on population, therefore, the budget for the Welsh Government would be correlated to how much the UK Government spends on the English population (Bristow, 2009). This demonstrates how the UK government regulates and operates transport infrastructure in Wales, and how it funds projects through its own institution and the Senedd.

4.2 Welsh Government

The Welsh Government and the then National Assembly for Wales were established under the Government of Wales Act 1998. Today's Welsh Government and now Senedd Cymru (Welsh Parliament) operate under the Wales Act 2017 that replaced the Conferred Powers Model with a Reserved Powers Model. This allows the Senedd to make legislation in areas and on matters that the UK Parliament has not reserved. Under section 7A, Part 2, Head E, the Senedd cannot make legislation on Transport, including road transport and rail transport. However, under the 2006 Government of Wales Act, there are extensive exceptions to this section, including enforcement and railway administration. Furthermore, the 2017 Act gave the Welsh Government complete powers

over the bus network. The Welsh Government interacts with local governments as it awards grants to projects and releases a five-year transport plan to be reviewed by the Government of Wales (WCPP, 2022). The Welsh government also enjoys some franchising rights of private companies, that operate bus transport in Wales.

Concerning rail infrastructure, the Welsh Government can set out priorities and business plans but plays a more advisory role, as well as using its funding from the Barnett formula to invest at a smaller scale. An example of this is the Welsh Government providing the case and subsequent electrification of the Great Western Main Line from Cardiff to Swansea after the DfT established the electrification of the line from London to Cardiff (Welsh Government, 2012). This means that although the government of Wales does not legally have jurisdiction over transport infrastructure under its current governing act of the Reserved Powers Model, it can influence transport infrastructure through previous legislation, as well as through exceptions and maintenance.

Moreover, the Welsh Government operates a publicly owned public transport company, Transport for Wales, that supports and advises the Welsh Government concerning Welsh transport projects, as mentioned by interviewees Alison Thomas, Mark Barry, and Dan Tipper. The Welsh Government Transport Company, more frequently referred to as Transport for Wales (TfW) was established in 2016 under Section 71 of the Government of Wales Act 2006 (Welsh Government, 2018:4). It is often associated with passenger trains; however, they operate a transport network across Wales, with limited infrastructure regulation as Network Rail has delegated infrastructure liberties for enhancing the Core Valley Lines, as explained by interviewees Tim Butler and Dan Tipper. It is overseen by the Minister of Transport to the Welsh Government, currently Ken Skates MS (Welsh Government, 2024). The Minister will set out the Government's aims and objectives for TfW, which in turn produce budgetary requirements.

Several regional commissions tackle specific transport issues in different Welsh regions. The North Wales Transport Commission is currently open to providing recommendations to improve public transport in North Wales in a sustainable and integrated way. The report concluded that coordination between services and better networks should be implemented to provide a realistic and plausible alternative to private vehicles. As North Wales primarily consists of rural areas (Beel, et al., 2020:719), the commission has also focussed on connecting rural communities with public transport but

also recognises the importance of cars in these societies. A similar commission established was the South East Wales Transport Commission. Convened in 2019, this commission's primary aim was to alleviate congestion on the South Wales motorway, the M4 (Welsh Government, 2020:3). They understood car congestion as a lack of good public transport alternatives to private vehicles, and therefore, recommended implementing a "Network of Alternatives". They offered five improvement areas, one of which was recommending an infrastructure package. This recommendation highlighted the deficiency of an appropriate rapid rail and bus network operating between the major cities of Cardiff, Newport, and Bristol (England). These commissions play a significant role in enhancing and influencing infrastructure projects that are implemented.

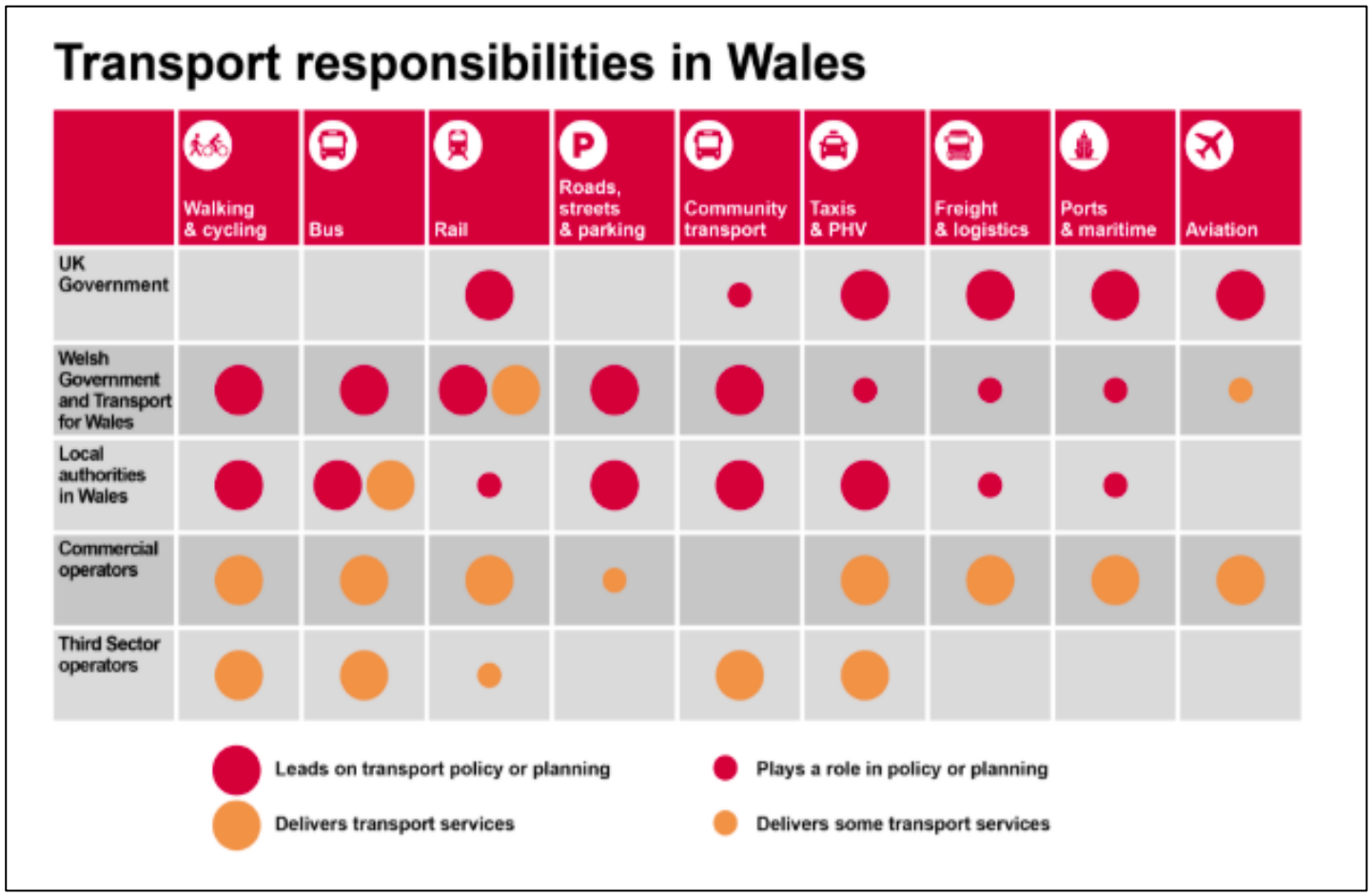

Figure 2: Governance Structure of the Welsh Transport (Welsh Government, 2022)

4.3 Other Government Actors

The lowest level of governance is the local authorities who are responsible for the highway construction and maintenance, active travel, and community transport. Bus

services in Wales are deregulated, with the Welsh Government providing some subsidiaries (TfW, 2024). Local authorities provide information regarding bus services and operations, and they must collaborate with the Welsh Government, Community Travel Association, and other private entities, which play the largest role in the Welsh bus industry. Similarly, the Active Travel (Wales) Act 2013 placed the planning and promotion of active travel into the role of local councils. The 22 "single-tier unitary authorities" are also required by the Transport (Wales) Act 2006 to produce a Local Transport Plan every five years and keep it under review. Local government can also play a part in financing small rail infrastructure projects. It should also be noted that there are several "green bus funds" from local authorities in England and Scotland, however, there is no equivalent scheme in Wales. The main collaboration between private companies and local authorities lies in the planning and managing of the bus industry.

