

# CALCULATION OF OPERATION FEE FOR ROMANIAN RAILWAY INFRASTRUCTURE

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**Abstract:** Fees charging for railways capacity (infrastructure, stations, signaling, etc.) is a mechanism that allows different users of railway services to have access to the rail network under fair conditions. This mechanism allows rail operators to offer new services, to improve choice and quality of rail transport offer and to encourage those who operate them, under the effect of competition, to lower costs and improve services quality. Meanwhile, in a vertically integrated rail system, the integrated railway company is not excited to authorize new users to use its network, thus entering into competition with its own services. Difficulties in implementing this type of relationship between integrated railway companies and other stakeholders have led in Europe, especially under the influence of the European Union (Directive 91/440), to the separation of operational railway infrastructure, first in terms of accounting and then, more and more, functionally. The **Infrastructure Operation Fee (IOF)** is an annual fee, monthly paid, which gives a railway passenger or freight operator the right to operate on owned property or on property managed by National Railway Company CFR SA (CFR). This fee will cover fix and variable costs (caused by the movement of trains on infrastructure and taking into account infrastructure improvements and constructions performed for this purpose) and provide an acceptable rate of return.

**Keywords:** infrastructure operation fee, basic services, binding services, additional services, voluntary services, fixed costs, variable costs

## 1. BRIEF HISTORY

Since 1997, even before the restructuring of the former National Society of Romanian Railways it has begun the process of highlighting the volume of train-kilometers for evaluating and preparing the application of infrastructure operation fee, so that the establishment in October 1998 of the three main railway companies (CFR SA as infrastructure manager, Romanian Freight Railway company and Romanian Passenger Railway company as freight and respectively passenger Railway Transport Operators (**RTO**)) allowed a relatively simple adaptation of the old computing system used to highlight the train-km service [1]. The charges system arising from this situation leads to four objectives:

**a. Efficient use of infrastructure.** Fees must be established so that infrastructure to be used as efficiently as possible. Utility of infrastructure for rail service beneficiaries must be optimized. Because a railway sector can be used in many ways, an administrative division mechanism can not determine the best use.

**b. Permissive access to infrastructure use.** Fee mechanism be established so as the available level of infrastructure to meet the demand of use. The charging system should encourage infrastructure providers to provide quality infrastructure, at a minimal cost; in other words, nothing should encourage infrastructure providers to use excessive labor or capital.

*c. The efficacy of the rest of railway activities.* At the same time, infrastructure charge should also improve the efficiency in the rest of railway activities. Infrastructure charges can contribute to the diversification of market structure and to increase overall efficiency in the railway sector.

In August 2000 appeared the first RTO with private capital in Romania which performed freight traffic. At the concluding of the rail infrastructure access contract with CFR SA, it was established a IOF level of 5.8 EURO/train-km. The IOF has been determined based on calculations which were taking into account mainly the costs of CFR SA for operation and maintenance of:

- Traffic lines and points;
- Fixed assets needed for basic activities;
- Traffic safety facilities;
- IT and telecommunications systems;
- Other systems that are connected with the activity of train movement.

IOF value was determined taking into account the costs for these items (except budgetary allocations for major investments and capital repairs) reported to statistically volume of train-km of the CFR railway network.

In 2004 appeared the first RTO with private capital, which performed passenger traffic and hence IOF recalculation was required for this type of traffic as the previous value of 1.3 EURO/train-km took in consideration only CFR passenger activity that is subsidized by the state. Thus in March 2004, following IOF recalculation it was issued a Minister order which established the IOF amount for passenger traffic at 2.4 EURO/train-km, this value being contained in Government Decision no. 1387/2004 which establishes new contract activity of CFR SA. Later, in 2006, IOF values were expressed in RON at a value of 14 RON/train – km for freight traffic and 9 RON/train-km for passenger freight [2 – 3].

## **2. CURRENT METHODOLOGY FOR IOF CALCULATION**

Currently on Romanian rail operates 24 RTO in freight traffic (from which only CFR freight has state capital) and 5 RTO in passenger traffic (from which only CFR passengers has state capital). Also, together with the CFR railway network dividing in interoperable and non-interoperable lines, on non-interoperable lines leased by CFR SA also appeared a number of new freight and/or passengers RTO, with capital which has operating rights on these sections. Moreover, several factors used in IOF calculation have changed by outsourcing of some activities such as telecommunications, electrification and mechanical maintenance of rails. It is obvious that under these conditions, the most difficult task of the CFR SA is to follow basic services (train-km) performed by RTO and establish fair and objective ways of calculating the IOF. IOF is calculated based on rates statistically determined but not explicitly taking into account the level of expenditure and the utilization level of infrastructure depending on the train tonnage, velocity on different sections and others. On the other hand, the fee for use of infrastructure comprises purchase of the following types of infrastructure sector:

**a. Basic services:** those services which are necessary to allow transit for at least one diesel train on the network without maneuver or refueling, namely:

- Access right on rails and processing application for trace;
- Use of rails and switches;
- Train traffic (signaling, dispatching, regulatory, telecommunications).

**b. Additional services:** services that owners of equipment, both the infrastructure manager itself or third parties, must provide upon rail transport operator's request, which are essential for certain categories of trains;

**c. Required Services:** These services are provided automatically by or through infrastructure manager;

**d. Optional Services:** those services that are provided on commercial principles, including services such as handling or access to communications networks.

In accordance with the legislation in Romania, CFR SA has the task to propose an IOF calculation system, which then must be approved by the ministry, following that the actual values to be approved by the government. Therefore it was necessary a new operational system able to daily calculate IOF for each RTO, given the actual traffic carried. This process should be independently assisted and defined as unique way officially recognized for issuing payment obligations related to infrastructure access. The new methodology was approved by Government Decision no. 700/2007 regarding the 2007 Addendum to contract activity of CFR SA.

