

## Benchmark on Financing of Main Railway Infrastructure Managers in Selected European Countries

November 2019

### **Executive summary:**

Driven by the fourth railway package and the recast of EU Directive 2012/34, many countries have adapted or are in the process of adapting their national legislation. The EU Directive sets guiding principles to define the services provided by the Infrastructure Manager (IM) within the Minimum Access Package (MAP) and the cost of their provision. This benchmark is an attempt to provide a first overview of the costs of the MAP, specifically total and direct costs, and the sources of income of IMs by looking at revenues (track access charges, (government) grants and other revenues). The benchmark shows the diversity of financing and charging practices across some main IMs operating in the IRG-Rail members' countries that participated in this study. Some countries show high level of grants and focus on charges based on direct costs while other countries try to recover a higher part of total costs using markups based on Article 32 (2) of the EU Directive 2012/34.

The benchmark also discusses how to differentiate cost data of the MAP provided by the main IMs focusing on the provided MAP services, the functional cost view, or the nature of expenses. In this regard, further work is needed to improve the data quality to provide a meaningful comparison across countries and to be able to better explain differences across countries. Analytical accountancy, regulatory accountancy and the scope of individual variables differ across countries; as a result, the data reported in this benchmark is indicative of the values concerned.

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## 1. Introduction

This benchmark is a first attempt of IRG-Rail to collect data on cost and track access charges concerning the main IMs operating in the countries considered in this benchmark (see Table 1). The benchmark aims at exploring the costs and the cost structure of the minimum access package (MAP) across countries. The project started in 2017 with a first explorative questionnaire. Based on the feedback to this questionnaire, IRG-Rail developed an additional questionnaire that focused on a more detailed split of cost and revenue data. The questionnaire was developed in the second half of 2018 and sent out to all IRG-Rail members. The results of this data collection were discussed internally and with different stakeholders<sup>1</sup> to improve on the methodology. Based on the feedback IRG Rail sent out an improved version of the questionnaire in 2019 and again received data from about 20 countries at varying levels of detail that is presented in this benchmark.

Table 1 lists all countries that participated in this benchmark and provides the name of the Regulatory Body (RB) and the incumbent infrastructure manager (IM) on which this benchmark focuses. Although in some countries more than one IM operates, IRG-Rail has decided to focus on the main incumbent IM in the hope of obtaining more and reliable data. Whenever data is shown, it will be based on the input provided by the respective RB or IM listed here. Whenever countries or groups of countries are mentioned, this refers to the main IMs operating in these countries or to the legal situation in this country. We note that occasionally countries / main IMs are missing in some tables or graphs. This is because the data collection did not always yield the same level of completeness.

The main goal of the project is to be able to compare gross and net costs of the provision of the Minimum Access Package (MAP) across countries. To do so, it is important to first define which services belong to the MAP and how the MAP was defined across countries. This is done in Chapter 2.

Chapter 3 analyses total cost of the MAP and tries to split costs further into categories that are more detailed. While IRG-Rail was able to obtain a broad overview of aggregate costs, it had less success in collecting data for the proposed splits. Given that this is the first attempt for this exercise, IRG-Rail intends to review the approaches and revisit the definitions to improve the response rate for a future benchmark. The current analysis already shows that the level of grants is very different across countries.

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<sup>1</sup> The WG Charges of IRG-Rail organized a joint workshop with PRIME in Vienna in February 2019 and presented the results to ERFA in May 2019.

Table 1: Overview of Countries included in the Benchmark

Country	Regulatory body	Main IM
<b>Austria</b>	Schiene-Control GmbH	OEBB-Infrastruktur AG
<b>Belgium</b>	Service de régulation du transport ferroviaire et de l'exploitation de l'aéroport de Bruxelles National	Infrabel
<b>Bulgaria</b>	Railway Administration Executive Agency	National railway Infrastructure Company (NRIC)
<b>Croatia</b>	HAKOM	HŽ Infrastruktura d.o.o.
<b>Czech Republic</b>	SŽDC	Úřad pro přístup k dopravní infrastruktúře
<b>Denmark</b>	Danish Rail RB (Jernbanenævnet)	Banedanmark
<b>Finland</b>	Finnish Rail Regulatory Body	Finnish Transport Infrastructure Agency (FTIA).
<b>France</b>	Autorité de régulation des transports	SNCF Réseau
<b>Germany</b>	Bundesnetzagentur	DB Netz AG
<b>Hungary</b>	Rail Regulatory Body	MÁV Magyar Államvasutak Zrt.
<b>Italy</b>	Autorità di Regolazione dei Trasporti	Rete Ferroviaria Italiana SpA (RFI)
<b>Latvia</b>	State Railway Administration of Latvian Republic	Latvijas dzelzceļš
<b>Lithuania</b>	Communications Regulatory Authority of the Republic of Lithuania	Lietuvos geležinkeliai
<b>Norway</b>	Norwegian Railway Authority	Bane NOR SF
<b>Poland</b>	UTK - Urząd Transportu Kolejowego	PKP PLK SA (PKP)
<b>Portugal</b>	AMT - Autoridade da Mobilidade e dos Transportes	Infraestruturas de Portugal, S.A. ("IP")
<b>Slovak</b>	Transport authority	Železnice Slovenskej republiky (ŽSR)
<b>Slovenia</b>	AKOS	SŽ-Infrastruktura
<b>Spain</b>	CNMC	ADIF
<b>Sweden</b>	Swedish Transport Agency (Transportstyrelsen)	Swedish Transport Administration (Trafikverket)
<b>Switzerland</b>	Schiedskommission im Eisenbahnverkehr (SKE)	SBB
<b>GB</b>	Office of Rail and Road (ORR)	Network Rail
<b>The Netherlands</b>	Autoriteit Consument en Markt (ACM)	ProRail B.V.

Source: own data collection of IRG-Rail WG Charges

The beginning of Chapter 5 offers a brief overview of the current situation on segmentation among countries. Since the segmentation across countries is rather diverse, the benchmark does not offer a very detailed description or comparison of actual segmentation. The chapter analyses track access charges, direct costs charges and markups across countries. It turns out that only a few number of countries charge markups and that the relative size of

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markups varies quite a lot. One reason for that seems to be the fact that the different countries have different levels of grants (as shown in Chapter 3.1), which affects the level of markups. It can generally be observed that the markup for passenger services is usually higher than for freight services, which might indicate a higher ability to bear markups in passenger services.

It should be noted that the IRG-Rail Market Monitoring Report also shows numbers on track access charges. Due to a number of reasons (different reported year, focus on main IM instead of the entire country, more recent data, etc.) the values are and can be different then the data displayed in the aforementioned report.

In the light of the reasons pointed out above and the divergence in approaches to access charging and rail funding across the observed countries, this benchmark is subject to a general disclaimer: data provided by different countries is not necessarily comparable and is mainly useful for monitoring trends within each country, given the variety of possible approaches which could be taken when calculating total costs, direct costs or track access charges. This is similar to the approach taken in the Annex to the Commission Implementing Regulation (EU) 2015/1100 of 7 July 2015 on the reporting obligations of the Member States in the framework of rail market monitoring<sup>2</sup>.

**2. Definition of the Minimum Access Package and Services Provided by the IM**

This chapter looks at the definition of the minimum access package in national law and which services are to be provided by the main IM across countries. EU Directive 2012/34 states in Annex II (1) that the minimum access package shall comprise:

- a. handling of requests for railway infrastructure capacity;
- b. the right to utilise capacity which is granted;
- c. use of the railway infrastructure, including track points and junctions;
- d. train control including signalling, regulation, dispatching and the communication and provision of information on train movement;
- e. use of electrical supply equipment for traction current, where available;
- f. all other information required to implement or operate the service for which capacity has been granted.

Most of the countries have transposed the provision above into national law without changes. Therefore, in nearly all the countries the minimum access package is the same as in the EU Directive. The only exception is Bulgaria, where the “use of electrical supply equipment for traction current” is not included in the minimum access package. The service “use of electrical supply equipment for traction current, where available” was added to the

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<sup>2</sup> “Given the variety of possible approaches which could be taken when calculating the TACs, the data provided in this table by different Member States will not necessarily be comparable and will mainly be useful for monitoring trends within each Member State” (Footnote 1)

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minimum access package in Slovakia and in Austria in 2015, when the Recast was transposed into national law.

In some countries, the minimum access package includes further services. In Spain, the information on train movement services and delays are also included in the minimum access package, probably to emphasize the importance of this information for the MAP.

Until 2017, in Portugal, the minimum access package included the costs related to the access to the supply of services at passenger stations, corresponding buildings and other facilities, which included management and oversight of conservation and maintenance thereof, guarantee of access to platforms, including lifts and escalators, security of passenger stations, corresponding buildings, platforms, and other facilities and maintenance and provision of platforms, including cover thereof dedicated to the provision of rail transport services and other areas allocated for service use by passengers. From 2018 onwards, these are no longer included.

Internal discussions<sup>3</sup> and IRG-Rail data collection show that in some countries, passenger and good platforms and/or stations and terminals are included in the MAP and in some countries they are separated from the MAP. The recent decision by the European Court of Justice on an Austrian case<sup>4</sup> concerning this question will probably induce changes in some countries. For the time being, the current benchmark relies on the countries to provide the costs they consider as the MAP.

In conclusion, it is justified to focus on the MAP, because most countries directly copied the definitions of the MAP into their national legislation. In order to allow a meaningful benchmark, it is important to make sure that all countries observed by the benchmark apply the same or very similar definitions, which is the case for the MAP. The MAP definitions from Annex II provide a good focal point for a benchmark.

**3. Total Costs of Minimum Access Package, Government Funds and Other Revenues**

Comparing the total costs of all services of an IM across countries is a difficult task as each IM is very different due to current and previous legal requirements in each country. In some countries, the network service is separated from the railway transport services and other services (e.g. GB, Netherlands, Sweden, Spain), and in some countries the network belongs to one larger vertically integrated holding where the network service is carried out by a dedicated subsidiary (e.g. Germany, France). Furthermore, IMs can offer a wide range

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<sup>3</sup> For a more detailed discussion, we refer to a paper of the WG ELP on this issue.

<sup>4</sup> See case C-210/18 WESTbahn Management  
<http://curia.europa.eu/juris/liste.jsf?num=C-210>

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of additional, ancillary or supplementary services unrelated to the MAP like the delivery of traction current or other analytical tools.<sup>5</sup>

This benchmark focuses on the accounted MAP costs of main IMs and excludes costs for any other services. This focus should allow a meaningful comparison because most IMs offer the same services for the MAP in line with Annex II (1) of EU Directive 2012/34 (see Chapter 2). This chapter analyses cost at the aggregated level of gross and net MAP costs and grants & other revenues. It was also intended to split MAP costs into the different services that are provided and two accounting splits: Functional Cost View and Nature of Expense. These splits are discussed in Chapter 3.2, but do not show any results, as more work is needed to improve the data base and provide explanations for each country specific differences.