Although there are a large number of private actors that are involved in transport services, they play a small but significant role in the infrastructure. Passenger trains are operated in the private sector, meaning the extensive rail network is nationalised, but the actual trains are privatised and franchised by the DfT (2016), with some liberties being given to the Welsh Government. The bus sector is largely in private ownership, with five main companies dominating the market: Stagecoach, First, Go Ahead, National Express, and Arriva (Statista, 2020). Local authorities who have large control over the bus sector have very little scope to achieve their objective as they must cooperate with private sector operations. This means that there is a weak governance position in the bus sector as local authorities are unable to set fares, routes, and frequencies. There has also been evidence of bus operators running services along the same route (Welsh Government, 2024:14), adding to the difficulties of coordinating interconnecting or linking services.

Despite the UK's exit from the European Union (EU), there is some influence from this supranational body on the transport sector, particularly in rail and bus services. As well as passing legislation that the UK must comply with (pre-Brexit), the EU also provides funding for many Welsh infrastructure projects (Welsh Government, 2023). In the bus sector, the EU provides regulations largely in support of environmental standards, driving hours, and operating licensing. It should be noted, however, that quantity and price regulations vary widely. The EU has invested almost £300m in transport infrastructure, its largest infrastructure industry that has been invested in in Wales. An

example of this is the upgrades made to bus stations in Port Talbot and Swansea. This is further demonstrated by the last of EU funds being used to upgrade the Core Valley Lines, as mentioned by expert interviewee Tim Butler (2024). However, due to the UK's exit from the EU, Wales no longer receives funding for these projects, and will no longer integrate new EU legislation. This complex, yet collaborative system of governance will be reflected in the next section that discusses the current issues of transport infrastructure.

5. Current Issues

Welsh transport infrastructure is at a critical breaking point. Four major issues are plaguing public transport infrastructure in Wales: underinvestment, accessibility, age and maintenance, and affordability. Underinvestment is an issue that derives from the UK Government and its lack of funding for Welsh infrastructure over a significant period. Accessibility and connectivity are also major issues, specifically in rural communities post-pandemic, with ageing infrastructure and maintenance backlogs causing unreliability. Finally, the cost of transport in Wales has been increasing, making public transport not only unattractive but also unaffordable. This section will provide an in-depth discussion of these current issues which are imperative for the actors to fix, beginning with underinvestment.

5.1 Underinvestment

Welsh transportation infrastructure has had historic underinvestment from the UK Government. This means that the level of investment seen in Wales has not been in correlation with the spending seen in the rest of the UK (Barry, 2018:20). When asked "What are the most significant challenges facing the transportation sector in Wales today?", every expert interviewed for this thesis stated that underinvestment was the most pressing issue, evidently highlighting the stress for more investment in this field. Bus services have faced underinvestment due to a lack of regulation and subsidiaries of services (Debus, 2023), however, as they are operated by private services, funding has more to do with the profitability of these companies and less with the Government funds, which is where the major problems result from. For rail infrastructure, Wales has not received funding in transport infrastructure that is 'commensurate' with the rest of the UK since 2011 (Barry, 2018:19). Although Wales holds 11% route length and 9% track length, it only receives around 4.54% of the total investment by the UK Government, with only 1.63% being used for enhancements (Barry, 2018:21). This transfers to £1.99 billion out of £44 billion. The lack of investment in Welsh transport infrastructure, and the uneven share of funding, are the reasons for the decline of effective transport infrastructure.

The spending seen for infrastructure in the UK also severely lags behind their G7 counterparts (Fleming, et al., 2024). To close the five-percentage point gap between the

UK and its peers, there would need to be a £130 billion increase in spending per year. This has been attributed to the non-devolution of rail infrastructure to the Welsh Government level which results in the categorisation of projects as being labelled as "England and Wales" (Welsh Government, 2020:7). This lack of investment in Welsh transport infrastructure, as well as a lack of devolution to resolve specific Welsh issues, illustrate the ineffectiveness of the current governance structure and subsequent underfunding that has created several other issues and makes public transport unappealing.

This underinvestment is exemplified through the funding and classification of the High-Speed rail project currently undertaken by the UK government. The project, known as HS2, is set to be the UK's first high-speed rail infrastructure and will run from London to Birmingham with plans to eventually expand. It has been estimated that the first leg has cost £24.4 billion, and the UK Government will further invest £36 billion on this section alone (Committee of Public Accounts, 2024). The cost of this project highlights the prioritisation of investment by the UK Government in England, as opposed to Wales. This is further complicated by the fact that this project is classified as an "England and Wales Project", meaning Wales will receive no subsidiaries in comparison to Scotland and Northern Ireland (House of Commons, 2021). It has been estimated that Wales will lose out on £250 million due to this classification. The uneven funding system therefore shows how Wales is overlooked by the funding presented by the UK Government, especially when compared to England but also compared to the other nations in the UK, who have transport as a devolved matter. Consequently, this demonstrates how the UK Government has historically underinvested in Welsh transport infrastructure and has made no remedies to this issue.

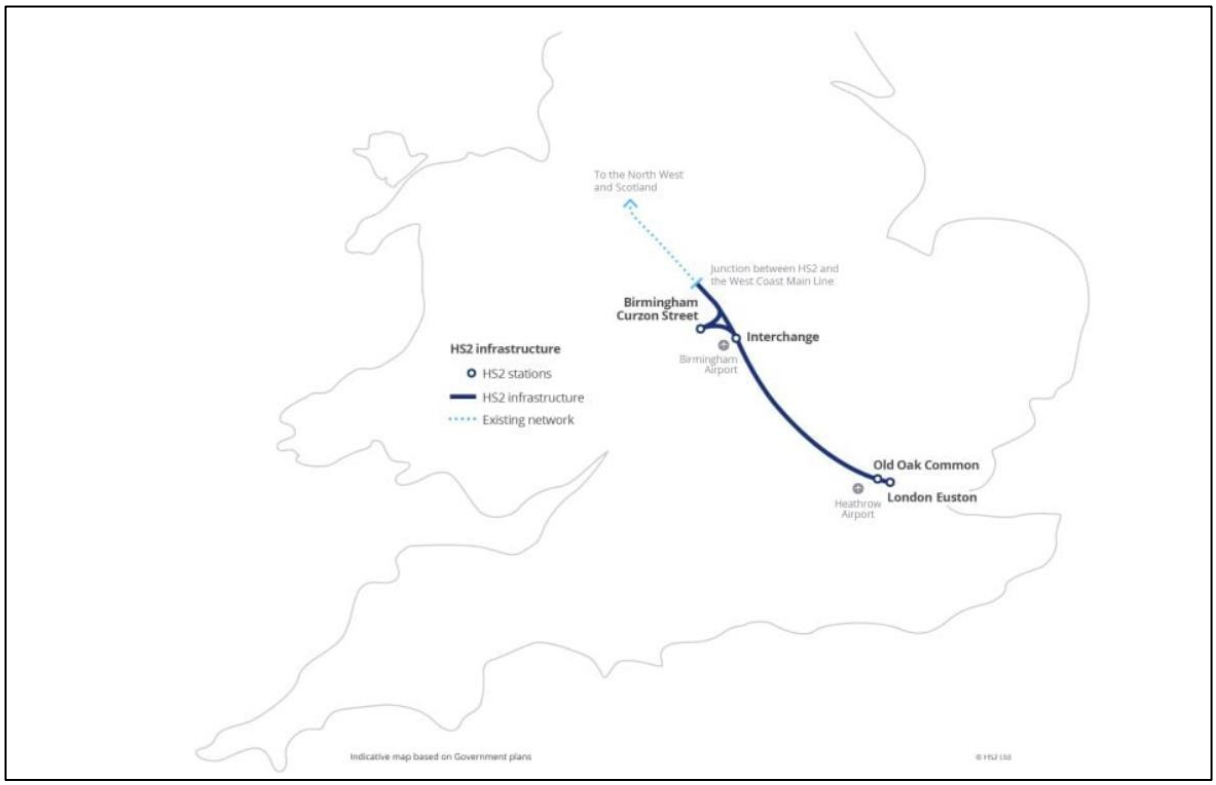

Figure 3: Map of HS2 illustrating no plans for Wales (HS2, 2024)

