TRANSPORT SCOTLAND
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National Transport Strategy Review

Transport Governance Rapid Evidence Review

Contents

Executive summary

Transport governance takes many forms across and within countries, meaning comparative study of it can be informative, but also challenging to conduct. The challenge arises due to differing organisational forms, institutional powers and availability of funding which can vary significantly between countries and regions of interest. However, the literature on transport governance identifies certain features that are common to 'best practice' examples. There are also common barriers to the effective operation of a transport system at a national and regional level. Due to limitations in the literature found in this review, the cases discussed in this report feature mostly metropolitan areas, as few examples were found that analysed the experience of rural areas.

Overall, findings from the evidence review suggest that institutional fragmentation (many separate authorities being involved in decision-making) and deregulated transport markets can lead to inefficiencies within a transport network, resulting in relatively more expensive journeys and longer journey times due to poor interconnectivity of services. The existence of a governance body or transport authority that coordinates the transport system are common in all cases reviewed that are considered as best practice.

However, the review has also shown that having such structures in place does not necessarily lead to improvement in transport governance but are likely to have a supportive effect for policy implementation. Policies can be implemented without having such transport governance structures in place. However, there are not many cases where this is documented - South Korea is one of the few examples found in this literature review.

Policies that foster integration of tickets, timetables and services are seen to be most effective for improving the quality of the transport system as a whole. These can have positive effects for the transport network overall, resulting in higher ridership, reduction of urban sprawl and higher customer satisfaction rates. Policies must also be coherent as implementation of policies with conflicting aims are unlikely to deliver desired outcomes.

Financial sustainability of respective transport governance models is a key challenge. The best practice models identified by the literature require high expenditures to keep their public transport systems running, with financial pressure leading to reduction or removal of services, particularly in rural or low demand areas.

The evidence base on transport governance models is limited by the coverage and quality of the available data, which varies greatly between countries and cases. Hence, further research is necessary to inform what governance models are appropriate in a Scottish context.

Introduction

Purpose of the paper

1.0 The aim of this rapid evidence review was to inform the review of Scotland's National Transport Strategy (NTS), currently being undertaken by Transport Scotland. The NTS sets out the long-term vision for transport and travel in Scotland and the review of it provides an opportunity to incorporate the latest evidence into the production of a successor strategy. A 'Call for Evidence' was conducted as part of the review process, with analysis of the 66 responses received suggesting that there were gaps to be filled on the theme of transport governance. This review of international evidence on transport governance was conducted internally and looks at the features shared by 'best practice' case studies as well as the barriers that hamper implementation of such governance structures. This report provides an overview of recent literature on transport governance and examples of international transport governance models. The rapid review of evidence provided here is intended as a starting point for further, more in-depth, work on transport governance as part of the review of the National Transport Strategy.

Background

1.1 Transport plays a key role in achieving national and local strategic policy objectives but there is a lack of understanding of which institutional arrangements and forms of governance are best suited in order to meet these goals. State intervention in transport is often a result of correcting for (real or perceived) market failures and/or because outcomes are not deemed to be socially or politically desirable. The assumption is that governance determines the relationships of the agents that interact with each other in the transport system (Christodoulou and Finger: 2012).

1.2 It is generally acknowledged that transport acts as an enabler to economic development in various ways. An efficient transport system provides: opportunities through accessibility to employment and markets; plays a role in tackling congestion, improving air quality, and reducing accidents and thus increasing overall quality of life. (UN-Habitat: 2013; UNDP: 2009). While it is difficult to quantify a direct relationship between transportation investment and economic development, it is generally accepted that transport indirectly facilitates such development. This is through cost and time savings when commuting, and access to both a wider labour and customer market, improving social mobility and increasing social opportunities (Eddington Report: 2006).

Structure of this report

1.3 This report reviews general literature and provides an overview of the latest research on transport governance. Case studies are used to highlight the common features evident in good practice examples of transport governance as well as demonstrating examples where governance creates barriers to the implementation of transport policies. Finally, although the literature on the relationship between transport governance and outcomes outside of metropolitan areas is limited, evidence found on rural areas will be discussed briefly.

Limitations of the evidence

1.4 It is important to be aware of the limitations of the evidence base reviewed in producing this report. A key issue is the availability of up-to-date data that offers the ability to conduct comparable analysis of transport governance structures. Some of the literature referenced is therefore dated.

1.5 In addition, the majority of studies that look at transport governance – with the exception of the OECD metropolitan governance study – are predominantly based on single country analysis which also hinders the ability to carry out comparative analysis use e.g. the European Metropolitan Transport Authorities analysis. However, the review of the evidence does highlight common factors across the transport governance systems featured that act as an enablers and barriers to a well-functioning transport system.

Literature review

Institutional fragmentation and transport provision

2.0 The literature on governance structures is inconclusive and does not provide a clear answer on which arrangements produce optimal outcomes in terms of the provision of services, accountability and the monitoring of policies. Some evidence points out that poly-centric structures - subnational units that provide services locally - provide better outcomes since they allow for local problems to be tackled and solved locally (Ostrom: 2010). Conversely, evidence supporting centrist approaches to governance argues that administrative and institutional fragmentation[1] leads to inefficiencies because it acts as a barrier to coordinated efforts (Orfield: 1997).

