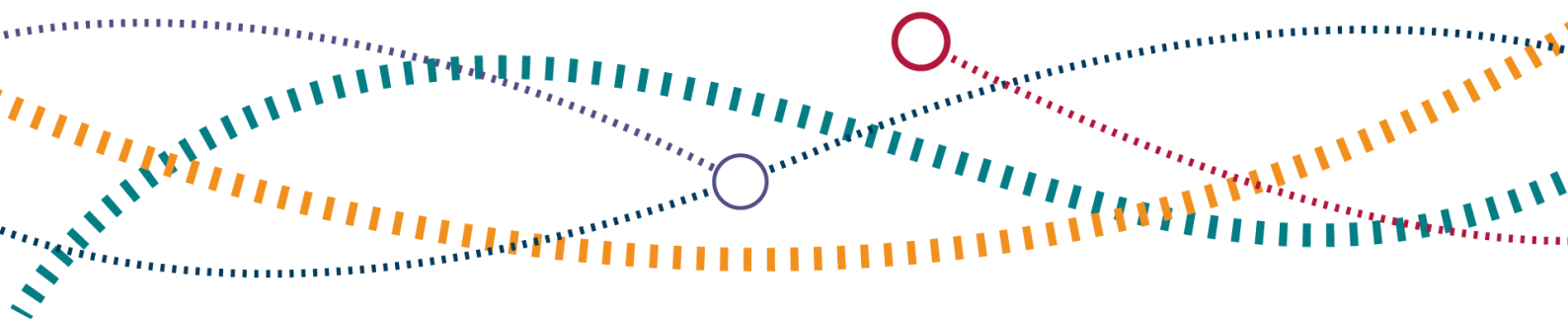




Discussion paper on rail industry productivity

04 April 2024



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Executive summary

Productivity gains across the rail industry, and their contribution to efficiency, will be a vital part in the recovery of the finances of the industry following the COVID-19 pandemic. In light of this, the UK Government's white paper for rail reform called on the ORR to report on the industry's productivity. This report is our first on rail sector productivity and is presented as a discussion paper from which we can develop our reporting in future years.

Productivity is the ratio between the outputs and the resources (inputs used) in a business activity. Productivity increases when more output (or higher quality output) is delivered with the same or fewer resources.

We have worked with economic consultants and industry stakeholders to develop the metrics used to assess the rail industry's productivity. We intend for our analysis to develop over time, with this first report focussing on a simple, headline view, assessing productivity on a whole-industry basis. This combines the productivity of train operator services with rail infrastructure.

This report complements other analysis we already undertake as part of how we hold Network Rail to account. For example, we monitor trends in unit costs in our annual [Cost benchmarking of Network Rail's maintenance and renewals expenditure report](#). We also undertake an [Annual efficiency and finance assessment of Network Rail](#), and an [Annual report on HS1](#). Rather than duplicate that analysis here, and to be consistent with the basis on which we have looked at the whole-industry output, our focus has been on how infrastructure costs contribute to headline productivity measures, such as distances travelled per pound of expenditure and per employee. Nevertheless, as we explain below, we intend for future iterations of our productivity study to reflect more granular measures of productivity, including those split between train operations and infrastructure.

Unless otherwise stated, data has been sourced from publicly available information such as ORR's [Rail Finance \(UK\) publication](#) and [data portal](#). We will continue to work with the industry to develop rail productivity metrics, including the data available for those metrics.

Chapter 1 compares headline productivity of the rail industry over time, with separate analysis for train operating companies and for infrastructure included in Chapters 2 and 3, respectively. A summary table for our headline productivity measures is in Annex A and our methodology is included in Annex B. All expenditure has been stated in 2022-23 prices throughout this report.

Key findings

Rail sector productivity is multi-faceted and care is required when interpreting headline measures

Care should be taken when interpreting the results in this report because there will be different reasons for why productivity increases or decreases. For example, there are many dimensions to rail sector output, including the quantity, quality and safety of the services provided. In this report we typically measure output using a quantity metric such as train or passenger distance travelled. As such, if distance travelled and resources used were constant from one year to another but the quality of the journey offered increased (for example, in terms of passenger comfort, punctuality or reliability of the service), then productivity would increase, but this would not be captured by a headline measure such as train or passenger distance travelled as used in this report.

We also recognise that some factors affecting productivity are more within the control of industry, such as use of technology and staffing levels, while others are much less so, such as the impact of the pandemic (and post-pandemic working patterns) on passenger numbers.

Rail industry headline productivity has started to recover since the pandemic but remains below previous levels

Productivity, as measured by the train distance travelled per employee, has recovered 12 percent since the pandemic (see Figure 1). Nevertheless, productivity remains below pre-pandemic levels, in significant part because of changes to passenger usage and the impact of industrial action (there were 29 days of industrial action that affected both train operators and Network Rail in 2022-23, although industrial action can also cause follow-on disruption to subsequent days and action short of a strike can also impact services run).

The productivity of the rail industry appears to have declined in five of the six years prior to the pandemic, before being substantially impacted by the pandemic in 2020-21. In that year alone, train distance travelled per employee and train distance travelled per pound of industry expenditure decreased by 26 percent. This is mostly because the rail industry's costs are largely fixed and did not change much in response to fewer people travelling on the network (for example, the track, structures and signalling infrastructure needs to be maintained regardless of the volume of traffic). Furthermore, Network Rail and franchised train operators did not place staff on furlough during the pandemic, thereby allowing the rail network to support key workers and essential travel during the pandemic.

Whilst productivity has not fully recovered to pre-pandemic levels there are opportunities which could improve it going forward. For example, additional passengers can be carried at a relatively low cost, given the high fixed cost nature of the railway, which would improve productivity using our metrics. Rail reform should also provide opportunities for improving rail productivity by streamlining the organisation of the industry.

Figure 1 Passenger train distance travelled per employee¹

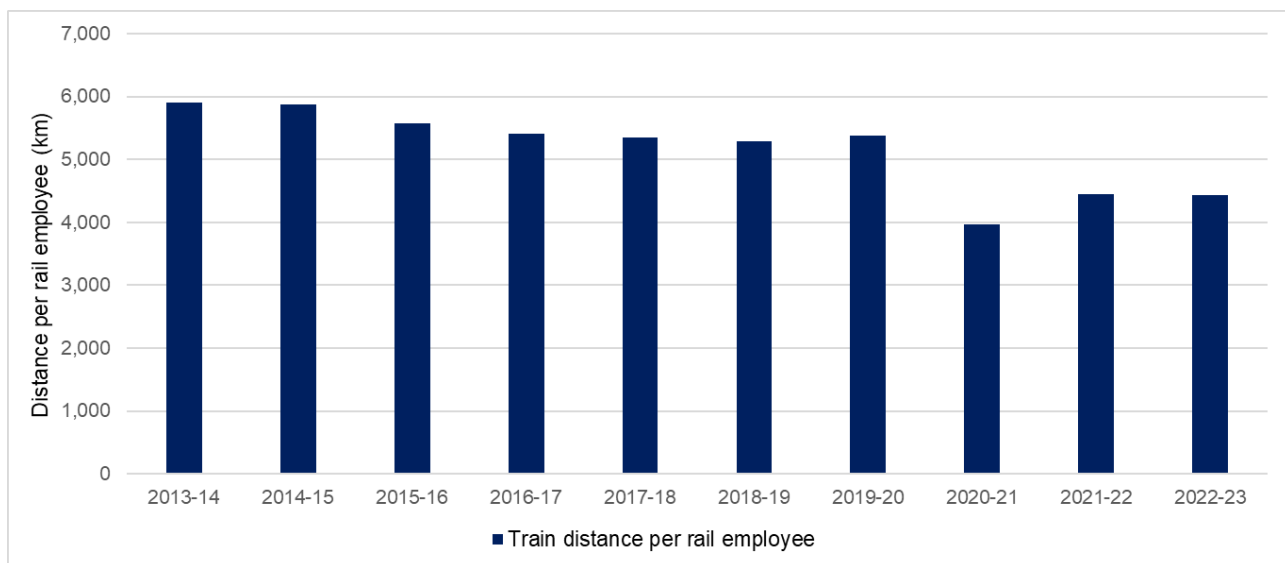
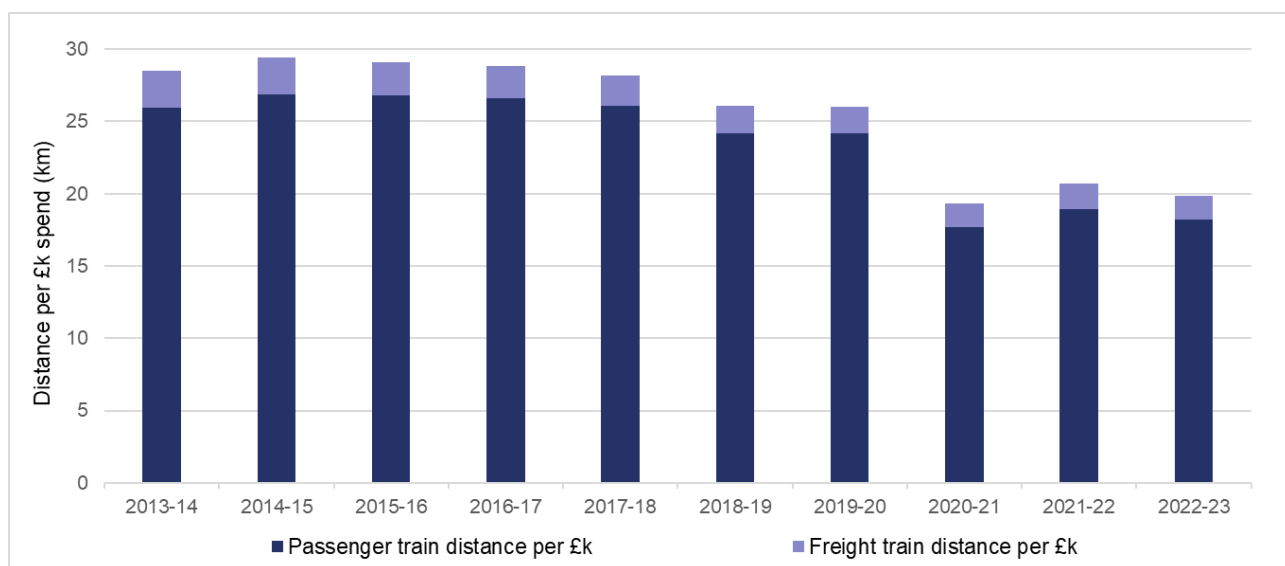