There is also an argument that there is unequal and underinvestment between North Wales and South Wales. Although the available data published regarding UK funding in different regions is unclear (O'Leary, 2018), many Welsh Conservative MS' argue that the Welsh Labour Government is failing to tackle the transport disparities seen in the North when compared to the South. Interviewee Darren Millar MS highlights this by comparing the proposed Welsh metro lines. The investment in the South Wales metro from the Welsh Government is £700 million more than the investment in the proposed North Wales metro. This significant funding disparity demonstrates the focus of the Welsh Government in the South Wales region, leading to underdeveloped transport infrastructure in the North. Furthermore, the Union Connectivity Review (2021:10), which set out to review the UK's transport connectivity, highlighted the need to invest in the North Wales Main Line to improve connectivity and sustainability. In comparison, the South Wales Main Line was suggested to adopt multi-modal transport to reduce car traffic. Although this review has focused on the connectivity of the whole of the UK and not only Wales, there is evidence that the North Wales region needs more investment to

avoid isolation from the rest of the UK. Moreover, a review conducted by the North Wales Travel Commission recognises the whole responsibility of the UK Government regarding the North Wales Main Line and suggests further commitment to funding to achieve the required upgrades for electrification and connectivity. Overall, there is a clear need to invest more in North Wales when compared to the funding for projects in South Wales on behalf of both the Welsh Government and the main stakeholders of the UK Government.

Underinvestment has had clear negative and knock-on effects on the effectiveness and sustainability of public transport in Wales. The historic underinvestment in Welsh rail transport infrastructure has resulted in higher funding per passenger per kilometre than anywhere else in the UK (Barry, 2018:21). This can also contribute to the slow journey times and insufficient passenger and train capacity that are seen in Wales. Similarly attributed to the underinvestment, there has been a series of route discontinuations and disjointed routes for the bus industry, often leaving rural communities disconnected from main lines. This is exacerbated by the unreliability and tardy public services, all strengthening the unappealing Welsh public transport. Understanding the root cause of Welsh transport issues, the following sub-sections will delve into practical problems that Welsh transport infrastructure faces.

5.2 Accessibility and Connectivity

Accessibility to public transport in Wales is an issue that mainly lies with the bus industry, but can have issues for rail infrastructure, specifically in rural areas. This is in addition to the contestable accessibility to older and disabled populations of Wales. Sustrans Cymru (2022:7) has found that 12% of the Welsh population does not have public transport links due to the discontinuation of 17.8% of bus vehicles. The loss of public transport services is seen significantly more in rural communities, making these cuts disproportionate. This is worsened by services that stop early in the evening or lack stops in key places. Lack of service frequency is another barrier to accessibility that results in an insufficient public transport network. An example of this is the series of funding cuts announced by the Welsh Government in October 2023. As illustrated by the Pembrokeshire County Council (2023), the Bus Emergency Scheme that helped the bus industry remain afloat during the COVID pandemic was replaced and capped at £46

million with the Bus Transition Fund. This has also led to concerns that local bus services would further be reduced by April 2024 as subsidies began to fall. This loss of subsidies has resulted in many bus enterprises shrinking their services and bus capacity, including FirstCymru which had to reduce the 349 service in West Wales. Accessibility of transport is important as many citizens use these modes of transport to travel to their employment (Sustrans Cymru, 2022:9). This demonstrates that access to transport to Wales is decreasing, especially in rural areas, after the COVID pandemic as the Welsh Government withdraws funding.

There is also a lack of accessibility for the elderly and disabled in Wales. Public transport in Wales often does not meet the basic requirements for infrastructure that is fully accessible to the entire population. A study by the Equality and Human Rights Commission (Rees and Prior, 2020) highlighted that half of the train stations in Wales were inaccessible to disabled people with 34% having no access for wheelchair users. This significantly impacts not only the independence of these individuals but also their opportunities. For bus services, there was large variability in the design and quality of bus shelters in local areas, often in inappropriate or inaccessible locations. These issues were exacerbated by a lack of car parking and public toilets. There was also a lack of enforcement for priority seating, with many respondents to the study stating that they were often ignored by drivers who refused to stop. Train infrastructure also had similar issues with accessibility for the elderly and disabled. The barriers these people faced were a lack of accessible pathways, lack of facilities and inappropriate design and location of large objects at the stations. It is highly important that public transport becomes less discriminatory to the disabled community, this is propelled by the fact that 25% of bus users are disabled or have a long-term illness (Climate Change, Economy, and Infrastructure Committee, 2022a:26). These accessibility issues further illustrate the issues with public transport, but also how the lack of infrastructure does not allow people to use it.

As previously mentioned in the governance section, connectivity and modal integration are barriers derived from the complex governance structure. As interviewee MS Darren Millar illustrates, this provides further problems for access to transport as poor transport connections, particularly in North and West Wales, leave residents unable to take local public transport (Climate Change, Economy, and Infrastructure Committee,

2022b:8). The connectivity proves to be a significant obstacle because of geographical constraints and poor connection times. Another major accessibility issue is capacity, again, in North Wales. Overcrowded trains illustrate how rail infrastructure is often unprepared to carry the expected number of passengers (Climate Change, Economy, and Infrastructure Committee, 2022b:12). More generally in Wales, TfW, the main transport operator and organiser, was found to be operating below the capacity needed for the service it had set in the timetable (Howorth, 2023). The effects of underperformance by TfW are particularly seen when compared to private transport companies. A participant in the Climate Change, Economy, and Infrastructure Committee (2022b:12) survey explains that Avanti West Coast, operating in North Wales, offers nine-carriage trains, whereas TfW will offer only a two-carriage train. This variation of capacity demonstrates both inaccessibility and unreliability. Unsurprisingly, customer satisfaction has been poor due to these consistent ill-prepared services. Consequently, public transport in Wales is very inaccessible because of physical inaccessibility and unreasonable connectivity.

5.3 Outdated Infrastructure and Maintenance Backlog

The infrastructure in the UK is ageing, which is exacerbated by the maintenance backlog seen from Network Rail. Wales's biggest infrastructure building/ planning company, Amey (2024), has described the UK's infrastructure as "ageing roads and Victorian rail network". The lack of investment in transport infrastructure has resulted in crumbling structures that desperately need maintenance work (Welsh Affairs Committee, 2021:9). This is further exemplified by the lack of new technologies used to upgrade rail networks until very recently. As the Station Manager of the Core Valley Lines, Emma Collins, explains, the Treherbert line has only recently been upgraded from a "token exchange signalling system", a system originating in the nineteenth century, and still has infrastructure in use from the 1930s. These outdated aspects of rail infrastructure highlight the need to invest more in transport infrastructure to create modern and functioning systems.

As McKinsey&Company (Mills, et al., 2024:10) demonstrate, much of the UK's infrastructure is old and therefore requires more maintenance work, however, the UK is experiencing severe backlogs in maintenance work. This issue is exemplified through the ORR (2023a) and the recent requirement of Network Rail to address their series of

backlogs for structure examinations as some regions have seen an increase. There has also been a request for the infrastructure company to tackle the backlog of several outdated connection contracts, such as insufficient use of current technology, which could alleviate the backlogs. They have also observed a series of contract cancellations due to hot weather, which has further created a backlog. The decaying structures and the inability to maintain or repair them have resulted in issues of punctuality and reliability, leaving the transport industry to become very unsustainable.

In Wales, the reliability and punctuality of services is a pressing issue. The annual study by Bus Users Cymru (2023) had remarkable findings about bus punctuality, meaning a bus arriving within one to five minutes of its original schedule. In North Wales, the monthly average was 92%; in Mid Wales, it was 87%; in South West Wales, it was 86%; and in South East Wales, it was an astonishing 65%. To this avail, it comes as no surprise that service reliability was the second highest complaint category to Bus Users Cymru. In rail infrastructure, TfW saw 59.8% of trains arrive on time from 2022-23, an all-time low (ORR, 2023b:6). Additionally, 4.5% of trains had been cancelled, the highest it has ever been. These statistics highlight how unreliable Welsh public transport has become, as punctuality and reliability are amongst the top complaints to TfW (2022). This has further prompted an investigation by the ORR (2024) into the services conducted in Wales. Transport Focus has also found that TfW has scored at the bottom of the customer satisfaction rankings for punctuality and reliability (Senedd, 2024:11). This has led Transport Focus to urge TfW to deliver a more reliable rail service, with concerns for information provided, monitoring, and complaint handling. These figures demonstrate why transport infrastructure is seen as unreliable in Wales, why there is a high level of complaints for both the bus and rail industry, and why there is an unwillingness to take Welsh public transport.