The fact that many countries just recently have changed their regulatory system to comply with the EU Directive 2012/34 makes it even more difficult to compare costs across countries and to collect the appropriate data. To take account of the most recent system and the best available data, countries are free to choose which year is the most appropriate year to be represented in the benchmark, while encouraging 2017 as the most suitable year. While there can be some differences from year to year, the general split of costs or the share of a given category on total costs should be fairly constant. Nevertheless, robustness checks were done and a common deflation factor was used to discount all data to 2017 prices. The domestic output price index is used as a common denominator to deflate values to the year 2017 provided by Eurostat<sup>6</sup>. Hence, all quantitative comparisons in all chapters follow this approach and show discounted cost per train km for 2017 or relative shares on costs or charges for 2017 or discounted to 2017. Table 2 shows which country<sup>7</sup> originally reported data for which year and 2017 is the most often reported year. Each of the following chapters will first discuss the methodology and then present the results, when appropriate.

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<sup>5</sup> DB Netz AG lists its Supplementary service products here: [https://fahrweg.dbnetze.com/fahrweg-en/customers/services/ancillary\\_and\\_supplementary\\_services/products\\_supplementary\\_services-2873796](https://fahrweg.dbnetze.com/fahrweg-en/customers/services/ancillary_and_supplementary_services/products_supplementary_services-2873796)

<sup>6</sup> [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts\\_inppd\\_m&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts_inppd_m&lang=en)

<sup>7</sup> For the ease of the reader, the benchmark refers to countries which represent the main IM of this country as presented in Table 1 in Chapter 1 or occasionally the general legal situation of this country.

Table 2: Overview of Reported Year

Year	Countries
2017	Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Luxembourg, Norway, Poland, Portugal, Slovakia, Slovenia, Sweden, GB, Switzerland
2018	Austria, Croatia, Lithuania, Spain, the Netherlands, France <sup>8</sup>
2019	Latvia

Source: own data collection of IRG-Rail WG Charges

### 3.1 Comparison of Total Gross Cost, Net Cost, Grants, and Other Revenues

In order to allow a meaningful comparison of charges, including markups, across countries (see Chapter 5), the difference of gross and net MAP costs has to be determined, which is the first step of the analysis. This benchmark defines gross costs as the cost before the deduction of grants and other revenues, while net cost is defined as the residual of the above. To avoid that users pay for costs that have already been covered by grants (i.e. their taxes), charges including markups are designed to only recover net costs. It is important to take account of the level of cost, capitalized grants and other revenues, since it varies greatly across countries, which in turn influences the level of net costs and hence charges. Due to a low level of grants in some countries, charges in those countries might appear rather high as the respective government aimed for a higher recovery of costs by end customers, which can distort the insights one derives from the comparison of charges across countries.

To be able to compare as many countries as possible, the analysis is based on a very broad definition of accounted gross cost, grants and other revenues on an annual basis.

- Gross costs: All cost related to the provision of the MAP services regardless of the funding sources
- Grants: Any form of funding sources that is not originally provided by the IM's own funds and is consumed or capitalized within the given year. This also includes funds provided by contractual agreements referred to in Article 30 (2) and Annex V of EU Directive 2012/34, as well as subsidies and any other sources of public funding.
- Other revenues: Other commercial revenues not directly linked to services provided within the MAP but based on assets used within the MAP. This could for instance be revenues from a sale of MAP assets, advertisement on MAP assets, or renting out parts of a MAP asset to other companies while still using them for the MAP (e.g. cables and network antennas on the track infrastructure)

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<sup>8</sup> Data on total costs is reported for 2017 and data on direct costs and TAC for 2018 since a new econometric methodology has been introduced in 2018 to calculate direct costs.

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- Net costs: The residual of gross costs and grants & other revenues. This should be equal to the revenue cap of charges for countries applying markups<sup>9</sup>.

This results in the following equation, representing the structure of total costs of IMs:

$$\text{Gross Cost} - (\text{Grants \& Other Revenues}) = \text{Net Costs}$$

If one knows any two of these three<sup>10</sup> terms, one can derive the other as the residual. The benchmark follows this approach, because looking at total level of these categories is more interesting than the exact split. Figure 1 offers an illustration of this approach. In some countries, the main IM might choose to deduct government grants related to assets directly in their public balance sheets as indicated by point 24 of IAS 20. Therefore, it might be difficult for some main IMs to keep track of all grant related costs over time if they do not take account of the funding source in their internal accounting. Nevertheless, the above definitions require the IM to report what part of their costs have been covered by government grants or own funds over time. This was made clear for the data collection.

There are two main approaches to setting charges defined by Article 32 of the EU Directive 2012/34. Generally, charges should reflect direct costs of the services but IMs are allowed to charge markups to (partially) recover their full costs (Article 32 (1)). Therefore, the ability to differentiate gross and net costs is usually necessary if a country decides to charge markups. For further examination of these different approaches, this benchmark refers to the IRG-Rail Updated Review of Charging Practices for the Minimum Access Package in Europe.<sup>11</sup>

Given the different size of the IMs across countries, the analysis needs to use a common denominator of size to allow a meaningful comparison across countries. An obvious candidate for this would be the output of the system. For this, train kilometres are a good choice, as they indicate how many trains have run on the system. This is also a comparable and available indicator. One could also look at the general size of the system by considering the length of the route in kilometres, but in order to allow a comparison across countries, this benchmark focuses its analysis on train kilometres and presents results in €/trkm, but does show results based on route km if possible, e.g. for direct costs.

When defining the level of grants & other revenues it is important to note that this benchmark conducts a cost-based analysis. Therefore, grants considered in this benchmark are meant to represent assets and projects that are already capitalized in the balance sheets and accounting system of an IM. The difference between expenditures or money granted to the IM and costs should be noted. Expenditures represent a flow of money while costs consider

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<sup>9</sup> With the exception that in some countries an incentive regulation applies that allows the revenue cap to be different than the actual cost of the respective year.

<sup>10</sup> IRG-Rail defines „(Grants & Other Revenues)“ here as one term

<sup>11</sup><https://www.irg-rail.eu/irg/documents/position-papers/166,2017.html>

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if the asset for which the expenditures were used are consumed within the observed time period. Expenditures and costs are equal when the asset is bought and consumed in the same time period.<sup>12</sup> The benchmark does not tackle the issue of expenditure nor does the data collection keep track of this particular aspect.

Figure 1: Illustration of Cost Structure of IM and MAP Costs



Figure 2 illustrates total gross costs of the MAP, grants & other revenues, and the resulting total net costs of the MAP for all countries that took part in the survey. In total, this benchmark can show data for 18 countries for at least three of the categories. Some countries were not able to provide all the data because it is not available for the RB or the IM could not or did not want to provide it. Three countries had issues calculating costs for the MAP and are therefore excluded. Hence, Figure 2 illustrates the differences across countries. One can see that the relative size of net cost (light blue bar) in comparison to gross cost (dark blue bar) is very different. This is shown in percentage in Figure 3. In many countries, other revenues are of non-negligible size or zero.

<sup>12</sup> <https://www.accountingtools.com/articles/what-is-the-difference-between-cost-and-expense.html>

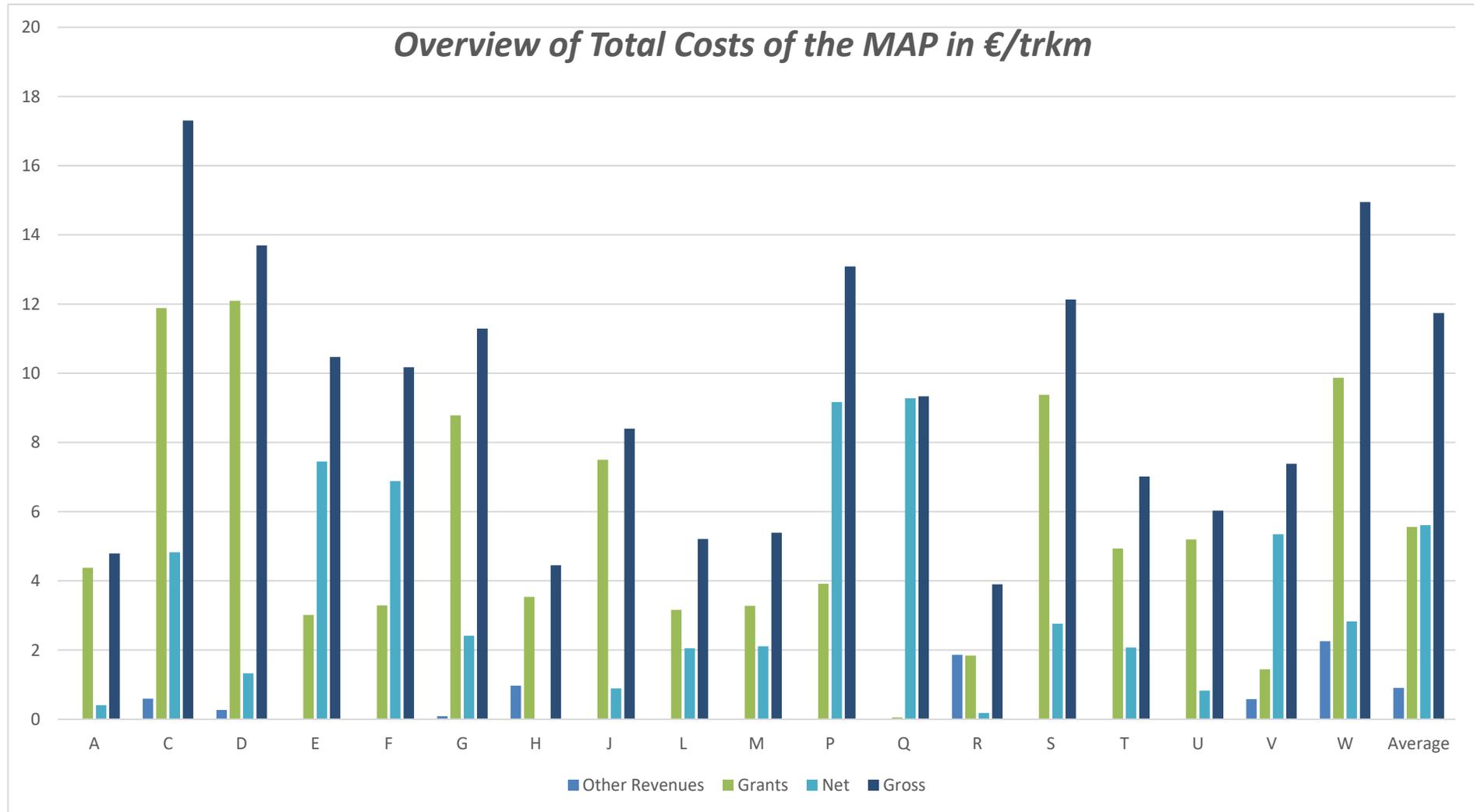


Figure 2: Overview of Total Costs of the MAP split in Gross, Net, and Grants & Other Revenues across Countries in €/trkm