Figure 2 Total passenger and freight train distance travelled per thousand pounds of industry expenditure



Longer-term productivity has been affected by increasing costs and headcount

While the largest annual decline in productivity came with the COVID-19 pandemic, there was also a steady decline in the headline productivity metrics before the pandemic.

The decline in productivity before the pandemic was largely due to industry costs increasing by more than the passenger distance travelled. Adjusted for inflation, industry costs increased by 26 percent between 2013-14 and 2022-23, this included an 18 percent increase in headcount. Over the same period, passenger distance travelled decreased by

¹ This measure is on a full-time equivalent (FTE) basis and includes agency and contingency employees. It excludes freight as employee numbers were unavailable at the time of publishing.

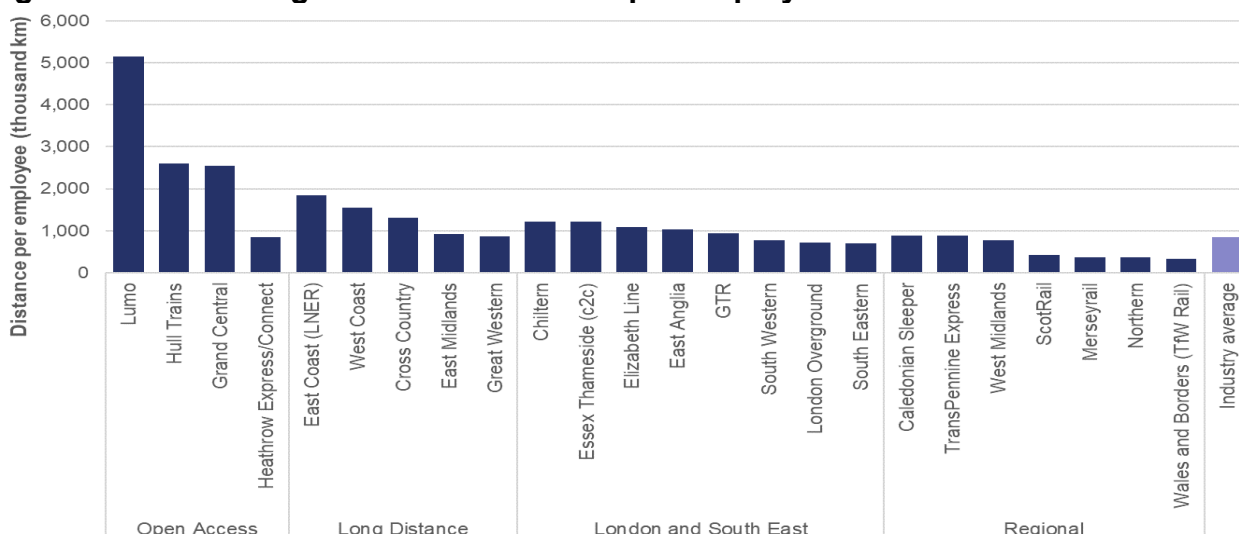
12 percent. This was significantly affected by the pandemic, however passenger distance travelled appeared to be slowing before the pandemic. These effects have adversely impacted the headline measures of productivity reported here:

- train distance travelled per rail employee in 2019-20 was nine percent lower than in 2013-14, but in 2022-23 it was 25 percent lower than 2013-14, and was 20 percent lower than the pre-pandemic average; and
- train distance travelled per pound of industry expenditure in 2019-20 was nine percent lower than in 2013-14, but in 2022-23 it was 30 percent lower than 2013-14, and was 29 percent lower than the pre-pandemic average.

Headline productivity varies across train operators depending on market segment and operating model

Our analysis shows that there are variations in headline productivity that reflect differences in passenger services, for example long distance services compared to regional services. This is to be expected given the different nature of these markets. Headline productivity for open access operators is comparatively high on average, although again there is variation within this group. The comparative productivity of open access operators on our headline measures may reflect their greater commercial freedom compared with franchised train operators which need to comply with franchising obligations – such as the frequency of services and routes run, as required by government. Open access operators also do not face some of the costs faced by franchised train operators. For example, most open access operators do not currently pay fixed track access charges for use of the railway infrastructure² (only variable track access charges). Further, open access operators do not manage stations (although they will pay a proportion of station costs through station charges) and can more easily tailor staffing to passengers and distance travelled.

Figure 3 Passenger distance travelled per employee

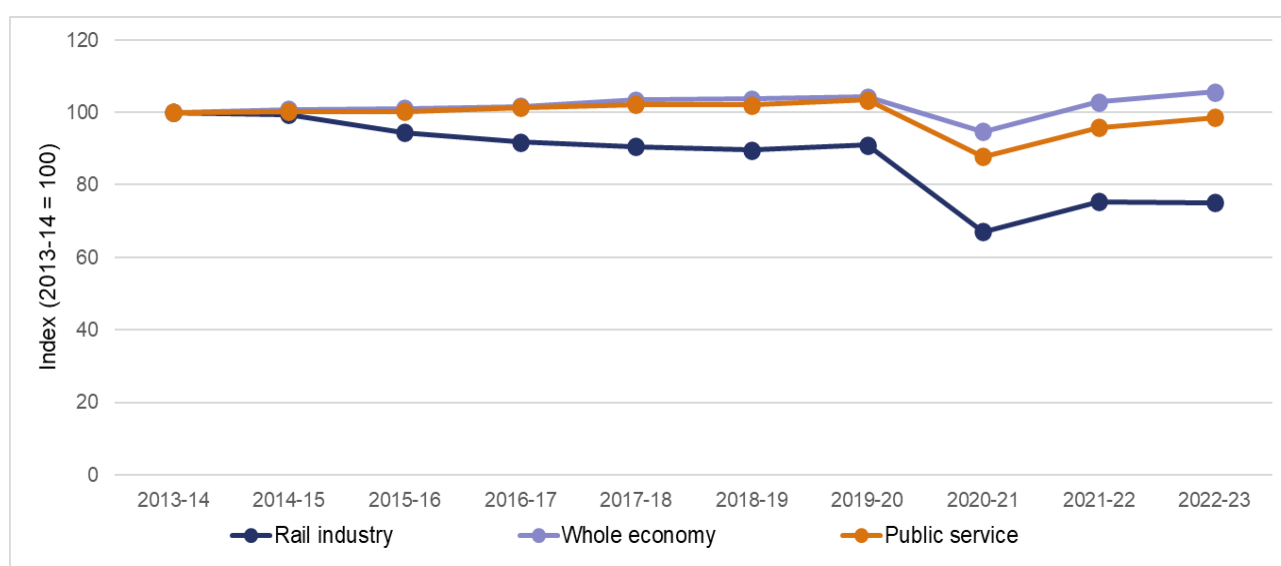


² Some open access operators, such as Lumo, pay an ‘infrastructure cost charge’ which recovers a portion of the fixed costs of rail infrastructure.

The trend in rail industry productivity has lagged behind the wider economy in recent years

While the recovery in headline productivity (as measured by output per employee) for the rail sector since the pandemic is similar to that of the wider economy, over the past ten years, the rate of change in rail industry productivity has lagged behind that of the wider economy. The rail industry's productivity appears to be still somewhat short of its level before the pandemic, whereas that of the wider economy is now slightly higher. Caution is required in this comparison given the different bases of calculation for both outputs and inputs between the rail sector and the wider economy. We discuss this matter in the methodology at Annex B.

Figure 4 Changes to the productivity for the rail industry and wider economy since 2013-14³



We will build on this analysis for future publications and welcome views on our discussion paper

As noted above, this discussion paper is intended to respond to the call for a better understanding of the drivers of productivity in the rail industry. We intend to build on this report, including by looking at alternative measures of productivity (for example, better disaggregated between train operations and infrastructure). Further, as we add years to the dataset the analysis will become more informative.