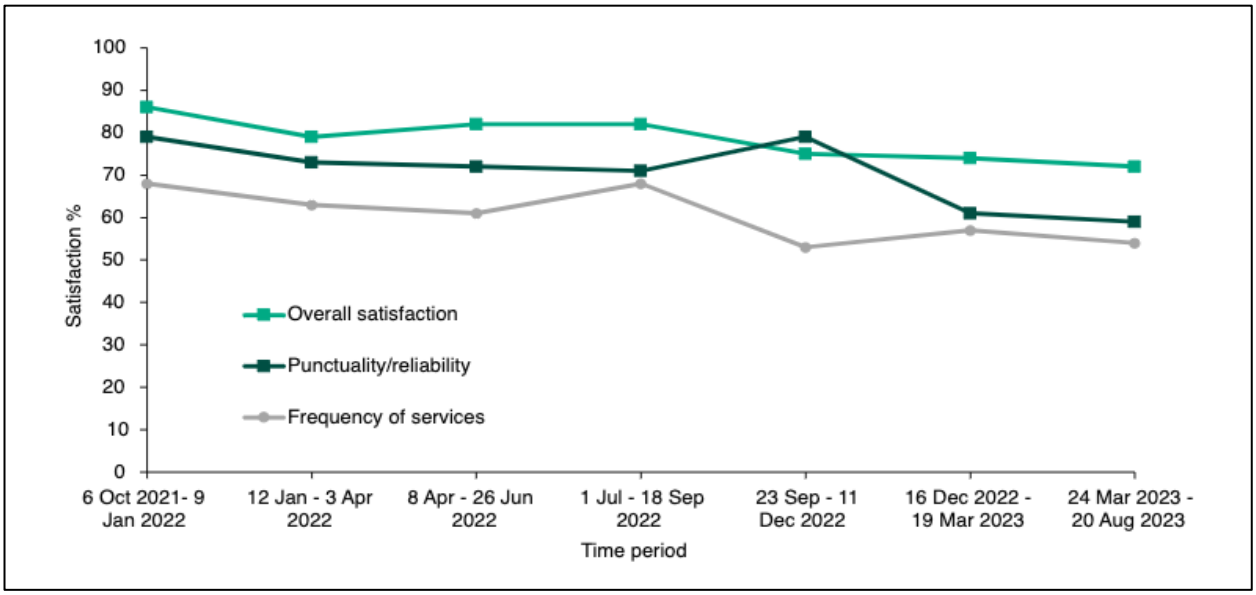

Figure 4: Passenger Satisfaction Rates for TfW (Senedd Research, 2023)

In addition to service disruptions, travelling by public transport results in slow journey times. When compared to journeys taken by car, travelling to a destination by bus or train can have poor journey times. For bus infrastructure, the North Wales Transport Commission (2023:13) attributes this to underfunding, car-based development, and car-centric attitudes, alongside a dysfunctional, deregulated bus network that is unfit for the region. The Commission also sees more investment in improving the journey times of train services, as well as for enhancements to infrastructure that will help tackle these time issues. They further argue that although planned stations would bring communities closer to rail services, they would actually increase rail travel times, and therefore, a bus service would be a preferable enhancement to these communities. This improvement of an integrated modal transport system would decrease journey times, making public transport competitive with private vehicle transport. They additionally support increased bus infrastructure, such as increased bus lanes, that can cut journey times further. An example of slow journey times is the Bangor to Cardiff trainline that has 208 miles of track length and takes around 5-6 hours (Barry, 2018:21). In comparison, the train journey from London to Edinburgh is around 332 miles but takes the same time as its Welsh counterpart (Trainline, 2024). These slow journey times in Wales highly influence passengers' appeal to public transport, principally in comparison with car journeys,

demonstrating that investment is needed in Welsh transport infrastructure to reduce journey times and to encourage more use of public transport.

5.4 Affordability

The UK is one of the most expensive places to build infrastructure on Earth (Department for Levelling Up, Housing and Communities, 2023). As the UK builds big infrastructure projects, the delivery is often thought to be too slow, and too bureaucratic with plans taking four years only to receive a yes or no answer. This increases risk for both investors and developers, which in turn, makes infrastructure building incredibly expensive. Projects frequently become over budget and over time, meaning building tracks per mile is more expensive than their European counterpart. Staying with the example of HS2, the Infrastructure and Projects Authority (2023:54) has given both Phase 1 and Phase 2 of the HS2 project a 'red rating', meaning the project seems unachievable, with major issues regarding definition, schedule, budget, quality, and/or benefits. These issues with the cost of infrastructure have transpired into the increasing cost of providing and using transport services.

The more expensive the infrastructure is, the less able the nation is to afford to expand, upgrade, and create new projects. Every aspect of Britain's transport is more expensive (Dumitriu and Hopkinson, 2023). Whether it's quick public transport, such as trams or an underground network, or longer routes, such as rail and road, the cost of building infrastructure is incredibly costly when compared to countries of a similar economic calibre and produce similar projects (Ruparel, et al., 2024). The expense has partly been driven by large and complex projects, followed by uncertainty and volatility, affecting the private sector's willingness to participate (Fleming, et al., 2024). This is further complicated by the UK's fundamental problem in the ability to deliver new projects. Ultimately, building infrastructure in the UK is disproportionately expensive, leaving little room for new or improvement projects.

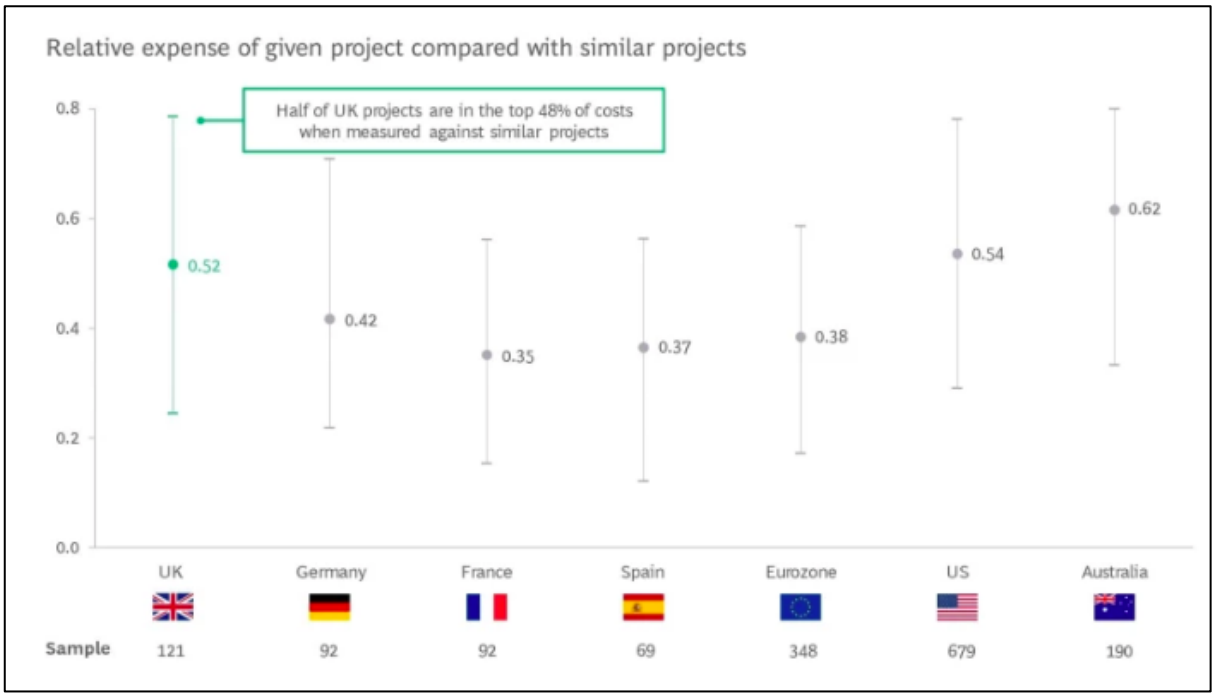

Figure 5: Expense of UK infrastructure comparative to other nations (BGC, 2024)

This issue provides a significant obstacle to citizens taking public transport. In Wales, the cost of rail, coach and bus fares have increased around 33%-56% over the past decade (Sustrans Cymru, 2022:6). For trains, the price had increased by 5.9% in 2023, the highest since 2012 (ORR, 2023c:2). The price has further increased in Wales by 4.9% in 2024, which is an increase that has been capped below inflation but in line with the wider industry (Waters, 2024a). Comparatively, Bus fares have increased by 3.5% from 2019-2020, as bus fares have increased by almost one-fifth in the past two decades (Sustrans Cymru, 2023:6; Debus, 2023). As one of the main disincentives for using public transport, affordability has led to a decrease in both rail and bus users, further demonstrating how it is a pertinent issue to the current industry.