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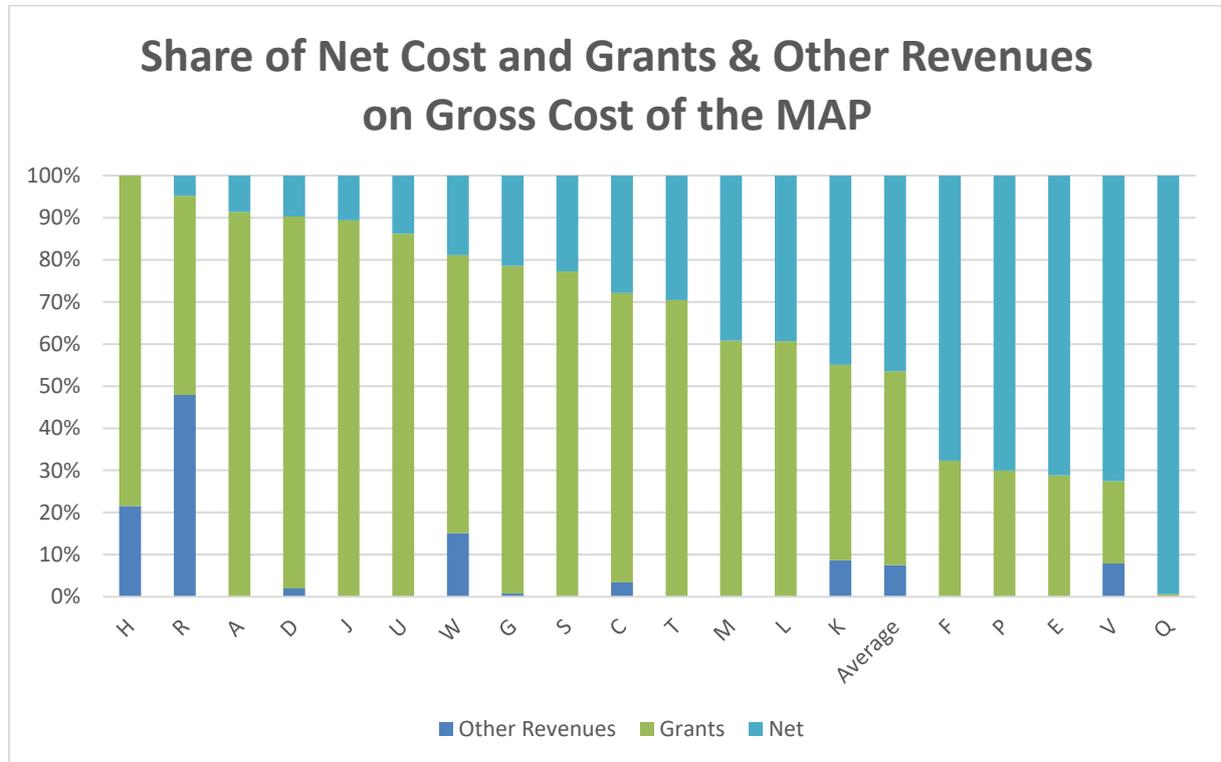
Table 3 shows that the weighted average cost per trkm based on 18 countries is 9.39 €/train km, with a standard deviation of 3.65 €/train km. The maximum is 17.31 €/train km. One can see that the average of net costs, grants & other revenues is slightly higher than the average for gross costs. This is because many countries did not report any values for other revenues, as can be seen in Figure 2 (for many countries there are only three bars). We did not set all these values to zero to present a more meaningful average of other revenues for countries that could report this value. Based on the information received, it is not possible to say if there are indeed no other revenues in the non-reporting countries or if they just cannot be computed. If this were the case, the value for other revenues would change to 0.29 €/train km.

**Table 3: Summary statistics of Total Cost per train km**

Statistics	Gross	Net	Grants	Other Revenues
<b>Weighted Average</b>	9.39 €/train km	4.61 €/train km	4.49 €/train km	0.51 €/train km
<b>Standard Deviation</b>	3.65 €/train km	2.76 €/train km	3.49 €/train km	0.35 €/train km
<b>Maximum</b>	17.31 €/train km	9.28 €/train km	12.10 €/train km	2.25 €/train km
<b>Count</b>	18	18	18	8

Figure 3 highlights the different shares of net costs and grants & other revenues on gross cost across countries. One can already see that the level of grants varies greatly among countries and the share of grants & other revenues on total gross costs orders countries. It turns out that there is a group of nine countries with a share of grants & other revenues all above 75%. A group of six countries with intermediate grants & other revenues levels around 40-75% follows them. At end of the scale, four countries have rather low levels of grants (below 30%). This has to be taken into account when one analyses the level of charges and markups in Chapter 5. One observation may be that the level of charges is higher in countries with low grants compared to countries with high grants.

Figure 3: Share of Net Cost and Grants & Other Revenues on Gross Cost of the MAP



### 3.2 Cost Split of MAP Costs

The previous analysis focused on the MAP cost at a highly aggregated level. To understand the cost structure and the main drivers of costs, it is imperative to analyse a more detailed split of the accounted MAP costs as foreseen in the International Accounting Standards (IAS)<sup>13</sup>:

*“An entity shall present an analysis of expenses recognized in profit or loss using a classification based on either their nature or their function within the entity, whichever provides information that is reliable and more relevant.”*

For this purpose, the benchmark considers three different approaches that are presented as follows.

1. MAP Service Split  
Based on Annex II (1) of EU Directive 2012/34

<sup>13</sup> International Accounting Standards (IAS): These standards were issued by the International Accounting Standards Council (IASC), and they set internationally recognized accounting standards.

2. Functional Cost View

In the spirit of an activity-based cost accounting (Kaplan 2004)<sup>14</sup>

3. Nature of Expense

In the spirit of a total absorption costing approach<sup>15</sup> and the use within the profit or loss accounting

While the first cost split is based on the EU Directive, the second and third are discussed in more detail in the IAS. The IAS discusses the nature of expenses split as follows:

*“The first form of analysis is the ‘nature of expense’ method. An entity aggregates expenses within profit or loss according to their nature (for example, depreciation, purchases of materials, transport costs, employee benefits and advertising costs), and does not reallocate them among functions within the entity. This method may be simple to apply because no allocations of expenses to functional classifications are necessary.”<sup>16</sup>*

In order to analyse costs by function, they are to be classified according to a functional classification, for instance: maintenance or renewals. According to the IAS:

*“The second form of analysis is the ‘function of expense’ or ‘cost of sales’ method and classifies expenses according to their function as part of cost of sales or, for example, the costs of distribution or administrative activities. At a minimum, an entity discloses its cost of sales under this method separately from other expenses. This method can provide more relevant information to users than the classification of expenses by nature, but allocating costs to functions may require arbitrary allocations and involve considerable judgement.”<sup>17</sup>*

### MAP Service Split

Annex II (1) of EU Directive 2012/34 features a list of services that should be provided by the IM, and which is discussed in Chapter 2. As a result, the benchmark report defines categories comprising the costs of the MAP according to MAP services to split costs according to the service for which they arise. One could consider this split as the costs for the services for which RUs are charged. Additionally, the Annex is a good common ground for the following definitions, which are mostly the same across countries.

1. Capacity Management & Scheduling

- a. handling of requests for railway infrastructure capacity
- b. planning of time tables

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<sup>14</sup> <https://hbr.org/2004/11/time-driven-activity-based-costing>

<sup>15</sup> "Absorption costing is a principle whereby fixed as well as variable costs are allocated to cost unit the term may be applied where production costs only or costs of all function are so allocated" (Garrison, Ray H; Noreen, Eric W; Brewer, Peter C (2012). *Managerial Accounting (14th ed.)*. McGraw-Hill).

<sup>16</sup> IAS 1, page 102

<sup>17</sup> IAS 1, page 103

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- c. coordination with the market
  - d. cancelations and changes of request during a time table period
- 2. Track infrastructure
  - a. use of the railway infrastructure, including track points and junctions<sup>18</sup>
- 3. Access to trains<sup>19</sup>
  - a. passenger and goods platforms, including in passenger stations and freight terminals
  - b. access way for passengers and goods
  - c. access by road and access for passengers arriving or departing on foot
- 4. Train Control
  - a. signalling, regulation, dispatching and the communication and provision of information on train movement
- 5. Energy services<sup>20</sup>
  - a. the use of electrical supply equipment for traction current, e.g. catenaries
  - b. energy transformation from the general grid to the track grid
- 6. Information services
  - a. all other information required to implement or operate the service for which capacity has been granted
  - b. information services for final customers at stations besides the information on train movement provided for train control purposes

Figure 4, an extended version of Figure 1, illustrates the split of gross costs according to MAP services. By using this approach, this benchmark looks at the costs of the MAP services for which RUs actually pay. It is also interesting to see if costs for the MAP services vary among countries. The benchmark does not present a figure for a split of net costs or grants, even though it would have been helpful to be able to differentiate them as well. Unfortunately, it turned out to be very difficult to collect data for a differentiated split of net costs, grants, and other revenues. It was also very difficult for the other proposed splits of the following chapters.

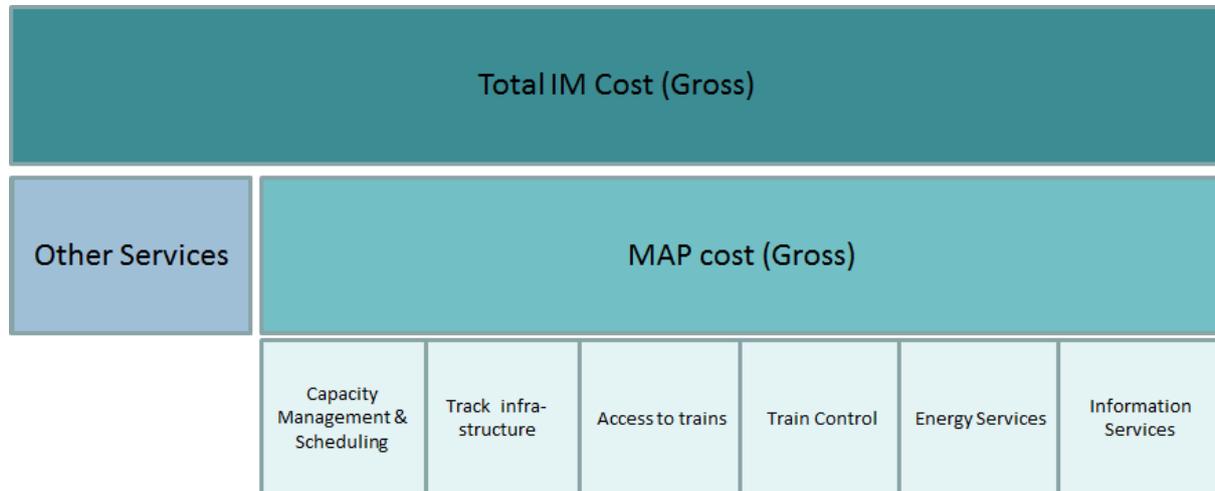
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<sup>18</sup> This is extensively described in Annex I of the EU Directive 2012/34, with the exception of the costs for platforms described in the following point, which mentioned indirectly as part of the infrastructure in Annex I, e.g.