We intend to undertake further research into the drivers of the rail industry's productivity, and to include more measures in future reports. For example, we could look to include the following:

³ Rail industry productivity is measured by train distance travelled per full time equivalent employee. Rail data is taken from the [ORR data portal](#). Whole economy productivity is based on the [Office for National Statistics \(ONS\) output per worker measure](#), based on the gross value added per worker; public service productivity is based on the [ONS's output per input measure](#). Productivity metrics have been indexed to a 2013-14 base year to enable comparability. See methodology in Annex B for more information.

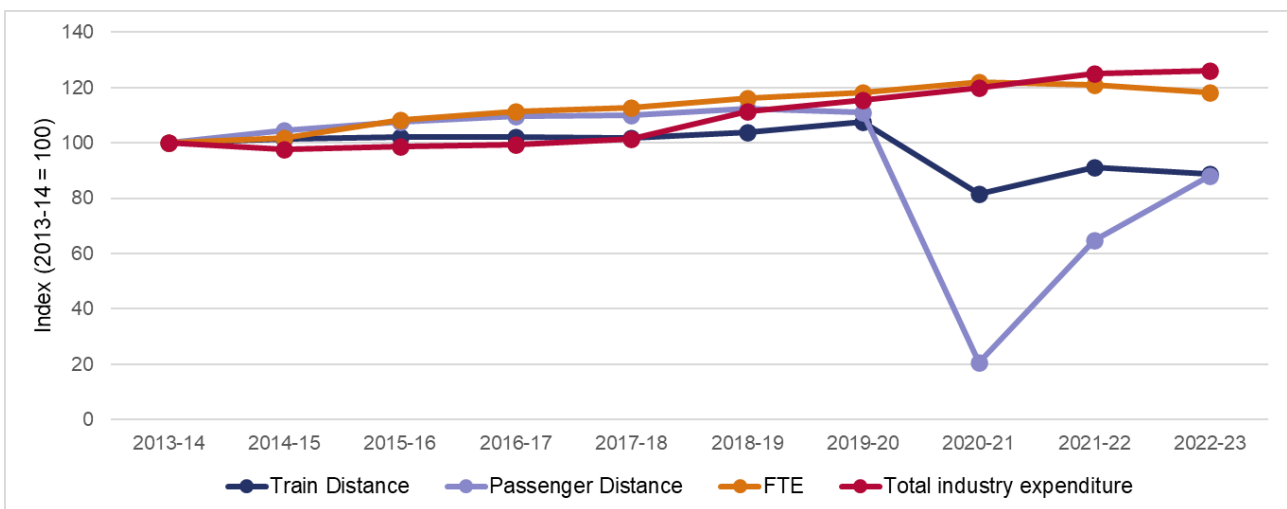
- percentage of train drivers driving their allocated diagrams;
- passenger journeys per pound of station expenditure;
- passenger journeys per station employee;
- freight tonne distances travelled per freight employee;
- time on tools at the infrastructure level; and
- percentage of planned engineering possessions (of the rail infrastructure) not used (or subject to late change).

We welcome comments on the measures we might use in future reports and any other insights on rail sector productivity. Please send these to contact.cct@orr.gov.uk.

1. Industry-wide metrics

- 1.1 This chapter sets out of the headline measures for whole-industry productivity. It includes the following metrics: passenger train distance travelled per rail employee; passenger distance travelled per rail employee; train distance travelled per thousand pounds of rail expenditure; and passenger distance travelled per thousand pounds of expenditure.
- 1.2 As noted previously, caution is required in interpreting the results of this analysis. There are many dimensions to rail sector output, including the quality and safety of the services provided. Our analysis is based on headline measures of output – notably train or passenger distance travelled. We also recognise that some factors affecting productivity are more within the control of the industry, while others are much less so.
- 1.3 Figure 1.1 shows how the underlying inputs and outputs used for calculating the headline productivity metrics have changed over time.

Figure 1.1 Train and passenger distance, full time equivalent employees (FTE) and expenditure over time



- 1.2 The following analysis uses ‘passenger train distance’ and ‘passenger distance’ kilometres travelled as a measure of industry output. ‘Passenger distance’ is higher than ‘passenger train distance’, for example if one train travels one kilometre carrying 100 passengers then it is one train kilometre (‘passenger train distance’) but 100 passenger kilometres (‘passenger distance’).

Distance travelled per rail employee

Figure 1.2 Passenger train distance travelled per rail employee⁴

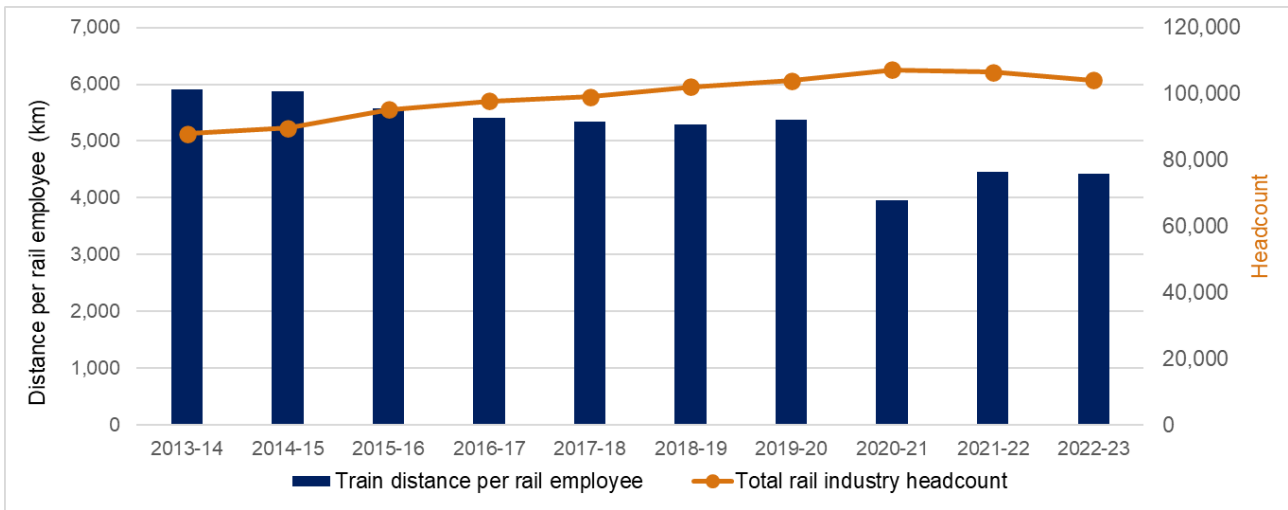


Figure 1.3 Passenger distance travelled per rail employee



1.4 Train distance travelled per rail employee reduced by 25 percent between 2013-14 and 2022-23 and passenger distance travelled per rail employee reduced by 26 percent over the same period. Contributing factors include:

- The number of employees in the rail industry has increased by 18 percent to 104,000 since 2013-14. See Chapters 2 and 3 for more detail; and
- As shown in Figure 1.1, both train distance and passenger distance travelled have declined by around 12 percent since 2013-14 due to the pandemic and subsequent changes to passenger usage, with fewer business and commuter journeys. Usage was also impacted by industrial action in 2022-23, which restricted the post-pandemic recovery of productivity.

⁴ Figures 1.2 and 1.3 does not include freight data (either employee or distance travelled) as this information is not publicly available.

Distance travelled per thousand pounds of expenditure

Figure 1.4 Passenger and freight train distance travelled per thousand pounds of industry expenditure⁵

