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Productivity in Rail Transport

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Note by the secretariat

I. Railway Productivity Indicators

1. This document aims to show the evolution of railway productivity in the railway sector between 2019 and 2021. However, the Covid-19 Pandemic, which emerged during the period, could have shaped the evolution of productivity in the railway sector.

2. The data used in this paper are based on the UIC (Union Internationale des Chemins) database "Railisa",[1] further information on UIC variables can be found on the website.

3. The choice of using UIC data instead of the UNECE (United Nations Economic Commission for Europe) data is due to the wider number of data available and their better comparability with previous datasets used.

4. Eight different UIC variables have been used in this analysis:

- 1113: Length of tracks - End of year (Km);
- 3103: Mean annual staff strength – Infrastructure (Full Time Equivalent);
- 3109: Mean annual staff strength – Total Operations (Full Time Equivalent);
- 3205: Staff Structure per Age and Gender - Total Men (Number of employees);
- 3206: Staff Structure per Age and Gender - Total Women (Number of employees);
- 4104: Train kilometres of the operator- All types of traction (KTrain - Km);
- 5113: Traffic on the national territory – Passenger (Million Passenger - Km);
- 6603: Global traffic – Freight traffic of the railway operator, domestic and international (Million Tonne – Km).

[1] https://uic-stats.uic.org/.

5. The fifteen member States for which a comparison was possible are the following:[2]

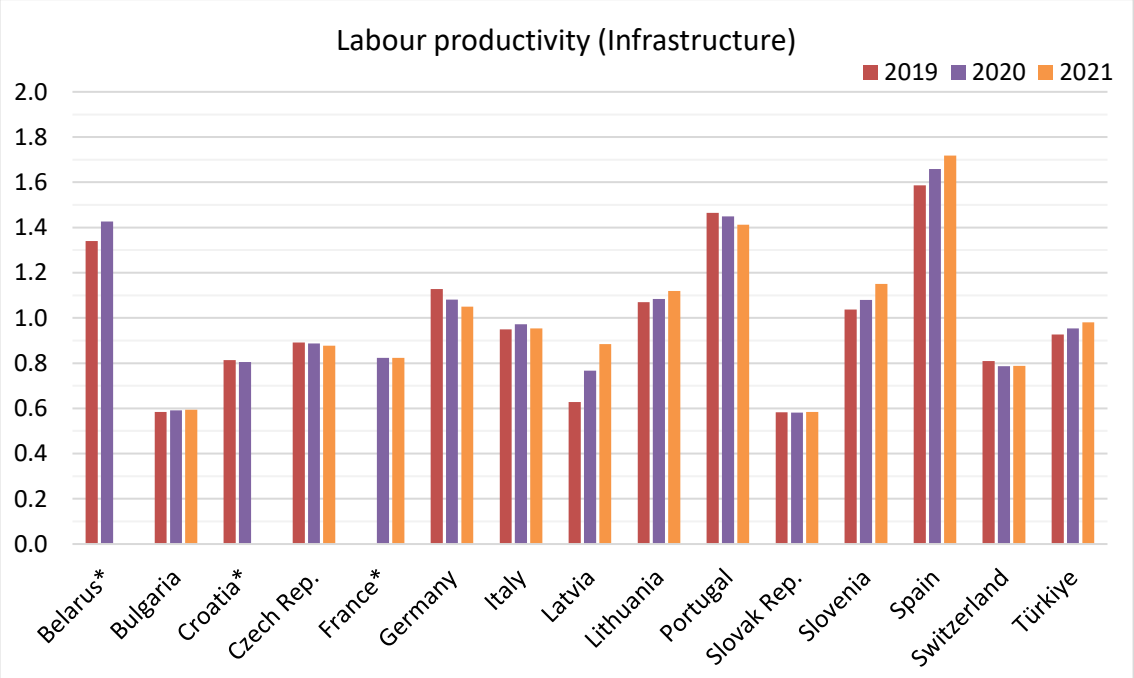
- Belarus
- Bulgaria
- Croatia
- Czech Republic
- France
- Germany
- Italy
- Latvia
- Lithuania
- Portugal
- Slovak Republic
- Slovenia
- Spain
- Switzerland
- Türkiye.