<sup>19</sup> This means access to train platforms and terminals excluding costs for other services provided in passenger stations and terminals that do not relate to the direct access to trains, e.g. merchandize services or ticketing costs.

<sup>20</sup> This does not cover costs for energy used for traction

Figure 4: Total MAP Costs by MAP services



### Functional Cost View Split

Another approach would be based on the accounting system of the IM (see Figure 5 for a graphical illustration). Our research shows that there are mainly two approaches to categorizing accounted costs of the IM, which this benchmark defines as: “functional cost view” and “nature of expense”. Both are related, since they rely on the cost centres of the accounting system of the IM and can be transformed from one view to the other using a cost key to allocate the cost to the corresponding categories. That is why, a decent availability of data is expected as IMs have obligations to report costs not only to the RB but also to other entities or due to legal obligations. This approach is also similar in spirit to the cost of sales approach, which is another admissible approach according to the IFRS. Usually, the IM and the RB only agree on one of the approaches to be published in the public financial reports, while both could be available to the accounting department of the IM.

The functional cost view split is presented first. This approach structures all cost centres based on their activity. The main challenge is the allocation of costs of intermediate or secondary cost centres like wages (used in the nature of expense split) to primary activities. Very short definitions of the common main categories follow:

- Operations:  
Business activities that the IM engages in to enable the RUs to have access to and use the railway network.
- Maintenance:  
The process of preserving the existing condition of an asset. Action of extending the life duration of an existing asset.
- Enhancement:  
An expenditure to improve the quality of an existing asset.
- Renewals;  
An expenditure to replace an existing asset with a new asset.

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- Upscaling:  
An expenditure to increase the capacity of an existing asset.
- New infrastructure:  
An expenditure to build new capacity
- Other costs:  
Costs not related to any of the above categories.

To provide an example: costs centres like maintenance of greenery or winter services would belong to the main category maintenance; cost centres like dispatch or train control centres would belong to the main category operations. The above definitions are defined broadly on purpose, to allow as many members as possible to provide data. In the future, a further benchmark could try to narrow down these categories.

### **Nature of Expense Split**

The nature of expense splits the costs of all cost centres into general types of costs. The challenge for this approach is that it is necessary to distribute the costs of each centre according to these general types. These general types are defined as follows.

- Material:  
Material cost is the cost of materials used to manufacture a product or provide a service.
- Depreciation & Amortization:  
Depreciation is an accounting method of allocating the cost of a tangible asset over its lifetime and is used to account for declines in value over time. Amortization applies to intangible assets. Usually defined by accounting standards (IFRS, local GAAP) and/or the law.
- Wages & Social charges:  
All costs paid for labour.
- Other costs:  
Costs not related to any of the above categories.

As an example: a cost centre focused on greenery could be split into 20% material costs, 60% labour, and 10% each for depreciation and other costs. Again, the benchmark uses rather broad definitions to allow some flexibility.

Similarly, to the split according to MAP services categories, it would have been helpful to be able to provide a split for gross cost, net cost, and grants & other revenues, but it turns out that only very few countries are able to provide data for either of the splits.

Figure 5: Accounting Splits of MAP Costs

<b>Cost Split</b>	<b>Gross MAP cost (Accounted)</b>			
<b>Functional Cost View</b>	Operations	Maintenance & Renewals	Upscaling & Enhancement	Other Cost
<b>Nature of Expense</b>	Material	Labour & Wages	Depreciation	Other Cost

Figure 5 shows both splits in one figure to highlight that both splits are in principle transferable to one or the other if a cost key is available. One just needs to know the share of material costs for maintenance, renewals, etc. or vice versa.

The data collection also includes financial costs for both splits to allow a better comparability. The above splits represent the cost part of the earnings before interest and taxes. Hence the data collection needs to include the costs of the IM to pay to all its security holders and to finance its assets, which is usually costs for own capital and debt capital.

#### 4. Direct costs

##### 4.1 Introduction

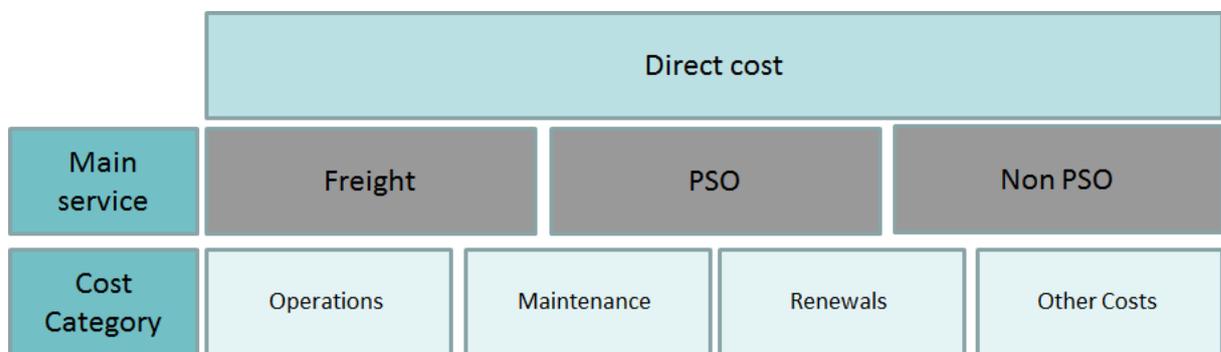
This chapter presents a benchmark of the direct costs across countries. The article 2 of implementing act 2015-909 provides a clear definition of the direct costs: “a cost which is directly incurred as a result of operating a train service”. In order to make the data collected comparable, all numbers of this benchmark are presented per train-km (which is the most available unit rate used by the countries having answered to the questionnaire) deflated to 2017 values according the domestic output price index discussed in Chapter 3. The data collection focuses on data differentiated by train services and different costs categories. For the train services, the focus is on freight, PSO, and non-PSO. PSO and non-PSO services have also been aggregated as passenger services whenever not available for the separate services. To analyse different costs categories, four categories have been identified:

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- Operations
- Maintenance
- Renewals
- Other

Figure 6 illustrates the approach. Optimally, it would have been helpful to differentiate costs by main service and cost category if data would have allowed for it. Unfortunately, not many countries provided data split by main services and rarely by main service and costs category.

**Figure 6: Methodology of Split of Direct Costs of the MAP**



The data shows some disparity of direct cost levels across countries. This can be explained by the following factors:

- Difference of interpretation of direct cost definitions in the implementing act 2015/909
- Difference of methodology
- Aged infrastructures
- The fact that some categories of direct cost (e.g. renewals) are in some countries directly financed by grants.

**4.2 Methodology to Calculate the Direct Costs**

Before presenting the quantitative data, this chapter highlights the different methods for calculating the direct costs, which are mentioned in article 6 of the implementing act 2015/909. These methods are the following:

- Econometric
- Engineering
- Subtraction Method<sup>21</sup>
- Others

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<sup>21</sup> Also known as deduction method

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Table 4 summarizes the method used by each country. Further research and information provided by the members of the IRG WG Charges has revealed that some countries are still in the process of adjusting their charging systems.

For instance, Belgium will introduce its new methodology in 2020 and uses the engineering bottom up method as per December 2018. From 2020 on, in the Netherlands the direct costs of the MAP are calculated using various econometric methodologies. Unit rates for train paths are based on train km and charged on the basis of five different weight categories. This system will come into force from 2020. In Portugal, the IM is currently reviewing the charging system. Portugal is approaching the methodology described in the Regulation 2015/909. It is expected that in 2020 the charging system will be compliant with the mentioned regulation and the Recast Directive. The IM recently presented a preliminary methodology for the charging system using the approach described in the Reg. 2015/909, Art. 3(1).

The table also shows that for the majority of the countries (66%), the methodology does not vary for different cost categories. In France, the methodology may slightly vary to take into account specificities of the cost or type of operation. In Germany, the econometric method is used to calculate depreciation costs and the engineering method is used to calculate costs of scheduling, maintenance & operations.

Table 4: Methodology to calculate direct costs used by each country

Country	Economic	Engineering	Subtraction Method	Other Methods & Comments	Same Method for all cost categories
Austria	X	X	X		Yes
Belgium		X		To be put in place in 2020	Yes
Bulgaria				Variable fee depending on km travelled & gross weight of the trains	Yes
Croatia				X	Yes
Denmark				Average direct cost per train km. Calculation based on historical and estimated data	Yes
Finland	X				Yes
France	X				No
Germany	X				No
NL <sup>22</sup>	X	X	X	The method is a combination of different methodologies. A new method is applied from 2020 on.	No
Poland			X		Yes
Portugal			X		Yes
Romania					Yes
Slovakia					Yes
Slovenia	X				
Spain		X	X		Yes
Sweden	X				Yes
GB	X	X			No

Source: own data collection of IRG-Rail WG Charges

<sup>22</sup> The Netherlands

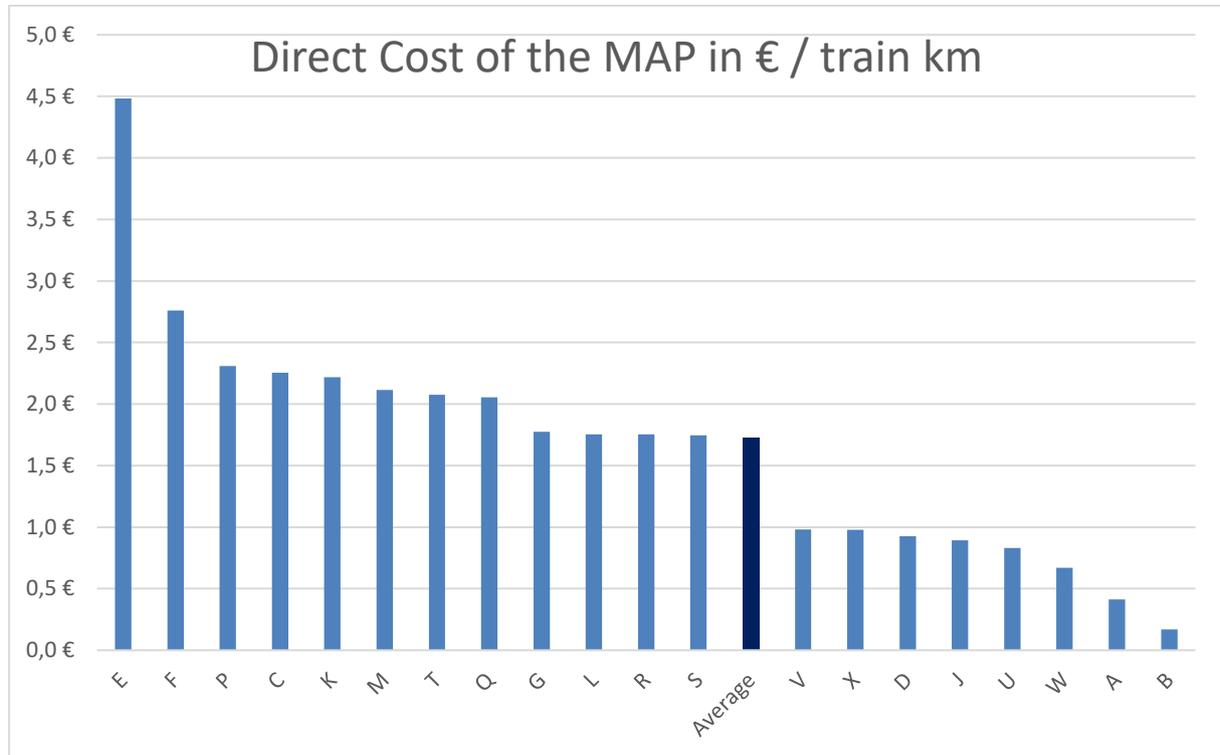
Some countries provided more detailed explanations of their method, which follow:

- In Denmark, the unit rate only covers the direct costs related to the maintenance within the track area for long distance train traffic. The method used is based on average cost per train-km. The calculation is based on historical data.
- In France, marginal costs of operations, maintenance and renewal are all calculated using various econometric methodologies. For maintenance and renewals, a marginal cost is calculated for each type of assets (track, signalling, catenaries, bridge, tunnels ...). Until 2017, these charges were expressed in train-km. As of 2019, these charges will be expressed in train-km and ton-km.
- In another country, total direct costs are computed by the IM following a methodology that implements the provisions in Regulation (EU) 2015/909. How the total direct costs are split among the users following some principles established by the RB: the unit rates per train km are chosen on the basis of sub-component A1 (weight) that has to be not less than 50% of the direct costs, sub-component A2 (speed), max 50% of the total direct costs and sub-component A3 (contact line), max 50%.
- In Spain, the IM uses the profit and loss accounts where the costs related to the MAP are identified and then the IM applies the methodology described in the regulation 909/2015. The IM allocates track's wear and tear costs using an engineering methodology based on the impact of every type of train on the tracks according to its weight, speed and axis number and distribution.
- In Slovenia, the direct cost is calculated considering train-km (freight + passenger) gross tonne-km (freight +passengers, cost of maintenance and renewals). The process is as follows: 1<sup>st</sup> step: calculation of average costs per train km; 2<sup>nd</sup> step: determination of elasticity of infrastructure (total gross tonne km / total track length); 3<sup>rd</sup> step: calculation of marginal costs in particular for maintenance and renewals (average costs per train km / elasticity)
- In Sweden, the direct costs estimates used by the Swedish IM are derived from an econometric approach. The data is based on an empirical study of the relationship between costs and traffic. More specifically, a regression model is used to estimate a cost elasticity for traffic. A marginal cost is obtained by multiplying cost elasticity with the average cost.
- In the Netherlands, the direct costs are calculated in the following way: Operation costs\* variability+ maintenance costs \* variability + renewals costs\* variability.

### 4.3 Direct Costs Amount

The following graph shows the direct costs amount per train/kilometre and per country.

Figure 7: Direct Costs per Country in €/ trkm



This graph shows some disparities across countries sorted by the level of direct costs, ranging from 4.5 to 0.17 €/trkm.

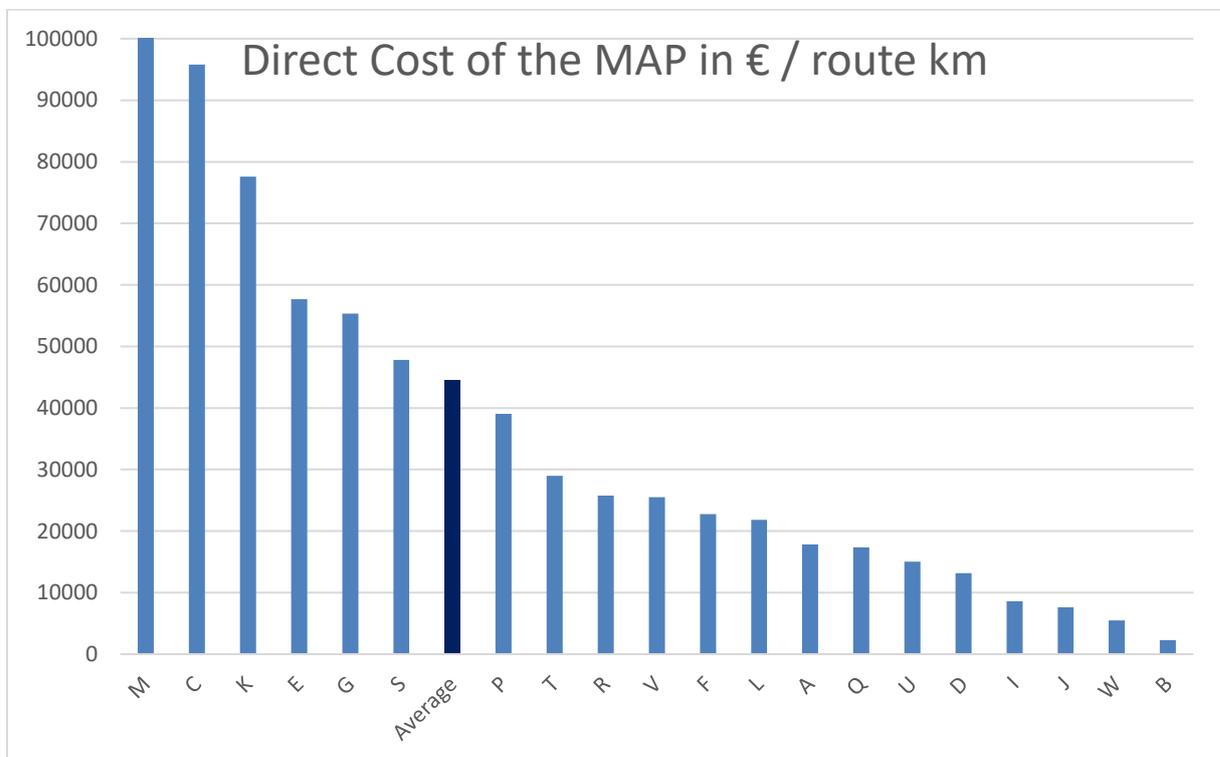
One can notice a rather high level of direct costs above 2 €/trkm for a group of countries (E, F, P, C, K, M, T and Q). Another group of countries has an intermediate level of direct costs in between 1.5 € /trkm and 2 €/trkm. These are G, L, R, and S. On the lower end of the scale, one can see several countries (V, X, D, J, U, W, A, and B) with direct costs below 1 € / trkm. A topic for future research would be looking into what is incorporated in the direct costs. Many countries incorporate renewals in the direct costs, which can represent a substantial part of these costs. Some countries do not incorporate renewals costs as these costs are directly financed by the grants. The weighted average by train kilometres is 1.72 €/trkm based on 20 countries.

Disparities among countries regarding the level of direct cost per train km may also be due to other reasons. As previously shown in Table 5, countries use different methodologies to calculate direct costs, and this may yield different outcomes. The volume of activity measured by train km may also condition the unitary costs, resulting in countries with an intense use of capacity having low direct cost. In addition, the level of grants could determine direct cost, since some countries classify as non-eligible those costs that do not relate to payments made by the infrastructure manager. In addition, the technical setting of the infrastructure or the share of high-speed lines could increase direct costs. Underlying

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maintenance costs associated to high-speed infrastructure are more expensive per track km than in conventional lines, given its technological equipment. In one country, for instance, the high-speed network represents more than 17% of total infrastructure. In some other countries, the high share of heavy freight trains could be the reason, as these trains produce a more intense wear and tear on the tracks, thus implying more maintenance work. To provide an alternative view, the benchmark also displays direct cost per route km (Figure 8), which shows a slightly different picture. The benchmark defines route km as the total km of the network of an IM, without taking account of the tracks per route km. Unfortunately there is no sufficient data on track km for a wide range of countries to compare direct costs per track km.

**Figure 8: Direct Costs per Country in €/ route km**



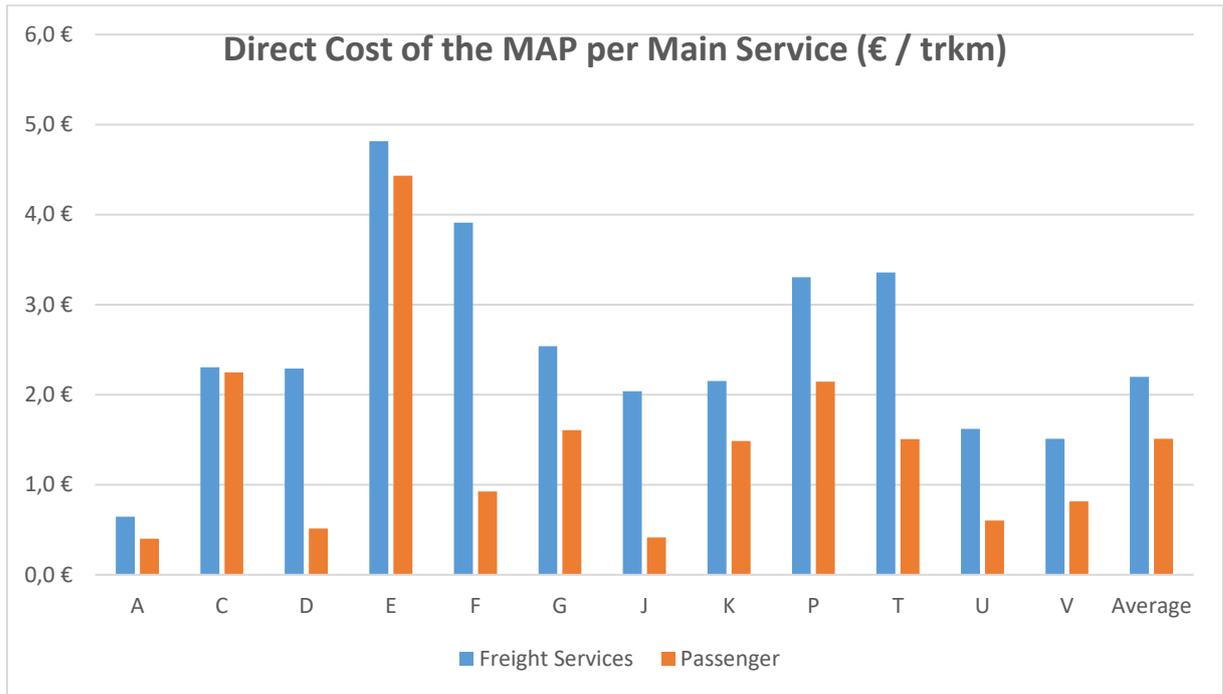
In contrast to Figure 7, some countries that have rather low direct costs per trkm have higher direct costs per route km, which is an indicator that their capacity is used intensively, so that direct costs are better distributed across different services.