2.1 A number of studies provide evidence that administrative and institutional fragmentation hampers the establishment of an effective transport system (Plucher and Kurth: 1996; International Transport Forum: 2011: Ahrend et al. 2014a; Ahrend et al. 2014b; Low: 2005). Institutional fragmentation is a common feature of almost every metropolitan area within the OECD (the Organisation for Economic Co-operation and Development) and it naturally amplifies the existing complexity of coordination of service provision. This is specifically the case for the provision of transport services since many journeys are multi-modal and cross through multiple administrative boundaries.

2.2 This administrative fragmentation has the potential to negatively impact on both transport infrastructure investment and land use planning, which regularly results in planning and investment that follows an administrative jurisdictional logic[2]. This in turn often exacerbates existing problems of congestion and moreover increases the likelihood of producing an inefficient public transport system due to poor integration of services, route planning and timetabling (Merk: 2014; Plucher and Kurth: 1996; International Transport Forum: 2011).

2.3 A study by the OECD on administrative fragmentation and productivity conducted in Germany, the United Kingdom, the United States, Mexico and Spain found a negative correlation between the two variables. It indicated that cities within the same country that exhibit a higher administrative fragmentation have productivity rates that are three to four percent lower compared to those that are less fragmented[3]. In addition, the study finds that cities that do have a governance body in place are able to mitigate against the loss of productivity that is posed by such fragmentation (Ahrend et al.: 2014a).

2.4 The existence of a governance body is sometimes considered as the most important element for best practice in urban transport, outweighing finance,

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[1] Administrative fragmentation refers to the number of functional administrative units that can be found in a given region where more units would mean a higher fragmentation whilst institutional fragmentation refers to the number of distinct authorities being involved in the design or delivery of a particular service (for instance: national, regional and local transport authorities in Scotland)

[2] Planning and investment is tied to geographic or organisational boundaries that are designed for a different purpose than delivering transport.

[3] The comparison is between cities that are of the same size as well as of the same spatial expansion.

infrastructure and urban land-use planning (Kennedy et al.: 2005; Low and Astle: 2009). This is due to the argument that poor governance creates poor decision-making processes, compromising accountability and encouraging a public transport system that produces inefficient outcomes (Kennedy et al.: 2005). Therefore, transport institutions need to possess certain features in order to be able to fulfill their role: the ability to deliver public value; the legal authority to implement policies; and political support for their actions as well as a strong internal capacity (Kumar and Agarwal: 2013).

- **delivering public value** refers to the ability of an institution to form policies that satisfy the mobility needs of people. For example, in Singapore the transport authority (LTA) uses a holistic approach to transport and land-use planning, exhibiting a best practice case in this regard (Kumar and Agarwal: 2013)

- **internal capacity** refers to the ability to fulfill the task having the technical expertise and financial means necessary to be successful (Kumar and Agarwal: 2013). For example, STIF in Paris and TfL in London have the authority to collect taxes in addition to the grants they receive, which provides them with financial strength to finance major transport projects (OECD: 2017)

- **political support** refers to the organisation's ability to gain the highest political support, the ability to make funds available and to carry out the public policy agenda. For example, London's congestion charge scheme was implemented in part due to the strong support of the Mayor (Kumar and Agarwal: 2013)

2.5 Multiple studies find that 'best practice' cases do have governance bodies or transport authorities in place. For example, Plucher and Kurth (1996) analysed three German metropolitan areas, one Swiss, and one Austrian case and all five have a transport authority in place that coordinates and organises public transport. All five cases, Munich, Hamburg, the Ruhr Valley, Vienna and Zurich are considered as examples of best practice by the authors in terms of the integration of services, ticketing and timetabling. Similar results were found in a report for the then Scottish Executive that identified 11 best practice cases[4] and concluded that there appears to be a link between the successful implementation of transport policies and the existence of a regional governance body, a structure all 11 best practice cases featured had in place (Scottish Executive: 2003).

2.6 These studies provide useful insights into governance structures for transport systems. However, their focus on best practice and the limited number of cases reviewed leaves room for speculation as to whether or not particular transport governance structures are required conditions in order to implement an efficient transport system.

2.7 The largest study found in this review that attempts to shed some light on how governance structures affect the functioning of metropolitan areas is by the OECD.

[4] Madrid, Barcelona, Sundsvall, Berlin, Copenhagen, Helsinki, Stockholm, London, Munich, Zurich and Vancouver.

The study examined 263 metropolitan areas from 27 OECD countries against a set of indicators, including field of operation of the governance body, staffing, budget, and the scale of regulatory powers of the governance body. The study found that 68 percent of all cases have governance bodies in place, with 27 percent of them being able to impose binding laws or regulations. Most governance bodies reviewed by the study cover work on the local economy (81 percent), followed by transportation (78 percent) and spatial planning (67 percent), with half of all governance bodies covering all three (91 out of 178) (Ahrend et al.: 2014b).