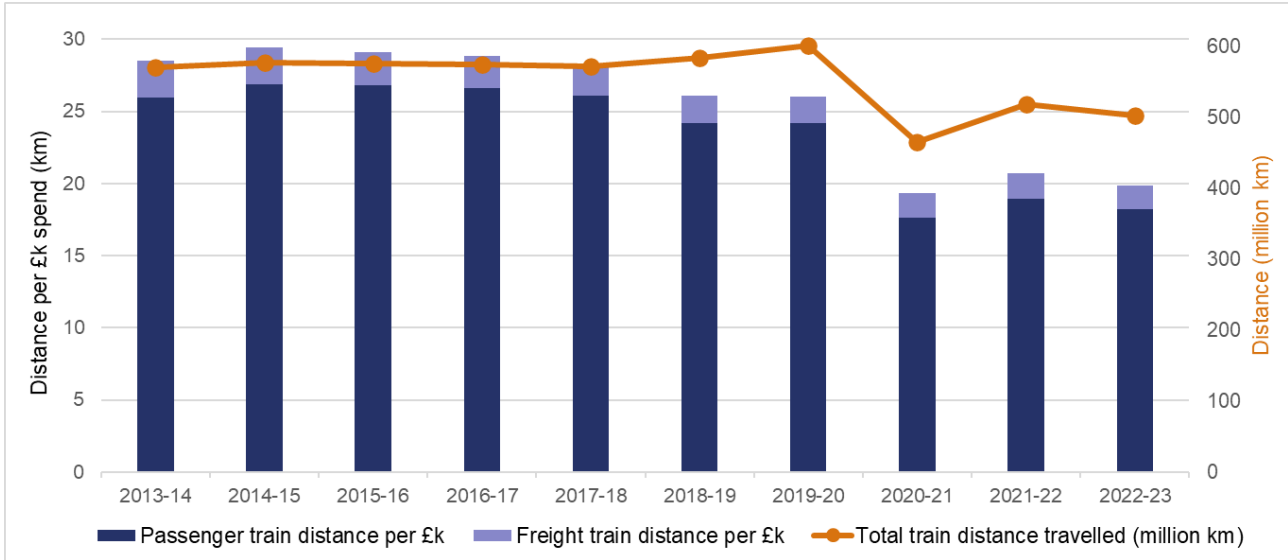
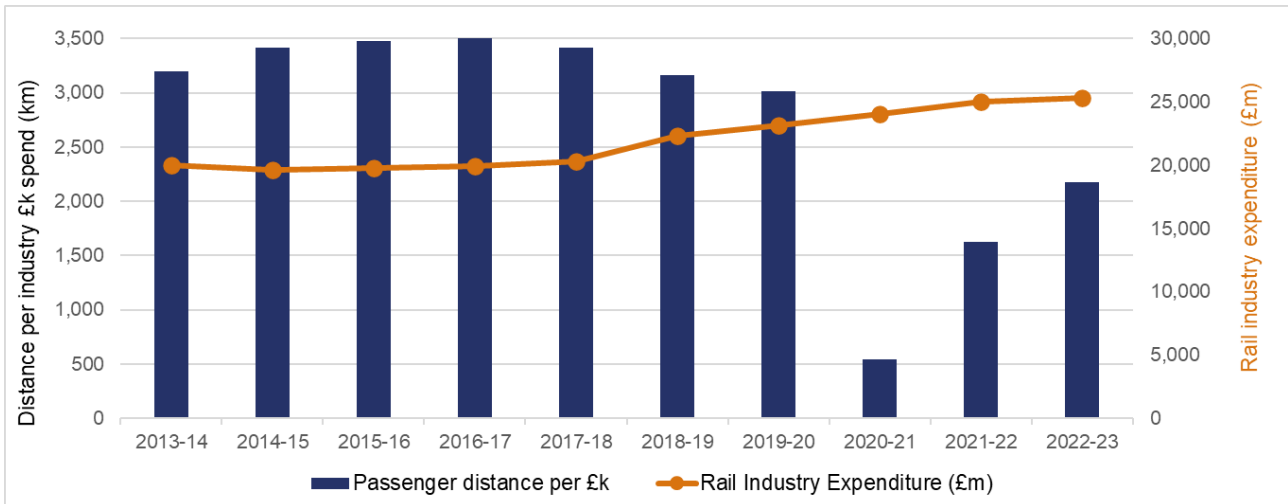


Figure 1.5 Passenger distance travelled per thousand pounds of expenditure⁶



1.5 Productivity as measured by train distance travelled per thousand pounds of industry expenditure decreased by approximately 30 percent, while productivity measured on the basis of passenger distance travelled per thousand pounds of industry expenditure decreased by 32 percent between 2013-14 and 2022-23. This was most significantly driven by an approximate 26 percent increase in industry costs (as measured in constant 2022-23 prices). Contributing factors include:

⁵ This metric includes Network Rail, passenger TOCs, freight, High Speed 1 (HS1) and Core Valley Lines (CVL).

⁶ This chart does not include freight expenditure as this is a passenger metric. The distance travelled per thousand pounds of expenditure is higher in figure 1.5, which uses passenger kilometres, than figure 1.4 which uses train kilometres.

- financing costs for the rail infrastructure increased by 130 percent, primarily driven by the rising cost of financing index-linked debt;
- rolling stock costs increased by 94 percent, which the industry has attributed to investment in new and refurbished rolling stock;
- infrastructure operations and maintenance costs increased by 48 percent; and
- industry-wide staff costs increased by 20 percent. This included increases to salaries and a rise in staff numbers (see Chapters 2 and 3).

1.6 Train distance travelled and passenger distances travelled are 12 percent lower than in 2013-14, due to the pandemic, changes to passenger usage and industrial action. The business travel and commuter markets were the most significantly affected.

2. Train operator productivity

2.1 This chapter reports on the headline measures of productivity for train operators. As noted previously, we focus on headline measures of productivity and because of the many dimensions of output and complexity in measuring inputs, caution is required when interpreting these results – including making comparisons between train operators.

2.2 We have developed three productivity metrics for train operators. These are:

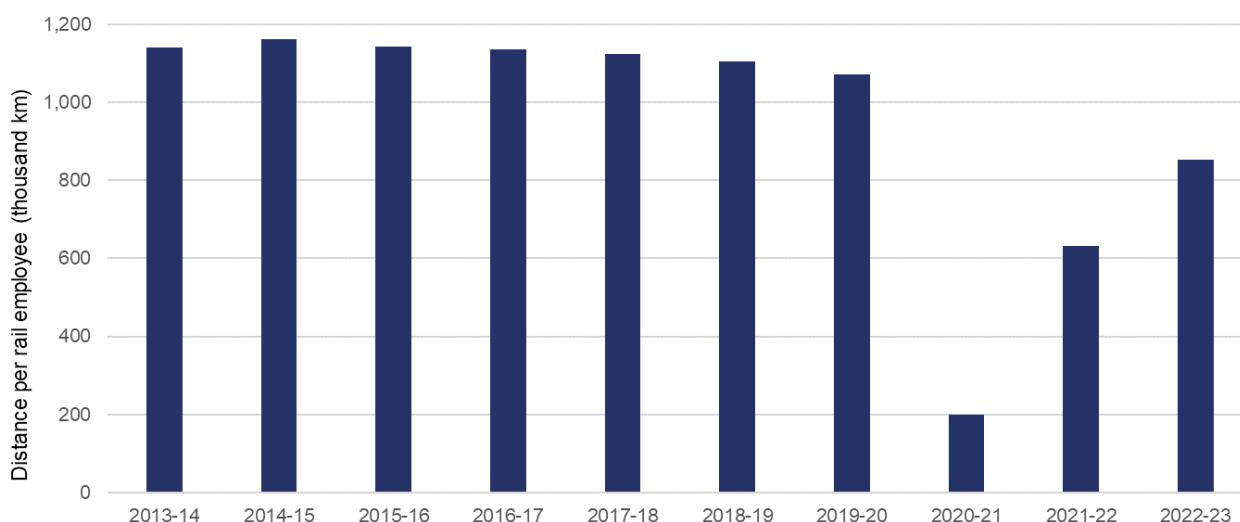
- Passenger distance travelled per employee;
- Passenger distance travelled per thousand pounds of expenditure;
- Freight tonne distance carried per thousand pounds of freight expenditure.

2.3 The passenger distance metrics assess productivity for 24 train operators, of which 20 are franchised (and which receive funding from the UK or Scottish governments – and have their service requirements set by these funders) and four are open access operators. The freight metric assesses productivity for four freight operators⁷.

2.4 We have sourced data from our [Rail Finance \(UK\) publication](#) and the [ORR data portal](#).

Passenger distance travelled per train operator employee

Figure 2.1 Passenger distance travelled per train operator employee



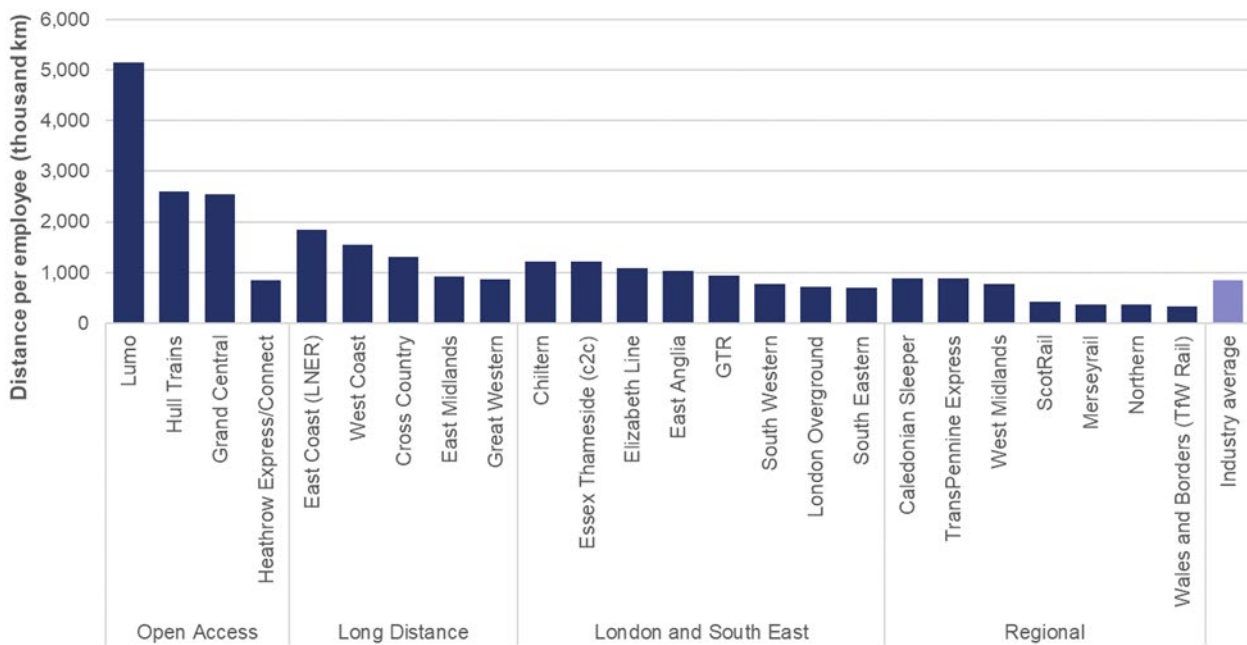
2.5 As shown in Figure 2.1, distance travelled per train operator employee has reduced by 29 percent since 2013-14. This is due to the number of train operator employees

⁷ DB Cargo, Direct Rail Services, Freightliner (and Freightliner Heavy Haul), GB Railfreight.

increasing by 18 percent, from 53,000 to 62,000 and passenger kilometres decreasing by 12 percent. Contributing factors include:

- passenger travel significantly reduced in 2020-21 due to the pandemic. There has been a partial recovery since then, though this has been restricted by industrial action;
- train operator staff numbers increases have been driven by the introduction of new services such as Lumo and TfL Rail.