6. The original data, split by railway operator, have been elaborated to create aggregate data for member States, for the categories of interest. Then, the aggregated data have been used to calculate seven different railway productivity ratios/indicators. The results of this analysis have been provided in the figures and explanation below. Where data in the figures is missing, an asterisk has been added next to the country name.

[2] Notes about the countries sampled: The UIC Database provides data on 46 pan-European countries with at least one national railway operator for the selected variables and period. All the available data have been selected and analyzed in the initial stages of this work. However, the presence of many missing values in the variables, and therefore in the aggregate data, meant that only a subset of these countries could be included. Data on Albania, Estonia, and Turkmenistan was not available.

Infrastructure labour productivity

Figure 1
Labour Productivity (Infrastructure)
Kilometres of railway lines / total number of employees working in infrastructure management. Measured in km/FTE (Full Time Equivalents)



7. There is no systematic difference within countries in the different years. Spain, Portugal, and Belarus registered the highest values in the period, while Bulgaria and the Slovak Republic had the lowest. It is worth noting that Czechia, Germany, Portugal and to a lesser extent, Switzerland have seen a continual decline in this period. The opposite is true for Bulgaria, Latvia, Lithuania, Slovenia, Spain and Türkiye.

Notes about the indicator and variables

8. The chart above shows data related to the labour productivity of infrastructure management, which are calculated by dividing UIC variable 1113 (Length of tracks - End of year (Km)) by UIC variable 3103 (Mean annual staff strength – Infrastructure (Full Time Equivalent)). The ratio is intended to compare the different performances of the infrastructure management workforce.

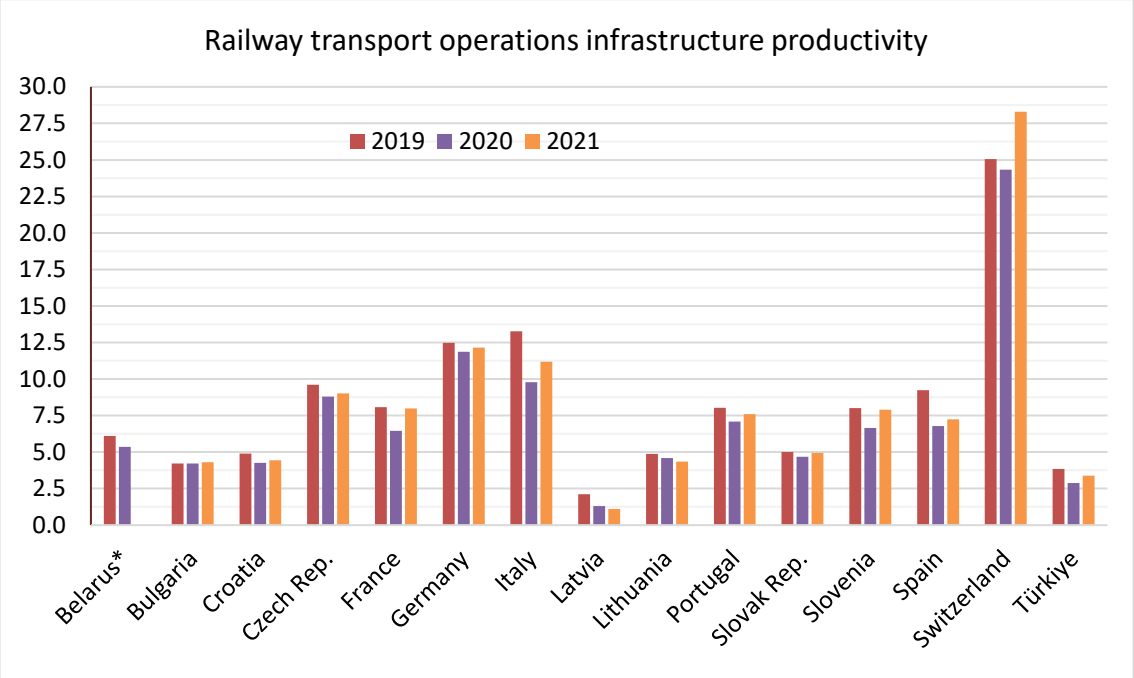
9. UIC variable 1112 (Length of line worked – end of year), used in the previous edition of this analysis, has been replaced by the UIC variable 1113 (Length of tracks - End of year) due to the better consistency with data provided by other International Organizations. The UIC variable 1113 includes data on both High Speed and conventional rail.