2.8 In respect to transport, the study finds that the most common form of organisation is that of a transport authority. A transport authority has a specific mandate that focusses on transport service provision, in contrast to a more general governance body that deals with a number of different public policy fields such as regional economic development, waste management, water management, spatial planning, and so on. Such transport authorities exist in 60 percent of the metropolitan areas included in the OECD study but are more often found in cities that have a governance body in place (60 percent with versus 40 percent without) (Ahrend et al.: 2014b). Nevertheless, there is great variation in transport authorities across and even within countries, with authorities at one end of the spectrum employing just a handful of employees covering work on strategic public transportation planning, while at the other end they can employ thousands of people who not only plan but also run the entire public transportation system. These circumstances make a meaningful comparison difficult. However, although comparisons across countries on such a scale are difficult due to limitations in the availability of data, differing organisational structures and legal frameworks, a study by Ahrend et al. (2014b) finds that[5]:

- the size of the metropolitan area is positively correlated to the existence of a governance body
- urban sprawl is negatively correlated to the existence of a governance body
- the existence of a transport authority is positively correlated to both better air quality and higher customer satisfaction on the public transport system

2.9 The majority of cities within OECD member states mitigate negative effects of fragmentation with the help of a governance body or transport authority. Despite the existence of such structures, transport governance varies from city to city both across and within counties. Moreover, there is evidence that governance bodies alone do not guarantee successful policy implementation.

2.10 Institutional fragmentation and poor coordination of services can pose severe challenges for any metropolitan area with regard to: the interconnectivity of services; to the coherence across different modes of transport; to accountability; and to the ability to implement overarching objectives covering planning and transport (Merk: 2014). Chicago, Mexico, Melbourne, South Korea and Athens provide valuable insights that illustrate this, discussed in the section that follows.

[5] Based on a regression analysis that controlled for country specific effects.

Barriers to the implementation of transport policy

Chicago

2.11 Chicago is one of the most institutionally fragmented metropolitan areas in the OECD study (comprising of the City of Chicago and some 270 municipalities) with dozens of subnational authorities exercising power in matters of transportation. Two governance bodies, a planning agency (CMAP) and a regional transport authority (RTA)[6] organise the metropolitan transport system. Although Chicago has transport governance structures in place, its transport system suffers from poor interconnectivity of services and lacks coherence across different modes of transportation. For example, the poor connection of bus services that feed into the rail links negatively affects ridership and only seven percent of all commuters that have to commute to a rail link make use of buses (Merk: 2014).

2.12 Moreover, end-to-end journeys, especially from the suburban areas to the city centre and vice versa, are time consuming and expensive. This is due to the fact that transport provision follows an administrative jurisdictional logic and does not reflect traffic flows as well as commuter demand. For example, urban buses which cover the city stop at city boundaries, beyond which suburban buses are responsible for service provision. However, these services are not interconnected nor coordinated and stops can be far away from each other making transit an unpleasant experience. In addition, each provider has its own fare structure creating further barriers to interconnectivity. Apart from these problems, the transport system faces the obstacle that various levels of government policy incentivise car use, even though the RTA promotes policies in support of modal shift. These policies include generous parking policies, with parking fees being extremely low or absent in most parts of the city, and a low gas tax making car use a cheap alternative to public transport. (Merk: 2014).

2.13 A factor that hampers coordination in the case of Chicago is that the suburban areas are under political control of one party whilst the city centre is in hands of another. Since representatives of both are board members of the governance bodies, decisions are at some instances politicised. This has led to a situation where board members reportedly point fingers at each other when problems emerge or the system is underperforming. That board members are politically appointed is considered to compromise accountability (Merk: 2014). A Scottish Executive report found that political support was essential for the success of the transport system in the cases of London, Stockholm and Barcelona (Scottish Executive: 2003).

Mexico City

2.14 Mexico City shares similarities with Chicago in that the metropolitan area is highly fragmented from an institutional and transport operator point of view despite transport being organised by a governance body (CDMX). Overall, 15 service providers operate in the metropolitan area but their operations are restricted to administrative boundaries. The metropolitan area is composed of a Federal District,

[6] RTA has taxing powers in its jurisdiction and is responsible for the development, implementation and enforcement of plans for the public transport of the metropolitan area.

58 municipalities in the State of Mexico and one municipality in the State of Hidalgo. As in the case of Chicago, transport in Mexico City is planned along an administrative jurisdictional logic which does not take into account where people live and where they work.

2.15 For example, the State of Mexico, a largely suburban area, has approximately 11 million inhabitants, more than half of the metropolitan population, but it only operates 35 miles of mass transportation; while the Federal District, a largely metropolitan areas, operates 186 miles for 9 million people[7]. As in Chicago, this fragmentation is present across all aspects of transport governance, from planning to the actual provision of transport. For example, a transport hub that is used by 150,000 people per day and where three modes of transport converge requires commuters to walk up to one mile in order to change modes. Hence, the implications for users are significant particularly in terms of cost of transport and journey time (International Transport Forum: 2015). In addition, a bus ride from outside the city is twice as expensive as a ride within the city limits. This is problematic as low cost housing often lies beyond city limits which penalises commuters who live in these areas.

2.16 Estimates indicate that transport costs can comprise up to 25 percent of the minimum wage in Mexico City (International Transport Forum: 2011). The social exclusion that occurs as a result is also observed in other cites as well. Currie et al. found 77 percent of disadvantaged households[8] living beyond the city limits of Melbourne, in regions where public transport is very limited or non-existent, stated that transport comprised a significant portion of their income (2010).