Figure 9 shows direct costs of the MAP per main service. The ten countries below charge different charges for the market segments freight and passengers. The other countries are either not able to provide data at this level of detail, or there are no differences in charges between the segments. Nevertheless, the figure shows a striking difference between direct cost of freight and passenger services. As expected, freight services appear to cause higher direct costs than passenger services in all countries. In one country, this is due to the fact, that weight is assumed to affect the track infrastructure more negatively and freight trains tend to be heavier than passenger trains. In another country (not visible in the graph

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though), different charges are used for different weight categories, which also results in higher charges for freight trains since RUs operate heavier trains, which cause more wear and tear.

**Figure 9: Direct Cost of the MAP per Main Segment in € per trkm**



This pattern is supported by the weighted average mean of direct costs for freight services of 2.20 €/train km compared to 1.51 €/train km for passenger services. There seems to be a similar insight for the direct cost of Non-PSO vs PSO services. The weighted average for seven countries for Non-PSO services is higher (2.79 €/train km) than for PSO services (1.50 €/train km). The reason for this difference is probably the higher share of high-speed lines within the non PSO-services in the mentioned countries. Table 5 provides an overview of the statistics on direct costs per main service.

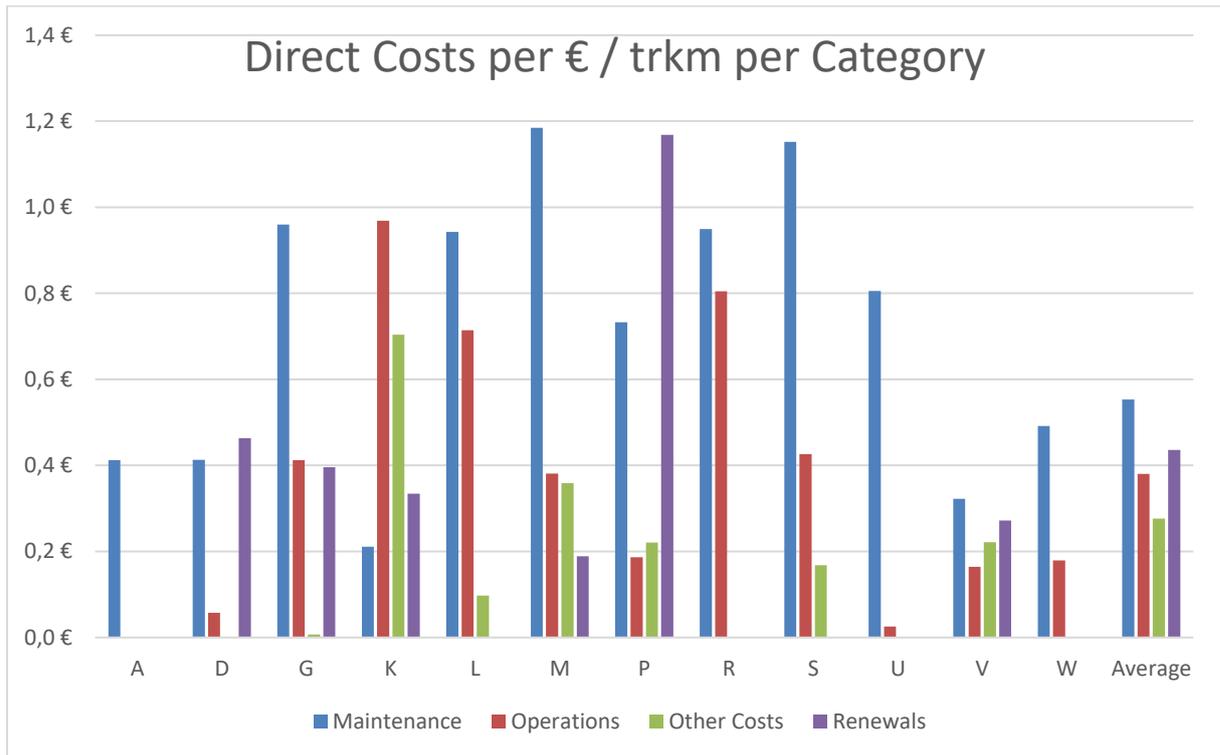
**Table 5: Overview Averages of Direct Costs per service**

Category	Average	Number of answers
<b>Total</b>	1.72 €/train km	20
<b>Freight Services</b>	2.20 €/train km	11
<b>Passenger</b>	1.52 €/train km	11
<b>PSO</b>	1.52 €/train km	7
<b>Non PSO</b>	2.79 €/train km	7

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Next, the benchmark looks at direct cost of the MAP split per category. Figure 10 breaks down direct cost per functional cost view per train km as defined before. Twelve countries were able to provide direct costs split into the categories maintenance, operations, other costs, and renewals. There are cases where only one category is used, which is up to the respective main IM and RB of this country.

Figure 10: Direct Costs per Category and Country in € / trkm



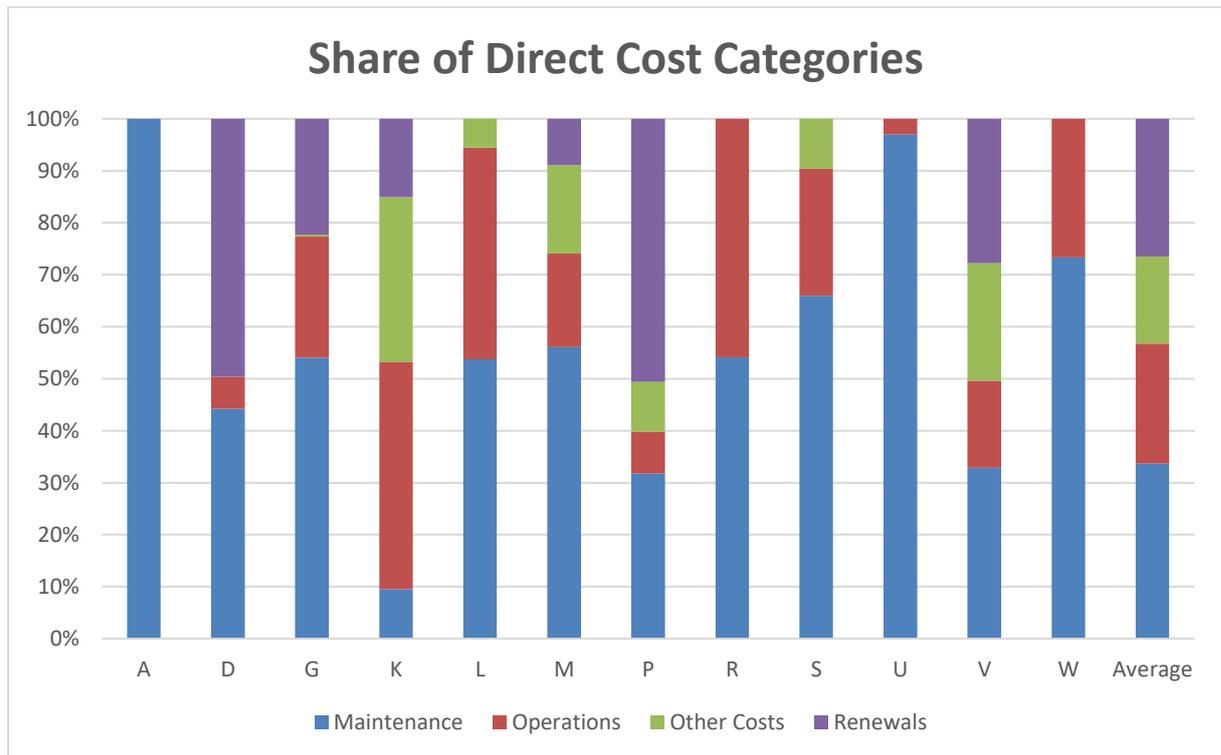
One can directly see that maintenance is usually the highest category. Two countries (S and R) do not consider renewals for direct costs. One indicator that the chosen categories fit well is that other costs usually represent rather the smallest part of the direct costs with the exception of K and partly M. Table 6 shows the weighted average per train km per category. One can notice that the sum of the four categories does not add up exactly.

Table 6: Overview Averages of Direct Costs per category

Category	Average	Number of answers
Operations	0.38 €/train km	11
Maintenance	0.55 €/train km	12
Renewals	0.44 €/train km	8
Other Costs	0.28 €/train km	11
<b>Total</b>	<b>1.72 €/train km</b>	<b>20</b>

Not surprisingly, maintenance shows the highest average and is also most often provided in the data collection. The same qualitative distribution can also roughly be seen in Figure 11, which shows the shares of each category per country.

Figure 11: Share of Direct Cost Categories



Again, maintenance is usually by far the largest category. In some countries operations is rather large, e.g. K, L, and R. Other costs only make up a sizeable share in K, M, and V. It would have been interesting to get a split of the direct costs per cost category and per segment as mentioned in the introduction. However, only a few countries have been able

to provide data at this level of detail. Hence, the benchmark refrains from showing data for only a few countries, as this would not be in the interest of an international benchmark.

## 5. Charges, Direct Costs, and Markups

This chapter compares the levels of charges, direct costs, and markups across countries. Article 32 of the EU Directive 2012/34 contains a list of exceptions to the basic charging principle of Article 31, which is foremost to set charges at the level of marginal cost. In particular, article 32(1) states that “[i]n order to obtain full recovery of the costs incurred by the infrastructure manager a Member state may, if the market can bear this, levy markups on the basis of efficient, transparent and non-discriminatory principles, while guaranteeing optimal competitiveness of rail market segments”. In other words, countries should set their charges at marginal costs and may, as an exception, set charges above this level to recover a part of the costs incurred by their infrastructure manager. The benchmark does not look into other charges related to the MAP (e.g. scarcity charge or environmental discounts). The data collection did not foresee a category for those other charges. However, there was only one country with a difference between total charges and the sum of direct costs and markups. That is why, it seems reasonable to conclude that other charges are of a negligible size

The gap between the total costs incurred by the infrastructure manager and the total charges recovered may also be covered by grants from different sources (Regions, State, and the European Union, etc.), as described in Chapter 3.1.

It should be noted that an IM has to come up with a market segmentation in order to charge markups. The EU Directive 2012/34 Article 32 (1) only requires a minimum segmentation for the IM levying markups. The list of market segments defined by infrastructure manager must contain at least the following three segments: freight services, passenger services within the framework of a public service contract, and other passenger service. Infrastructure managers may further distinguish market segments according to commodity or passengers transported and have to evaluate the relevance of possible market segments listed in point 1 of Annex VI of the EU Directive.

Hence, there are three options are available with respect to the segmentation across countries:

- Freight and passenger services;
- Freight, PSO and Non PSO, which also coincides with the minimum segments for markups according to Article 32 (1);
- More elaborated segments, in line with Article 32 (1) and Annex VI (1) of the EU Directive 2012/34.