10. UIC variable 3111 (Mean annual staff strength), used in the previous edition of this analysis, has been replaced by the UIC variable 3103 (Mean annual staff strength – Infrastructure) allowing for a more precise analysis.

11. There are no available data for the variable 3103 for Belarus. However, an approximation has been used, calculating the difference in the values of the variables 3111 and 3109.

Combined passenger and freight operations infrastructure productivity

Figure 2
Railway transport operations infrastructure productivity
KTrain-Km travelled by railway freight and passenger operators/ kilometres of railway lines.
Measured in KTrain-km/km



12. In most countries, there has been a decrease in the values between 2019 and 2020. However, an increase is visible in 2021 in many countries. This phenomenon could have been caused by the Covid-19 pandemic and the related restrictions. During the period, Switzerland achieved the highest level in the values of the ratio – more than twice the value of the second highest – while Latvia had the lowest.

Notes about the indicator and variables

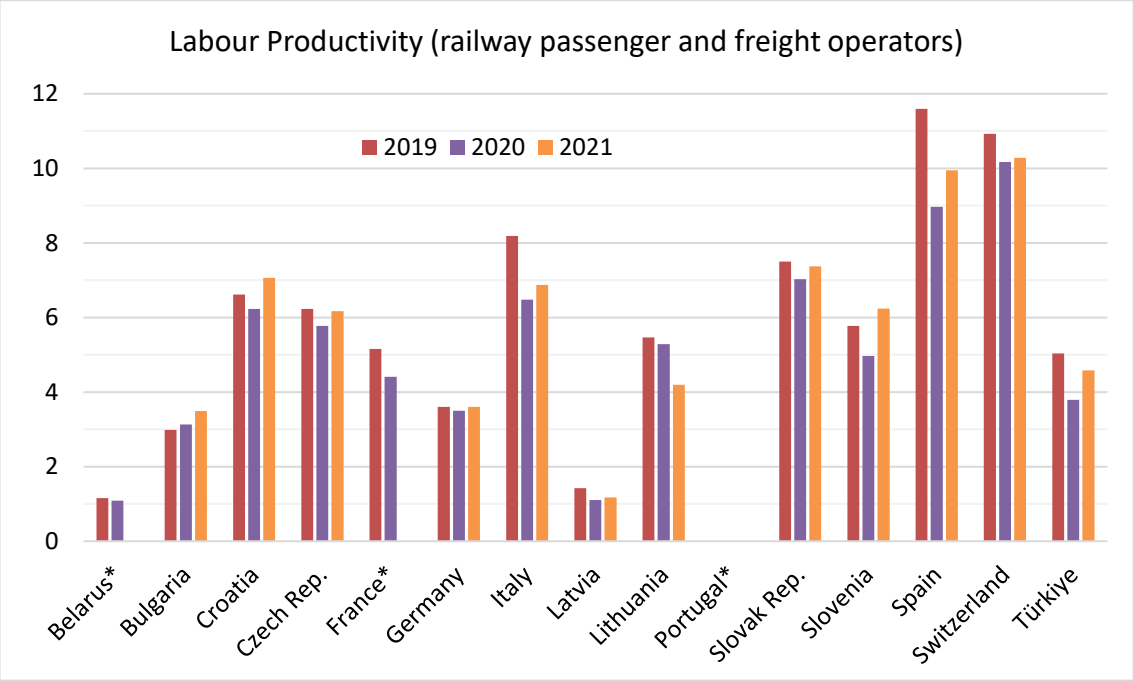
13. The chart above shows data on the productivity of railway lines, which are calculated by dividing UIC variable 4104 (Train kilometres of the operator- All types of traction (KTrain - Km)) by UIC variable 1113 (Length of tracks - End of year (Km)). The ratio is intended to compare the different levels of usage of railway tracks by freight and passenger operators in the countries.

14. UIC variable 1112 (Length of line worked – end of year), used in the previous edition of this analysis, has been replaced by the UIC variable 1113 (Length of tracks - End of year) due to the better consistency with data provided by other International Organizations. The variable 1113 includes data on both High Speed and conventional rail.