2.17 In order to provide a better service that connects the city with the suburban areas, Mexico City implemented a Bus Rapid Transit (BRT). This reduced journey time on the corridor by 30 minutes and reduced emissions by 50 percent as it replaced 1,000 low capacity high emission mini buses with clean high capacity buses. Mexico City received the 'Sustainability Transport Award' for its project (International Transport Forum: 2015; UN: 2005). Although the system is operating at a deficit and new ways of financing need to be found, it is considered a success due to its achievements in this aspect. The project was implemented largely because of the personal efforts of the environment secretary and again highlights that political support can be an important factor for policy implementation.

South Korea

2.18 South Korea has a well-developed transport system but transport in its metropolitan areas is not governed by a transport authority. Despite this, Korea has been able to implement policies such as a countrywide single mobility and smart cards that allows travellers to use buses and subways throughout all metropolitan areas. Moreover, South Korea has reformed its bus sector, which is viewed as an example of best practice within OECD countries (OECD: 2017). South Korea's example highlights what the study for the Scottish Executive (Scottish Executive:

[7] Mass transportation refers to modes of transport such as commuter trains, metro and BRT (Bus Rapid Transit).
[8] Sample size = 535

2003) found; that such policies can be implemented without having a governance body in place.

2.19 The South Korean bus market has been characterised by no state intervention, running solely in accordance with free-market mechanisms until the 1990s, when the operators first faced difficulties and the state had cover for operating deficits. When service levels kept declining and routes were scrapped regardless of transport demands, Seoul introduced a semi-public bus operating scheme in 2004. Since inception, ridership increased by 10 percent within the first 10 years; average speeds increased as well as punctuality; and accidents declined by one third (OECD: 2017).

2.20 The reforms to bus policy was accompanied by policies that aimed to strengthen the bus sector, such as dedicated bus lanes, the implementation of information systems, and the creation of transfer centres which helped to make transit a smoother experience.

2.21 However, South Korean cities suffer from congestion and poor air quality, with four out of five OECD metropolitan areas with the highest air pollution being South Korean (Ahrend et al: 2014b).[9] This may affect the well-being of South Korea's citizens which ranks among the lowest on the work-life balance index within the OECD Better Life Index (OECD: 2016). Moreover, it is believed that the economic costs of congestion and air pollution equate to around 2% of South Korean GDP in 2015. The reform has cost Seoul 1.5 billion GBP in the first decade but 50 percent of this sum can be attributed to external factors (e.g. rises in oil prices during this period and the introduction of transfer discounts on public transport fees - costs that cannot be attributed to the governance reform). Although the transport system is well-developed, transport planning follows, as in the cases before, an administrative jurisdictional logic with little to no coordination between jurisdictions which results in services terminating at administrative boundaries which do not reflect desired journey patterns (OECD: 2017).

Athens

2.22 Athens has a single transport authority (OASA) which operates directly under the Ministry of Infrastructure. OASA sets fares and allocates fare revenues to the three operators according to passenger numbers. The operators are direct subsidiaries of OASA and include a bus network, a trolley bus network, a metro network and a suburban rail system (OECD: 2015). The Athens transport system receives large subsidies since its fares, like in most OECD countries, do not cover its operating costs. Most funds go to Athens itself whilst the surrounding areas, as well as rural areas, have almost no public transport provision at all (OECD: 2015).

2.23 Athens is a good example that demonstrates that a governance body alone does not guarantee the implementation of an efficient transport system. The share of public transport declined from 45 percent in 1983 to 32 percent in 2004, with the overall modal share of transport being in favour of cars. Additionally, over the last 12

[9] The level of atmospheric PM2.5 – air pollutant particles that cause damage to the lungs – in South Korea is 27.9 micrograms per cubic meter. This value is the highest level measured within OECD countries, which on average exhibit levels of 13.9 micrograms per cubic meter (OECD: 2016).

years, travel time has increased by 26 percent due to congestion caused by one of the highest car ownership ratios in the EU (Gritzka et al.: 2011).

2.24 Suboptimal policies and planning have led to the current situation. Policies that were designed to restrict car use in the city centre backfired. For example, the government implemented a restriction that certain license plates could only enter the city on odd days whilst others could enter on even days. However, Athenians reacted by buying a second car to circumvent the restrictions (OECD: 2015). In terms of planning, a study found that the different operators cooperate in some cases but in others they are in competition with each other, leading to inefficiencies. For example, while some buses feed into the metro system others run parallel to the system competing for the same customer base (Gritzka et al.: 2011).

Melbourne

2.25 Melbourne, as with Chicago and Mexico City, is a dispersed city characterised by a fragmented rail service system where services are franchised to four providers. However, the transport authority does not have the capacity to coordinate schedules or routes. This fragmentation leads to time consuming journeys due to poor interconnectivity…something the other case study areas exhibit as well. Low and Astle (2009) argue that in these circumstances public agencies require more managerial and organisational skills to regulate such a deregulated and fragmented system than they would were they to run the whole transport system themselves.

