Rialtas na hÉireann
Government of Ireland

Spending Review 2020

A Review of the Governance, Efficiency and Effectiveness of Public Service Obligation (PSO) Transport Services

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Summary

The paper provides an overview of governance, efficiency and effectiveness of Public Service Obligation (PSO) funding of public transport services over the period 2009-2019. PSO funding supports socially beneficial but financially unviable services through PSO transport operators such as Dublin Bus, Bus Éireann and Iarnród Éireann. The PSO is D/Transport single largest item of current expenditure, costing the exchequer €314.45m in 2019.

Operation of the PSO

PSO contracts require operators to meet a series of standards which relate to the regularity/punctuality, reliability and customer service quality of services provided. The terms of these contracts can be altered by either the NTA or the operator through an agreed variations procedure.

When reviewing potential changes to routes the NTA considers a range of factors such as availability of funds, existing demand profile and reports from operators. The NTA then convenes a Network Planning Group which considers and prioritises potential changes to routes or services.

In the summer, the NTA provides D/Transport with an estimated cost for maintaining the current level of services. The NTA also produces an estimate of the cost of providing potential new services, suggested by the Network Planning Group. These estimates are used to inform the Department's request for funds in the annual budgetary process.

Expenditure, Revenue and Utilisation

Between 2009 and 2019, a U-shaped pattern of expenditure is evident with PSO expenditure declining by over 37%. This was then followed by a significant increase of over 65% in PSO expenditure from the period 2015-2019.

The number of passenger journeys completed by the three state owned operators has increased by 14.9% over the period 2009-2019. Despite the loss of some services to Go-Ahead Ireland.

Fare revenue received by the three state owned PSO Operators declined by 7.6% over the period 2009-2011. They then rebounded strongly, growing by 53.6% between 2011 and 2019. This growth was driven by an increase in fares over the period 2009-2014, while from 2014-2019 increasing passenger numbers were the main contributor to fare revenue growth.

Efficiency and Effectiveness

There are many challenges in determining the efficiency or effectiveness of services due to issues such as the wide range of inputs, outputs and other external factors such as traffic conditions. At a high level, the following is of note:

Dublin Bus - In recent years, the cost of running services has increased per seat and vehicle kilometre, which at a high level indicates a reduction in efficiency. However, the cost per passenger has fallen due to a higher usage of the service and the service has become less dependent on PSO subsidisation. The punctuality rate and reliability of services has also increased over the period 2017-2019.

Bus Éireann - In recent years, cost per passenger and per seat km decreased slightly, broadly indicating a slight increase in efficiency. However, the level of subsidy per passenger and per seat kilometre has increased significantly. There has been a significant increase in the punctuality of low frequency services. The reliability of the services, as measured by the lost kilometre rate, has also increased slightly over the period 2017-2019.

Iarnród Éireann - In recent years, the cost of running services has decreased per passenger while cost per seat kilometre increased. For the same time period, subsidy per passenger was relatively stable, alongside significant increase in utilisation In 2018 and 2019, Punctuality rate is above the target punctuality rate (90%) for all but one route. However, it is important to note that punctuality is defined as the service arriving within ten minutes of its scheduled time. The reliability of services also increased between 2018 and 2019.

Detailed performance results of the three state owned PSO operators is provided in the Summary of Key Findings Table below.

Next Steps and Future Research

- Future research could analyse the impact of planned major capital investment projects, such as BusConnects, medium term impact on costs, revenues and PSO requirements.
- Future research could also analyse the impacts of Covid-19 on the PSO.
- It is recommended that further research is conducted to consider the emissions impact of public transport services.
- Future research could analyse reasons why punctuality and reliability was below the target on a route by route basis.
- Research could examine the performance and operation of Go-Ahead Ireland and other BMO Contracts in detail.

Summary of Key Findings

	Dublin Bus	Bus Éireann	Iarnród Éireann
	2015-2019		
High Level Trends	• Fare revenue ↑ 13% • Total revenue ↑ 10% • FTS funding remained → • Costs ↑ 7% • PSO ↑ 1% • Passenger numbers ↑ 15%	• Fare revenue ↑ 22% • Total revenue ↑ 41% • FTS funding remained → • Costs ↑ 32% • PSO ↑ 99% • Passenger numbers ↑ 32%	• Fare revenue ↑ 26% • Total revenue ↑ 26% • FTS funding remained → • Costs ↑ 12% • PSO ↑ 31% • Passenger numbers ↑ 26%
Operation	• Go-Ahead Ireland took over 10% of Dublin Bus routes in 2018 • New Direct Award contract agreed in 019 for 5 years	• Awarded BMO contract for Waterford City Service in 2018 • New Direct Award contract agreed in 2019 for 5 years	• New Direct Award contract agreed in 2019 for 10 years
Key Performance Indicators	• Cost per passenger journey ↓ 7% • Cost per vehicle kilometre ↑ 32% • Cost per seat km ↑ 20% • Fare revenue per passenger ↓ 2% • Total revenue per passenger ↓ 5% • Revenue per seat km ↑ 23% • PSO per passenger ↓ 13% • PSO per seat km ↑ 13% • Utilisation ↑ 29%	• Cost per passenger journey ↓ 0.3% • Cost per seat km ↓ 6% • Fare revenue per passenger ↓ 8% • Total revenue per passenger ↓ 7% • Revenue per seat km ↑ 1% • PSO per passenger ↑ 51% • PSO per seat km ↑ 42% • Utilisation ↓ 6%	• Cost per passenger journey ↓ 11% • Cost per seat km ↑ 8% • Fare revenue per passenger ↓ 1% • Total revenue per passenger ↓ 0.3% • Revenue per seat km ↑ 21% • PSO per passenger ↑ 4% • PSO per seat km ↑ 26% • Utilisation ↑ 21%
Performance and Reliability (2017-2019)	• Punctuality rate ↑ slightly (2017-2019) • Departures on time ↑ for 17% of routes (2018-2019) • Lost kilometre rate ↓ (2017-2019)	• Punctuality rate ↑ 11 percentage points for low frequency routes (Q4 2017-Q3 2019) • On-time departures ↑ for *c.* 20% of routes (2018-2019) • Lost kilometre rate ↓ 1 percentage point (2017-2019)	• Punctuality rate is above the target punctuality rate for all but one route (2018 and 2019) • The punctuality rate ↑ for 5 out of 18 routes (2018-2019) • Reliability rate ↑ (2018-2019)

Section 1 PSO Funding and Governance

1. Introduction

This paper provides an overview of Public Service Obligation (PSO) funding of public transport services. PSO funding acts as a subvention payment or 'balancing item' that covers the shortfall between service costs and revenues for transport operators. PSO funding primarily supports Ireland's three state owned public transport operators; Bus Éireann, Dublin Bus and Iarnród Éireann as well as Go-Ahead Ireland and other smaller PSO operators; to provide socially beneficial but financially unviable services.

The paper has been completed as part of the 2020 Spending Review. The Spending Review process aims to improve how public expenditure is allocated across all areas of Government. This analysis will build upon IGEES work already undertaken in this area including 2017[1] and 2018[2] Spending Review papers and a 2019 Social Impact Assessment[3] analysing the profile of public transport users. The paper is primarily concerned with the three state owned PSO operators Dublin Bus, Bus Éireann and Iarnród Éireann but will also briefly outline activities of other PSO operators including Go Ahead Ireland. The Luas will not be considered within this paper as it did not receive PSO funding in the relevant years.

2. Methodology and Data Limitations

The paper is structured as follows; Section 1, which has been prepared by D/Transport, provides an overview of the rationale for the PSO and outlines the high level trends in expenditure, service provision and operator costs and revenues. This section will also set out how PSO stakeholders relate to one another, how contracts operate and how decisions are made. Section 2, which was prepared by DPER, provides an update of the key performance indicators of efficiency outlined in the 2018 Spending Review paper. Section 3, which was also prepared by DPER, provides and analysis of the effectiveness and quality of PSO services by examining their punctuality and reliability.

There are a number of data limitations associated with the analysis. These limitations should be considered when interpreting the analysis in this paper. The first limitation is associated with the operator data provided by the National Transport Authority (NTA) on punctuality and reliability. The data collection process for punctuality and reliability began in 2015 however significant operator data quality issues were identified, which took some time to resolve and therefore the first wave of data is available from 2017 Q4. Therefore, the analysis covers the period 2017 Q4 to 2019 Q3. Secondly, in relation to the analysis of punctuality, the data measures punctuality only where both an actual observed time and a corresponding scheduled time is

[1] https://assets.gov.ie/7287/772c34904b8e4cc8969d3371b770d07d.pdf
[2] https://assets.gov.ie/7310/5ef2f3bff8dc457ba7bd735d4d3e7d4d.pdf
[3] http://www.budget.gov.ie/Budgets/2020/Documents/Budget/Public%20Service%20Obligation%20(PSO)%20Funding%20for%20Public%20Transport.pdf

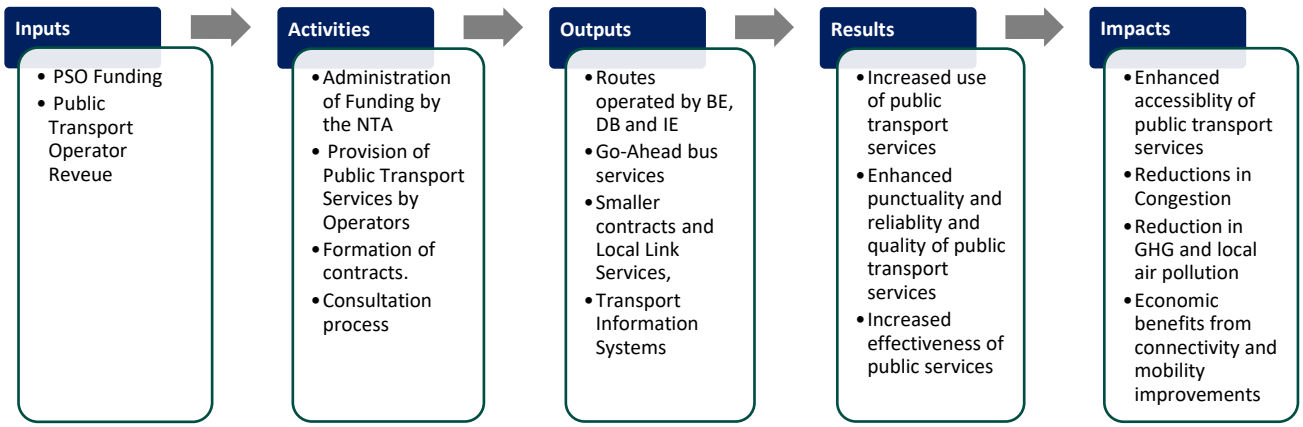
available for comparison purposes. In certain cases, punctuality targets differ throughout the year as they are significantly impacted by traffic conditions. Additionally, traffic conditions vary due to a number of factors including school terms and weather conditions.

Despite these limitations it should be acknowledged that changes in how the NTA collect and compile data has facilitated a much more in-depth review of PSO transport services than was possible in previous Spending Review papers.

The COVID-19 pandemic has led to significant reductions in both the usage of and capacity of public transport services. Because the paper examines the period 2009-2019, it is beyond the scope of the paper to examine the pandemics impact on public transport usage and funding requirements. However, the insights which the paper provides on how the PSO currently operates, and the analysis of trends in KPI's and punctuality and reliability of current PSO services, will help inform decisions on how best to support the provision of socially beneficial but financially unviable public transport services, both during the current crisis and in its aftermath.

Figure 1 below outlines a Programme Logic model (PLM) in order to understand how the provision of PSO Public Transport Services achieves its objectives. The PLM maps out the logical linkages between the Inputs, Activities, Outputs, Results and Impacts. The model assists in identifying cause effect relationships between these elements.

Figure 1 - Logic Path Model for PSO Funding for Public Transport Services



3. Rationale and Policy Context

3.1 Economic and Social Rationale

PSO Funding of Public Transport Services aims to provide socially beneficial but financially unviable transport services. These services address a number of issues of market failure including:

Issues of Equity and Accessibility – Although the market for public transport services may achieve an equilibrium outcome i.e. the point at which the demand for a service is equal to its supply, there are issues of

equity and distributional impacts which may mean that the "efficient" allocation of resources from the markets perspective is not a socially desirable one. Following a purely market driven approach would entail operators profitable transport services or routes. However, the withdrawal of non-profitable services would leave many potential users isolated. Public transport services also provide access to users with disabilities who may not be able to avail of private mobility opportunities. In addition to providing accessibility benefits, PSO services also address issues of equity as PSO services can help improve the mobility opportunities of lower income groups who may not have access to private cars.

Externalities – Externalities arise when the market price for a good or service does not reflect the full cost (or benefit) which its provision has on society. Examples of genitive externalities include cost of congestion, Greenhouse gas emissions and local air pollution that private cars impose on society. PSO services help address these by negative externalities by supporting the modal shift away from private cars, thus achieving a more optimal outcome for society.

3.2 National Policy Context

The objectives of the PSO are aligned with the National Strategic Outcomes (NSOs) set out in Project Ireland 2040, particularly NSO 2 –which relates to enhanced regional accessibility, NSO 4 - which aims to promote sustainable mobility and NSO 8 - transition to a low carbon climate resilient society. In this respect the provision of PSO transport services also supports the decarbonisation targets for the transport sector set out in the Climate Action Plan[4] and the Programme for Government[5].

4. Operation of the PSO

4.1 PSO Governance

The National Transport Authority (NTA), was established under the Dublin Transport Authority Act 2008, originally as the Dublin Transport Authority, and in 2009 it was given a national remit by the Public Transport Regulation Act. The NTA was established in part in response to an EU Regulation (1370/2007) which required Member States to provide rail and road passenger services that are required in the "general economic interest" and receiving state subsidies to do so through PSO contracts between a public transport authority and public transport operators. D/Transport provides funding to the NTA and the Authority in its role as competent authority manages the delivery of public transport services and the contracts with operators and decides on changes to fares, routes or service levels. In addition, the NTA in its role as the public transport regulator is responsible for the granting of licences to bus operators for the provision of commercial bus

[4] https://www.dccae.gov.ie/en-ie/climate-action/topics/climate-action-plan/Pages/climate-action.aspx
[5] https://static.rasset.ie/documents/news/2020/06/draft-programme-for-govt.pdf

services. Whereas conditions can be applied to operator licences, there is no contract in place between the operator and the NTA in relation to these services.

4.2 PSO Contracts

4.2.1 Overview of PSO Contracts

PSO services are delivered through a series of public service contracts agreed between the NTA and public transport operators. Under these contracts the NTA compensates operators with money received from D/Transport in return for the provision of specified public transport services. Operators are also required to meet a series of minimum performance standards which relate to the regularity/punctuality, reliability and customer service quality of services provided. Contracts vary according to the mode of transport being used (rail or bus) and the scope of services, (route, regional or national) but they do share a number of common elements. These are:

Network and Route Specifications

Operators are required to satisfy a series of network requirements; these include standards for vehicles and stations operated across the network. Specifications for individual routes are also set out in the contracts including: vehicle engine type and age; luggage space; wheelchair accessibility and Wi-Fi availability.

Service Specifications

Each contract also contains a detailed set of service specifications which the operator must comply with. This includes a list of routes, stops and stations serviced by each route, frequency of services and a time (within a defined range) for the departure/arrival of the first and last service of the day for each route. Operators use these service specifications to draw up draft timetables for each route, which are then submitted to the NTA for approval.

Variations Procedure

Contracts allow for variations to be made in the network or service specifications throughout the lifetime of the contract. These variations can be initiated by either the Operator or the NTA. An Operator can request a variation in any element of the contract by issuing an Operator Variation Notice. This notice should set out the proposed change in sufficient detail to allow the NTA to evaluate it, it should also include an impact analysis of the proposed variation including: the impact of the proposed variation on services; the impact of the proposed variation on Network Assets; the cost of the proposed variation; its impact on revenues; any capital expenditure required or no longer required as a result of the variation and the operators plan to implement the proposed variation.