Transport poverty and transport inequality are pertinent issues in Wales. Transport inequality is when people who can afford to take faster and more expensive forms of transport, such as a private vehicle, can reach a wider range of opportunities in a given time. This is opposed to those who can only afford to take slower forms of transport, such as bus or cycling, and therefore have restricted access to opportunities (Bucelli and McKnight, 2022:13). Similarly, transport poverty is when a household spends more than

10% of their income on transportation, and it has become increasingly common in Welsh society, particularly due to the cost-of-living crisis seen in recent years (Debus, 2022). It is the combination of social disadvantages and transport disadvantages, coupled with inaccessibility and social exclusion. Transport-related social exclusion is problematic as it prevents citizens from participating in economic, political, and social life, as well as limiting people from opportunities, services, and networks (Bucelli and McKnight, 2022:14). Although there is no specific data for Wales, transport made up the largest expenditure for those in rural communities, and the second largest for those in urban areas across the UK (Salutin, 2023:5). The cost of transport results in five million people being caught in transport poverty, around 8% of the British population. This demonstrates that affordable transport is necessary not only to encourage more people to use public transport but also to help alleviate those in poverty and achieve a more inclusive and sustainable society. The following section will demonstrate how the UK and the Welsh Government aim to resolve these problems.

6. Future Strategies

To make transport more appealing and more effective, the Welsh Government have begun to implement a sustainable transport strategy. The Llwybr Newydd (2021) is the Welsh Government's transport strategy that will shape Welsh transport infrastructure for the next twenty years. Meaning a new path, the government centres these plans around people and climate change, encouraging people to use public or active transport. There are also a plethora of projects currently underway to tackle the aforementioned issues. Key schemes include "one network, one timetable, one ticket", travel cards for the youth, and South Wales, and eventually, North Wales Metro lines. The ambitious policy and strategy framework supports these projects, as we will see in the following section.

6.1 Sustainable Transport Strategy: Llwybr Newydd

The Llwbyr Newydd (Welsh Government, 2021b:5) is the transport strategy that establishes the Welsh Government's vision of transport priorities in the pursuit of a "prosperous, green and equal society". Under the Well-Being of Future Generations (Wales) Act 2015, 44 Welsh public bodies are required to follow seven goals intended to make a responsible, prosperous, resilient, healthier, more equal, cohesive, and vibrant Wales by working together. The Act requires public bodies to think about sustainability above all, and therefore, has influenced the transport strategy to enhance infrastructure with a focus on sustainability. The strategy employs the sustainable transport hierarchy that has primarily shaped the prioritisation of certain aspects of sustainable transport. This hierarchy places active travel at the top, such as walking and cycling, followed by public transport, then ultra-low emission vehicles, and private vehicles at the bottom. The plan understands sustainable transport modes as transport that contributes to decarbonisation.

Active travel is at the forefront of the Llwybr Newydd, as the government push for it to be "mainstreamed" with this form of transportation being the main choice for short journeys. Where new infrastructure is necessary, the transport hierarchy will be employed, meaning active travel will always be considered before public transport (Active Travel Act, 2021:30). The reason why active travel is viewed as the more optimal form of transport by the Welsh Government is due to the indisputable benefits to both environment and health, as well as the planned contribution to boosting the local

economy. As interviewee Alison Thomas states, this is exemplified by the increase of cycle infrastructure built in recent years, particularly in the Cardiff region.

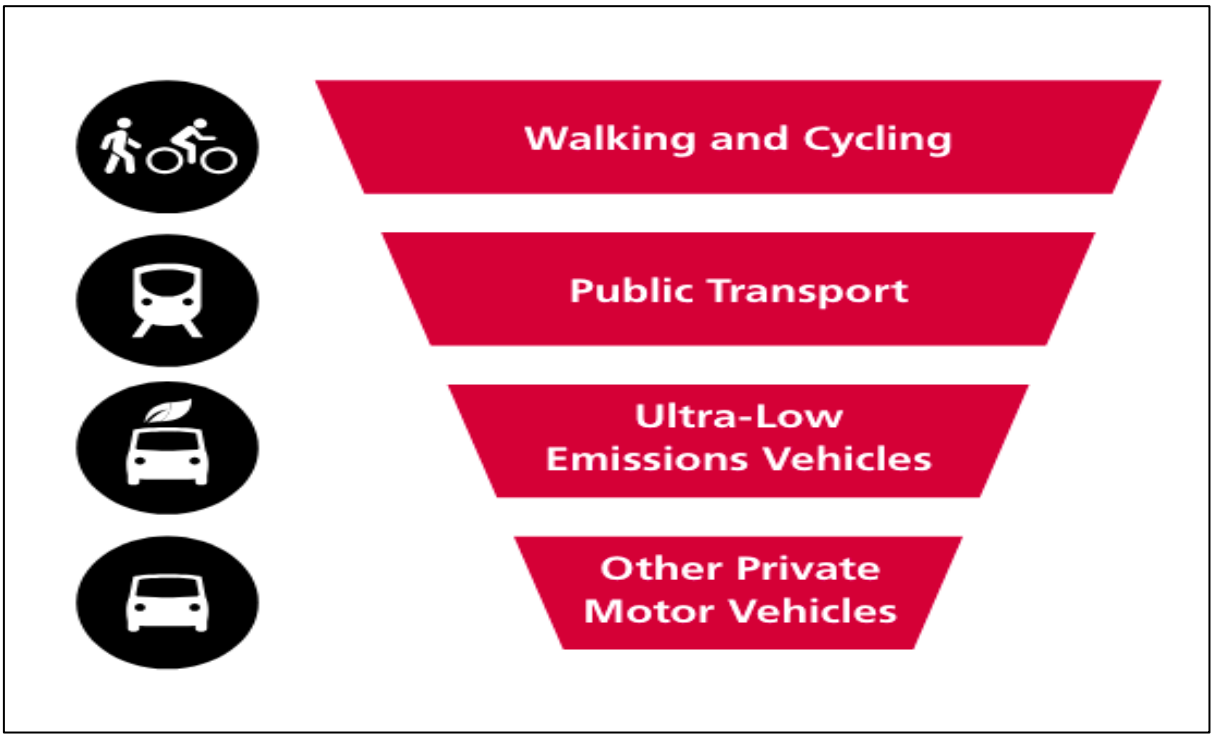

Figure 6: Welsh Government vision of transport hierarchies (Llwybr Newydd, 2021)

The strategy has nine mini-plans related to each mode of travel, including, bus and rail, with a major focus on active travel. The plans for bus infrastructure established in this strategy include an integrated multi-modal service that is reliable, affordable, accessible, and low carbon. It aims to tackle slow journeys, extend bus services and accessibility, and implement new technologies that ensure low carbon emissions for buses. As rail is not a devolved area, the Welsh Government intend to implement an integrated Metro system and work closely with the UK Government to improve and maintain rail infrastructure. There is also a "third sector" mentioned, which involves community transport schemes, heritage rail services, and other transport delivery organisations. The plan for this sector regards integrating these providers into the wider system, expanding private car alternatives, and supporting operators who respond to community needs.