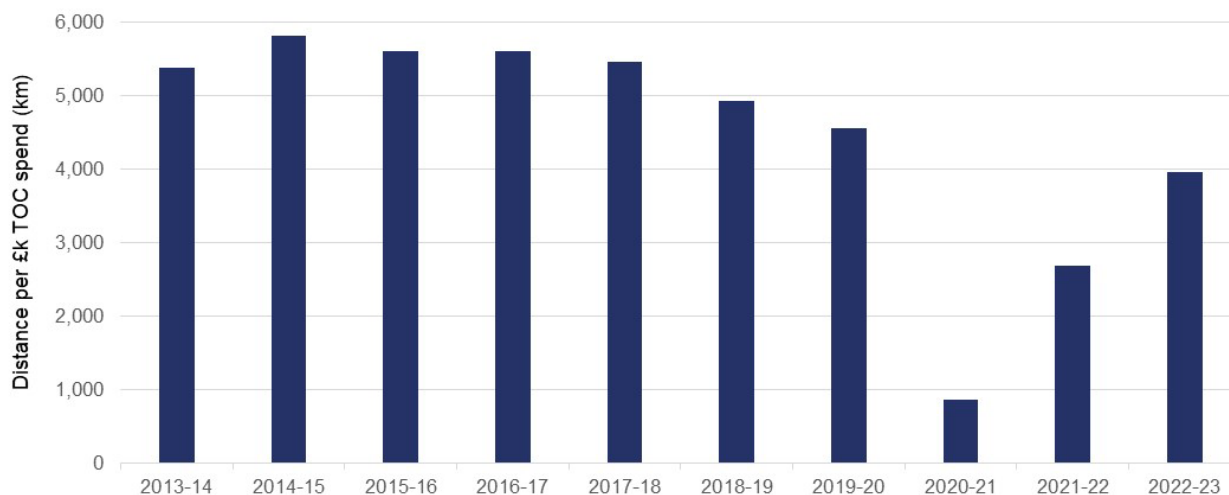
Figure 2.2 Distance travelled by passengers per train operator employee in 2022-23



2.6 Figure 2.2 shows passenger distance travelled per employee for the most recent year of our analysis. Three of the open access operators, Lumo, Hull Trains and Grand Central, show as the most productive using this headline metric. However, as explained previously, the comparative productivity of open access operators on our headline measures may reflect their greater commercial freedom compared with franchised train operators which need to comply with franchising obligations – such as the frequency of services and routes run, as required by government. Open access operators also do not manage stations and so will have a lower staffing requirement. Some operators also outsource other services, the staffing requirement for which may not be reflected in our analysis.

Passenger distance travelled per thousand pounds of train operator expenditure

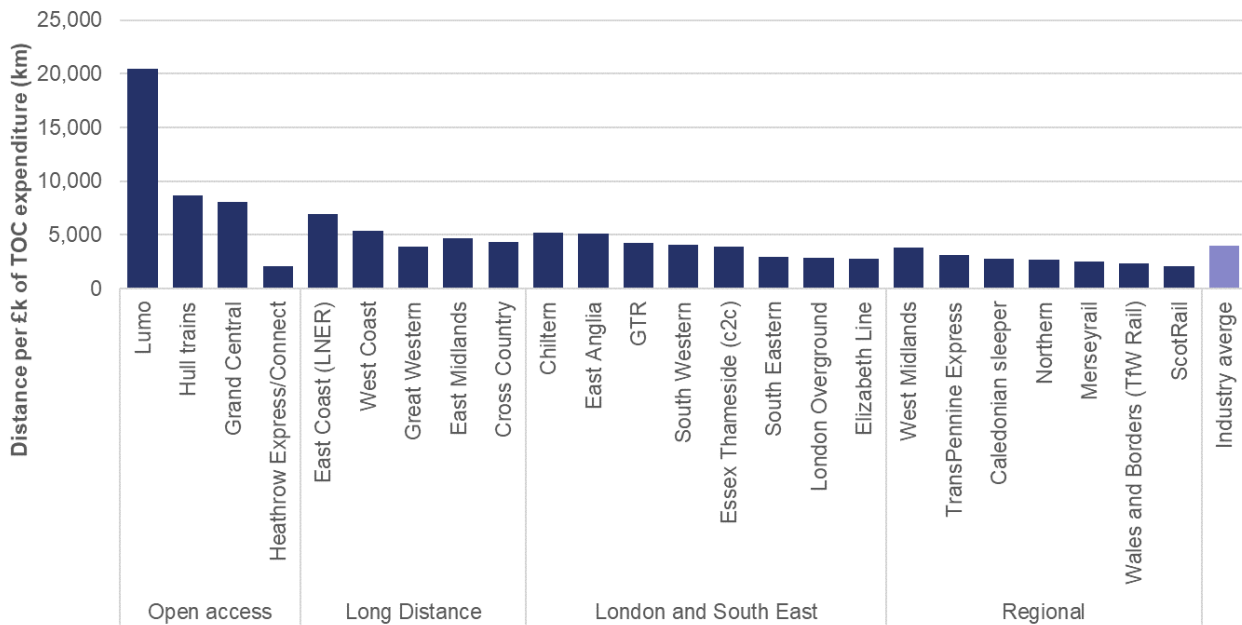
Figure 2.3 Passenger distance travelled per thousand pounds of train operator expenditure



2.7 In 2022-23, on average, for every pound of train operator expenditure (including access charges), a passenger travelled just under four kilometres. This has reduced by 26 percent over the ten years since 2013-14 due to a 19 percent increase in train operator costs and a 12 percent decrease in passenger distance travelled. In addition to the factors noted previously:

- Rolling stock costs increased by 94 percent over the period. The number of rolling stock vehicles increased by approximately 20 percent since 2013-14, while the cost per rolling stock vehicle increased by 61 percent. This is partly due to additional spend to improve customer facilities, performance, and to aid decarbonisation. Many train operators have limited choice about the vehicles they operate due to contractual agreements and the nature of the infrastructure used (for example, whether electrified). Between 2013 and 2023, electrification of the rail network increased by 15 percent and the average age of rolling stock has reduced by 2.6 years to 16.8 years following the retirement of older rolling stock.
- Staff costs rose by 20 percent, mostly due to a rise in headcount as shown above, but also due to a rise in pay; and
- Whilst there was a significant impact during the pandemic, we have seen in recent years productivity starting to improve (productivity has improved 361 percent, which was driven by passenger distance travelled rising by 324 percent and train operator expenditure decreasing by 8 percent since 2020-21).

Figure 2.4 Passenger distance travelled per thousand pounds of train operator expenditure in 2022-23



2.8 Figure 2.4 shows train distance travelled per thousand pounds of train operator expenditure for the most recent year of our analysis, 2022/23. Lumo, Hull Trains and Grand Central carried passengers the furthest distance for each thousand pound of expenditure incurred.

2.9 There will be different reasons why some train operators are more or less productive than others using this headline metric – some within a company’s control, some not. As noted previously:

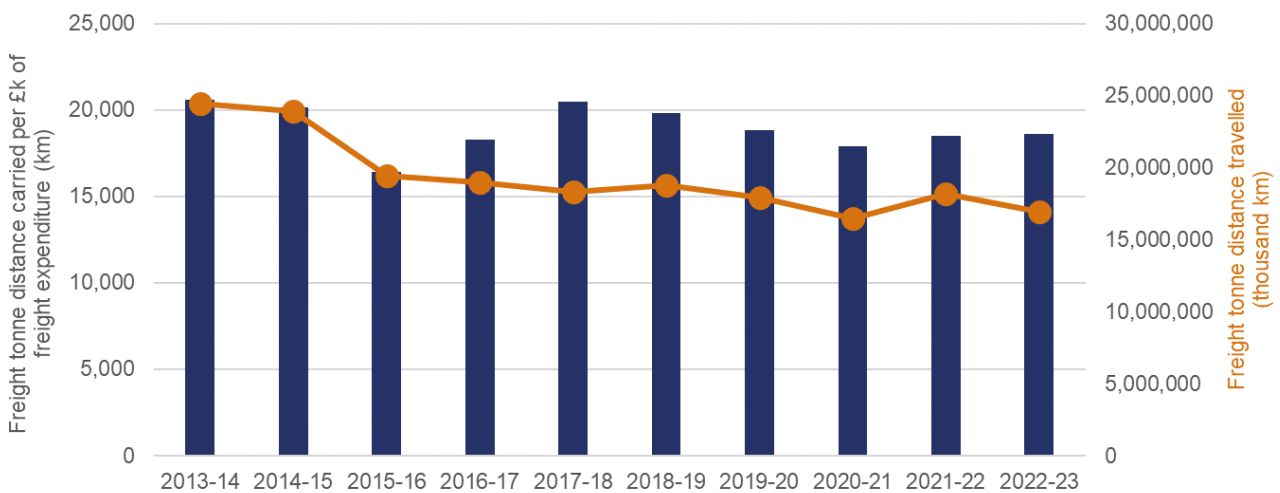
- Open access operators have greater flexibility and ability to focus on more profitable times and routes which maximise their productivity;
- Open access operators do not face many of the costs that franchised operators do. For example, most do not currently pay fixed track access charges for use of the railway infrastructure⁸ (only variable track access charges), they do not manage stations (although they will pay a proportion of station costs through station charges) and they can more easily tailor staffing to passengers and distance travelled as the routes they operate are generally less complex;
- Recovery from the impact of the pandemic has been better in some parts of the railway than others. For example, commuter routes have recovered less quickly. See our [passenger rail usage statistics](#).