Following receipt of the Operator Variation Notice, the NTA will discuss the proposed variation with the operator and will choose to; accept it, propose modifications or reject it. If the Variation is accepted, then it will be implemented in line with the dates set out in the Variation Notice. When the NTA proposes a variation

to a contract it issues an Authority Variation Notice to the operator setting out the proposed change. The Operator will then issue a Variation Response, which contains the impact assessment information set out above. Further details on the NTA's decision making process for route and service changes are set out in Section 4.3 below.

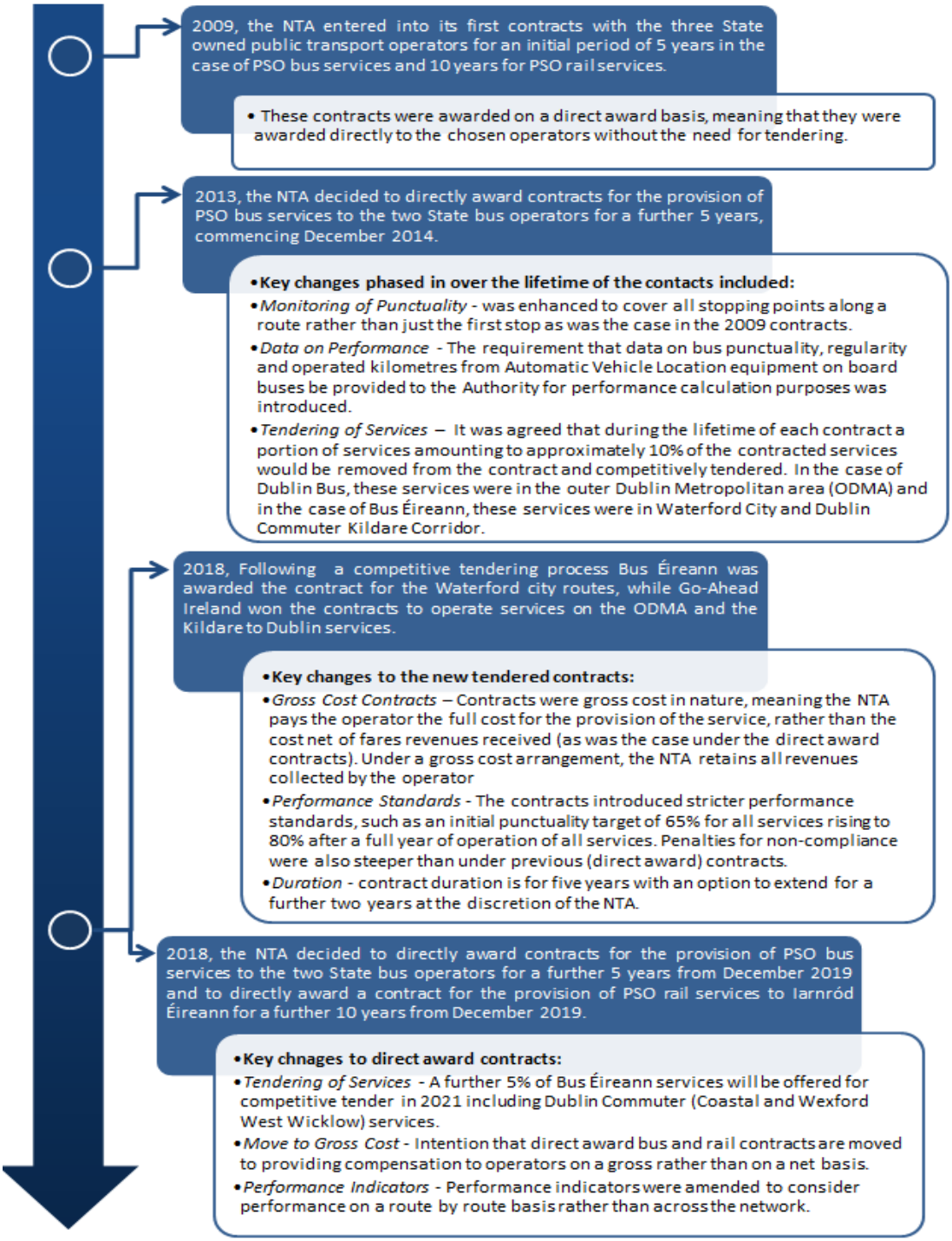
Performance Standards

Contracts set out a set of minimum performance standards which operators must comply with. These may include:

- Punctuality - which is measured by the percentage of services on a route operating within a defined arrival/departure time
- Lost km rate - which is measured as the percentage of lost km (scheduled km – operated km)
- Excess Wait Time - This metric provides a measure of the average time a passenger must wait for the next service, in excess of the wait time which would be expected as per the schedule for that route.
- Service Quality – measured using mystery shopper reports of customer experience and operator responses to customer complaints.
- Guaranteed Connections- measure of failure to fulfil a guaranteed connection during the reporting period.

Failure to comply with these performance standards results in a percentage reduction to the payment issued to the operator in that period. Further details on the performance related metrics and how they are assessed is provided in Section 2 of this paper.

4.2.2 Evolution of PSO Contracts



4.3. PSO Decision Making

PSO services are delivered through a series of public service contracts agreed between the NTA and public transport operators. Each year the NTA provides D/Transport with an estimated cost for maintaining the current level of services. The NTA also produces an estimate of the cost of providing potential new services, suggested by the Network Planning Group. These estimates are used to inform the Department's request for funds in the annual budgetary process.

4.3.1 Identification of Candidate Routes and Service Changes

The NTA considers a number of factors when deciding to change the operation of a particular route or adding a new route including:

1. Availability of funds – any decision to alter routes can only be made within the funding available for that year;
2. Review of existing demand profile – passenger volumes by day of the week and time of the day, including morning and evening peaks;
3. Examination of service profile – comparing the service levels with a similar route operating elsewhere in the network.
4. Consultation with the Operators – meetings with the operators each period to highlight specific issues such as lack of capacity on services or need to revise bus timetables due to developments such as congestion;
5. Bus/train availability – the number of vehicles available or likely to become available for deployment;
6. Changes to the built environment –the transport needs of new housing, retail, leisure, healthcare or employment;
7. Local representations – response to issues raised by local residents, businesses, educational establishments, or their political representatives.

4.3.2 Decisions on PSO Funding

The NTA convenes a Network Planning Group which includes the Director of Public Transport Services, the Head of Service Planning, the Head of Public Transport Contracts, the Head of PSO Finance, the Head of Public Transport Regulation and the Head of Rural Transport Services. It considers potential route and service level changes taking into account the factors outlined above. In the case of more significant candidate changes, a Transport Planning Business Case is prepared by the Service Planning Team for review by the Group. The Group maintains a list of priority changes to be implemented across the network should funding become available, which is reviewed and updated on a regular basis.

Once the Network Planning Group approves the progression of a candidate service change from its priority list, the next stage of the process involves turning outline route change proposals into more detailed service level specifications, in particular:

- Confirming a new or revised route alignment;
- Agreeing on bus stop and terminus locations with local authorities or landowners;
- Designing and constructing new stop infrastructure;
- Defining the operating hours and the service frequencies

The NTA then provides the transport operator with this specification and suggested runtimes, based on historic data where available. This includes a time (within a defined range) for the first and last service of the

day. The operator will then draft a timetable using these parameters, and associated operating costs, which are subject to approval by the Head of Public Transport Regulation and the Head of Public Transport Contracts.

Over the summer each year the NTA provides D/Transport with an estimated cost for maintaining the current level of services. This estimate is based on future fare revenue forecasts, adjustments to contract costs for inflation and estimated cost increases. The Authority also produces an estimate of the cost of providing potential new services, suggested by the Network Planning Group. These estimates are used to inform the Department's request for funds in the annual budgetary process.

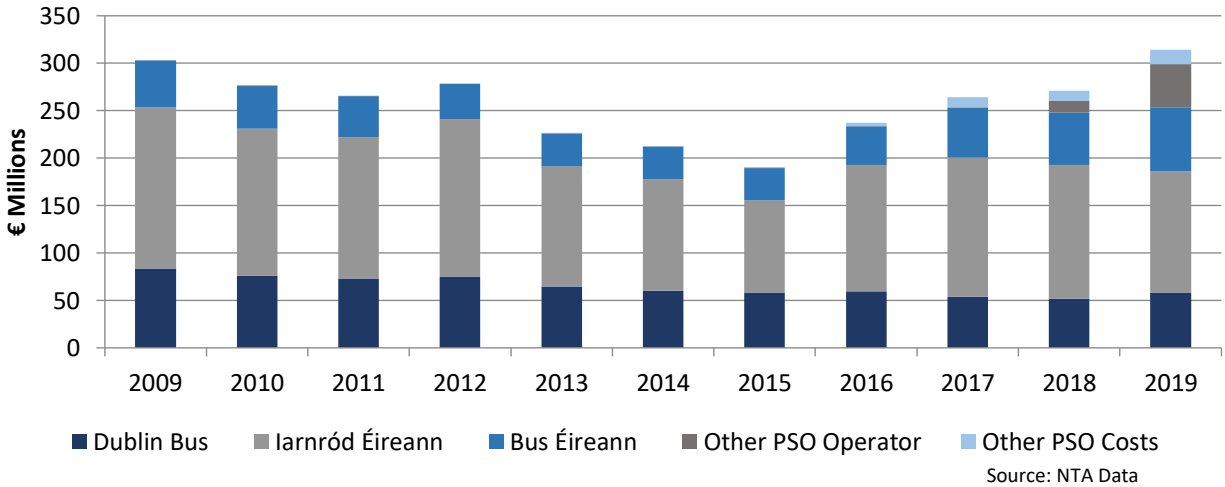
5. PSO Activities

PSO expenditure declined over the period 2009-2015. This was then followed by a significant increase in PSO expenditure over the period 2015-2019. The amount of PSO expenditure allocated to the three state owned public transport operators has declined from 100% in 2009 to 80.5% in 2019. This change was driven partly by rising costs for other PSO Operators in 2018 and 2019 with the tendering of routes to Go Ahead Ireland.

5.1 Overview of PSO Expenditure

Figure 2 below sets out the high level trends in PSO expenditure over the period 2009-2019. A U-shaped pattern of expenditure is evident over this period with PSO expenditure declining from €303.2m in 2009 to €190.6m in 2015, a decline of over 37%. This was then followed by a significant increase of over 65% in PSO expenditure from the period 2015-2019. The remainder of this section will provide a brief overview of some of the key trends in expenditure over this period as set out in Table 1 below.

Figure 2 – PSO Expenditure 2009-2019



Source: NTA Data

Expenditure on the Three State Owned Public Transport Operators

Total PSO expenditure has increased from €303.2m to €314.5m over the period 2009-2019. While expenditure on the three state owned public transport operators decreased from €303.2m in 2009 to €253.3m in 2019. The proportion of PSO expenditure on these operators declined from 100% of PSO expenditure in 2009 to just

over 80.5% in 2019. This trend has been driven largely by the award of Bus Market Opening (BMO) contracts and the increasing share of funding provided to other PSO operators. In terms of the split of funding between operators, the share of PSO funding issued to Dublin Bus and Iarnród Éireann has significantly declined over the period 2009 to 2019 from 27.4% to 18.4% and 56.3% to 40.8% respectively, while the proportion of funding issued to Bus Éireann has increased from 16.3% to 21.4% over the same period.

Table 1 – PSO Expenditure 2009-2019[6]

Year	IÉ	DB	BÉ	Other	Marketing	PSO Support Costs	Internal Audit	Leap Family Card	TII Ireland	Depreciation	Total
2009	170.6	83.2	49.4	-	-	-	-	-	-	-	303.20
2010	155.1	75.7	45	-	-	-	-	-	-	-	275.86
2011	148.7	73.1	43.4	-	-	0.441	-	-	-	-	265.64
2012	166.4	74.8	36.9	-	-	0.196	-	-	-	-	278.30
2013	127.0	64.5	34.4	0.05	0.50	0.04	-		-	-	226.53
2014	117.4	60.0	34.4	0.178	0.153	0.007	0.09		-	-	212.22
2015	98.2	57.7	33.7	0.27	0.31	0.30	0.09		-	-	190.56
2016	133.1	59.6	40.9	0.39	1.18	2.04	0.03	0.31	-	-	237.47
2017	147.0	54.0	52.2	0.41	0.92	2.56	0.16	-	6.68	0.21	264.09
2018	141	52	55	12.42	2.15	7.33	-	-	-	1.09	272.99
2019	128	58	67	46	-	14	-	-	-	1.08	314.45

Source: NTA Data

Other PSO Operator Expenditure

A notable trend in expenditure from Table 1 is the growth in expenditure for Other PSO Services from €0.41m in 2017 to €46m in 2019. This rapid increase in expenditure was largely driven by the award of new Bus Market Opening (BMO) contracts to Go Ahead Ireland, as outlined above.

PSO Support Costs

PSO support costs include back office systems and Authority staff required to manage PSO services. Support costs have increased significantly over the period 2017-2019, rising from €2.56m to €14m. This cost increase has been driven partly by the tendering of BMO contracts. This has resulted in the need for the NTA to provide

[6] It should be noted that in 2019 the NTA received €20.8m in Fare Revenue as part of the movement to Gross contracts for the BMO operators

ticketing and AVL data systems for use by the BMO contract operators and the NTA. The NTA intends to begin receipting Dublin Bus and Bus Éireann fare revenue from direct award contracts from 2021, and in anticipation of this change, there has been significant expenditure on back office management.

The tendering process has also resulted in a larger number of contracts for the NTA and has led to the NTA hiring new contract managers as a result. Given the value of the direct award contracts, additional staff have been recruited to enhance monitoring and reporting of operator performance and to work with operators to improve performance, as well as to enhance planning of new services, and manage programmes for improved bus stop infrastructure and customer information.

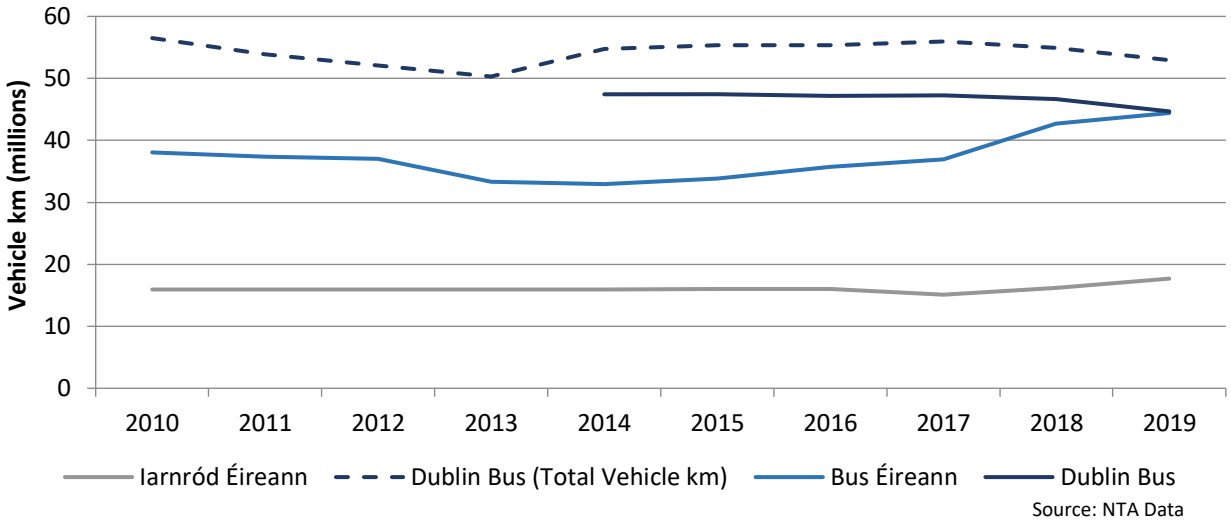
5.2 PSO Journeys

Bus Éireann vehicle km increased over the period 2010-2019. Vehicle km operated by Iarnród Éireann was largely unchanged over the period 2010-2018, with a significant increase in 2019. Dublin Bus recorded a reduction in vehicle km operated over the period 2014-2019, which was driven by the loss of routes within the Outer Dublin Metropolitan Area to Go Ahead Ireland in 2018.