6.2 One Network, One Timetable, One Ticket

As the Llwybr Newydd sets out the direction for sustainable public transportation in Wales, the Welsh Government has employed projects to help achieve this vision. The most ambitious project that will, arguably, be the most effective in tackling the issues of governance complexity and dysconnectivity of multi-modal transport is the "One Network, One Timetable, One Ticket" initiative. As the interviewee and minister in charge of this initiative, Lee Waters explains, this project is an integrated transport network that is focused on enhancing bus infrastructure to encourage people to take more public transport. It is set to be completed by 2035 with a new fleet of renewable buses and more connecting transport systems.

The "One Network" refers to a coordinated local, regional, and national (Welsh) transport system that has every mode of transport integrated to ensure ease of navigation, good infrastructure, and clear passenger information. The "One Timetable" ensures connectivity and a greater choice of transport options, and "One Ticket" refers to the purchase of one ticket for both bus and train travel. The plan also intends to roll out the franchising of bus services that will be mobilised and managed under TfW, meaning all public transport in Wales would largely be managed under one, national company. The simplification of the transport system, as well as the planned integration of different modes of transport, address the issues of connectivity and governance complexity. The mentions of accessibility and affordability are also included but have no concrete action to tackle them, other than some proposed bus stops and the singular ticket that is yet to have a price.

6.3 The South Wales Metro

The South Wales Metro, currently focused on the Cardiff Capital Region, is a new transport network that integrates trains, buses, and light rail (Welsh Government, 2016:6). Pioneered by interviewee Mark Barry, the expert explains that it aims to provide faster journeys that are more frequent and will link communities to improve the economy. The project is constructed and managed by TfW, who will provide expertise and cohesiveness to this project that is set to expand across South Wales. It is partly funded by the final amount left by the European Regional Development Fund after Brexit, as demonstrated by interviewee Tim Butler. The scheme will expand current rail infrastructure to areas of

the capital that have limited capabilities, with likely components being an electrified rail system, integrated transport, and new routes. The design and implementation of this project are based on economic evidence, as the South East is becoming more international, with an expanding service sector, there needs to be far more investment in transport infrastructure.

Beginning in May 2024, a new fleet of passenger trains, new routes, and new terminus stations are being implemented as a start to the metro service (Shuttleworth and Servini, 2024). The economic prosperity however is not reflected across the region, with some of the Valley communities having a GVA per capita of less than 60% of the UK average (Welsh Government, 2016:13). This is further reflected by the constraints seen in the current infrastructure network which makes it difficult to run frequent or extend services. As a result, the preliminary Cardiff Metro is necessary for the prospective development of both the capital and its surrounding area.

The South Wales Metro, therefore, is a developing project that is planned to better connect the communities of South Wales, and provide faster and more frequent public transport in an environmentally conscious way. These plans extend westwards towards the second biggest Welsh city, Swansea, with further proposals to expand north from Swansea into the Swansea valleys. Additionally, there are plans for a North Wales Metro, with £50 million being committed to the initial development, and a planned £1 billion to match the spending seen in South Wales. However, it should be noted that the £1 billion spent on the South Wales Metro was unplanned due to delays and the pandemic (Thomas, 2023). This project aims to extend the electrification throughout Wales, contributing to the Welsh Government's commitment to the Future Generations Act. The metro further aims to build new infrastructure and enhance existing lines.

6.4 Developing Projects

To support the implementation of the South Wales Metro, there are several plans to build new or upgrade bus and rail stations to create "interchange stations" (Cardiff Capital Region, 2024). These stations are intended to house both bus and rail services in one or adjoining buildings. This move to improve multimodal transport and make passenger journeys easier will address the issues of connectivity and slow journey times. Station Manager of Porth Interchange and interviewee, Emma Collins, highlights how

this new infrastructure will affect journeys and timetables, as the station will aim to marry bus and train journeys. Although it will not have the newly integrated system when opened this year, these new buildings highlight the steps being taken towards passenger-centred public transport infrastructure.

Directly addressing the issue of affordability is a proposed scheme for free public transport for young people. The Senedd Petition Committee, the Children's Commissioner to Wales, members of the Welsh Youth Parliament, and the Future Generations Commission are all calling for the Welsh Government to implement a scheme that would allow people under the age of 25 free travel on public transport (Senedd, 2024). 75% of young people surveyed said that they would travel by public transport more often if it was free. Despite the financial constraints currently facing the Welsh Government, there have been suggestions to prepare and further research the policy, as it would ease the cost-of-living crisis, help the post-pandemic recovery of the bus sector, as well as supporting the achievement of climate goals. Although not an operating scheme, the project would alleviate the affordability issue, as well as help to combat transport poverty.

As the main regulator and investor of infrastructure, the UK Government has proposed a "Levelling Up" scheme in different nations, aimed at aiding projects for local people and businesses (UK Government, 2024). For Wales, the government have promised £2.5 billion for levelling up budget. In regards to transport infrastructure, the UK Government has committed £50 million to invest in a new connection between Cardiff Central train station and Cardiff Bay. The investment will contribute to the enhancement of platforms, services, and public spaces, as well as advocating for a new and integrated system. This will add to the upgrades and massive investments that are being channelled into the Cardiff Capital Region. Also in the levelling-up scheme, the UK Government have committed to directly investing in the electrification of the North Wales Main Line, as well as spending £5 million on improving transport links in Monmouthshire County (Davies, 2023). These investments in infrastructure further demonstrate the collaboration that must occur to achieve the interests of both the Welsh Government and the UK Government. This will be expanded upon in the next section, which will evaluate the findings of this research.

7. Discussion of Findings

This section will discuss the findings to the question as to whether transport infrastructure can be effective and sustainable. It will assess how effective the governance structure is for managing and implementing new infrastructure projects. It will further analyse the issues that have resulted from existing infrastructure, and then the strategies that the actors intend to implement to resolve them.

7.1 Governance

The UK Government is the biggest actor in regards to regulating and funding bus and train infrastructure and services. The Welsh Government plays a considerable role in planning, funding, and advising both rail and bus infrastructure projects, although do not have the liberty to undertake infrastructure projects, with the Core Valley Line project being an exception. The Welsh Government also own the main transport service company operating in Wales, TfW. This nationalised enterprise runs train passenger services, advises the Welsh Government regarding investment, and will manage and oversee the new Metro line. Private companies make up the largest actors in the bus industry as they can set routes, fares, and frequencies due to deregulation. However, bus infrastructure is set to change due to the planned franchising scheme under the "One Network, One Timetable, One Ticket" initiative. Local authorities also play an important role in managing local bus industries, with some liberties in rail infrastructure, such as installing and upgrading train stations. The EU has previously funded transport infrastructure projects, such as the final funds from the European Regional Development Fund.

The overall governing of the system invites collaboration between actors, however, fails to provide practical, passenger-centred infrastructure. The system of delivering infrastructure is fragmented in its approach to producing a coherent and integrated timetable. Different actors oversee different sectors of public transport, which then leads to a disintegrated system, and leaves passengers paying more and travelling for longer. As the deregulation of bus services leaves bus timetables and routes to be decided by profitability for private companies and not the benefit of passengers, bus operators do not link their services to other operators or other modes of transport. This disconnect demonstrates how the current delivery of transport infrastructure is ineffective as it does not allow passengers to undertake a seamless and simple journey.

The governing structure is also incredibly complex, with trains being highly regulated at the central level with some input from the Welsh Government, and buses having deregulation with input from local authorities. Instead of producing a uniform system or department that can produce infrastructure from Wales, for Wales in a cohesive manner, the governance structure is complex and fragmented. For this reason, there is a strong case for complete devolution of rail infrastructure to the Welsh Government level, in line with the Scottish version, both for financial and practicality purposes (Poole, et al. 2024:8). As operational and delivery are already devolved matters, mainly due to the Government funded TfW enterprise, it seems logical to align rail infrastructure with these visions, as well as having a plethora of benefits from the ease that will be seen from integration with other systems of transport that are already devolved, such as active transport. In a similar sense, there is a positive perception for stronger regulation of Welsh bus services to prevent overlap, reduce prices, and increase integration with other operators and modes of transport. This is already prepared through the new bus framework that is set to be completed by 2035.