2.26 The institutional capacity of the road planning agencies in Melbourne is strong compared to the public transport planning agencies. Road planning agencies pursue their own priorities and have the largest allocation from the infrastructure budget.

2.27 The transport planning agencies in Melbourne, and Sydney, show similar problems and a result both places have little to no integration of tickets or services (Low and Astle: 2009). Furthermore, Low (2005) finds that a major barrier for the implementation of integrated land-use and transport planning in Australia in general is poor transport governance. Hence, the Australian evidence suggests that transport governance requires a holistic approach, involving all stakeholders, which brings together the process of designing, planning, delivering and managing.

Best practice cases – system integration

2.28 German speaking metropolitan areas are good examples of how intergovernmental co-ordination for urban transport can create a fully integrated transport system (OECD: 2017; International Transport Forum: 2011). This system is considered best practice for coordinating such efforts.

2.29 All German, as well as Swiss and Austrian metropolitan areas, have set up transport authorities. These are called Transport Alliances ('Verkehrsverbund') and bring together all players in their respected alliance area (Länder[10], local

[10] Refers to the federal subdivisions of Germany where 16 federal states (Länder) have exclusive powers in the domains of culture, education, universities, local authority matters as well as the police. They have overlapping powers with the federal government in regards to justice, social welfare, civil law, criminal law, labour law and economic law (European Committee of the Regions: 2012).

government, operators etc.). In Germany alone there are 60 alliance structures which cover about 85 percent of Germany's population (BMZ: 2010). Alliance structures can vary considerably in size, form of organisation, competences and level of integration. Transportation in the metropolitan area of Frankfurt for example, is organised by a transport authority (RMV) that fosters cooperation between three tiers of government (15 counties, 11 cities and the Land Hesse[11]) and 153 public and private operators covering all modes of transport (OECD: 2015). Three level of integration can be differentiated:

- **level one integration** refers to a transport alliance that cooperates on a combined timetable, and has integrated tickets that can be used within the network and on integrated transit connections

- **level two integration** refers to a transport alliance that creates a common fare system with tickets being valid across administrative jurisdictional boundaries and on multiple operators. This type of integration has arrangements in place governing fares, conditions of carriage and the distribution of revenues collected through fares

- **level three integration** refers to a transport alliance that in its most sophisticated form devolves key responsibilities to a legal entity which is formed by all participants involved. Key responsibilities centre around a common fare system, the organisation of the entire transport network, and the establishment for an integrated timetable for the entire road and rail transport within the alliance network. In legal terms, such an alliance company is an independent entity. (BMZ: 2010)

2.30 Different studies (Scottish Executive: 2003; Plucher and Kurth: 1996, OECD: 2015) find that all the metropolitan areas in German speaking regions that have opted for the transport alliance model have significantly increased the ridership on their network.

2.31 For example, in Hamburg passenger trips increased by 16 percent; in Munich by 50 percent; in Rhein-Ruhr by 18 percent; in Vienna by 63 percent; in Zurich by 34 percent[12]; and in Frankfurt by 25 percent[13] (Plucher and Kurth: 1996; OECD: 2015). After sharp growth in ridership in the first years after inception, all cases exhibit stable growth rates within later years. Hamburg's ridership increased by a further 10 percent (HVV: 2017); Zurich by 8 percent (ZVV: 2017); Rhein-Ruhr by 5 percent (VRR: 2017) from 2011 to 2016; and in Munich by 2.7 percent from 2015 to 2016 (MVV: 2018).

2.32 The latest data from Vienna shows that the growth in ridership has continued from 1995 to 2014, displaying an increase of 35 percent (City of Vienna: 2015). The increase in ridership for the first five cases happened at a time when falling ridership could be observed throughout the OECD (1970-1990). Within an alliance model, operators still provide the service and competition between modes is mitigated

[11] The federal state of Hesse, one of 16 federal states in Germany's federal system.
[12] From the year of the implementation to the year 1993 (Hamburg 1965-1993; Munich 1970-1993; Rhein-Ruhr 1980-1993; Vienna and Zurich 1985-1993).
[13] From the year of the implementation 1995 until 2013.

through policies that help disadvantaged modes to compete with advantaged ones. For example, trains and metros have an advantage over buses which have to deal with lower average speeds due to congestion. All aforementioned cases have therefore, over time, expanded their network of dedicated bus lanes and implemented traffic control systems that give buses and trams priority at intersections with normal traffic. As a result, on-time performance of buses increased due to higher average speeds (Plucher and Kurth: 1996). By contrast, in Athens the operators compete with each other leading to inefficiencies because the metro and bus service are serving the same customer base in the same geographic region.

2.33 Zurich's transport authority (ZVV) is operated as a holding that finances the transport companies and the network in the metropolitan area. Operators are not driven by profit since income is predetermined by contract (Christodoulou and Finger: 2012). Investments in the networks after inception were relatively high because many improvements were of a physical nature, including dedicated bus lines, tram lines, transport hubs and so on. However, an essential component has been to further deepen the integration of services and above all, the coordination of timetables within the alliances network. Although there are limits to the synchronisation of timetables of different modes, operators were able to design route schedules that minimise transit times (Plucher and Kurth: 1996). This is achieved through pulse timetabling ('Taktfahrplan'), which is used in Germany, Switzerland and the Netherlands amongst others. Within such a network, several 'pulse points' exist at which services converge at the same time making transfers for travellers less time consuming (Petersen: 2016).