Figure 3 show the vehicle kilometres (km) operated by the three state owned public transport operators over the period 2010-2019[7]. The number of vehicle km travelled by Bus Éireann declined by 13.5% over the period 2010 to 2014. This is in line with the fall in transport demand and reduction in services following the economic downturn in 2008. Bus Éireann vehicle km then increased over this period 2017-2019. Dublin Bus vehicle km travelled declined by 5.8% over the period 2014-2019. Note that the methodology used to calculate Dublin Bus Vehicle km travelled changed in 2014 (see footnote 4 for details). This fall in Dublin Bus km was driven by the award of routes within the Outer Dublin Metropolitan Area (ODMA) to Go Ahead. The vehicle km travelled by Iarnród Éireann was largely unchanged at approximately 16m over the period 2010-2018 with a notable uptick to 17.7m in 2019.

7 The 2010-2019 data for Dublin Bus Total Vehicle km (displayed as the dotted line in Figure 3 above) includes kilometres travelled outside of providing services. As such it is not directly comparable to the vehicle km's of other operators. Data from 2014-2019 for Dublin Bus (displayed as the solid dark blue line in Figure 3 above) is for in-service km and is directly comparable with that of other operators. This data is obtained from the NTA.

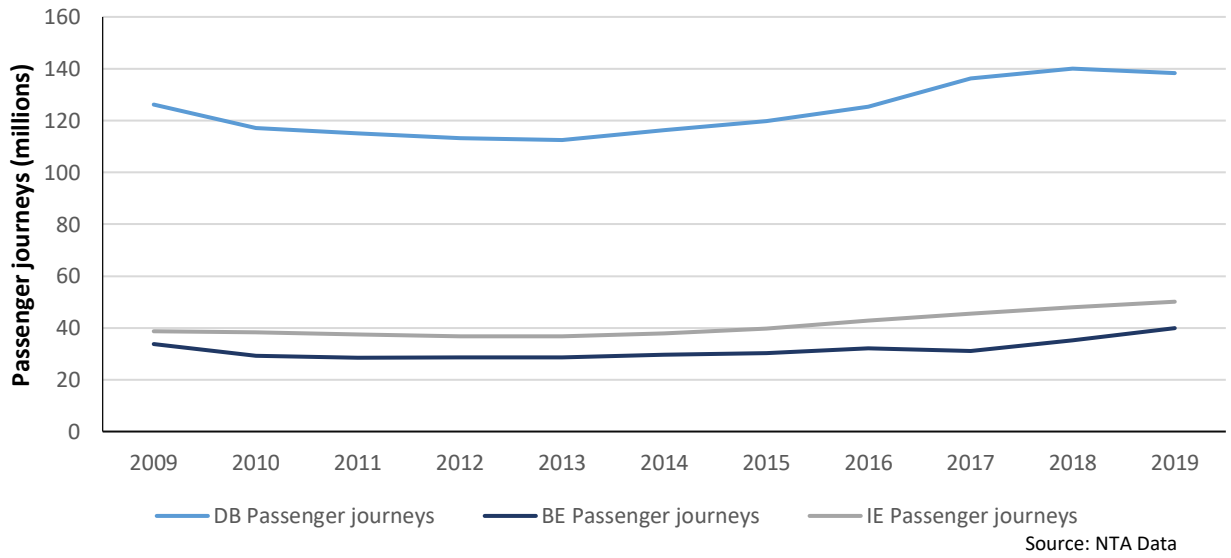
Figure 3 - PSO Vehicle km Travelled[8]



Source: NTA Data

Figure 4 below shows the number of passenger journeys by operator. It is seen that there has been an increase in passenger journeys for all operators since 2013. The number of passenger journeys completed by the three state owned operators has increased by 15.9% over the period 2009-2019. In 2019, 56.2% of the total PSO journeys were carried out by Dublin Bus, 16.2% by Bus Éireann and 20.3% by Iarnród Éireann.

Figure 4: Passenger journeys by operator



Source: NTA Data

6. Revenue

PSO Operators have three major sources of revenue. These are:

- Fare revenue;
- PSO funding and

[8] Following a change in calculation methodology Bus Éireann restated their 2013 vehicle kilometres operated and while Dublin Bus restated their 2014 figures. As a result the 2013 Bus Éireann vehicle kilometres operated is not directly comparable with previous years. Similarly Dublin Bus 2014 figures are not directly comparable with previous years.

- Free Travel Scheme (FTS) funding.

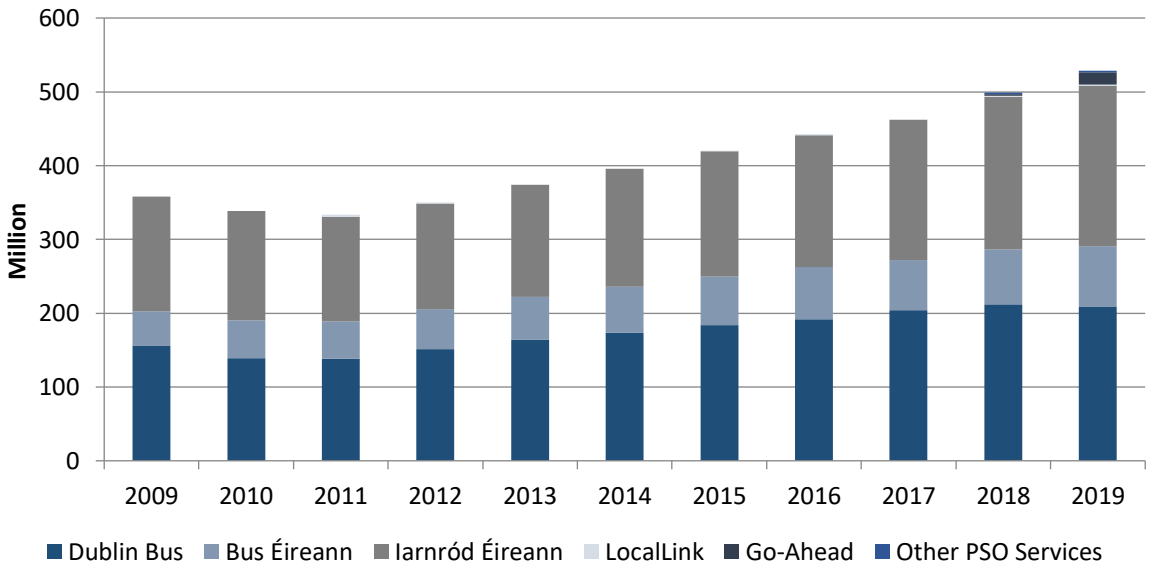
Fare revenue accounts for the vast majority of Operators' revenue. Fares accounted for 74% and 60% of Dublin Bus and Iarnród Éireann's revenue respectively, and just over 50% of Bus Éireann's revenue in 2019[9]. PSO funding is the next largest element accounting for just under 20% of Dublin Bus revenue and approximately 40% of Bus Éireann and Iarnród Éireann's revenue. The FTS accounts for a much smaller share of operator's revenues, at just under 7.5% for Dublin Bus, 8% for Bus Éireann and just over 4% for Iarnród Éireann in 2019.

6.1 Fare Revenue

Fare revenue for the three state owned public transport operators has increased significantly over the period 2009-2019. This growth was driven by an increase in fares over the period 2009-2014, while from 2014-2019 increasing passenger numbers were the main contributor to fare revenue growth.

Fare revenue is driven by passenger numbers and fare structures. Fare revenue received by the three state owned PSO Operators declined by 7.6% over the period 2009-2011 from €357.8m to €333.8m. They then rebounded strongly, growing by 53.6% between 2011 and 2019 to €508m. Overall when Local Link, Go-Ahead and Other PSO services are included fare revenue for 2019 stood at €528.3m. Significant fare increases were approved by the Authority for 2012 and 2013 to compensate for loss in PSO subsidy and these fare increases enabled the growth in passenger revenues despite slight declines in passenger journeys during this period. In 2014-2019 average fare increases were moderate and it was the growth in passenger journeys on the transport services which was the main contributor to fare revenue growth.

Figure 5 – PSO Operators Fare Revenue



Source: NTA Data

[9] Note that this does not include other non-operational sources of revenue such as advertising or car park revenues.

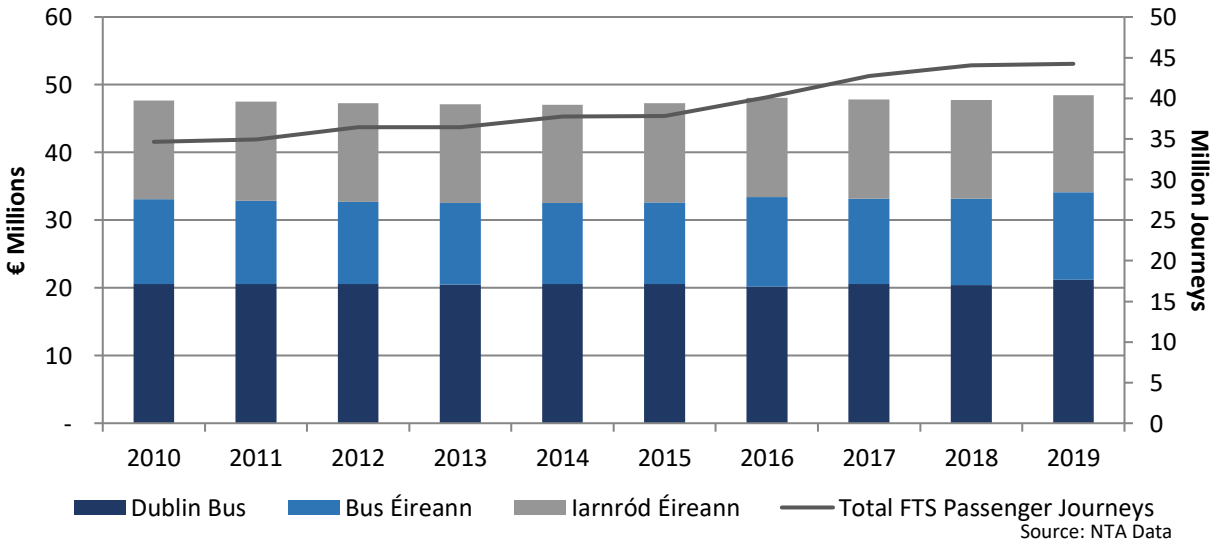
6.2 Free Travel Scheme

In addition to the funding provided by the PSO, public transport operators also receive funding through the Free Travel Scheme (FTS). The Free Travel Scheme allows users to travel free of charge on all public transport owned by the State. Everyone aged 66 and over, legally living permanently in the State, is entitled to the Free Travel Scheme. Some people under 66 also qualify. Unlike the PSO, the FTS is paid directly to operators through the Department of Employment Affairs and Social Protection (DEASP). Figure 10 below displays the FTS funding provided to the three state owned transport operators over the period 2010-2019. It is notable that while the funding provided to operators has remained relatively static at *c.* €47m over the period, FTS passenger volumes using Dublin Bus, Bus Éireann and Iarnród Éireann have increased markedly, rising from 34.6m in 2010 to over 44m in 2019. This was due to a Government decision in 2011 to freeze the level of payment to public transport operators who carried passengers under the Free Travel Scheme (FTS).

The funding paid to the transport operators to provide transport to all passengers who are availing of the FTS has not changed since 2011. Between 2011 and 2018, fare paying passengers have been subject to significant fares increases. There has also been substantial growth both in the numbers of people who are entitled to free travel and in the number of journeys these passengers take each year. This has led to a large deficit in the funding the operators receive for carrying these passengers.

Note that the allocation to DEASP for the FTS is significantly higher than the figures quoted above. For example, in 2019, the expenditure on the FTS was over €93m. The reason for the discrepancy between these figures is due to the fact that the figures analysed above relate only to the PSO services and do not consider other commercial services which also receive FTS funding.

Figure 7 – (LHS) Free Travel Scheme Funding and Passenger Numbers, (RHS) FTS Passenger Journeys



Source: NTA Data

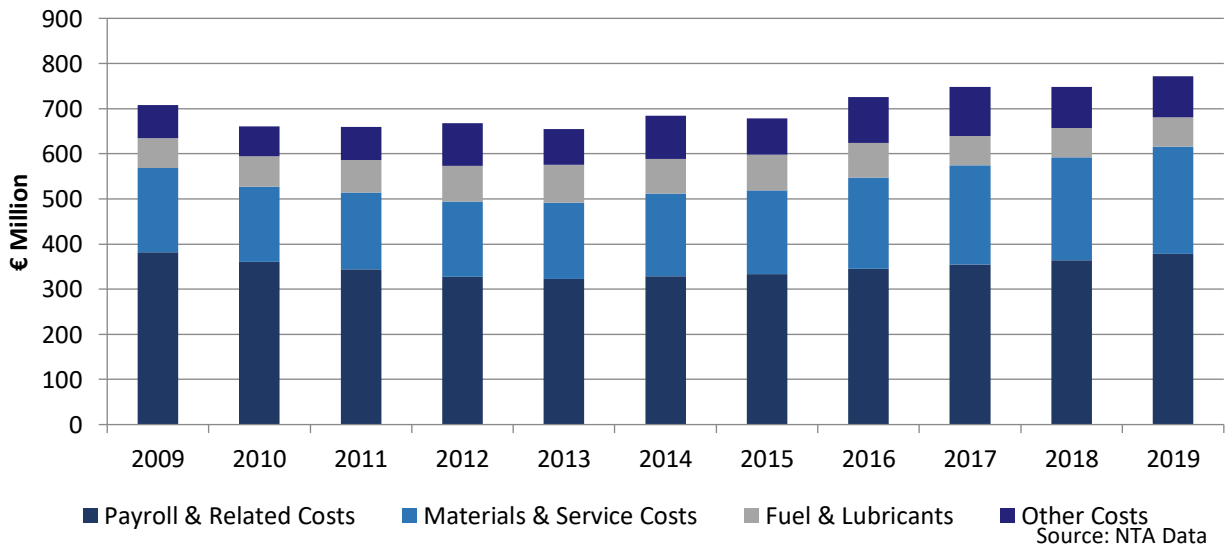
7. PSO Operating Costs

Payroll and related costs accounted for 67% of Dublin Buses PSO operating costs in 2019. By contrast material and service costs accounted for the majority (57.4%) of Bus Éireann PSO operating costs in 2019. At Iarnród Éireann other costs accounted for 23.7%, which was a much higher percentage compared to either of the bus operators.

The total cost of operating Dublin Bus PSO services has remained relatively stable over time, declining by 9% from €281.3m to €255.7m over the period 2009-2014, in line with the fall in passenger numbers and reductions in service levels over the period. Costs then increased by an annual average growth rate of 1.56% between 2014 and 2019 to stand at €283.6m in 2019. Payroll and Related costs are the primary driver for costs over the period and accounted for over 67% of all costs in 2019.