7.2 Current Issues

The main challenge facing transport infrastructure is the chronic and historic underinvestment implemented by both the UK and Welsh Governments. The UK Government have not funded the Welsh rail infrastructure in comparison to their funding for English projects. This is noticeable by the High-Speed rail project wholly in England, yet it is classified as an England and Wales project. Additionally, Scotland and Northern Ireland, who have devolved transport infrastructure, will receive subsidies in correlation to the HS2 spending whereas Wales will not. The underinvestment can also be viewed within Wales as investments in the development of North Wales is often secondary to South Wales. As the lack of investment has caused the upkeep of infrastructure to become more expensive, it is evident that transport infrastructure desperately needs more investment to avoid further worsening of problems. This neglect of the transport system has resulted in three key issues.

Public transport in Wales is physically inaccessible and has poor connectivity timings due to its lack of modal integration. For the bus industry, there is a lack of frequency in services, inappropriately placed stations and poor integration of services that

leave the network more complex with longer journey times. There are similar accessibility issues for rail infrastructure, with small capacity being an additional issue for accessibility. There are also major issues with access for disabled and elderly persons, meaning that public transport infrastructure is discriminatory in its functioning and appeal to all of society. These aspects physically impede travel users from accessing public transport.

The lack of investment in transport has also resulted in the system becoming aged and therefore, requiring more maintenance than would be necessary for a modern and proportionately invested transport system. This is being exacerbated by the maintenance backlog that is plaguing Network Rail's operations. The old infrastructure is causing issues for the transport service as it is now unreliable and often lacks punctuality. Both the bus and rail industry have seen a severe lack of punctuality, which has been decreasing over recent years. The rail sector has also seen an increase in cancellations, which has prompted an investigation by the ORR. Slow journey times also lead to customer dissatisfaction and unreliability. This is specifically with the nationalised TfW, which has seen the worst customer performance in the UK. Unreliability and lack of punctuality highlight the disincentive to take public transport.

Transport infrastructure is additionally becoming increasingly costly to build. The infrastructure in the UK is one of the most underfunded yet overtly expensive in the world. The increased planning times due to the highly bureaucratic nature of British infrastructure planning has resulted in a raised risk for private sector investors, leaving UK transport infrastructure costing more per mile than its G7 peers. This has caused public transport to become unaffordable in comparison to car usage. A large portion of the population does not have access to a car and therefore must take public transport to contribute economically and societally. This contributes to the transport poverty and transport inequality seen in Wales with transport taking up a significant share of both rural and urban household expenditure. There is clear evidence that cheaper transport would encourage more people to use public transport, with it being an incentive to provide an alternative to car usage.

7.3 Future Strategies

The Llwybr Newydd has ambitious proposals with goals that will achieve an effective and sustainable transport system. The strategy is very impressive and exciting with promises the desperately needed upgrades to transport infrastructure to most of Wales. It aims to deliver new transport projects sustainably, is committed to the Welsh Future Generations Act, and aspires to ameliorate the issues that prevent people from frequently using transport. However, this has not stopped the strategy from receiving critical feedback or disapproval. The Welsh Government held a consultation during the drafting stages of the transport strategy and received 402 responses (Welsh Government, 2021a:3). The summary given in the consultation was that the seven well-being goals from the Future Generations Act should be illustrated more clearly, which is reflected in the final strategy. However, when taking a deeper dive into the responses, many responses stress the focus on urban areas and neglect of the rural communities. An example of this is the response to the first question, which highlights the need for a strategy to address urban/rural inequalities. The plan has been further criticised by the Royal Town Planning Institute (2021) for not making an explicit commitment to reducing the impact of transport on climate change. These criticisms, with emphasis on the urban/rural disparity, exemplify that despite the ambitious and progressive strategy to tackle transport issues sustainably, there is still an incomplete approach to confronting all of these serious issues.

Another criticism of the Llwybr Newydd is that its main focus is promoting active travel. The benefits of a population using active travel are immense; the population becomes healthier, it is the most sustainable way to travel, and it promotes the local economy (Sustrans Cymru, 2017:4). Like most transport infrastructure considerations, two conditions advocate for a positive active travel transportation system: designing user-friendly infrastructure, and ensuring public support for implementation (Timmons, et al., 2024). The “What Works Network”, a series of nine independent centres, called for more evidence that accurately demonstrates the positive impacts of active transport on society (What Works Centre, 2023:1). They highlight their particular concern with the decline of active travel at an older age. This is further highlighted by a study conducted by the Senedd Research (2023) for how active travel infrastructure has impacted Wales, ten years after the Active Travel (Wales) Act. The research found that as funding has increased, there has not been an increase in active travel rates. It highlights that in 2022-23, 51% of adults walked and 6% of adults cycled at least once a week for active travel.

This highlights that, despite the evidence illustrating the benefits of active travel, if there are no users then the expenditure on infrastructure is effectively redundant.

The developing bus integration scheme and Metro lines are evidently in line with the Welsh Government's commitment to the Future Generations Act, and their commitment to the UN SDGs. The new services will aid the improvement of accessibility and connectivity, as well as increasing the speed of journeys, reducing delays, and hopefully increasing punctuality due to new and improved technology. Furthermore, the proposed free bus scheme for young people will be an important addition to the Welsh transport system as it will help combat transport poverty. The projects established to achieve the Welsh Government's transport vision will further sustainably boost the Welsh economy while practically dealing with the issues.

7.4 Assessment of Efficiency and Sustainability

Using the measures established in the introduction, it is evident that the current transport infrastructure in Wales is inefficient. In terms of volume, the frequency of trains and buses is low, with the number of passengers declining. Also, there is low resilience as the services are unreliable, with connectivity and satisfaction ranking amongst the lowest in the UK. The cost of infrastructure is high, along with emissions. For sustainability, the transport sector in the UK produces the third most emissions out of any sector. It also has damaging consequences for the surrounding environment, making the current infrastructure unsustainable. This lack of sustainability and efficiency further are exacerbated by the dysfunctional governance structure.

Regarding future strategies, the efficiency of the transport infrastructure is set to increase exponentially. With more frequency, more passengers are encouraged to take public transport. Similarly, with newer infrastructure and modern technologies, services will be more reliable. The connectivity is also set to increase with the new multi-modal focus, which should increase customer satisfaction. There is an acknowledgement of the unreasonable cost of infrastructure, although there is no evidence that that can, or will decrease, as seen in the case of the South Wales Metro. Despite this, the sustainability measures should be satisfied as modern infrastructure in rail and decarbonisation of buses will lead to less impact on the environment.

8. Recommendations

Understanding where the issues and criticism lay in Welsh transport infrastructure, this section will present recommendations for areas of improvement. The recommendations will include governance reform, revolving around devolution, more regulation, and more data. It will also touch upon how to improve current issues by providing faster infrastructure plans, better efficiency of funds, and building more infrastructure. For recommendations of future strategies to alleviate the current issues, there should be an acknowledgement of the rural-urban disparity, as well as the North-South disparity, a focus on public transport instead of active travel, and providing solutions to affordability, accessibility, and reliability for the near future.

8.1 Recommendations for Governance

1. Devolve control of rail infrastructure

As the governance structure is complex with a plurality of actors, it is evident that the construction and planning of rail infrastructure should be devolved to the Welsh Government. As the Welsh Government operates a transport company that completes their transport goals for transport services, it is logical that the devolvement of transport infrastructure would ease the implementation of their desired projects. Furthermore, the Welsh Government would receive fair funding for these projects, increasing the needed investment in transport infrastructure.

2. Bus Regulation under the Welsh Government

Several bus operators, management from local authorities, and input from the Welsh government led to a fragmentation of responsibilities and difficulty holding accountability. By implementing bus regulation, at the Welsh Government level, the system becomes far more cohesive, especially if rail infrastructure is devolved as the complete transport sector would be under the governance of the Welsh Government. Further bus regulation is needed to prevent bus operators from running the same routes and increasing the frequency of trips. It is clear that this recommendation is already part of the “One Network, One Timetable, One Ticket” scheme, however, bus franchising is set to complete in 2028-35. Bus regulation is needed sooner, rather than later.

3. Welsh Specific Data

There have been very few sources that provide recent, Welsh-specific sources. Either due to Wales having the option to leave UK-national data collection services, or because national data does not differentiate between the sub-national states. Therefore, to accurately improve and resolve the problems seen in the current transport infrastructure, the Welsh Government and their subsequent companies should collect more data regarding transport efficiency, more frequently. This would provide an ease of assessment on what should be improved and what infrastructures should be invested in.