15. UIC variable 4104 includes the Train-km travelled both by passenger and freight operators.

Combined passenger and freight transport labour productivity

Figure 3
Labour Productivity (railway passenger and freight operators)
KTrain-Km travelled by railway freight and passenger operators/ total number of employees working in railway freight and passenger operators. Measured in KTrain-km /FTE (Full Time Equivalents)



16. In most countries, there has been a decrease in the values between 2019 and 2020, however, an increase is visible already in 2021 in many countries. This phenomenon could have been caused by the Covid-19 pandemic and its related restrictions. During the period, Switzerland and Spain registered the highest values for this ratio.

Notes about the indicator and variables

17. The chart above shows data on the labour productivity of railway operators, which are calculated by dividing UIC variable 4104 (Train kilometres of the operator- All types of traction (KTrain - Km)) by UIC variable 3109 (Mean annual staff strength – Total Operations (Full Time Equivalent)). The ratio is intended to compare the different levels of productivity of railway freight and passenger operators in using their human resources.

18. UIC variable 3111 (Mean annual staff strength), used in the previous edition of this analysis, has been replaced by the UIC variable 3109 (Mean annual staff strength – Total Operations), allowing for a more precise analysis.

19. UIC variable 4104 includes the Train-km travelled both by passenger and freight operators.

20. For this dataset, data for Portugal are missing.

Freight transport productivity

Figure 4
Productivity indicator of freight transport
Net tonne-kilometres transported by freight trains/total number of kilometres of network in use. Measured in Mt-km/km

21. In some countries, there has been a slight decrease in the values between 2019 and 2021. This phenomenon could have been caused by the Covid-19 pandemic and the related restrictions. A significant difference can be noted considering the levels achieved by Belarus, Latvia, Lithuania, Slovenia, and Switzerland, when compared to all the other member States.

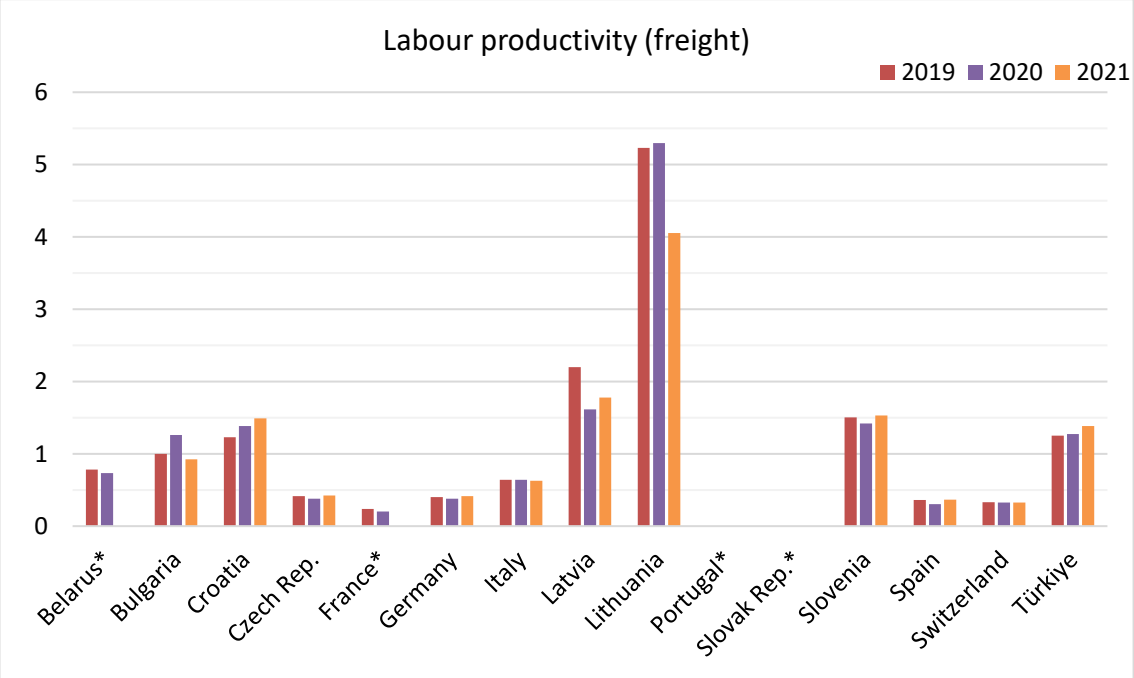
Notes about the indicator and variables

22. The chart above shows data on freight transport productivity, which are calculated by dividing UIC variable 6603 (Global traffic – Freight traffic of the railway operator, domestic and international (Million Tonne – Km)) by UIC variable 1113 (Length of tracks - End of year (Km)). The ratio is intended to compare the different levels of usage of railway tracks by the different freight operators in the country.