Bus Éireann costs followed a similar pattern to those of Dublin Bus, but with more pronounced falls in costs of 18% during the period 2009-2014, in line with a reduction in services over this period; followed by growth in costs of 45.6% over the period 2014-2019. Unlike Dublin Bus, Materials and Services costs were the primary driver of costs for Bus Éireann over the period and accounted for 57.4% of all costs in 2019. The cost profile for Iarnród Éireann is rather different from the two bus operators. While Payroll and Related costs accounted for 40.8% of costs in 2019, and Materials and Service costs accounted for a further 27%, other costs accounted for a much higher proportion of total costs at 23.7% compared to either of the bus operators. This is due primarily to the substantial track access charges paid by Iarnród Éireann each year.

Figure 7 - State Owned Public Transport Operator Costs

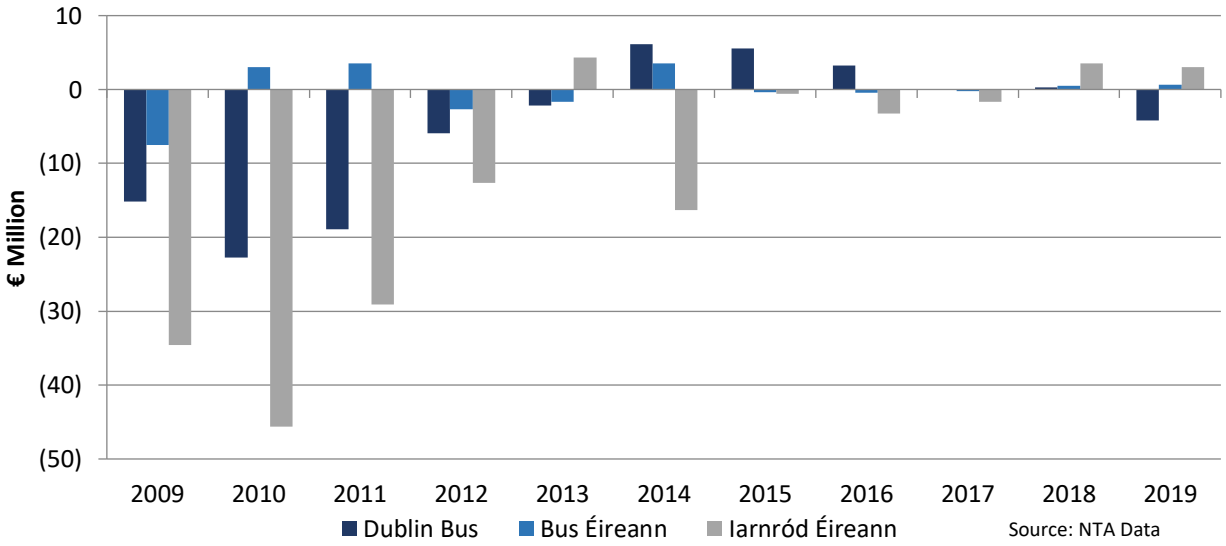


Source: NTA Data

Figure 8 below displays the financial position of the three large PSO Operators over the period 2009-2019. It is notable that the operators made substantial losses during the period 2009-2013, due to the loss in PSO

funding over this period, coupled with the loss of fare revenue. Operators responded by absorbing losses using reserves to cover the shortfall over the period 2009-2011, retaining many of the services considered socially optimal, while other services were curtailed. This in turn led to additional costs such as redundancies. It is worth noting that this could not be repeated in future years as operator's reserves have been exhausted and there has been no period of significant surplus in subsequent years. Operators' financial positions have improved over the period 2014-2019 as the level of PSO funding has been increased and passenger numbers have increased.

Figure 8 - Net Operator Surplus/Deficit on PSO Services 2009-2016



Section 2: Efficiency Analysis

The purpose of this section is to carry out efficiency analysis of state owned PSO operators i.e. Dublin Bus, Bus Éireann and Iarnróid Éireann. This involves analysing indicators that can provide some insight into whether the services are becoming more or less efficient over time. However, it is important to note that efficiency is a relative concept. The following efficiency indicators are analysed in this section and further detail is provided in the Appendix.

Key Performance Indicators

1. ***Cost per passenger journey*** **–** This is the total cost of the operator divided by number of passengers. Total cost of the operator includes materials & service cost, payroll, and fuel. It is important to note that the PSO costs does not take other costs such as contractor costs, cost of claims or depreciation costs into account. It is important to note that these costs are not substantial i.e. other costs only accounted for 4% of total costs when total costs are included.
2. ***Cost per seat kilometre*** **–** This is calculated by dividing the total cost by seat kilometres. Vehicle seat kilometre is the total number of seats available multiplied by the in service kilometres travelled.
3. ***Cost per vehicle Kilometres*** **–** This is calculated by dividing total cost by vehicle kilometres. Vehicle kilometres refers to the actual amount of vehicle kilometres that a bus has operated in a given period.
4. ***Revenue per passenger journey*** **–** This is the total revenue divided by the number of passenger journeys. Total revenue includes fare revenue, FTS funding and PSO funding.
5. ***Revenue per seat kilometre*** **–** This is calculated by dividing total revenue by total vehicle seat kilometres.
6. ***PSO per passenger journey*** **–** This is calculated by dividing PSO funding by number of passenger journeys.
7. ***PSO per seat kilometre*** **–** This is calculated by dividing PSO by total vehicle seat kilometres.
8. ***Utilisation–*** This is measured by calculating passenger trips per seat kilometre.[10] It is important to note that there are caveats to this measure as the measure does not distinguish between peak times and off-peak times and also between standing and seating capacities.

In this section, a variety of metrics have been analysed to judge the efficiency of the PSO operators. It is important to state data on the number of passenger kilometres is not collected by the NTA. For the purpose of this paper, we have selected to employ both the cost per seat kilometre and cost per passenger as the efficiency indicators. However, there are limitations around using them as efficiency indicators as vehicle seat kilometres does not take account the standing capacity in the fleet[11] and cost per passenger does not account for the distance of journeys and is related to usage in a year.

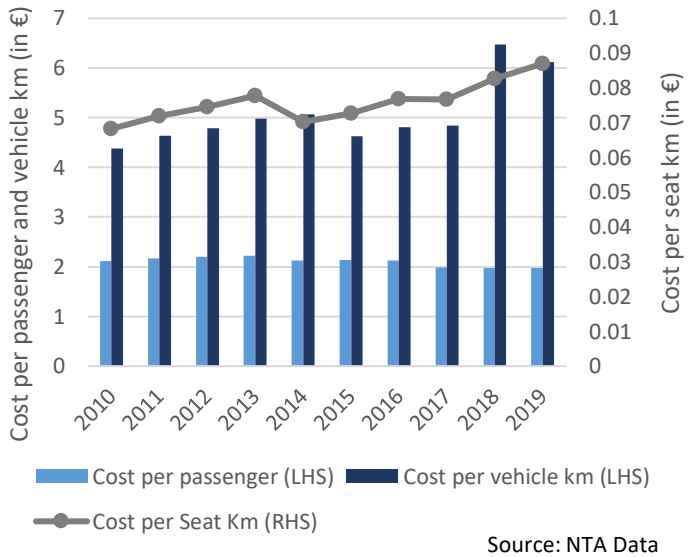
[10] https://core.ac.uk/download/pdf/41174771.pdf (page 4)
[11] https://www.nationaltransport.ie/wp-content/uploads/2019/08/Bus_and_Rail_Statistics_2019.pdf

DUBLIN BUS

Between 2015 and 2019, the cost of running Dublin Bus services has increased per seat and vehicle kilometre, which at a high level indicates reduction in efficiency. However, the cost per passenger has fallen due to a higher usage of the service. In the same time period, the services have become less dependent on subsidy with a reduced level of PSO per passenger.

1. Dublin Bus - Cost per Passenger Journey/Seat Km

Figure 9 - Dublin Bus Cost per Passenger/Seat Km

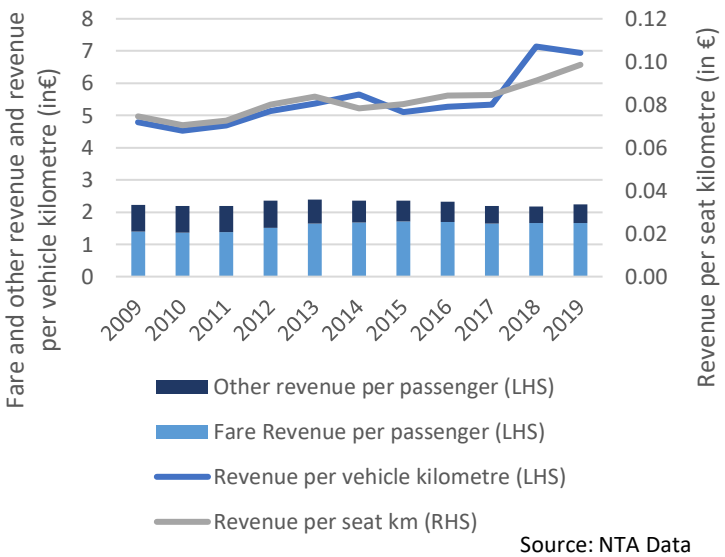


Source: NTA Data

As illustrated in Figure 9, the cost per passenger journey has decreased by 7.2% between 2015 and 2019, in line with increased passenger numbers (15%) which implies a higher level of efficiency. Total costs also increased between this period due to increase in payroll costs. It is important to state that passenger demand is generally correlated with economic growth leading to the rise in wages. Additionally, it was seen that the cost per vehicle kilometre metric increased by 32%. This is partially as a result of utilising an older less fuel efficient fleet. On the other hand, cost per seat km increased by approximately 20% for the same period, indicating that it is becoming more expensive to operate the Dublin Bus services. According to this metric, since 2015, services have decreased in efficiency in recent years with the cost of each seat kilometre rising. Other reasons for increases in cost per seat kilometre include the fact that Go-Ahead Ireland took over 10% of the services, resulting in higher costs per seat kilometre, and the loss of 5% of the number of fleet seats as a result of adding extra standing space and adding a centre door.

2. Dublin Bus - Revenue per Passenger Journey/Seat Km

Figure 10 - Revenue per Journey/Seat Kilometre

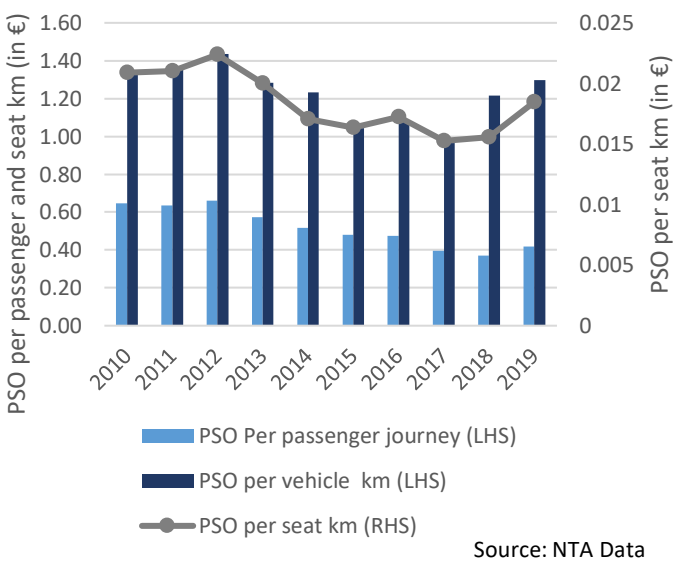


Source: NTA Data

The proportion of fare revenue has increased in proportion to PSO payments between 2011 and 2018 and reduced slightly between 2018 and 2019. On the other hand, absolute DSP funding has remained constant (approximately) since 2009. From 2015 to 2019, total revenue per passenger has decreased by 5% as a result of disproportionate increases in total revenue (10%) and passenger numbers (15%). This is largely due to increased number of free travel passenger and increased leap card users. It is important to note that fare revenue per passenger decreased by 2% from 2015 to 2019. On the other hand, revenue per seat kilometre has been increased by 23% for the same years.

3. Dublin Bus - PSO per Passenger Journey/Seat Km

Figure 11 - Dublin Bus PSO per Journey/Seat Km

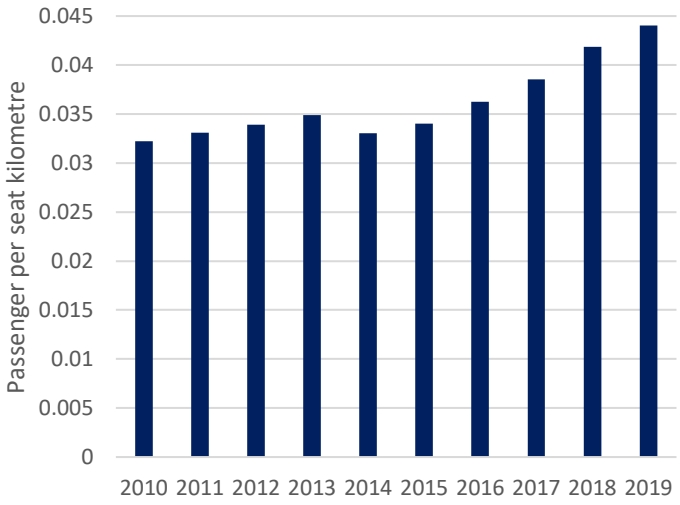


Source: NTA Data

Since 2015, the PSO per passenger journey has decreased by 13%, as a consequence of an increase in PSO subsidy of 1% and increase in passenger numbers of 15%. Conversely, for the same period, PSO per seat kilometre increased by 13% as a result of a decrease in seat kilometres and an increase in PSO subsidy. These indicators, at a high level, illustrate that reliance on PSO for Dublin Bus has increased for the period between 2015 and 2019.

4. Dublin Bus - Utilisation

Figure 12 - Dublin Bus Passengers per Seat km (Utilisation)



Source: NTA Data

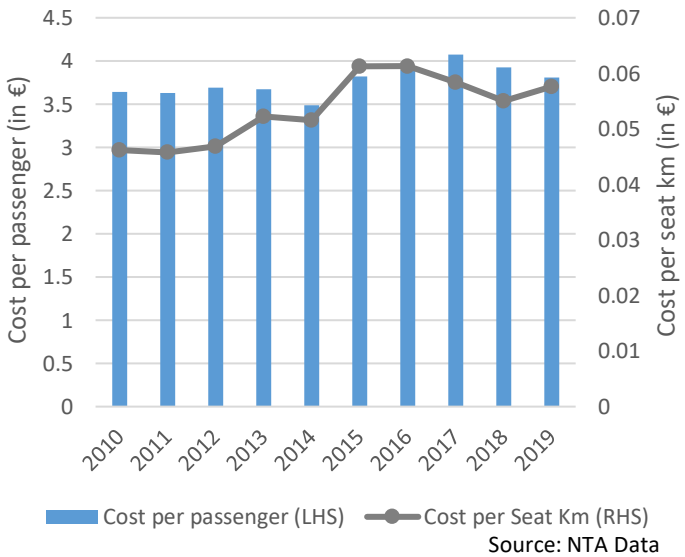
Figure 12 shows Dublin Bus passengers per seat kilometre. It is clear that passenger per seat kilometre has increased significantly for Dublin Bus. Between 2015 and 2019, passenger per seat kilometre increased by 29%, indicating an increasing level of utilisation for Dublin Bus.

BUS ÉIREANN

Between 2015 and 2019, cost per passenger and cost per seat kilometre has decreased slightly, indicating a slight increase in efficiency. However for the same time period, fare revenue per passenger decreased and PSO per passenger journey and seat kilometre increased significantly.