⁸ Some open access operators, such as Lumo, pay an “infrastructure cost charge” which recover a portion of the fixed costs of rail infrastructure. This however is set at a lower rate than the fixed track access charge paid by franchised train operators.

- Industrial action in 2022-23 has impacted some operators more than others;
- Some operators have proportionally higher costs than others:
 - (i) 44 percent of TfW Rail’s expenditure is related to staff costs compared with an average of 28 percent for other operators. This is largely because TfW has recently recruited more staff, leading to a 45 percent increase in the number of FTE employees since 2013-14. Passenger km per FTE for TfW Rail was 62 percent lower than the industry average in 2022-23; and
 - (ii) ScotRail’s access charges were 40 percent of total expenditure compared with an average of 26 percent for other operators, which reflects different funding arrangements in Scotland compared with England & Wales. In Scotland, a higher proportion of government funding of Network Rail is paid through fixed track access charges, rather than through direct government funding (i.e. through the network grant).

Freight tonne distance carried per thousand pounds of freight expenditure

Figure 2.5 Freight tonne distance carried per thousand pounds of freight expenditure⁹



2.10 Figure 2.5 shows that freight tonne distance travelled per thousand pounds of expenditure has decreased by ten percent since 2013-14. Freight tonne distance travelled decreased by 31 percent and while freight expenditure also decreased, it decreased by less (only by 23 percent). The impact of the pandemic on the freight sector appears not to have been as significant as for passenger services and productivity has since recovered to pre-pandemic levels. However, caution is required in interpreting these results because financial data for freight operators for

⁹ If one train carrying 400 tonnes of freight travels one kilometre, we would report one freight train kilometre, but 400 freight tonne kilometres.

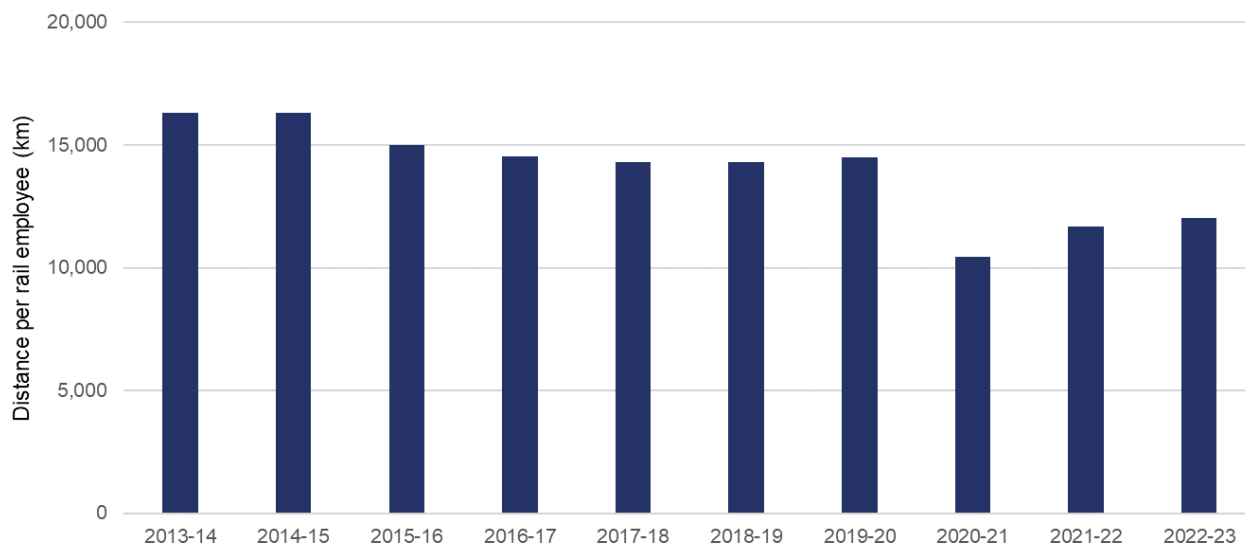
the latest year (April 2022 to March 2023) and from April 2013 to March 2015 were not available. In order to provide a complete picture of industry-wide finances, an estimate of freight expenditure was made for these three years.

3. Rail infrastructure productivity metrics

- 3.1 Analysis of rail infrastructure productivity has been broken down into five separate metrics. These include:
- Train distance travelled per FTE employee;
 - Train distance travelled per thousand pounds of operations, support, maintenance and renewals (OSMR) expenditure;
 - Train distance travelled per thousand pounds of maintenance expenditure;
 - Train distance travelled per thousand pounds of operations expenditure; and
 - Train distance travelled per thousand pounds of renewals expenditure.
- 3.2 As noted previously, there are challenges with defining and measuring productivity in any sector. In the case of rail infrastructure, the outputs are intermediate outputs, for example, the volume of track renewed, number of structures renewed, volume of maintenance activity and so on.
- 3.3 We already undertake some analysis on these intermediate outputs as part of our work on holding Network Rail to account. For example, we monitor trends in the unit costs of certain key activities in our annual [Cost benchmarking of Network Rail's maintenance and renewals expenditure report](#). We also undertake an [annual Efficiency and finance assessment of Network Rail](#).
- 3.4 Rather than duplicate that analysis here, and to be consistent with the basis on which we have looked at whole-industry output, for this discussion paper, our focus is on how infrastructure costs as a whole contribute to headline productivity measures, such as train distances per pound of expenditure and train distances per employee.
- 3.5 As previously mentioned, we intend for future iterations of our productivity study to reflect suitable measures of more granular measures of productivity – including those split between train operations and infrastructure.
- 3.6 This chapter covers the rail infrastructure managed by Network Rail only (for example, it does not include HS1 Limited).

Train distance travelled per rail infrastructure employee

Figure 3.1 Train distance travelled per rail infrastructure employee



3.7 Figure 3.1 shows that there has been a 26 percent decrease in productivity since 2013-14, as measured by train distance travelled per rail infrastructure employee (on an FTE basis). Possible reasons include:

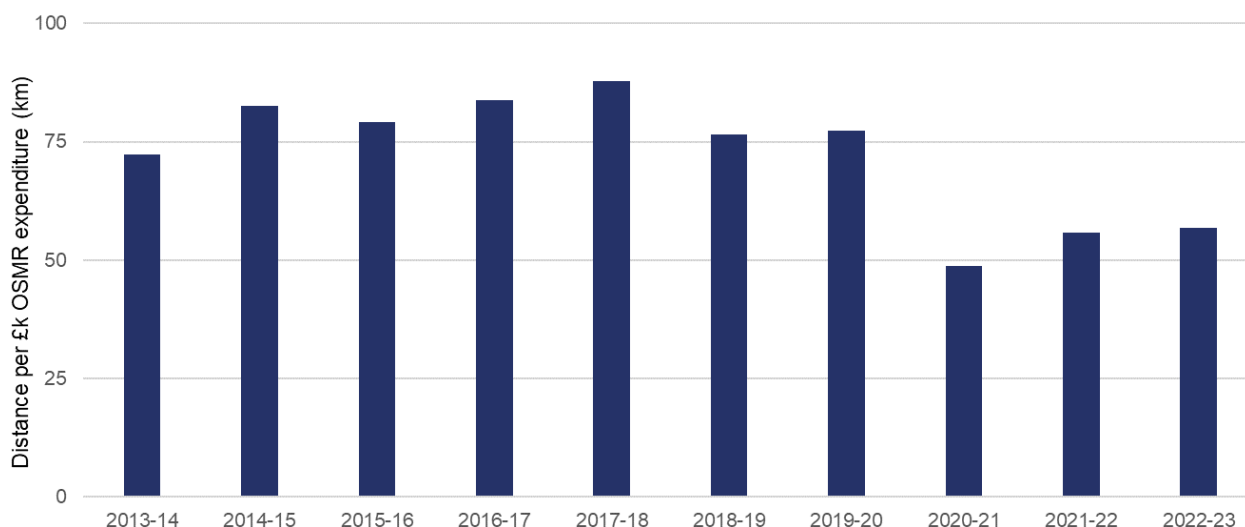
- Train distances travelled have declined by 12 percent due to the pandemic, recent industrial action and changes to passenger usage (with fewer business and commuter journeys); and
- There was an increase in staff headcount in 2015 when Network Rail insourced part of its maintenance and renewals function. More recent restructuring programmes and voluntary redundancy schemes (particularly within maintenance and management), combined with natural attrition, have resulted in a 6 percent headcount reduction since 2020-21.