2.34 Nevertheless, for some case studies, the increase in ridership has not always accomplished the envisaged mode shift away from car towards public transport and active travel. Zurich and Munich have experienced a mode shift away from car due to the rapid growth in ridership that simply outruns the growth in car ownership. Whilst Hamburg, Rhein-Ruhr and Frankfurt have increased their ridership, car ownership increased at a faster rate. Munich and Zurich have additionally invested more in their public transport infrastructure and implemented car restrictive policies, which helped public transport in these cities (Plucher and Kurth: 1996). The City of Vienna has since managed to increase public transport's modal share from 29 percent in 1993 to 39 percent in 2014, going hand in hand with the stark increase in ridership over the same period (City of Vienna: 2015). Similar results are found in Oslo where higher spending on infrastructure had a positive effect in fostering modal shift. Conversely, Madrid, which is highlighted as one of the best practice cases in increasing public transport ridership[14] has not experienced a mode shift as car's modal share was increasing by 0.6 percent annually compared to 0.2 percent per year for public transport (Scottish Executive: 2003). One reason for this might be that accompanying policies are missing; for example, only 0.5 percent of Madrid's bus network exhibited dedicated bus lanes or other forms of priority for buses in 2006 (Scottish Executive: 2003).

2.35 Evidence from these case studies suggest that policies need to be coherent if modal shift towards public transport and active travel is to be achieved. The case of

[14] Ridership increased by 56 percent between 1986 and 2000 since the inception of its transport authority (CRTM)

Chicago has shown how contradicting policies can hamper the establishment of an efficient sustainable transport system by incentivising car use.

2.36 The integration of services and timetabling had positive effects on ridership in these cases. However, another important factor can be found in the fare structure. Integrated tickets and substantial discounts on monthly tickets, for students and school pupils, combined with aggressive marketing campaigns have helped to increase ridership. Studies from the United States suggest that falling ridership is associated with poorly integrated services, ticketing and marketing, suggesting that no U.S. metropolitan area in the 1980s and 1990s that expanded its light rail transport infrastructure, was able to increase its ridership (Hass-Klaus and Crampton: 2002; Dunphy: 1995). A comparison between the fare structure in Edinburgh and Glasgow and 11 best practice cases in 2003 showed that tickets in Scotland were much higher priced than in these cases[15] offering less service. The reason behind this was that although there was a Zonecard for Glasgow, the price of the monthly ticket reflected all the prices of the single operators, which was in sharp contrast to the identified best practice cases (Scottish Executive: 2003).

2.37 However, the low fares policy has implications for the financial sustainability of the entire network in German speaking countries and the role subsidies play will be discussed in more detail below. Ultimately, the alliance model has been able to provide an integrated public transport service that attracts passengers and can increase or stabilise public transport's share of the modal split, respectively[16]. However, the challenge this model faces is financial viability due to the likely fall in subsidy level during times of fiscal consolidation and budget cuts (Plucher and Kurth: 1996; International Transport Forum: 2011).

2.38 Melbourne and Sydney demonstrate how lacking the institutional capacity in the public transport domain while exhibiting strong capacity in road planning provides not only less funding but leaves a transport system which is fragmented. It is therefore suggested that transport planning and land-use planning are coordinated, serving an overall vision rather than being separated from each other (Low: 2005).

2.39 Ultimately, the case studies infer that certain factors are important for the efficiency of a transport network. Policies that appear (within the limitations of the evidence reviewed) to have proven to be effective are the integration of timetables, services and tickets in combination with policies to limit private car use. Sufficient as well as stable funding flows are a cornerstone of best practice cases. Structures that help implement these policies are governance structures such as governance bodies and transport authorities that have the capacity to deliver measures.

Best practice cases – funding of transport systems

2.40 This section will take a closer look at how transport systems are funded in different metropolitan areas. Obtaining financial data is difficult for a range of reasons, including: the availability of information; the complexity of funding schemes

[15] After adjustment for living costs.
[16] Cases such as Rhein-Ruhr or Hamburg exhibited a falling share of the modal split, which stabilised after the inception of the alliance system.

that are difficult to untangle; and the complexity of organisational structures which are challenging to quantify or categorise.

2.41 The literature reviewed for this report found that countries or regions identified as best practice cases in terms of transport governance systems are usually situated in countries that display a medium to high percentage of subsidies. Research from 2000 showed that countries such as the Netherlands, Austria, Belgium and Italy subsidised 60 to 70 percent of passenger bus transport operating costs at that time. Denmark, France, Sweden, Iceland, Greece and Germany subsidised 40 to 50 percent, and Spain 20 to 40 percent in 2000. This was in stark contrast to Scotland, England, Ireland and Norway, which subsidised between 0 and 20 percent over the same period. (Reynolds-Feighan et al.: 2000). Since then, however, Scotland's concessionary travel scheme has led to a sharp increase in government subsidies, which now make up to 45 percent of the revenues of bus operators (Transport Scotland: 2016). Scotland's current high percentage is substantially due to payments made under its concessionary travel scheme, which is important to consider when making comparisons of subsidies between countries. For instance, more recent data shows that German subsidies for concessionary travel make eight percent of total subsidies, which are estimated to be between 30 and 60 percent depending on the source (VDV: 2016; Hans-Böckler-Stiftung: 2015; Friedrich Ebert Stiftung: 2015).