1. Bus Éireann - Cost per Passenger Journey/Seat Km

Figure 12: Bus Éireann Cost per Passenger Journey and Cost per Seat km

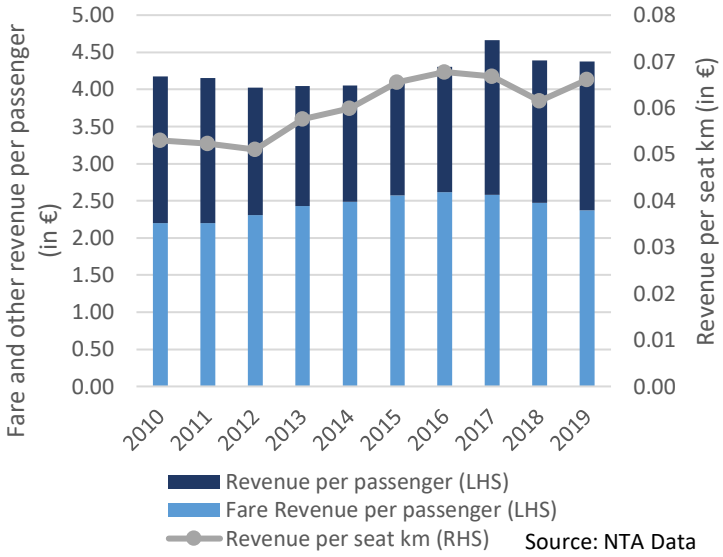


Source: NTA Data

Total Cost have increased since 2015 and passenger numbers have increased since 2012, with a slight drop in passenger numbers in 2017 explaining the significant increase in cost per passenger journey in 2017, as depicted in Figure 12. Between 2015 and 2019, cost per passenger decreased by 0.3%. Cost per seat kilometre decreased by 6%. This analysis shows that the efficiency of Bus Éireann with respect to both of these indicators has increased slightly over period 2009-2019.

2. Bus Éireann - Revenue per Passenger Journey/Seat Km

Figure 13: Bus Éireann Revenue per Passenger/Seat km

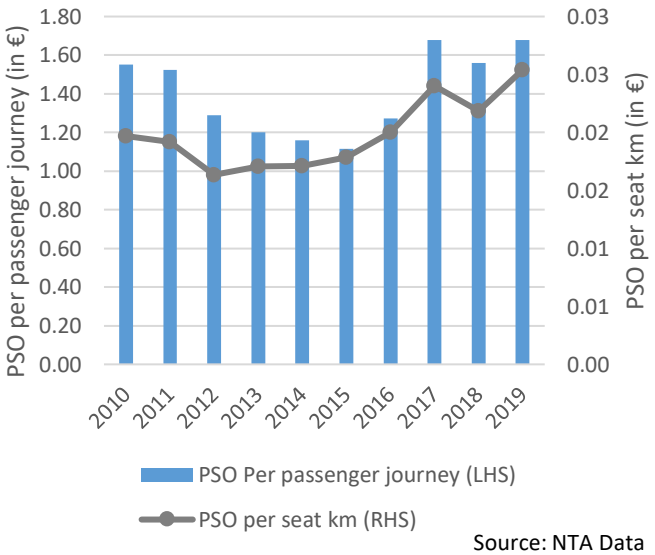


Source: NTA Data

Initial analysis shows that Bus Éireann revenue has been increasing from 2012 to 2017. This is as a result of consistent increases in fare revenue since 2011. The Figure 13 shows the revenue per passenger journey and revenue per seat kilometre for Bus Éireann. Since 2015, revenue per passenger has increased by 7% as a result of increase in total revenue by 41% and increase in passenger numbers by 32%. For the same time period, revenue per seat km increased by 1%.

3. Bus Éireann - PSO per Passenger Journey/Seat Km

Figure 14: Bus Éireann PSO per Passenger Journey and PSO per Seat km

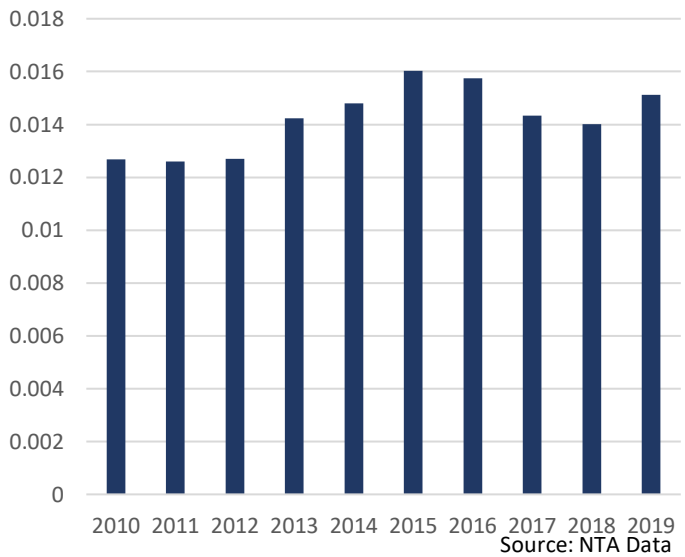


Source: NTA Data

PSO per passenger journey decreased from 2011 to 2015, it then increased for two years before declining in 2018 and increasing in 2019. The increase in PSO per cost and seat kilometre in 2017 is partially due to the Bus Éireann strike. Between 2015 and 2019, PSO per passenger increased by 51%. This has been as result of 99% increase in PSO and 32% increase in number of passengers. The PSO per seat kilometre increased by 42% as a result of 99% increase in PSO and 40% increase in seat km for the same period. These measures, at a high level, show that the efficiency of Bus Éireann has reduced as more PSO subsidy per passenger is required overtime.

4. Bus Éireann - Utilisation

Figure 15 - Bus Éireann Passengers per Seat km



Source: NTA Data

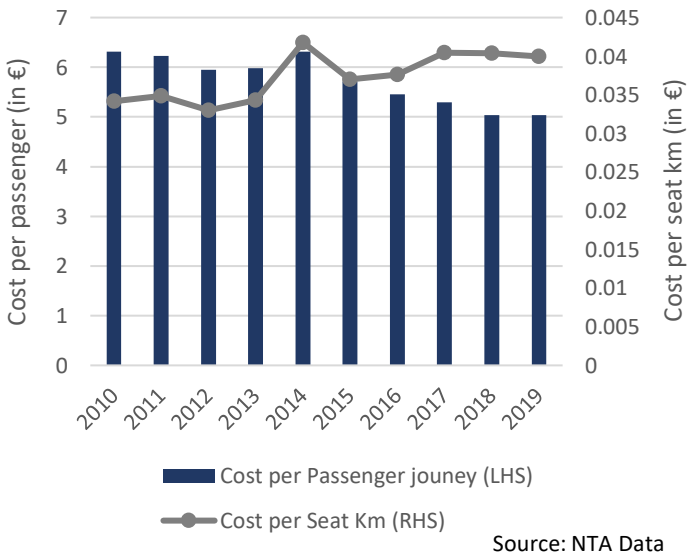
Figure 15 shows the passenger per seat kilometre for Bus Éireann. Passenger per seat kilometre has increased by 6% between 2017 and 2019, implying that utilisation of Bus Éireann has increased. This is a result of an increase in passenger numbers by 28% and seat kilometres by 21%. Overall, the passenger per seat kilometre or utilisation rate has increased by 19% between 2010 and 2019.

IARNROD EIREANN

Between 2015 and 2019, cost per passenger journey has decreased while cost per seat kilometre has increased, alongside a substantial increase in utilisation. For the same time period, fare revenue per passenger and PSO per passenger journey were relatively stable.

1. Iarnród Éireann - Cost per Passenger/Seat Km

Figure 16 - Iarnród Éireann Cost per Passenger Journey and Cost per Seat km

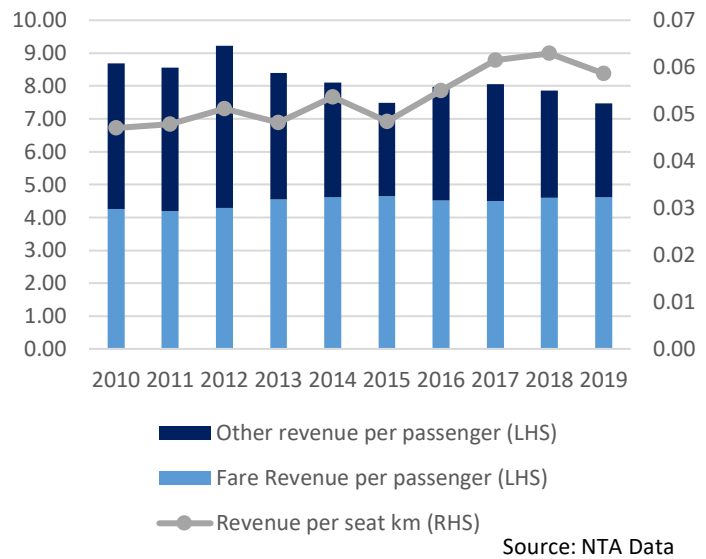


Source: NTA Data

It can be seen from Figure 16 that cost per passenger fell by 11% since 2015. Additionally, cost per passenger in 2019 is the lowest it has been in almost ten years. On the other hand, cost per seat kilometre has increased by 8% since 2015. It is important to note that for this time period, total cost increased three times (by 12%) as much as seat kilometres (4%).

2. Iarnród Éireann - Revenue per Passenger/Seat Km

Figure 17 - Iarnród Éireann Revenue per Passenger, Fare Revenue per passenger and Revenue per Seat km

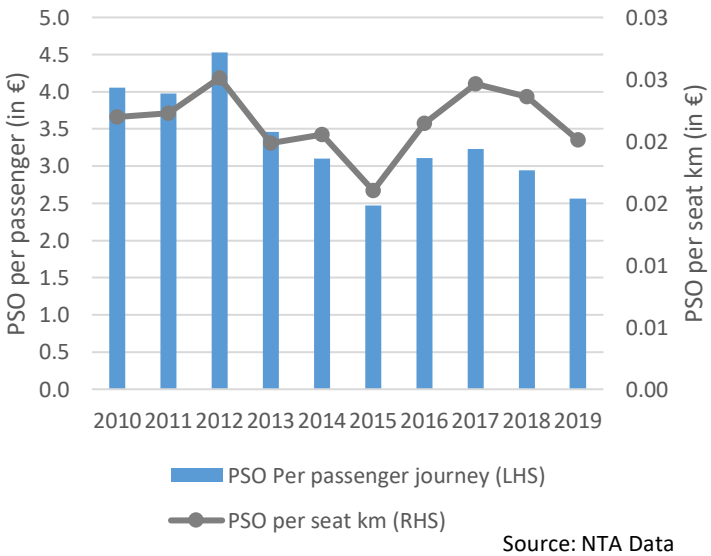


Source: NTA Data

It can be seen from Figure 17 that, since 2015, total revenue per passenger has decreased slightly by 0.3% as a result of an increase in total revenue by 26% and an increase in passenger numbers by 26%. On the other hand, revenue per seat km increased by 21% as a result of total seat kilometre increasing by 4% between 2015 and 2019.

3. Iarnród Éireann - PSO per Passenger/Seat km

Figure 18 - Iarnród Éireann PSO per Passenger Journey and PSO per Seat km

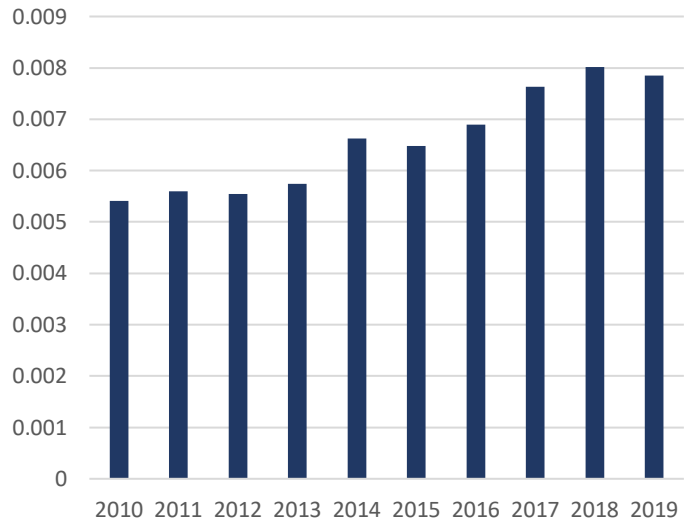


Source: NTA Data

The significant reduction in PSO per passenger journey, as shown in Figure 18, is due to a significant decline in PSO funding for Iarnróid Éireann from 2012 to 2019. Additionally, PSO per seat kilometre follows roughly the same trend as PSO per passenger journey. From 2015 to 2019, PSO per passenger journey increased by 4%, in line with increase in PSO funding by 31%. The PSO per seat km increased by 26%, as a result of an increase in PSO funding, and an increase in seat km (4%).

4. Iarnród Éireann - Utilisation

Figure 19 - Iarnród Éireann Passengers per Seat km (Utilisation)



Source: NTA Data

Figure 19 shows the passenger per seat kilometre for Iarnród Éireann. It is seen that the passenger per seat kilometre has increased by 21% between 2015 and 2019. This is as a result of increase in passenger numbers by 26% while seat kilometres only increased by 4% for the same period. This indicates a high utilisation of Iarnróid Éireann services.

Section 3: Effectiveness/Quality Analysis

The purpose of this section is to examine the effectiveness of the PSO operators by analysing their reliability and punctuality. These measures can tell us whether the actual services delivered by the operators are getting better or worse. This paper considers the changes between years, 2017 to 2019 for the PSO operators. Research shows that punctuality and reliability are the most significant factors in determining passengers' overall satisfaction with their journey.[12]

1. Methodology - Punctuality and Reliability

The following section looks at the methodology for effectiveness indicators such as punctuality and reliability. It provides definitions of the effectiveness indicators, outlines an explanation of the indicator variables and summarises any external or internal factors that may have impacts on the variables.

Punctuality *is the extent to which low frequency services are on time.*

Punctuality is a key performance indicator for the PSO operators. For Dublin Bus and Bus Éireann, punctuality is measured as the percentage of times buses are at the stop within -1 minute and +5 minutes 59 seconds of the scheduled time, observed at all stops along a route over each four week period. The NTA measures percentage punctuality each four week period (P1 to P13) in each year measuring scheduled departure times for each stop against actual departure time as recorded by Automatic Vehicle Location equipment on board each bus, except the final stop where the arrival time is measured. It is important to mention that a minimum

[12] https://www.transportfocus.org.uk/punctuality-and-transparency/

performance standard of punctuality has been set by the NTA. Recently, this has been termed minimum performance standard as it reflects the fact that operators are encouraged to go beyond the target punctuality rate. It is important to note that in the figures and descriptions in this paper, the minimum performance standard are referred to as target. For Iarnród Éireann, the NTA defines the criteria for punctuality; Intercity and regional routes are defined as being on time if they are at the station within ten minutes of scheduled time. The corresponding minimum performance standard is five minutes for DART, Dublin and Cork commuter routes. All recently signed PSO contracts include a punctuality incentive payment system to encourage improvement beyond the contractual performance standard.

It is important to note that punctuality is affected by both internal and external factors. Internal factors include boarding and alighting time (time taken by passengers to board and exit vehicles), dwell time (time the vehicle is stopped), effectiveness of vehicle maintenance and management, driving style, timetable and route planning, while external factors include traffic congestion, incidents, overall management of the transport system and infrastructure.

Excess Wait Time (EWT) – *measuring punctuality of High Frequency routes.*

For Bus Éireann and Dublin Bus, there are high frequency routes and low frequency routes. Regularity of high frequency routes is measured by the EWT metric. This metric provides a measure of the average time a passenger must wait for the next high frequency bus, in excess of the wait time which would be expected as per the schedule for that route. The high frequency routes for Dublin Bus are 1, 4, 9, 13, 14, 15, 15B, 16, 27, 39A, 40, 46A, 123, 130 and 140.