Train distance travelled per thousand pounds of OSRM expenditure

3.8 OSRM expenditure refers to any cost associated with operating, supporting, maintaining and renewing the railway infrastructure¹⁰.

¹⁰ This excludes traction electricity, industry costs and rates, financing costs, corporation tax and schedule 4 and 8 costs (compensation paid to train operators for disruption to services).

Figure 3.2 Train distance travelled per thousand pounds of OSMR expenditure



3.9 Figure 3.2 shows that, since 2013-14, train distance travelled per thousand pounds of OSMR expenditure has decreased by 21 percent. This is driven by a 12 percent decrease in train distance travelled and a 12 percent increase in costs. Contributing factors include:

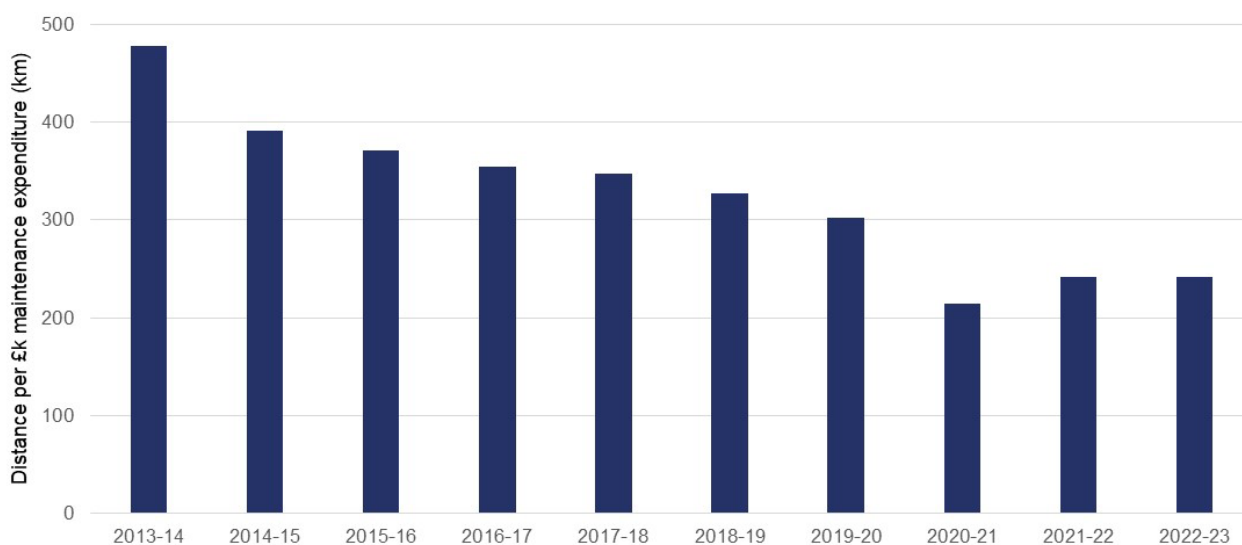
- Maintenance costs have increased by 74 percent, partly due to increased expenditure on safety and performance improvement schemes, but also due to higher market prices for materials and labour;
- Operational costs have increased by 33 percent, partly due to organisational restructuring, passenger improvement schemes, and higher market prices for utilities; and
- Renewals costs have decreased by 13 percent, largely due to deferred renewal projects. This is because of reprioritisations following funding concerns, but also due to the disruption caused by the pandemic, industrial action, access challenges and adverse weather incidents.

3.10 The reduction in headline productivity is largely for reasons outside of Network Rail's control, such as the impact of fluctuating market prices and the impact of the pandemic. At the same time, for the costs it does control, Network Rail has become more efficient, as reported in our [Annual Efficiency and Finance Assessment](#).

Train distance travelled per thousand pounds of maintenance expenditure

3.11 Maintenance costs are those incurred to keep the infrastructure asset in a condition that supports the performance and capability requirements of the railway.

Figure 3.3 Train distance travelled per thousand pounds of maintenance expenditure



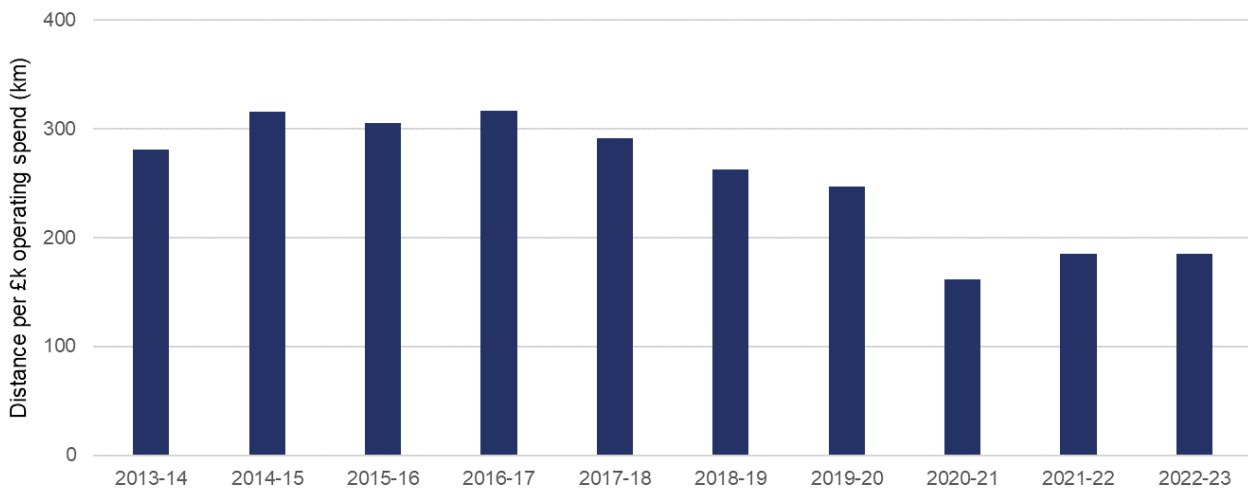
3.12 Figure 3.3 shows that, since 2013-14, train distance travelled per thousand pounds of maintenance expenditure has reduced by 49 percent. This has been driven by maintenance costs increasing by 74 percent whilst train distances travelled have reduced by 12 percent. Contributing factors which explain the recent decline include:

- Increased expenditure on initiatives to improve asset resilience, devegetation, safety and train performance;
- Additional short-term expenditure associated with the pandemic in 2020 and 2021; and
- Higher material and labour costs.

Train distance travelled per thousand pounds of operating expenditure

3.13 Within this section, ‘operating expenditure’ refers to the combined cost of operations and support functions (but excludes maintenance). Operations costs are mostly associated with the management of the timetables, signalling and level crossing systems on the network but also incorporates activity at managed stations and other customer-facing services. Support functions include finance, legal and HR functions, as well as costs for accommodation and utilities.

Figure 3.4 Train kilometres travelled per thousand pounds of operations expenditure



3.14 Figure 3.4 illustrates that train distance travelled per thousand pounds of operations expenditure has declined by 34 percent since 2013-14. This has been driven by operations costs increasing by 33 percent while train distances travelled have reduced by 12 percent. Contributing reasons for this include:

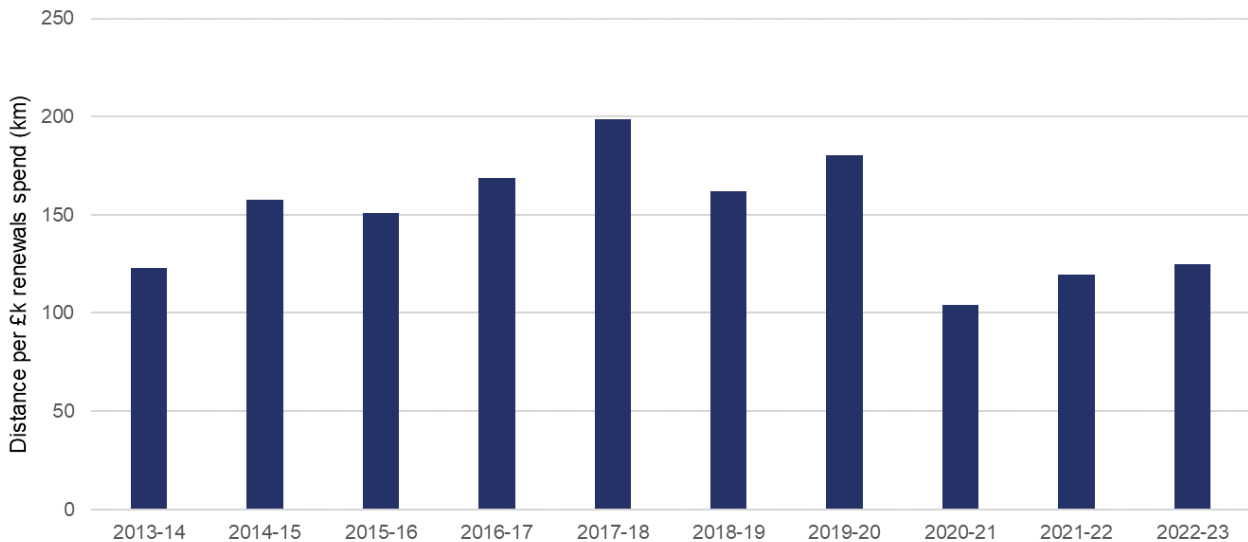
- additional expenditure to enhance train performance;
- additional costs relating to fatigue management safety standards;
- the Putting Passengers First (PPF) reorganisation, which resulted in additional staff in the Network Rail regions;
- the pandemic, which led to a significant rise in short term costs in 2020 and 2021, for example the additional cost of implementing social distancing measures;
- higher market prices for utilities in 2022-23;
- voluntary redundancy costs following headcount reductions as part of the modernising management and maintenance programmes; and
- train kilometres that were impacted by the pandemic and industrial action.