2.42 The level of funding does not necessarily mean that these places provide better outcomes, as the case of Athens illustrates where in 2010 and 2011, state subsidies comprised 49 percent of operating revenues (OASA: 2012). Funding can be used inefficiently: a study from Sweden suggests that trips in Sweden could have been increased by around two percent without any additional funding provided if decision-makers had opted for innovative measures in low-demand areas instead of trying to maintain a minimum service level (Holmgren: 2010). Chicago allocates funding according to an eligibility procedure that is now 20 years old and does not reflect the current realities of travel demand (Merk: 2014). Nevertheless, a high level of funding is usually found in cases that exhibit best practice. For instance Copenhagen, Berlin, Rotterdam, Oslo, Stockholm, Madrid, Barcelona, London and Helsinki subsidised their public transport systems between the level of 40 to 60 percent in order to cover the operating costs in 2015 (EMTA: 2015). Zurich covered 60 percent of the operational costs of its transport system in 2016 through revenues generated, whilst 35 percent came from the municipalities and the Canton[17] (evenly split 50-50),with a further five percent through revenues from advertisement (Christodoulou and Finger: 2012; ZVV: 2016). Generally, only one European transport system included within the European Metropolitan Transport Authorities (EMTA) covered more than 60 percent of its operational costs through revenues from fares (Cadiz covering 74 percent of its operational costs through revenues) (EMTA: 2015).

2.43 Recent research from Germany estimates that at an aggregate level, 36 percent of the operating costs of the entire public transport system (rail and road) are covered by revenues (fares, advertisement and lease), whilst 64 percent come from different sources such as concessionary fares, tax deductions and direct subsidies flowing from different tiers of government (Friedrich Ebert Stiftung: 2015). The report

[17] A Canton is a federal state within the Swiss confederation and Canton Zurich is one of 26 Cantons.

concludes that financing the German transport network is complex and lacks transparency, which stems from historic developments and the competences that are exercised by different levels of government, transport alliances and transport companies (Friedrich Ebert Stiftung: 2015). The results of this report are supported by a second report by the Hans-Böckler Stiftung, which comes to similar results. Both reports are in contrast with numbers presented by the Association of German Transport Companies (VDV), which states that subsidy levels have decreased from 26 percent in 2006 to 23 percent in 2015 (VDV: 2016).

2.44 Frankfurt is one of the cities in Germany that generates almost 60 percent of its operating costs through revenues, a best practice case within Germany (OECD: 2015). A reason for the overall relatively low coverage of operating costs from fares in Germany can be found in the fares policy which provides one ticket for all modes in a network comprising relatively low ticket prices. This is accompanied by large discounts on yearly and monthly tickets (Plucher and Kurth: 1996). The same might hold true for the other cases that demonstrate high subsidies compared to low revenues. For example, Prague's very high subsidy level of 75 percent is due to its low fares policy (EMTA: 2015). For the cases investigated by Plucher and Kurth (1996) the following observation can be made: for all five cases, the percentage of operating costs covered by revenues fell substantially in Zurich from 78 percent in 1985 to 42 percent in 1993, and the current revenues are still below the level they were before the inception of the transport alliance. The same can be observed for Munich (from 65 percent to 52 percent), Hamburg (from 65 percent to 54 percent), Vienna (from 47 percent to 40 percent) and Rhein-Rhur (from 66 percent to 40 percent) (1996)[18]. The City of Vienna estimates that ticket prices would need to double in order for the transport network to sustain itself by revenues (City of Vienna: 2015). Explanations are found in the low fares policy and the simultaneous expansions of services and infrastructure that could not be compensated by the increases in ridership (Plucher and Kurth: 1996).

2.45 Notably, a major limitation of this study is the availability of up-to-date financial data, consistent over time and comparable across cases. Although most of the data is not up-to-date, some observations can be made. First, subsidy level increased in the years after a transport authority was implemented (for the cases where data was available). Second, current data from the German speaking regions and from cases across Europe suggests that the majority of cases[19] exhibit subsidy levels of between 40 and 60 percent. However, a more systematic approach to obtaining and analysing financial data is required in future research in order to have more confidence in this conclusion.

2.46 OECD countries show substantial variation in financial models adopted since financing schemes incorporate local conditions. Hence, it is difficult to apply a financial model from one OECD country to another one. However, research finds some evidence on how to make transport financing more sustainable. These include the strengthening of economic appraisal procedures as well as applying eligibility criteria for subsidies (OECD-ITF: 2013; Merk et al.: 2012).

[18] From the year of inception to the year 1993 (Hamburg 1965-1993; Munich 1970-1993; Rhein-Ruhr 1980-1993; Vienna and Zurich 1985-1993).
[19] Cases that were identified as best practice within the literature.