23. UIC variable 1112 (Length of line worked – end of year), used in the previous edition of this analysis, has been replaced by the UIC variable 1113 (Length of tracks - End of year) due to the better consistency with data provided by other International Organizations. The UIC variable 1113 includes data on both High Speed and conventional rail. Data for Portugal are missing.

Freight transport labour productivity

Figure 5
Labour productivity indicator (freight)
Net tonnes-kilometres of freight trains/total number of employees working in freight railways. Measured in Mt-km/FTE (Full Time Equivalents)



24. During the period, Lithuania and Latvia registered the highest values for this ratio, but the values decreased in both countries between 2019 and 2021. Of note is the how much greater the value for Lithuania is when compared to other member States.

Notes about the indicator and variables

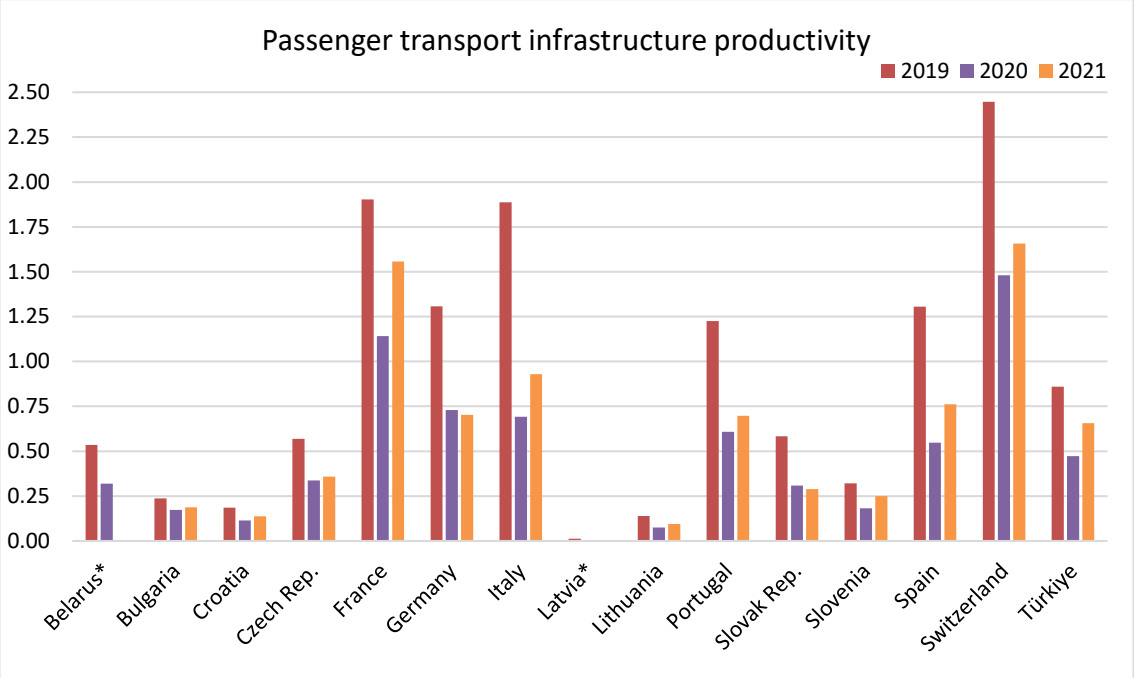
25. The chart above shows data on labour productivity of freight transport which are calculated by dividing UIC variable 6603 (Global traffic – Freight traffic of the railway operator, domestic and international (Million Tonne – Km)) by UIC variable 3109 (Mean annual staff strength – Total Operations (Full Time Equivalent)). The ratio is intended to compare the different levels of productivity of railway freight operators in using their human resources.

26. UIC variable 3111 (Mean annual staff strength), used in the previous edition of this analysis, has been replaced by the UIC variable and 3109 (Mean annual staff strength – Total Operations), allowing for a more precise analysis. A distinction between the workers employed in freight transport and those employed in passenger transport would be more appropriate, but such data are not available in the database.