The data collection on the legal situation among countries participating in this benchmark has shown that 18 out of 20 countries differentiate traffic according to freight and passenger

services. 11 countries further differentiate by PSO and other passenger services, 9 do not. Concerning the segmentation, three groups of countries may be distinguished. The first group of seven countries currently has a more elaborate segmentation in place (among which are Hungary, Spain, Austria, France, Germany, and GB). The second group of nine countries is not planning to introduce a more elaborate segmentation or applying markups. The third group of four countries is still in the process of reforming the national charging systems and may levy markups in the future. This is for instance the case in the Netherlands and Belgium, which are to introduce a more detailed segmentation to apply markups from 2020 onwards.

Before the Recast, only GB, France, and Bulgaria had a more elaborate segmentation in place, but only GB, Hungary, and France charged markups. Austria and Germany started charging markups in 2018 and have since introduced a more elaborate segmentation. It is important to note that Bulgaria and Spain have introduced segments without levying markups. The Spanish law does not exactly define segment but types of services that could be understood as segments.

## **5.1 Level of Charges, Direct Costs and Markups**

Charging practices across countries are very different and some countries opt for a Direct Costs only charging system and other for markups. Some countries only have markups in certain segments

### **5.1.1 All Services**

The benchmark starts by presenting an overview of the total revenues, direct costs and markups for the MAP per train km in Figure 12. This is done by showing the deviation to the weighted average by train km. The figure shows a high heterogeneity of practices across countries. For three countries, there is no specific information on the level of charges and no specific information on direct costs.

Figure 12: Percentage Deviation to the Weighted Average by trkm of Direct Costs, Markups, and Total Charges in €/trkm for all Passenger Services of the MAP by the Main IM

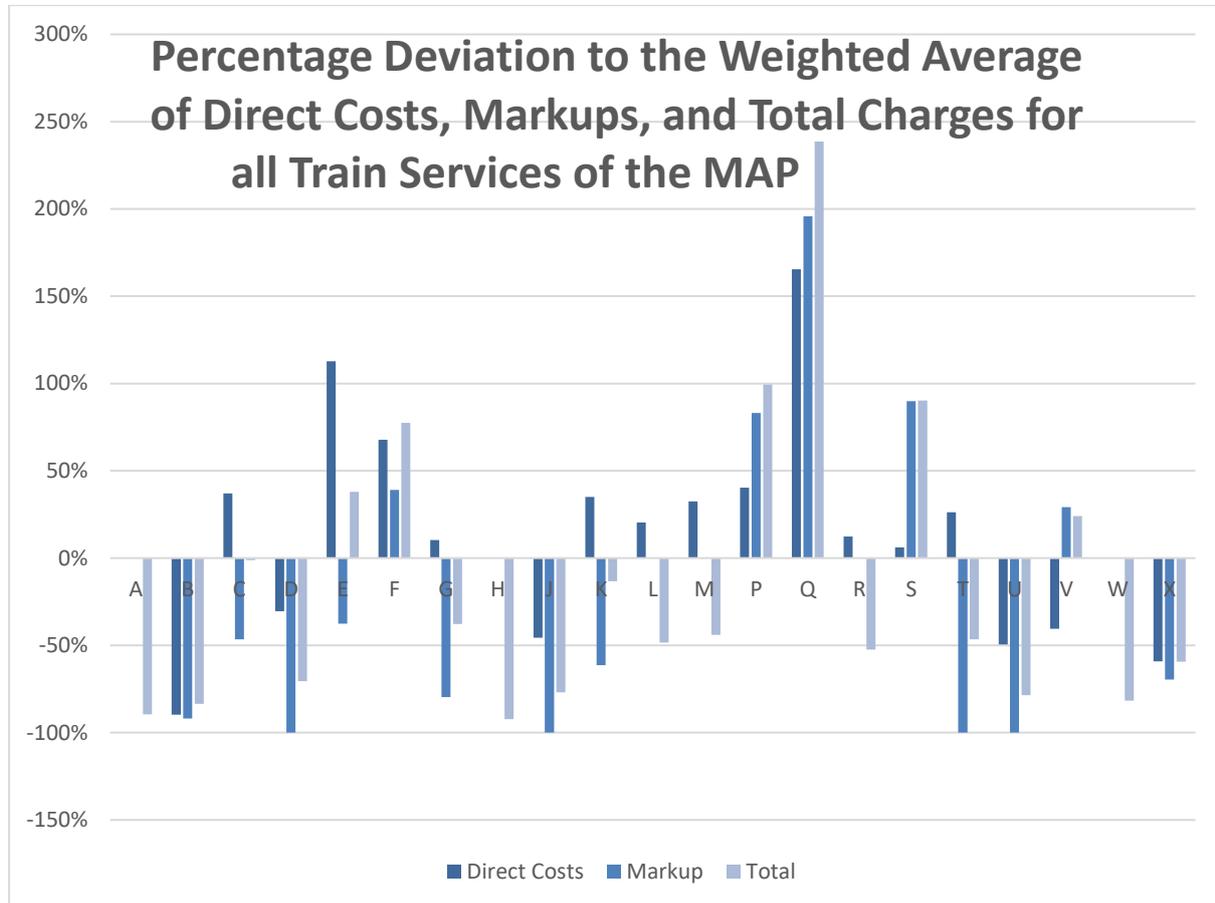


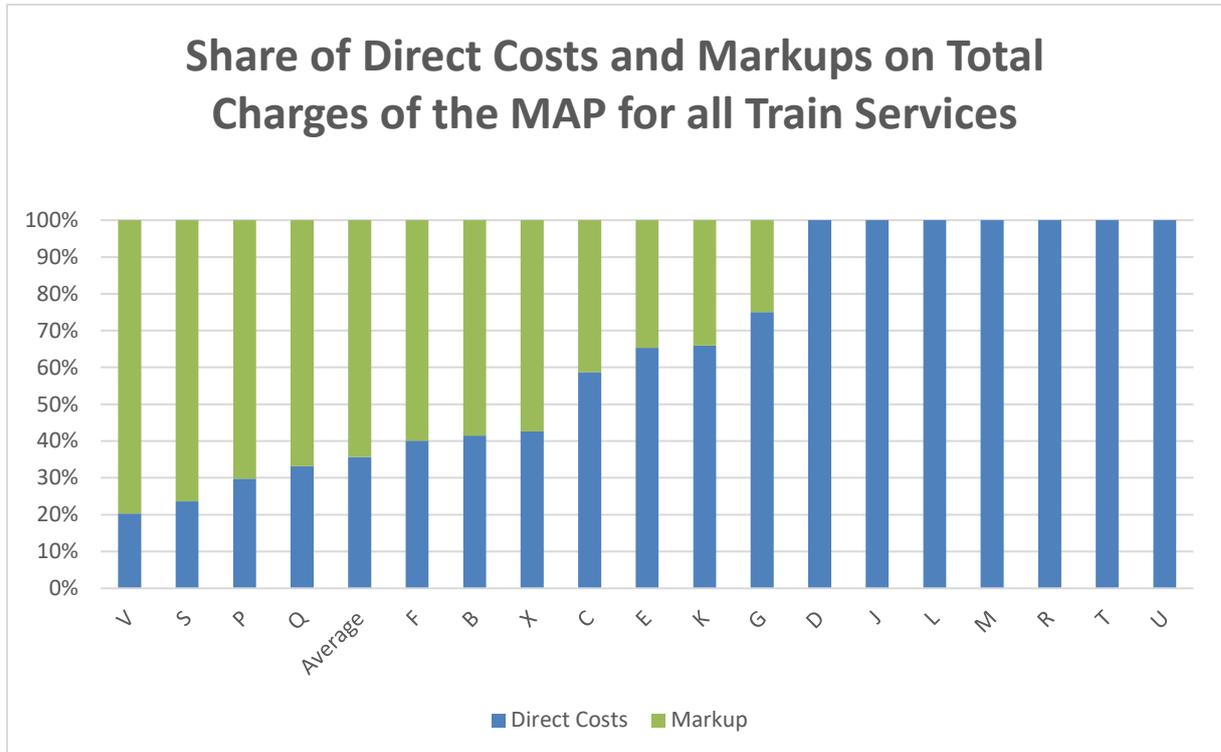
Figure 13 shows the share of markups and direct costs on total charges. In some countries markups represent more than 50% of the total charges recovered while in others, they represent less than 50%. The other countries only charge direct costs as charges.

As discussed in Chapter 3.1 and shown by Figure 3, such disparity in the implementation of markups may be explained by the fact that there exist other funding sources of the European railway sector. The infrastructure manager may benefit from public grants or from any other revenues related to the MAP assets and not explicitly excluded by law or the EU Directive. Figure 13 shows that some countries with higher levels of grants<sup>23</sup> are not levying markups; for instance L, M, T with grants share higher than 60% and D, J, R, and U with grants higher than 80%. Some other countries that do apply markups, can be seen on the right hand side of Figure 3 with lower level of grants & other revenues. Having lower levels of grants may increase as well the level of capital costs because all assets are funded by

<sup>23</sup> i.e. grants covering more than 50% of gross total costs.

own fund and considered for the calculation of capital costs, which is for instance the case in one country.

Figure 13: Share of Direct Costs and Markups on Total Charges of the MAP for all Train Services



### 5.1.2 Comparison of Passenger and Freight Services

This chapter focuses on a comparison of total charges, direct costs and markups of passenger and freight services across Europe. This comparison shows that the level of markups for freight is much lower than for passenger services. First, the general level of charges, direct costs, and markups is shown separately for passenger services (Figure 14) and then for freight (Figure 15). Again, this is done by showing the deviation to the weighted average by train km.