2.47 Overall, it can be observed that certain factors appear essential for best practice in these cases. These are:

- a governance body or transport authority that organises and coordinates public transport which mitigates against risks posed by fragmentation in institutional and transport arrangements

- integrated land use planning and transportation planning which produces better outcomes compared to scenarios where efforts are not coordinated
- integration of services, tickets and timetables, which positively influences ridership

- mode shift from car to public transport and active travel is not guaranteed through the implementation of the above; evidence suggests that this requires accompanying policies that restrict car use

Rural transport provision – case study examples

2.48 This report has focused on metropolitan areas due to the relative scarcity of evidence on transport governance outside of these areas. Nevertheless, this section will attempt to provide a brief overview on what the literature reviewed says about how public transport is organised in lower-demand areas.

2.49 Rural areas often suffer from poor connectivity due to low frequency of services, poor interconnectivity between modes and limited hours of operation (Petersen: 2016). There is a consensus in the literature reviewed that is not financially feasible to have the same transport service provision for rural areas as exists for metropolitan areas (Leiren and Skollerud: 2015; BMZ: 2010; Nelson et al: 2010). This has to do with the fact that distances in rural areas are usually longer with lower capacity resulting in greater net losses (Petersen: 2016).

2.50 Three cases will be looked at briefly: Germany, Switzerland and Norway.

Germany

2.51 Germany's transport alliances cover many rural and low density areas. For example, the transport authority of Berlin-Brandenburg (VBB) operates in the Land Brandenburg which has a population density 83/km2 compared to Scotland which has a population density of 65/km2.[20] Trains build the backbone of the network and due to the integration of timetables, buses feed into the rail links and connect them with towns and villages within the alliance network. The challenges regarding the provision of such services lie in high expenditures for a low demand service (BMZ: 2010). As a result, services are constantly cut back. In order to maintain a certain service level, on-demand services were introduced to serve as a supplementary to

[20] Data for Brandenburg comes from the statistical office Berlin-Brandenburg https://www.berlin-brandenburg.de/metropolregion/daten-und-fakten/. Data for Scotland comes from the NRS https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/archive/mid-2005-population-estimates-scotland/population-density.

regular services for rural communities and suburban areas (Nelson et al: 2010; BMZ: 2010).

2.52 Over recent years it can be observed that the alliance networks have expanded in metropolitan areas but have withdrawn from rural areas due to financial constraints that make the model unsustainable for rural areas (BMZ: 2010). Moreover, there is still a lack of integration between different alliance networks because the integration of services, timetables and tickets is limited to the area of each alliance operating. This has particularly negative effects for inhabitants of rural areas living at the border of a network which can make travel to the next town across that border a long and complicated journey.

Norway

2.53 Norway has a very good long distance bus network. Buses connect cities with each other as the rail network is not as extensive (Alexandersson et al.: 2010). Norway is testing several on-demand services that operate next to the coach service and feed into the medium/long distance coach network. The on-demand network is financed through government transfers to the counties that are responsible for transport service provision. The subsidies vary considerably; for example, the Oslo metropolitan area receives 44 percent in subsidies, whilst the rest is financed by revenues from fares. The rural county of Hedmark on the other hand receives 90 percent in subsidies with 10 percent coming from revenues (Leiren and Skollerud: 2015).

2.54 Demand Responsive Transportation (DRT) is practiced in many countries and an overview of such services is provided by Nelson et al. (2010).

Switzerland

2.55 Switzerland is using demand responsive solutions for reaching its rural population but has also introduced ‘pulse timetabling’ as a way to reach the inhabitants of rural or semi-rural areas. The timetable in Switzerland, similar to Germany, is planned around the national rail service and when trains arrive at one of the pulse points, buses are already waiting to guarantee a smooth transit (Petersen: 2016). It is estimated that the rural areas around Zurich support a mode share of journeys to work of around 22 percent. This is high for areas such as these that are usually car dependent (Petersen: 2016).

Conclusion

3.0 This report identifies features that are common in best practice cases in transport governance and can be generally distinguished as being either structural or policy focused.

3.1 The existence of a governance body or transport authority that coordinates the transport system are common in all cases reviewed that are considered as best practice. Nevertheless, the review has also shown that having such structures in place does not necessarily lead to improvement in transport governance but are likely to have a supportive effect for policy implementation. Policies *can* be implemented without having such transport governance structures in place. However, there are not many cases where this is documented (South Korea is one of the few examples found in this literature review).

3.2 Hence, it is hard to evaluate whether or not transport policy implementation is more effective when governance structures are in place. Policies that foster integration of tickets, timetables and services are seen to be most effective for improving the quality of the transport system as a whole. The examples given here have shown that policies must be coherent; policies that support mode shift from car to public transport are less likely to be effective when simultaneously policies are implemented that promote car use (generous parking policies for instance).

3.3 The biggest challenge identified in most best practice cases centre around the financial sustainability of their respective models. Overall, best practice cases require high expenditures to keep their public transport systems running and cut backs of services are usually observed in rural or low demand areas. However, financial consolidation, new ways of funding, and an efficient use of existing funding could help here.

3.4 This literature review found only limited evidence on rural areas, and further research is likely to be necessary to determine what learning can be taken from the examples here to be used in the Scottish context.

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