Reliability *is the extent to which scheduled services operate.*

Reliability is a key performance indicator of Dublin Bus, Bus Éireann and Iarnróid Éireann as part of the terms of their PSO Contract with the NTA. Reliability of Dublin Bus and Bus Éireann is measured using a metric called Lost Kilometre Rate (%). This is measured in two steps. Step 1 consists of calculating the number of lost km which is total scheduled services minus total operated km. Step 2 consists of calculating lost kilometre rate which is number of lost km divided by total scheduled services, all multiplied by one hundred.[13] The reliability rate of Iarnród Éireann is calculated by dividing the total kilometre operated by PSO Train kilometres target.

Punctuality and reliability targets are set by the NTA as stated in Section 1 of the paper.

[13]The Total Services Operated is determined by the AVL (Automatic Vehicle Location) system which is installed on each bus to record the route and distances travelled. The Number of Lost Kilometres does not include bus services (whole or partial routes) which could not be operated for reasons outside of the control of Dublin Bus (for example, road closures due to a major event, extreme weather resulting in unsafe road conditions etc.). These exceptions are identified by Dublin Bus and approved by the NTA.

2. Analysis of Punctuality and Reliability

Dublin Bus

Between 2017 and 2019, the punctuality rate has improved slightly. Additionally, between 2018 and 2019, departures on time have improved for 17% of the routes. Additionally, loss kilometre rate and loss kilometre rate standard decreased between 2017 and 2019, indicating at a high level, an increase in reliability.

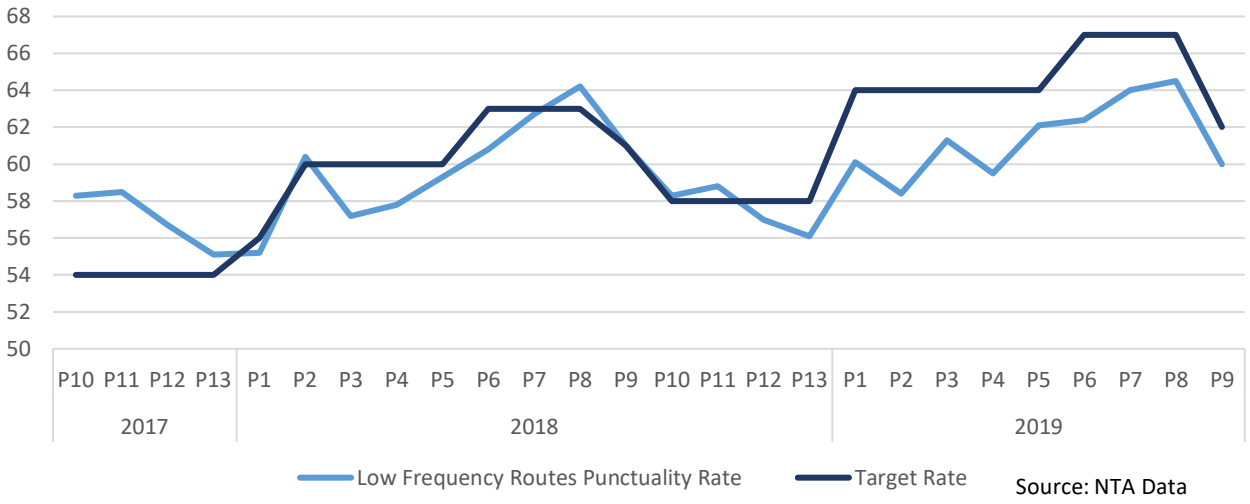
Punctuality

The following subsection sets out punctuality and reliability analysis for Dublin Bus, examining both the current situation and situation overtime. The infographic below shows the planned leave times, the actual leave times, actual departures on time, early departures and late departures for the most recent data period (Q3 2019). It is seen that 63% of the departures were on time, 14% were early departures while late departures accounted for 23%. The Bus routes with less than 10% of late departures and those with more than 30% of late departures can be found in the Appendix.

The paper also focuses on the Excess Waiting Times (EWT) for Dublin Bus for the 2019 Q3. To recall, this metric measures the punctuality of the high frequency routes. The analysis shows that EWT for Saturday is greater than EWT Weekday and EWT Sunday. To elucidate, the EWT interval for weekdays and Sundays is between one and four minutes, while it is between two and six minutes for Saturday. The EWT by specific routes for Weekdays, Saturdays and Sunday can be found in the Appendix below.

It is vital to analyse the changes between the quarters and the years in order to measure if Dublin Bus punctuality is getting better or worse. Figure 20 below looks at the punctuality rate and target rate of low frequency routes. It is important to mention that target rate has been termed minimum performance standard as it reflects the fact that operators are encouraged to go beyond the target punctuality rate. It is seen that punctuality target rate are the highest for P6 to P8 (mid-May to mid-August), while they are lowest for P10 to P13 (mid-September to the first week of December). The analysis shows that for the period between 2017 Q4 and 2019 Q3, the actual punctuality rate is lower than the target rate for 18 out of 26 periods. For the time period shown in Figure 20 below, on average, the actual punctuality rate increases between P3 to P8 and decreases from P9 to P13, while fluctuations in the punctuality rate are observed from P1 to P3.

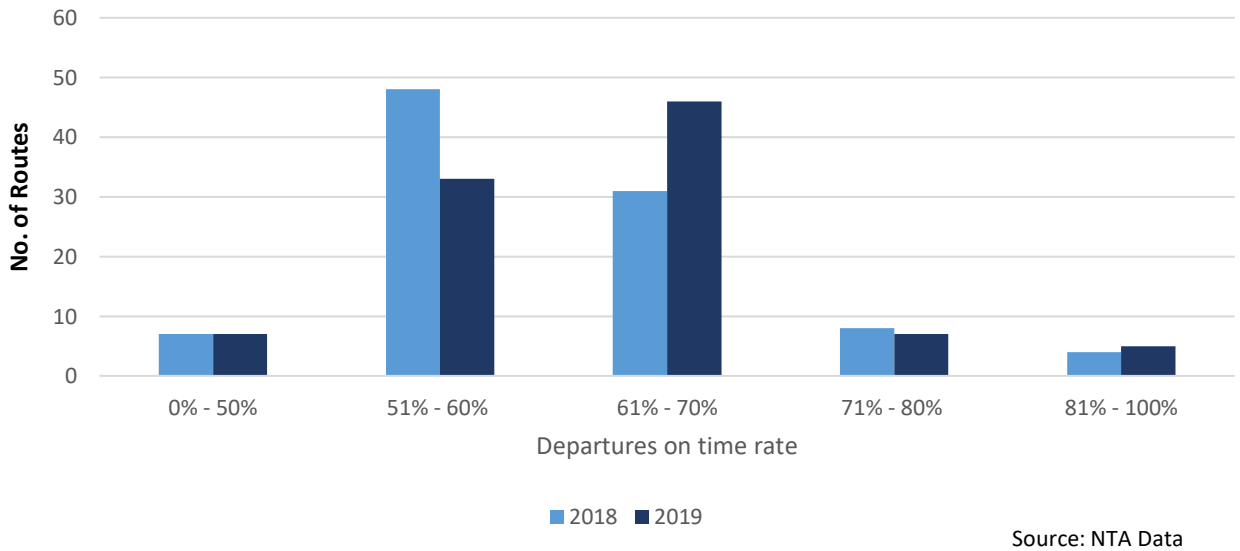
Figure 20 - Dublin Bus Punctuality Rate and Target Punctuality Rate by Years



Source: NTA Data

According to the NTA, for passengers, departure from a route-stop is a more important measure of punctuality than arrival time, since passengers are concerned firstly with the time they need to arrive at the departure point and the time that they set off on their journey. As an example, a bus might arrive at a stop a few minutes ahead of schedule, but as long as it departs 'on-time', the passenger who relies on the timetable will have been in a position to board the bus. Figure 21 below shows the number of routes by the 'departures on time' rate and years. It is important to highlight that the bar charts have been constructed by taking the average of Q1, Q2 and Q3 of both years i.e. 2018 and 2019. It is seen from Figure 21 that there are 15% more routes in the 61-70% interval in 2019 than 2018, indicating that punctuality has improved.

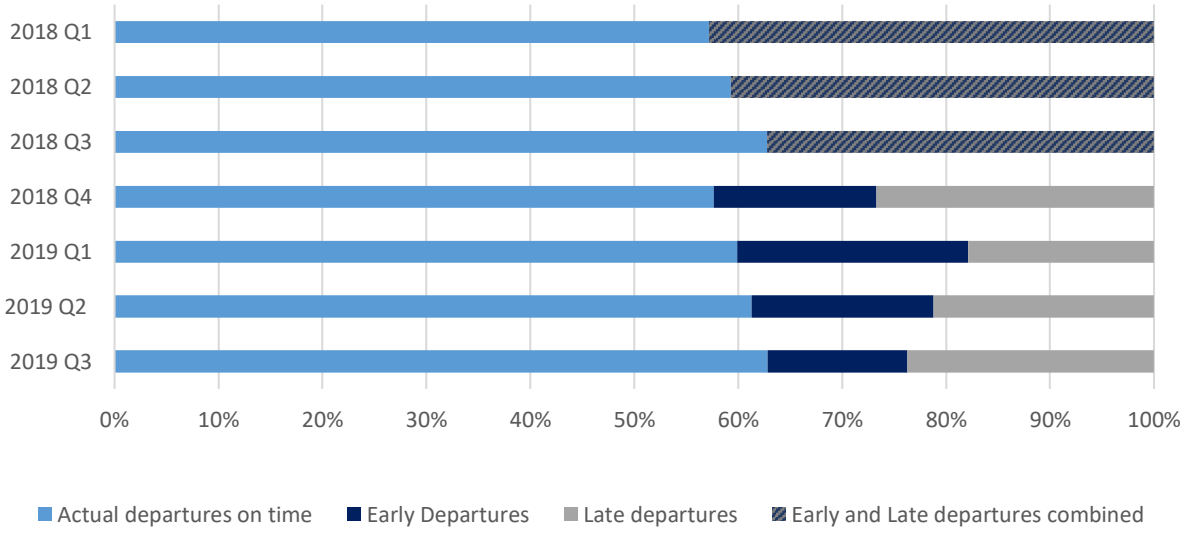
Figure 21 - Dublin Bus Number of Routes by Punctuality Rate and Years



Source: NTA Data

The stacked bar chart below shows the proportion of services whose departure was on time, early or late. It shows that in 2019 Q3, 63% of the departures were on time. It also shows that the proportion of actual departures on time has been increasing since 2018 Q4. It is important to highlight that in the proportion of late departures increased between 2019 Q1 and 2019 Q3. However, as stated earlier, comparisons between quarters are difficult to interpret due to external factors such as weather conditions and traffic congestion.

Figure 22 - Dublin Bus Departures on Time, Early Departures and Late Departures by Quarters.



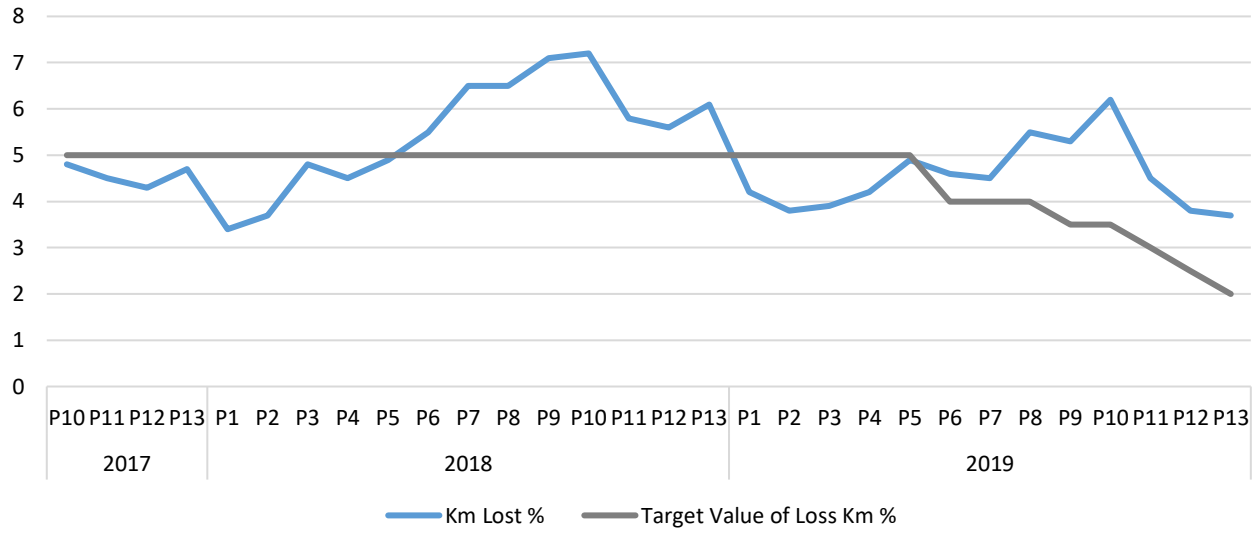
Source: NTA Data

Reliability

Reliability is the extent to which scheduled services operate. It is a key performance indicator of Dublin Bus. The infographic shows the planned kilometres, actual kilometres travelled and the reliability metric, kilometre lost, for Q3 2019 for Dublin Bus. It is noted that 94.9% of the planned kilometres were in operation in Q3 2019, indicating that Dublin Bus was slightly over the 5% Loss kilometre target. Route by route analysis of reliability shows that around 75% of Dublin Bus routes had a lost kilometre rate of below 5% in 2019 Q3.

Figure 23 below, illustrates the lost kilometre rate and the target for the periods between 2017 Q4 and 2019 Q3. The loss kilometre target rate is 5% for all periods, with the exception of 2019 P6 to 2019 P13 where it reduces. This means that Dublin Bus's target is to operate, at least or more than, 95% of their planned routes between the periods shown in the graph below. From Figure 23 below, it can be seen that, in 2017, the lost kilometre rate is below the target value whereas it is over the target value from P5 to P12 2018 and from P6 to P13 in 2019. Focusing on the lost kilometre rate, it is noted that reliability decreased from P6 (May 21st) to P10 (Mid-October) in 2018 and from P3 (February 25th) to P10 (October 6th) in 2019.

Figure 23 – Dublin Bus Lost Kilometre Rate and Target Lost Kilometre Rate by Period



Source: NTA Data

Bus Éireann

Between 2017 Q4 and 2019 Q3, a significant increase (11 percentage points) in the punctuality rate of low frequency routes was observed. Route by route analysis shows that, between 2018 and 2019, the departures on time improved for approximately one-fifth of the routes. Additionally, lost kilometre rate decreased by 1 percentage point between 2017 and 2019, indicating an increase in reliability.

Punctuality

The following section looks at punctuality of Bus Éireann services.[14] The infographic below shows the proportion of buses that were on time, early and late. The punctuality rate of 59% was under the target value of 64% for Q3 2019. Analysis by route was also completed and it was found that approximately 9% of the routes were below the punctuality rate of 40%, while approximately 7% of the Bus Éireann routes were above the punctuality rate of 75%. The route numbers and their operating regions can be found in the Appendix.