8.2 Recommendations for Issues

4. Faster delivery of policy and projects

A large reason why infrastructure projects are so expensive in Wales is because of the pace of delivery of planning and projects. The speed at which infrastructure is planned and deliberated in the UK is incredibly slow, creating uncertainty and slowing down the speed at which positive social impact can be delivered. A way to overcome this is to create policy and delivery teams that are creative and diverse in background. The UK must fasten its delivery of plans, which in turn will increase the period during which infrastructure is under construction, reducing time, as well as cost.

5. Greater efficiency for funds

Many infrastructure projects in the UK are incredibly expensive to build due to perceived riskiness, a result of lengthy deliberation and planning. For this reason, plans tend to go over budget. It is normal and to be expected that these issues occur, particularly during inflation, which has been seen in the UK with a period of over 10% inflation in recent years, however, the comparative European projects remain low in cost. To increase the efficiency of funding, the UK must ameliorate project management, both for planning and tracking. To do this, the UK can improve their communication with stakeholders, and provide benchmarks for performance.

6. More infrastructure

Wales also requires more transport infrastructure. The lack of investment in the infrastructure has created a severely underdeveloped transport system and disconnected society. Expanding rail lines and ensuring bus routes do not overlap is not enough, Wales needs more infrastructure in more directions. Rural societies particularly need more infrastructure as even the simplest modes of public transport do not provide sufficient

services. Therefore, Wales should invest in new train routes to economic hubs in West Wales, as well as focusing on providing better transport links between North Wales and the Merseyside or the wider Northern English region. By providing this infrastructure, more economic activity can be seen in Wales, provided in a sustainable fashion.

8.3 Recommendations for Strategies

7. Rural and North Wales Engagement

The Llwybr Newydd and current projects under development are largely concentrated in the urban, southern regions of Wales. Despite the larger population in the south and urban areas, the rural areas particularly in the North need better integration into wider Welsh and UK society. This can be conducted through better bus infrastructure that integrates with other modes of transport.

8. Focus on Public Transport

There is a clear focus on active travel infrastructure in the Llwybr Newydd, as it is the best travel system due to its benefits on public and environmental health. However, the evident lack of interest from the public in using this transport system highlights the need to focus on more effective ways to travel sustainably. There are plenty of large transport infrastructure projects around Wales that are not active travel, as highlighted in the "Future Strategy" section, however, these services would be optimised with further investment, in opposition to funding new or upgraded transport infrastructure schemes.

9. Promote Public Awareness of New Transport Initiatives

The plans for huge infrastructure enhancements that will transform and modernise Welsh transport infrastructure are highly commendable and desperately needed. Nevertheless, they fail to engage the public in increasing their use of public transport. The initiatives being implemented aim to tackle every issue discussed in this paper, however, there is little uptake from the public, as seen by the low active travel numbers. This can be resolved through sustainability campaigns which encourage behaviour change, or travel training programmes to increase public confidence in using these services.

9. Conclusion

This section will provide a summary of the thesis, which will reinforce the conclusion of this paper that the current infrastructure in Wales is not effective nor sustainable, leaving many users adverse to or unlikely to take public transport. It will present the limitations of this study, which will discuss the limit of interviews and data available, before suggesting further areas for research.

9.1 Summary of Findings

The UK Government is the biggest actor in regulating bus and train infrastructure and services. The Welsh Government plays a considerable role in planning, funding, and advising both rail and bus infrastructure projects, while private companies make up the largest actors in the bus industry as they can set routes, fares, and frequencies due to deregulation. Local authorities also play an important role in managing local bus industries, with some liberties in rail infrastructure. The EU has previously funded transport infrastructure projects that have led to some necessary upgrades. Overall, the system employs a collaborative structure for funding and management, however, there is a lack of coordination for services that are governed by different actors.

The main challenge faced by the transport industry is chronic and historic underinvestment. Transport infrastructure in Wales has received comparatively far less funds from the UK Government, particularly for enhancements. The UK also spends far less on its transport infrastructure than its neighbours, highlighting how behind the UK is when it comes to building modern transport infrastructure. This neglect of the transport system has resulted in three key issues. Public transport infrastructure in Wales is physically inaccessible and has poor connectivity due to its lack of modal integration. It is ageing and lacks the required maintenance work, leading to unreliable and often late services, specifically as the nationalised TfW has seen the worst customer performance in the UK. Moreover, transport is becoming increasingly unaffordable both in building and in usage, making it even more inaccessible to rural and poor communities, as well as contributing to poverty.

The Llwybr Newydd is a very ambitious and exciting strategy that promises desperately needed upgrades to transport infrastructure to the whole of Wales. It aims to deliver new transport projects sustainably, which is committed to the Welsh Future

Generations Act. It aspires to ameliorate the issues that prevent people from frequently using transport. Similarly, the projects established to achieve the Welsh Government's transport vision will further sustainably boost the Welsh economy while practically dealing with the issues. The downsides of these projects are that they will take time to implement and are very urban-focused.

The findings of this thesis are that planning transport infrastructure can be both effective and sustainable. The Welsh government's transport strategy addresses the need to upgrade and implement new infrastructure projects with sustainability as a driver for change. Completing these plans would make the transport infrastructure of Wales more effective, as it will begin to tackle the issues of ageing infrastructure and accessibility. In this way, it will attract more users as the plans include decreasing journey times and lowering user costs. It will also be more sustainable, as new infrastructure will be more efficient, and therefore waste less resources, with concrete plans for decarbonisation of the transport sector. This will help the Welsh Government's commitment to the Future Generations Act, and the UK government's obligation to the UN SDGs.

On the other hand, despite the future initiatives, the current infrastructure is neither effective nor sustainable. This is exacerbated by the governance structure, which is complex and fragmented with different actors providing different services in the transport infrastructure sector. For this reason, there is a strong case for devolving the industry to the Welsh Government level, to improve the ease of planning and integration of services. The three major issues of transport infrastructure, which are accessibility, ageing, and affordability, all stem from the historic underinvestment in the industry. This is being attempted to be resolved by an increase in funding from both the UK and Welsh Governments. Although this increased level of funding will tackle several issues in the future, it still does not alleviate all issues that need to be tackled. The findings, therefore, have found that transport infrastructure can be effective and sustainable, but with an altered governance structure and increased funding, transport infrastructure would be more effective.

The recommendations provided will support the progression of the public transport sector. The recommendations for governance revolve around structural reform, including devolution of the transport infrastructure sector, bus regulation, and specific data for Wales. The recommendations for improving the current issues with transport

infrastructure are delivering faster plans, efficiently planning funds, and building more infrastructure in rural places. Finally, the recommendations about the future strategies are to include more plans for rural and North Wales, focus on public transport, and provide public awareness and education to increase the use of public transport.

9.2 Limitations

The main limitation of this study is the lack of Welsh-specific data due to the centralised nature of rail infrastructure and the fragmentation of the bus industry. As rail infrastructure is regulated and funded through the UK Government, official data for Wales has been difficult to discover. This is largely due to generalisations of issues within the transport sector, or a prioritisation of England and the London region. Another addition to this is the generalisation of problem areas, for example, the ORR describes maintenance backlog but does not specify what regions or for what purpose. Information regarding bus infrastructure, as opposed to bus services, has also been difficult to find, presumably due to the industry largely operating under the private sector.

On the side of interviews, finding the right experts to interview and obtaining interviews with these experts has been very difficult. Although there would not be any missed information, it would have been beneficial to have more opinions on this topic. Obtaining an interview with more critics of the new Welsh future strategies, or with experts working at the UK level would have bolstered this thesis and provided a more cohesive and holistic perspective.

9.3 Further research

A suggestion for further research would be to directly monitor the old infrastructure specifically in Wales. It is evident that the lack of data for Wales, and the lack of investment, would lead to both ageing infrastructure and a maintenance backlog in Wales that is unaccounted for. This could also relate to research into the effects of the withdrawal from the EU and the subsequent reduction in investment in the transport sector. It would likewise be interesting to see the full impact of deregulation of the bus industry in comparison to a more regulated or even nationalised industry. This is due to the lack of focus on the bus sector when discussing transport infrastructure, despite it

being the most utilised form of public transport. Further research could also be conducted into the effects of these planned projects in Mid and West Wales, where there are a few urban areas. This could be conducted in conjunction with Aberystwyth University, a prosperous university in Wales that could benefit from improved transport links to these areas.

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