Figure 14: Percentage Deviation to the Weighted Average by trkm of Direct Costs, Markups, and Total Charges in €/trkm for all Passenger Services of the MAP by the Main IM

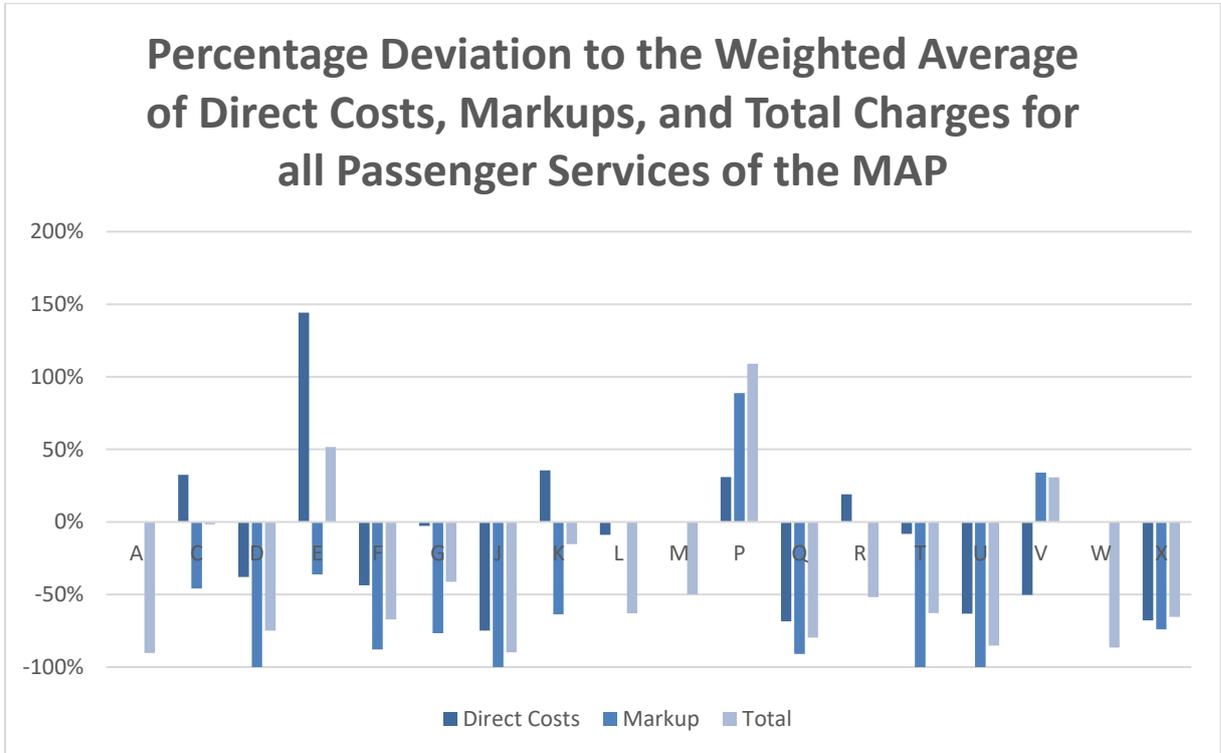
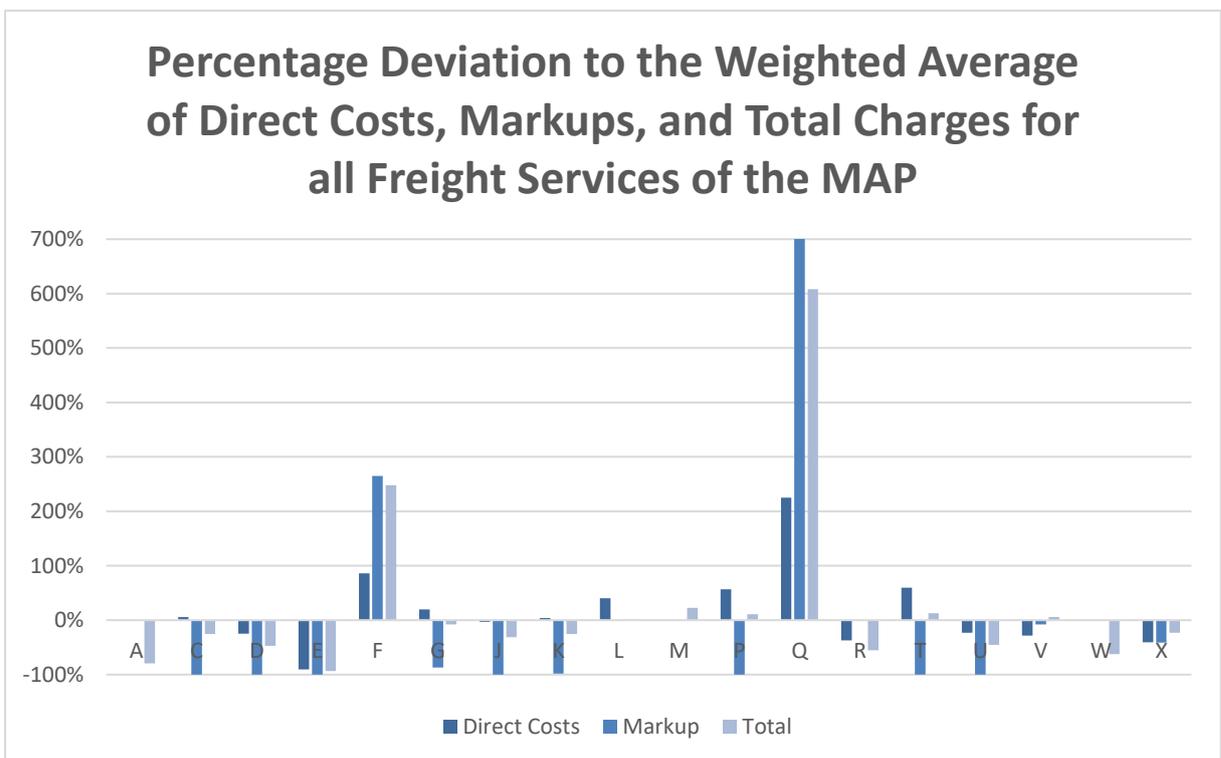


Figure 15: Percentage Deviation to the Weighted Average by trkm of Direct Costs, Markups, and Total Charges in €/trkm for all Freight Services of the MAP by the Main IM



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As indicated in Table 7 average charges weighted by train km for freight seem to be lower for the surveyed countries (weighted averages do not necessarily have to add up to the total, because not all countries reported all categories, e.g. some only reported total TAC, and different shares of passenger and freight services). One reason for that may be that markups for passenger services tend to be higher than for freight services, while the level of direct costs is on average not very different but somewhat higher for freight. On the other hand, the higher charges for freight seem to be a pattern more relevant in only two countries (F and Q) where charges for freight are very high.

**Table 7: Weighted Averages with respect to train km of Total Charges, Direct Costs, and Markups<sup>24</sup>**

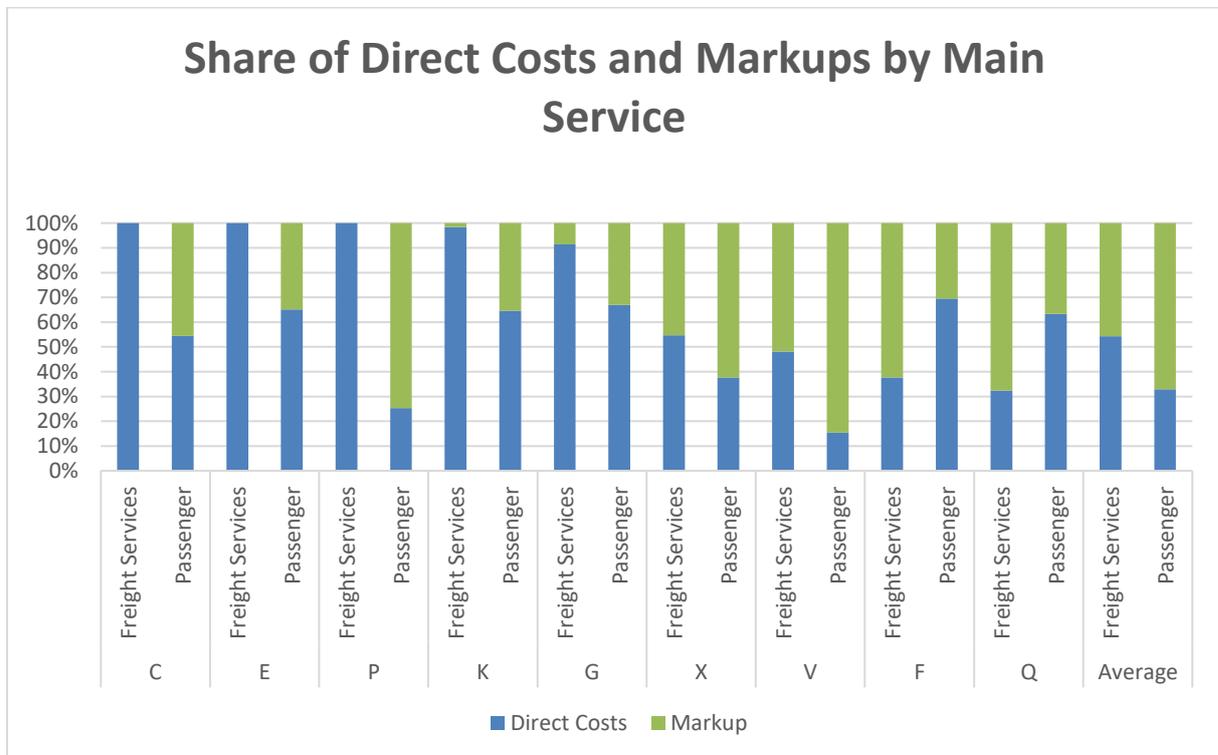
<b>Category</b>	<b>Total</b>	<b>Freight Services</b>	<b>Passenger</b>
<b>Total Charges</b>	3.88 € /trkm	2.98 € /trkm	4.05 € /trkm
<b>Direct Costs</b>	1.64 € /trkm	2.11 € /trkm	1.64 € /trkm
<b>Markup</b>	2.97 € /trkm	1.77 € /trkm	3.35 € /trkm

To emphasize the point of higher markups in passenger services, Figure 16 directly compares the shares of direct costs and markups by main service country by country for the countries that charges markups in at least one of the main services. Generally, the main IMs of the surveyed countries expect freight services to be less able to bear markups than passenger services, that is why the first five countries in the graph have no or almost zero markups for freight and usually the share of markups is higher for freight than for passenger services, as shown by the average as well. It also apparent that the share of the markups exceeds 60% in some cases, which seems to be quite substantial.

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<sup>24</sup> Deviations between total charges and the sum of direct costs and markups are due to the fact that sample sizes for each category are different and because of different shares of freight and passenger services.

Figure 16: Direct Comparison of Direct Costs and Markups by Main Service



## 6. Conclusion

This benchmark analyses how IMs finance the MAP across IRG-Rail participating members. The analysis revealed striking differences across countries with respect to the share of grants, the level of direct costs and the level of charges and markups.

Chapter 3 shows that the level of grants is very different across countries. There are countries with high level of grants (>75%) that usually only charge direct costs for the MAP and other countries with lower level of grants and have implemented markups in line with Article 32 (2). Naturally, the level of total charges is also higher in those countries.

Our goal to differentiate costs according to different splits requires more work to clearly define the splits and requires RBs and their main IMs to deliver all necessary data. The split in line with the MAP services proposed in Annex II of the EU Directive 2012/34 can build on the definitions of the Directive, but is on the other hand not a common split from an accounting point of view. The accounting splits based on a cost accounting view and a cost absorption approach are both interesting with respect to learn more about the cost structure of the main IM, but it appears that some countries have difficulties providing data for all categories and have decided to use other costs as a residual category.

Chapter 4 analyses direct costs and shows that the level of direct costs differs substantially across countries. In some countries, this might be due to the poor state of the infrastructure

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or due to other heterogeneities, for instance geography or climate. Usually, maintenance is the biggest cost driver across all countries. The data shows that freight services cause higher direct damages according to the calculations of the main IMs in all countries, when available.

Chapter 5 combines the analysis of track access charges, direct costs, and markups. As of now, only some countries have introduced markups to recover parts of the fixed costs of their main IM. It also turns out that those countries are usually the countries with a lower level of grants. The other countries only charge direct costs. Our analysis also shows that the markups for freight are lower than for passenger services in all countries, which charge markups, but for two in which a large share of cross border freight traffic allows for higher mark ups.