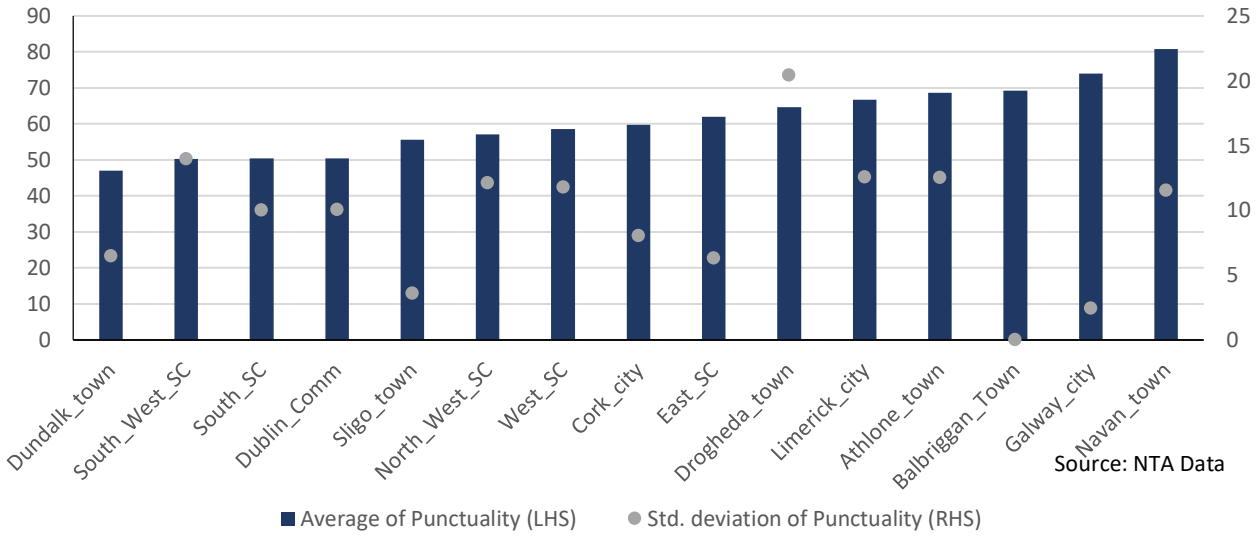
Actual Leave times 6,607,402 = **Actual Departures on time** 3,896,179 (59%) + **Early departures** 993,591 (15%) + **Late departures** 1,717,632 (26%)

Punctuality analysis of the six high frequency Bus Eireann routes was also carried out. The analysis showed that the Excess Wait Time (EWT) for Saturday is greater than EWT weekdays and EWT Sunday for all routes except 206 and 409. It was noted that the interval for EWT for weekdays and Sundays was between 0 and 2 minutes and between 0 and 3 minutes on Saturday. Specific route EWT data can be found in the Appendix.

[14] There are also a number of commercial bus services operated by Bus Éireann. These routes are not part of the PSO contract with the NTA and are therefore not included in any KPI calculations.

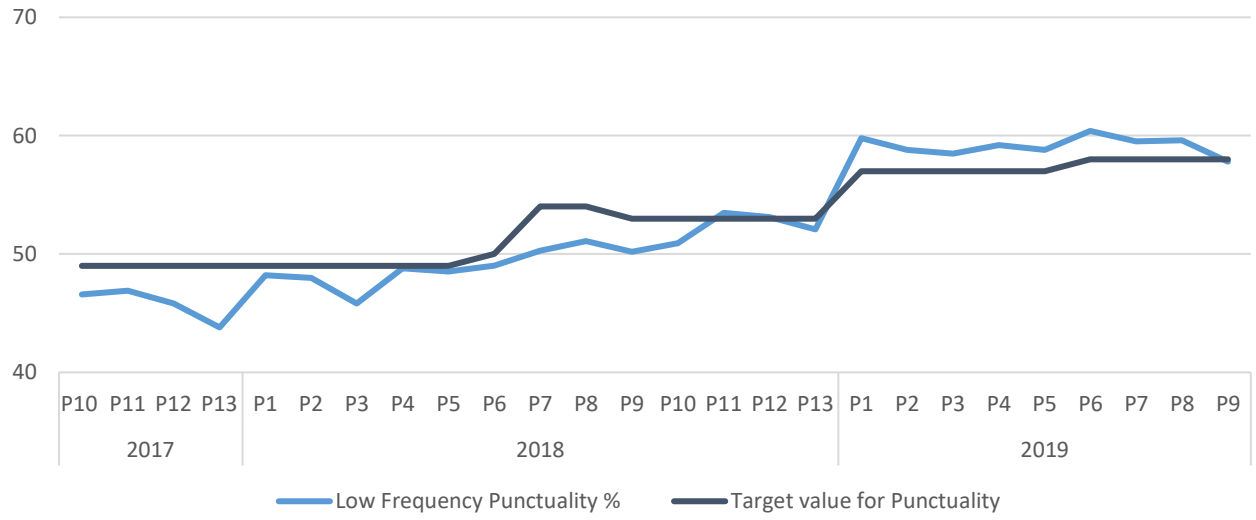
Figure 24 below, shows the punctuality rate by region for 2019 Q3. The bar chart displays the average rate of punctuality of the region while the grey dots represent the standard deviation, which is the measure of spread of the punctuality rate and is heavily impacted by local traffic conditions and bus priority in that particular region. The Bus Éireann services in Galway city and Navan town have the highest rate of punctuality at 70%. It is important to note that a low standard deviation, such as in the case of galway city, means that most of the punctuality rates of all Galway routes are around the route average.

Figure 24 - Bus Éireann Punctuality Rate and Standard Deviation by Regions



Punctuality by periods was also calculated with the results displayed in Figure 25 below. It is important to note that from 2017 to 2019, there is a significant increase (9%) in the target value for punctuality, indicating confidence in the punctuality of the Bus Éireann routes. From 2018 P11 to 2019 P8, it can be seen that the punctuality rate is higher than the target value set out for that period, with the exception of P13 2018. Focusing on the punctuality rate, it is seen that the punctuality rate fluctuates and has increased by almost one-quarter between 2017 Q3 to 2019 Q3.

Figure 25 - Bus Éireann Punctuality Rate and Target Punctuality Rate by Years

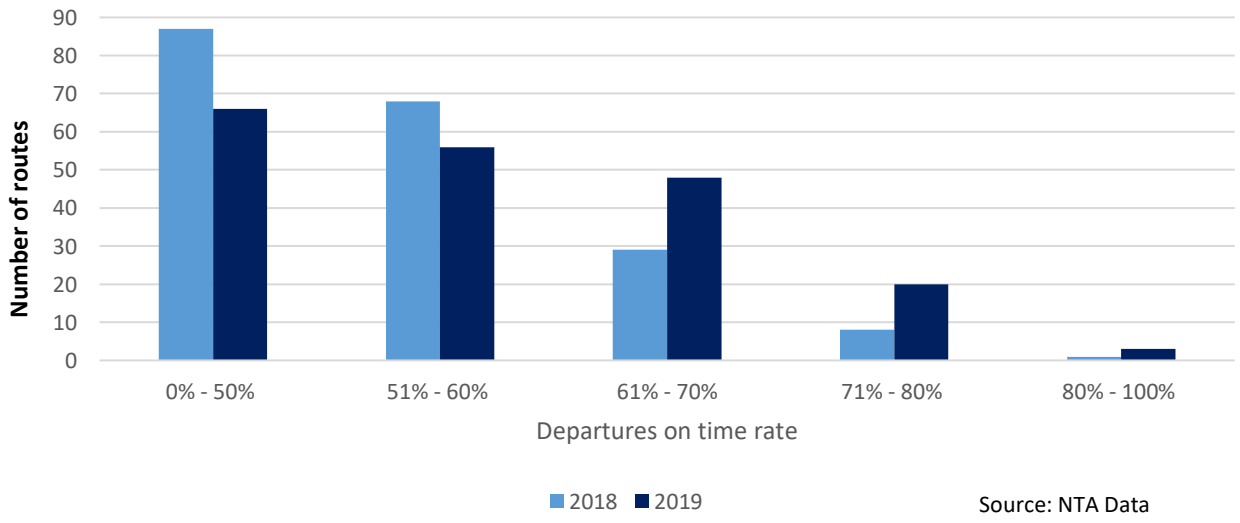


Source: NTA Data

Analysis was also carried out to look at the changes in Excess Waiting Time (EWT) for Bus Éireann High Frequency routes between 2019 Q1, Q2 and Q3. To recall, low actual EWT means that the passenger spends less time waiting for the bus to arrive at the bus stop. It is noted that the actual EWT is less than the target EWT for all periods except P5 (April 22nd to May 19th). The Actual EWT increases between Q1 2019 and Q2 2019, after which the EWT declines until Q3 2019.

To recall, according to the NTA, for passengers, departure from a route-stop is a more important measure of punctuality than arrival time, since passengers are concerned firstly with the time they need to arrive at the departure point and the time that they set off on their journey. Figure 26 below shows the number of routes by 'departures on time' rate and years. As the graph depicts, the departures on-time rate increased significantly between 2018 and 2019, in particular the 61% to 80% interval.

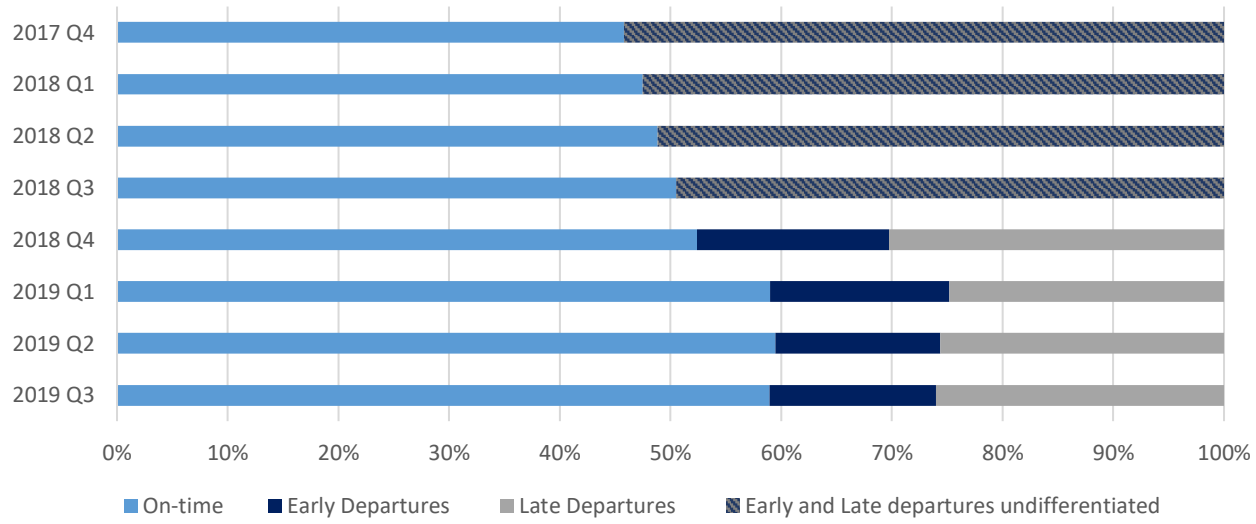
Figure 26 - Bus Éireann Number of Routes by Punctuality Rate and Years



Source: NTA Data

Figure 27 analyses the changes between 2017 Q4 to 2019 Q3 for Bus Éireann. It can be seen that the proportion of on-time departures increased significantly between 2018 Q4 to 2019 Q2 and fell slightly from 2019 Q2 to 2019 Q3. It is also important to note that the proportion of late departures increased slightly between 2019 Q1 and 2019 Q3.

Figure 27 - Departures on Time, Early Departures and Late Departures by Quarters.

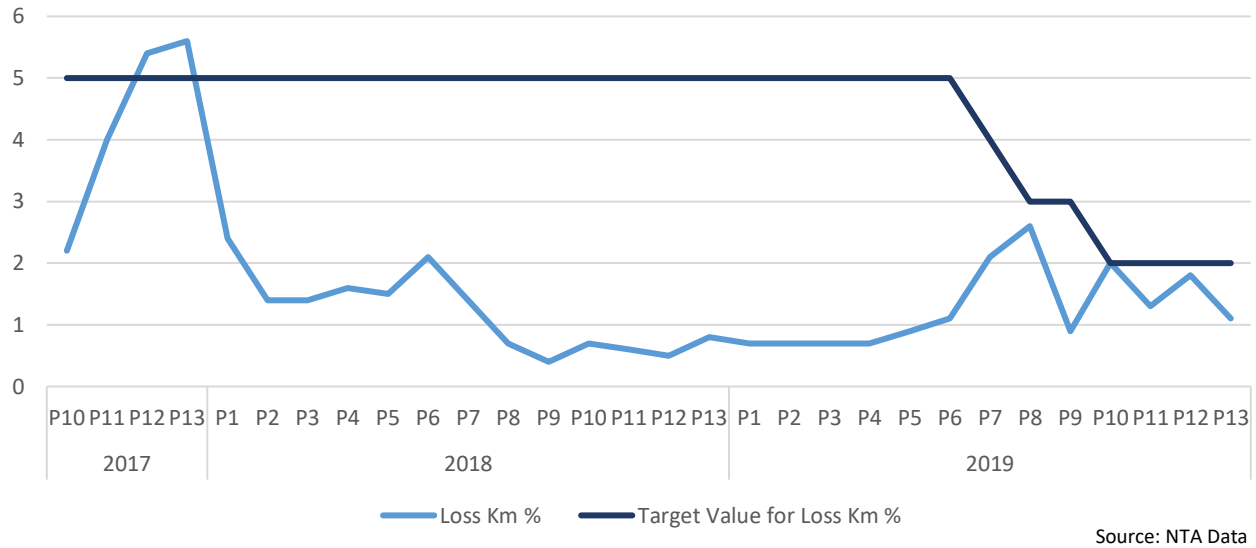


Reliability

The subsection discusses the reliability performance of Bus Éireann in 2019 Q3. The infographic below shows that 98.1% of the planned kilometres were operated in 2019 Q3, indicating high reliability of Bus Éireann. It is also seen that 1.9% of the planned kilometres are lost, which is less than the target value for loss km rate (5%).

Figure 28 below examines the periods between Q4 2017 and Q4 2019. It is evident that the target value for lost km rate has remained unchained between 2017 P10 to P6 2019, after which it reduces. From this line graph, it is seen that the loss km rate is below the loss kilometre target value for all periods except P12 and P13 in 2017. It is clear from looking at the figure below that loss kilometre rate has fallen from Q3 2017 to Q3 in 2019, indicating that the effectiveness and reliability of Bus Éireann has increased between 2017 and 2019.

Figure 28 - Bus Éireann Lost Kilometre Rate and Target Lost Kilometre Rate by Period



Source: NTA Data

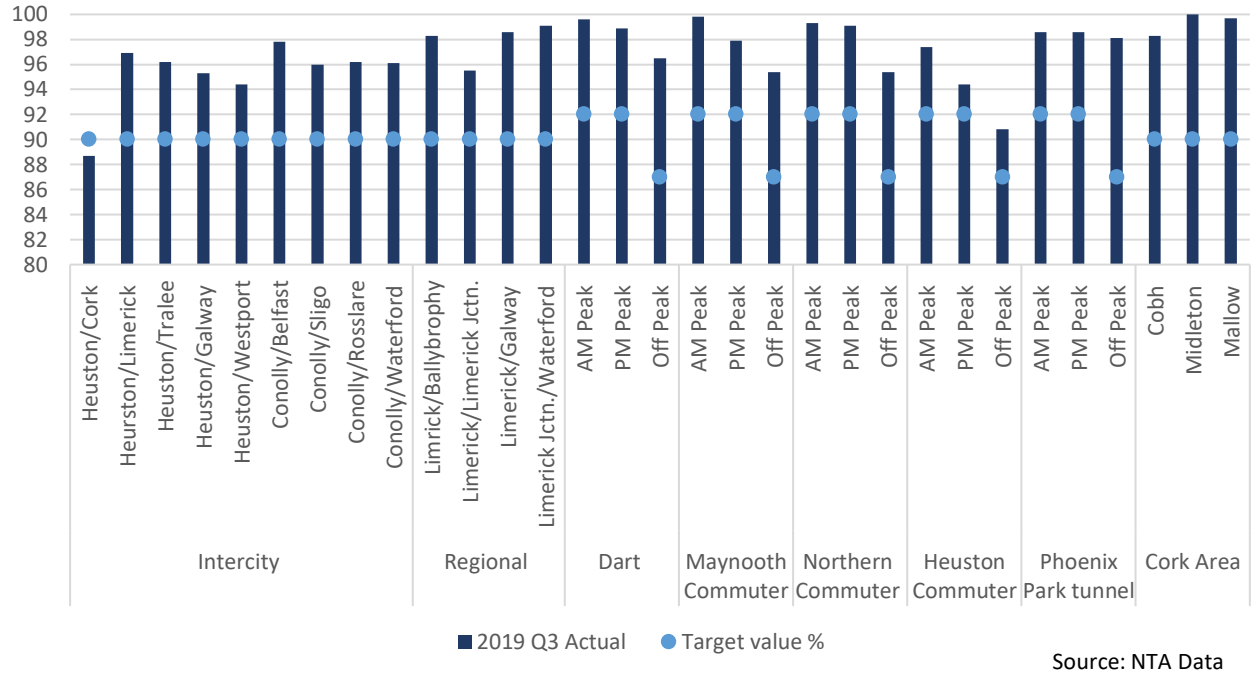
Iarnród Éireann

In 2018 and 2019, Punctuality rate is above the target punctuality rate (90%) for all routes with the exception of the Heuston Cork route in 2019 Q3. Additionally, reliability has increased between 2018 and 2019.