27. For this indicator, data for Portugal and Slovakia are missing.

Passenger transport infrastructure productivity

Figure 6
Passenger transport infrastructure productivity (high-speed and conventional rail)
Passengers-kilometres moved by conventional and high-speed trains/total number of kilometres of network in use. Measured in Mp-km/km



28. In most countries, there has been a significant decrease in the values between 2019 and 2020. However, an increase is visible in 2021 in some of the countries sampled. This phenomenon could have been caused by the Covid-19 pandemic and the related restrictions. During the period, Switzerland achieved the highest level in the values of the ratio while Lithuania and Croatia the lowest.

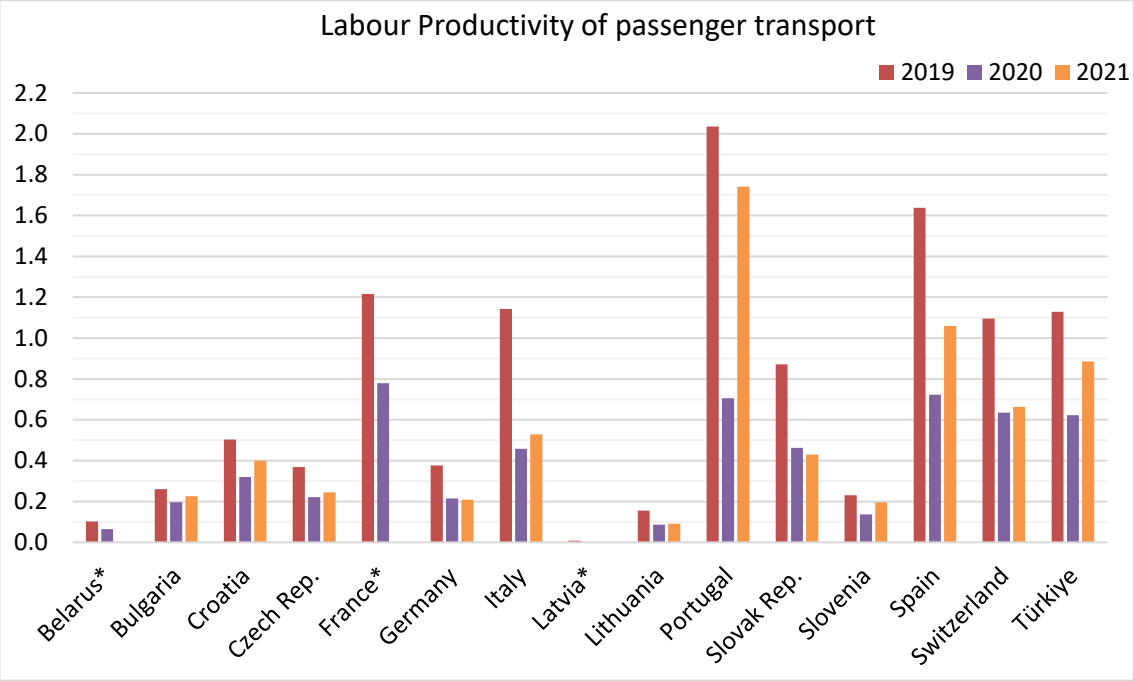
Notes about the indicator and variables

29. The chart above shows data on the productivity of passenger transport in the countries, which are calculated by dividing UIC variable 5113 (Traffic on the national territory – Passenger (Million Passenger - Km)) by UIC variable 1113 (Length of tracks - End of year (Km)). The ratio is intended to compare the different levels of usage of railway tracks by the different passenger operators in the country.

30. UIC variable 1112 (Length of line worked – end of year), used in the previous edition of this analysis, has been replaced by the UIC variable 1113 (Length of tracks – End of year) due to the better consistency with data provided by other International Organizations. UIC variable 1113 includes data on both High Speed and conventional rail.

Passenger transport labour productivity

Figure 7
Labour productivity of passenger transport
Passengers-kilometres moved by conventional and high-speed trains/total number of employees working in railway freight and passenger operators. Measured in Mt-km/FTE (Full Time Equivalents)



31. In most of the countries there has been a significant decrease in the values between 2019 and 2020. However, an increase is visible in 2021 in all countries. This phenomenon could have been caused by the Covid-19 pandemic and the related restrictions. During the period, Portugal and Spain registered the highest values for this ratio, while Belarus, Latvia, and Lithuania – the lowest.