Train distance travelled per thousand pounds of renewals expenditure

3.15 Renewals expenditure relates to activities to replace network assets that have deteriorated such that they can no longer be maintained economically. Renewal of an asset restores the original performance of the asset and can add additional functionality as technology improves.

3.16 Renewals expenditure can vary greatly from year to year depending on the renewal projects undertaken, asset life cycle stage and funding available. Renewal expenditure is therefore less routine than maintenance and operating activities and can vary year to year.

Figure 3.5 Train distance travelled per thousand pounds of renewals expenditure



3.17 Figure 3.5 shows that train distance travelled per thousand pounds of renewals expenditure has fluctuated but is now similar to 2013-14. This has been driven by renewals costs decreasing by 13 percent whilst train distances travelled have reduced by 12 percent. Possible reasons for the fluctuation in renewals productivity include:

3.18 Infrastructure renewals expenditure has increased at times because:

- higher market rates for materials, contractors and above market rate wages as set out in our 2022 rail industry pay study;
- investments in workforce safety, earthworks and drainage schemes, following the Margam accident in 2019 and the Stonehaven derailment in 2020;
- Higher costs were also incurred due to the impact of the pandemic requiring extra labour cover and adherence to social distancing rules.

3.19 Infrastructure renewals expenditure has decreased at times because of:

- reprioritisation of planned renewals (cancellations or deferrals) due to funding pressures caused by cost increases;
- the pandemic, industrial action, access challenges and adverse weather incidents have disrupted and delayed project delivery, impacting phasing of expenditure;

- Network Rail's regulatory accounting policies have changed since 2013-14, which means that the categorisation of some costs has changed from renewals to maintenance. We have not adjusted for this in our analysis.

Annex A: Summary table

Table A.1 A summary table of all headline productivity metrics included within the report

Metric	% change 2022-23 vs 2021-22	% change 2022-23 vs 2013-14	% change 2022-23 vs pre-pandemic average
1) Industry-wide metrics			
a. Train distance travelled per rail employee	0%	- 25%	- 20%
b. Passenger distance travelled per rail employee	+ 39%	- 26%	- 24%
c. Train distance travelled per £k of expenditure	- 4%	- 30%	- 29%
d. Passenger distance travelled per £k of expenditure	+ 34%	- 32%	- 34%
2) Train operating company metrics			
a. Passenger distance travelled per FTE employee	+ 35%	- 25%	- 24%
b. Passenger distance travelled per £k of expenditure	+ 47%	- 26%	- 26%
c. Freight tonne distance carried per £k of freight expenditure	+ 1%	- 10%	- 3%
3) Rail infrastructure metrics			
a. Train distance travelled per FTE employee	+ 3%	- 26%	- 20%
b. Train distance travelled per £k of OSMR expenditure	+ 2%	- 21%	- 29%
c. Train distance travelled per £k of maintenance expenditure	0%	- 49%	- 34%
d. Train distance travelled per £k of operations expenditure	0%	- 34%	- 36%
e. Train distance travelled per £k of renewals expenditure	+ 4%	+ 1%	- 23%

Annex B: Methodology

- A.1 This report brings together productivity measures from over 30 rail industry companies over a 10-year period. We have included franchised passenger operators, open access passenger operators (non-franchised), freight operators, Network Rail, HS1 Ltd and CVL, where the data is available.
- A.2 This report largely draws upon information that is already in the public domain, including ORR's own official statistics that are published on [ORR's data portal](#). Table A.2 summarises the sources (as per the ORR data portal) utilised in calculating our metrics.

Table A.2 Sources used in calculating our metrics

Data		Source
Distance travelled	Freight train distance travelled	Table 1333
	Passenger train distance travelled	Table 1243
	Passenger distances travelled	Table 1230
Number of employees	Number of passenger train operator employees	Table 2233
	Number of Network Rail employees	Network Rail's Regulatory financial statements
Expenditure	Franchised passenger train operator expenditure	Table 7226
	Non franchised passenger train operator expenditure	Table 7233
	Freight train operator expenditure	Table 7243
	Network Rail operating, maintenance and renewals expenditure	Table 7216 Network Rail's Regulatory financial statements
Other	Rolling stock age	Table 6313
	Wider economy productivity	ONS data
	Public services productivity	ONS data
	Rolling stock vehicle numbers	RDG Table 6314

- A.3 Our productivity metrics combine various sets of data to show the ratio of output to input. For example:
- Distance travelled per employee; and
 - Distance travelled per £k of expenditure.
- A.4 We have used [Office for National Statistics productivity metrics](#) in Figure 4. These are based on the output per worker and the public service productivity measures. These measure output in terms of gross value added, which is a standard measure of economic activity in a particular area. This measure of output is very

different to the distance travelled outputs used in our metrics and so caution should be taken when interpreting figure 4.

A.5 The following section provides more further detail on data sourced from the ORR's data portal.

Train Operating Companies

- **Franchised passenger operators**

Franchised passenger operators run services as part of contracts awarded by franchising authorities (DfT, Transport Scotland, Transport for Wales, Transport for London, and Merseytravel). The financial data is based on management accounts. Where two or more train operators have operated a franchise in the year, they are added together to show the finances of that franchise for the whole financial year.

- **Non-franchised (open access) operators**

Non-franchised (open access) are licensed by the ORR to run services on specific routes. Data for Grand Central, Heathrow Express, Hull Trains (up to March 2022 only) and Lumo (which began operating services on 25 October 2021) are included. Financial data is based on bespoke returns to the ORR and accounts where published.

- **Passenger usage statistics**

The primary data source for passenger usage statistics is the rail industry's LENNON (Latest Earnings Networked Nationally Over Night) ticketing and revenue system. It is supplemented by non-LENNON data from train operators.

- **Freight operators**

Freight operators transport goods via the Great Britain mainline rail network. Statutory accounts are used for freight operators. Financial data for freight operators for the latest year (April 2022 to March 2023) and from April 2013 to March 2015 were not available. In order to provide a complete picture of industry-wide finances, an estimate of freight income and expenditure was made for these three years based on other years, for example the 2022-23 data was based on data held for 2021-22 and uplifted for inflation.

Rail Infrastructure

- **Network Rail**

Network Rail is the infrastructure manager for the main railway network of Great Britain. Network Rail regions are Eastern, North West and Central, Scotland, Southern, and Wales and Western. Network Rail financial information is based on its regulatory financial statements for the financial year.

- **HS1 Ltd limited**

HS1 (or High Speed 1) Ltd has a 30-year concession to operate and manage the railway between St Pancras and the Channel Tunnel. Financial information is based on financial accounts.

- **CVL (or Core Valley Lines)**

The Core Valley Lines (CVL) network was transferred from Network Rail to Transport for Wales on 28 March 2020. While the CVL is included within the industry-wide metrics, it has been excluded from the more detailed rail infrastructure analysis due to the lack of available data. Financial data is based on bespoke returns to the ORR.

Our Adjustments

- **Industry-wide consolidation adjustments**

For the industry-wide metrics, we have made consolidation adjustments to remove intra-industry costs, consistent with our Rail Finance (UK) report. These industry costs are those that are entirely within the industry, i.e. charged from one part of the industry to another, for example access charges, which are paid by train operators to Network Rail and HS1 Ltd. In the latest financial year this resulted in £3.1 billion being removed from industry income and expenditure.

- **Consumer Price Index (CPI) adjustments**

The CPI is used throughout our analysis to adjust for the effect of inflation and state all numbers in a consistent April 2022 to March 2023 price base.

- **Limitations to our adjustments**

This report is subject to a quality assurance process and data is shown on a comparable basis where possible. However, the following limitations exist:

- Changes to accounting standards and / or the categorisation of costs. This may affect the way costs are reflected in our analysis;
- Time Period. Most companies included in this report prepare financial data on an April to March financial year basis, however some companies prepare accounts on a calendar basis (January to December); and
- Some TOCs will outsource some parts of their operations which may affect comparisons between companies, especially for headcount.

More insight into the methodology used for the ORR's Rail Finance (UK) report can be found [here](#).



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