Punctuality

The following section focuses on the punctuality performance of Iarnród Éireann. There are 31 routes in total divided into 8 categories; Intercity, Regional, Dart, Maynooth Commuter, Northern Commuter, Heuston Commuter, Phoenix Park Tunnel and Cork area. Some of the services have AM, PM and off peak services, where the off peak services have a target value of 87% while the AM peak, PM peak and other services listed in the graph below have a target value of 90%. An Off-Peak train time is classed as any time outside the busiest times of rail travel, usually outside of commuting hours and during weekends. It is evident from the line chart below that, punctuality rate is above the target value for all routes with the exception of Heuston Cork route in 2019 Q3.

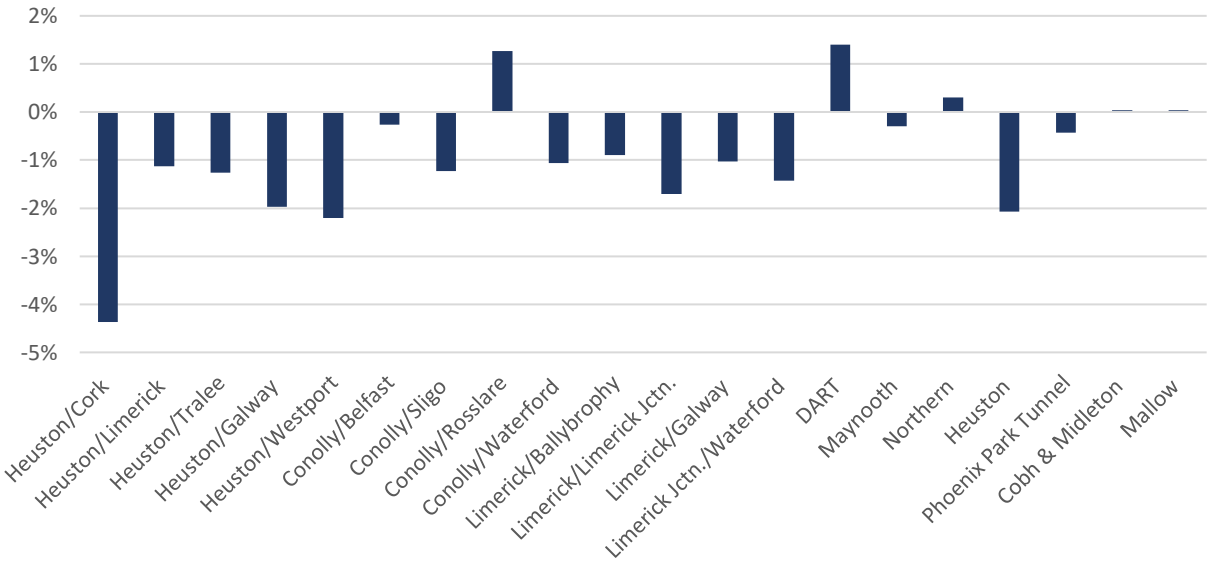
Figure 29 - Iarnród Éireann Punctuality Rate and target Rate for 2019 Q3



Source: NTA Data

The graph below illustrates the difference in the punctuality rate between 2018 and 2019. The 2018 average was calculated by taking the average of 2018 Q1, Q2 and Q3 and the 2019 average was calculated by taking the average of 2019 Q1, Q2 and Q3. It is seen from the chart below that routes such as Connolly - Rosslare, DART, Northern commuter, Cobh and Midleton and Mallow have improved in punctuality between 2018 and 2019 while others, especially Heuston- Cork has declined in punctuality for the same time period.

Figure 30 – Difference in punctuality rate between 2018 and 2019



Reliability

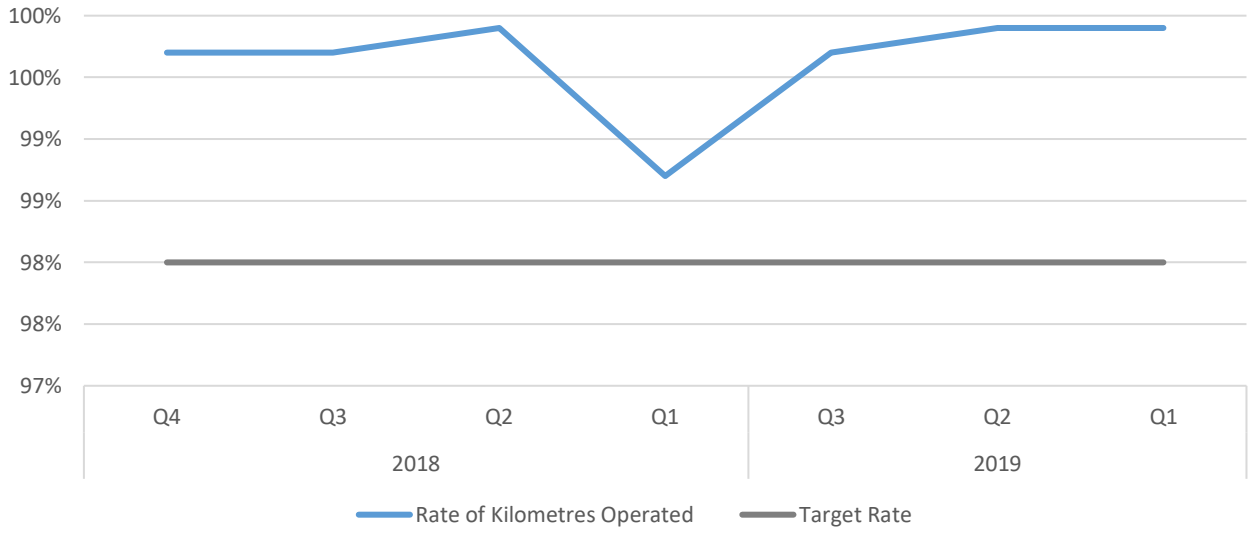
The infographic below shows that PSO kilometre target has been achieved for 99.7% of the routes in 2019 Q3, exceeding the Iarnród Éireann reliability target rate of 98%. However, it is important to know that for the same time period, Limerick Ballybrophy (97.6%) and Cobh Midleton (97.7%) were under the reliability target.

PSO Km Target
4082.6

Total km operated
4072.1 (99.7%)

Figure 31 below shows the changes between the quarters in 2018 and 2019. It can be seen that the kilometre operated rate of is over the target rate for all the quarters. Focusing on the kilometres operated rate, Figure 31 illustrates that reliability has increased between 2018 and 2019.

Figure 31: Iarnród Éireann Kilometres Operated Rate and Target Rate by Years



Conclusion

In conclusion, this paper has made the following high level findings:

- In terms of the operation of the PSO when considering potential changes to routes the NTA considers a range of factors such as availability of funds, existing demand profile and reports from operators. The NTA also convenes a Network Planning Group which considers and prioritises potential changes to route or services.
- In the summer each year the NTA provides D/Transport with an estimated cost for maintaining the current level of services. The NTA also produces an estimate of the cost of providing potential new services, suggested by the Network Planning Group. These estimates are used to inform the Department's request for funds in the annual budgetary process.
- PSO expenditure declined by 37% over the period 2009-2015 from €303.2m to €190.6m. This was then followed by a significant increase of over 65% in PSO expenditure over the period 2015-2019 to stand at €314.45m in 2019.
- Fare revenue for the three state owned public transport operators has increased significantly over the period 2009-2019 from €357.8m to €508m. By contrast Free Travel Scheme revenue has remained constant since 2011, despite significant growth in FTS passenger numbers.
- Operators made substantial losses during the period 2009-2013, due to the loss in PSO funding over this period, coupled with the loss of fare revenue. Operators responded by absorbing losses using reserves to cover the shortfall over the period 2009-2011, retaining many of the services considered socially optimal, while other services were curtailed. Operators' financial positions have improved over the period 2014-2019 as the level of PSO funding has been increased and passenger numbers have increased.

In addition to these, the paper also made the following operator specific findings:

- *Dublin Bus* – - In recent years, the cost of running services has increased per kilometre, which at a high level indicates a reduction in efficiency. However, the cost per passenger has fallen due to a higher usage of the service and the service has become less dependent on PSO subsidisation. Between 2017 and 2019, the punctuality rate has improved slightly. Additionally, between 2018 and 2019, departures on time have improved for 17% of the routes. While the lost kilometre rate and lost kilometre rate target decreased between 2017 and 2019, indicating at a high level an increase in reliability.

- *Bus Éireann* - In recent years, cost per passenger/seat km has remained relatively consistent, broadly indicating unchanged levels of efficiency. However, the level of subsidy per passenger has increased. Between 2017 Q4 and 2019 Q3, a significant increase (11 percentage points) in the punctuality rate of low frequency routes was observed. Route by route analysis shows that, between 2018 and 2019, the departures on time rate improved for approximately one-fifth of the routes. Additionally, lost kilometre rate decreased by 1 percentage point between 2017 and 2019, indicating an increase in reliability.
- *Iarnród Éireann* - In 2018 and 2019, Punctuality rate is above the target punctuality rate (90%) for all routes with the exception of the Heuston Cork route in 2019 Q3. Additionally, reliability has increased between 2018 and 2019. In 2018 and 2019, punctuality rate is above the target punctuality rate (90%) for all but one route. However, it is important to note that punctuality is defined as the service arriving within ten minutes of its scheduled time. Additionally, the punctuality rate improved for only five out of eighteen routes between 2018 and 2019. On the other hand, reliability has increased between 2018 and 2019.

Recommendations and Further Research

Further to the analysis conducted in this paper, it is recommended that the following areas are examined with further research:

- Future research could analyse the impact of planned major capital investment projects, such as BusConnects, and conduct a scenario analysis of how these projects will impact on costs, revenues and PSO requirements over the medium term.
- Future research could also analyse reasons for why punctuality and reliability was below the target rate on a route by route basis.
- Given the importance role that public transport will play in achieving our decarbonisation targets outlined in the Climate Action Plan and Programme for Government it is recommended that further research is conducted to consider the emissions impact of public transport services. Both in terms of the emissions intensity of the PSO fleet, and the potential for public transport services to generate modal shift to more sustainable forms of transport.
- Additionally, it could be expanded to collect passenger kilometres for all PSO operators in order to determine patterns of public transport use.
- Future research could analyse the key parameters required for a future cost projection including potential drivers and also revenue projections including consideration of capacity measures. This may facilitate a scenario analysis of revenues and PSO requirements.
- Future research could also look at the Impact of COVID-19 societal adaptations (e.g. partially remote working, regional shifts in population) on demand for public transport modes e.g. more extreme peaking midweek and higher drop off into Monday/Friday.
- For Iarnróid Éireann's DART service, the punctuality rate could be measured using the Excess Wait Time frequency.
- It should be noted that recent changes in how operator's reliability performance standards are monitored, i.e. moving from monitoring reliability on a network basis to an individual route basis, will enable a more detailed analysis of operators reliability performance in future years.
- Suggest further recommendation that we examine revenue and costs in detail on a route by route basis and consider means of improving cost effectiveness focussing on routes with low revenue to cost ratio and higher costs, including options such as changes to route, frequencies/times of operation, operator, etc.
- This paper has primarily focused on the performance of the three state owned operators, due to time and data constraints, future research should examine the performance of Go-Ahead Ireland and other BMO contracts in detail in terms of operation and performance standards.

Appendix

Efficiency Analysis	
Methods/Types	**Description**
$Cost/passenger\ journey$: $\frac{Total\ Cost\ of\ operator}{No: of\ passengers\ by\ operator}$	This indicator outlines the cost per passenger. A low cost per journey shows that the service is efficient.
$Cost/per\ seat\ Km$: $\frac{Total\ Cost\ for\ operator}{Seat\ Km}$	As a general principle, the lower the cost per seat km, the profitable the public transport.
$Revenue/passenger\ journey$: $\frac{Total\ Revenue\ of\ operator}{No: of\ passengers\ by\ operator}$	This indicator calculates the revenue per passenger. A high revenue per passenger journey indicates a profitable service.
$Revenue/per\ seat\ Km$: $\frac{Total\ Revenue\ for\ operator}{Seat\ Km}$	The higher the revenue per seat km indicates that the service is profitable. However, an extremely high revenue per seat km indicates high utilisation.
$PSO/\ pasenger\ journey$: $\frac{Total\ PSO\ for\ operator}{Number\ of\ journeys}$	This indicator outlines PSO per passenger journey. A PSO per passenger journey outlines that the service is inefficient.
$PSO/per\ seat\ Km$: $\frac{Total\ PSO\ for\ operator}{Seat\ Km}$	A higher PSO per seat km outlines that the service is inefficient.

Table X: Routes with less than 10% late departures and greater than 30% of late departures.

Bus numbers with <10% of late departures	Bus Numbers with >30% of late departures
70D	16D
68X	155
53A	33
42D	33E
41D	39
31D	41X
27A	44
16C	68
14C	77A
118	7D

Table showing the EWT for Weekday, Saturday and Sunday for 2019 Q3 by route.

Line	Weekdays EWT	Saturday EWT	Sunday EWT
1	1.82	2.18	1.83
123	2.57	7.93	3.78
13	2.3	4.12	2.02
130	1.33	3.98	1.23
14	1.84	3.46	1.78
140	1.62	2.21	1.67
145	2.05	2.37	1.9
15	2.03	3.18	1.65

15B	2.08	5.43	1.24
16	3.12	6.28	3.2
27	3.4	4.67	1.72
39A	1.95	2.12	1.77
4	1.73	1.83	1.15
40	3.22	5.5	2.73
46A	2.57	3.79	2.23
9	1.91	2.42	1.66

Table X: Bus Éireann routes with <40% and >75% punctuality rate.

Bus Numbers <40% Punctuality %	Bus Numbers >75% punctuality%
Southwest 279A	Navan Town 110B
Southwest 72	Navan Town 110C
Southwest 350	Limerick City 302
Southwest 332	Limerick city 306
Southwest 321	South 366
Southwest 273	Galway 402
Southwest 341	Galway 407
Northwest 489	West 422
Dublin Commuter 126	North-west 494
Dublin Commuter 109A	Athlone A2
Dublin Commuter 124	D2 N.A
South 259	Southwest 274
South 237	Cork 207A
South 239	
South 381	
South 382	
Southwest 343 X	

Table X: EWT Difference between 2018 Q3 and 2019 Q3 for Bus Éireann high frequency routes

Line	Weekdays EWT	Saturdays EWT	Sundays EWT
202	0.88	1.93	1.55
205	0.53	0.78	0.56
206	0.81	0.5	0.42
208	1.68	2.77	1.8
304	1.83	1.96	1.98
409	1.35	1.36	0.75