Notes about the indicator and variables

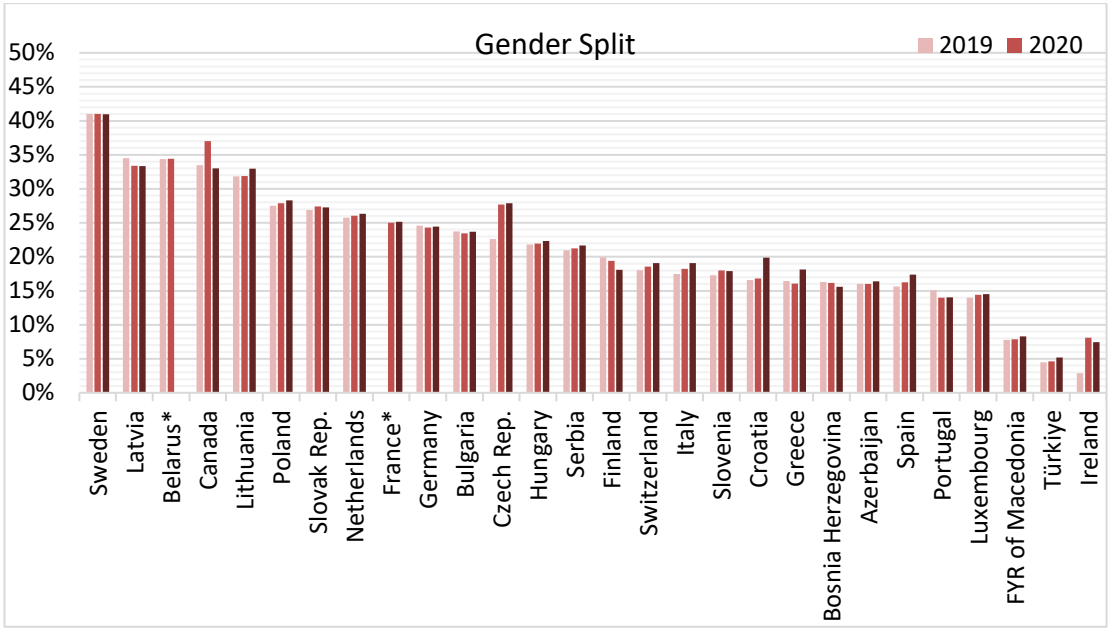
32. The chart above shows data on passenger transport labour productivity, which are calculated by dividing UIC variable 5113 (Traffic on the national territory – Passenger (Million Passenger - Km)) by UIC variable 3109 (Mean annual staff strength C Total Operations (Full Time Equivalent)) The ratio is intended to compare the different levels of productivity of railway passenger operators in using their human resources.

33. UIC variable 3111 (Mean annual staff strength), used in the previous edition of this analysis, has been replaced by the UIC variable and 3109 (Mean annual staff strength – Total Operations), allowing for a more precise analysis. A distinction between the workers employed in freight transport and those employed in passenger transport would be more appropriate, but such data are not available in the mentioned database.

II. Additional data on gender

34. Additional analysis has been prepared focusing on the gender split in the railway sector across the region.

Figure 8
Gender Split
Number of women working in the railway sector/ number of people working in the working sector (men and women). Measured in percentage



35. In most countries, there has been at least a slight increase in the number of women working in the sector between 2019 and 2021. However, in all the countries, the percentage of women employed in the railway sector is below 45 per cent, showing a men's majority in this sector.

Notes about the indicator and variables

36. For the gender split analysis, a larger sample has been provided, also including the following member States: Azerbaijan, Bosnia Herzegovina, Canada, Finland, Greece, Hungary, Ireland, Luxembourg, FYR of Macedonia, Netherlands, Poland, Serbia, and Sweden.

37. The graph above shows the gender split in the railway sector in the countries sampled. The ratio has been calculated by dividing the UIC variable 3206 (Staff Structure per Age and Gender - Total Women (Number of employees)) by the sum between UIC variable 3206 and 3205 (Staff Structure per Age and Gender - Total Women (Number of employees)).

III. Final considerations

38. Countries experienced a general decrease in passenger transport productivity between 2019 and 2020 most probably due to the Covid-19 pandemic. However, most of the countries experienced a rebound already in 2021. The decrease has been less important for freight transport.

39. The Working Party may wish to consider next steps in relation to this work.