## **2.1. The main elements of the methodology**

Public railway infrastructure operation fee is the amount paid by the railway operator for the provision of rail infrastructure by ensuring minimum set of services for RTO trains circulation and access through the network to services infrastructures and services provided according with provisions of art. 5 from the Government Ordinance no. 89/2003 on the allocation of railway infrastructure capacity and the levying of railway infrastructure, approved with amendments and completions by Law no. 8/2004 as amended.

For public rail infrastructure, the calculation and collection IOF is CFR SA task as railway infrastructure manager in accordance with art. 4 align. (2) of Government Ordinance no. 89/2003 provisions. The price RTO must pay for services is established based on a formula that consists of two main parts:

**a. The fixed part,** (where RTO chooses price regime, taking into account fixed costs);

**b. The variable part,** which can be divided, optionally, further in:

- a part related to *marginal costs*;
- a part regarding the possibility of recovery or *cost effectiveness*.

IOF applies without discrimination to all RTO for similar conditions of transport in accordance with art. 4, align. (6) of Government Ordinance no. 89/2003. IOF calculation method is based on the following elements:

a) train distance;

b) the gross tonnage of the train;

c) the type of traffic: freight or passengers;

d) route of movement;

e) department traffic class and existing electrification systems ensure traction current.

IOF is calculated and applied for each train traveled, based on the above items. Traffic sections of public infrastructure are divided into 7 classes based on the technical characteristics of each section, according with the following table (Table 1.).

For setting the tariffs for each line category, in accordance with art. 7, align. (3) of Government Ordinance no. 89/2003 provisions, there are considered direct costs resulting from the operation of trains which are distributed according to the type of freight and passenger traffic, as follows:

- a) *Fix costs* depending on the used traffic route, representing costs with traffic management on public railway infrastructure;
- b) *Variable costs* depending on the gross weight of the train representing costs of maintenance and operation of public railway infrastructure.

Traffic section class	Speed (km/h)	
	From	To
<b>A</b>	121	200
<b>B</b>	101	120
<b>C</b>	61	100
<b>D</b>	0	60
<b>E</b> For rails with freight only traffic	0	60
<b>R</b> For rails with reduced traffic: traffic volume less then 5 trains per day	-	-
<b>I</b> For rails with narrow gauge	-	-

Table 1. Traffic sections classification

Basic tariff elements applicable to determine IOF are defined function of costs incurred by CFR SA for the operation of the railway infrastructure. IOF value for a train with covers a traffic route is calculated by the sum of rates for each distance traveled on a traffic section (IOF section), depending on its class, using the following formula:

$$IOF = \sum IOF_{\text{section}}$$

where:

$$IOF_{\text{section}} = IOF_{\text{tonnage}} + IOF_{\text{traffic}}$$

and:

- $IOF_{\text{tonnage}}$  – represents the tariff for rail infrastructure use on a traffic section class function of travelled distance and existence of electrification system as well as weighted tonnage of train, which is given by the formula:

$$IOF_{\text{tonnage}} = (Km * Tts) + (Gross\ tonnage - T_{\min}) * Ft * Km * Tts$$

where:

$Km$  = number of travelled kilometres on the traffic section;

$Tts$  =  $Ttse$  if the section is electrified;

$Ft$  = 0 for trains with gross tonnage less then  $T_{\min}$ ;

$Tts$  =  $Ttsn$  if the section is not electrified;

Gross tonnage = gross tonnage of the train according to the form “*wagons appearing*”, including locomotives in action or locomotives or railcars tonnage in case of non towed rolling material traffic.

- IOF<sub>traffic</sub> – represents the tariff for traffic management according to travelled distance and is given by the formula:

$$\text{IOF}_{\text{traffic}} = \text{Km} \times \text{Tc}$$

where:

Km = number of kilometers traveled on traffic section.

Value of tariff base elements determined by CFR SA for each class section of traffic and for type of freight and passenger traffic will be provided in the Performance Contract together with the application mode of IOF. IOF is calculated by CFR SA by own informatics means, based on data provided by specific tracking systems for train movements.

Detailed situation of traveled trains will be presented monthly to each RTO for analyzing, agreeing and its approval as provided in the contract of access stated in art. 18, align. (1) of Government Emergency Ordinance nr.12/1998. The contract of access will specify access paths allocated to RTO and the methodology for determining the IOF.

After determining the values of basic tariff applicable to determine IOF according to costs incurred by CFR SA to operate the railway infrastructure, several calculation alternatives were simulated, currently being approved by the Association of Transport Operators with private capital (ATFER) and the Ministry of Transport (through DGITF), IOF version leading to a statistical average of 14 lei / train-km for freight and 9 lei / train-km for passenger traffic.

### 3. USE OF INFORMATION TECHNOLOGY

In the past, IOF calculation was performed using computer applications, called CICLOP (for CFR Passengers) and - respectively - SIT (for CFR Freight), designed to highlight the services of traction means for the benefit of railway operators. These applications have been adapted to ensure also the calculation of the volume of train x km achieved in traffic [2-3].

To implement the mechanism required by the new approved methodology, under a consulting contract financed with European funds, it was accomplished a software application named “IRIS-CALIPSO” which calculate the IOF for each train traveled according to the type of traffic, tonnage and route. A detailed presentation of this application is included in the next chapter.

The main problem lies in the proper acquisition of data traffic provided by programming and traffic monitoring systems currently used in CFR SA (IRIS- ATLAS, IRIS-CRONOS and IRIS-FOCUS) which now have a satisfactory availability.

#### 3.1. The current methodology

When determining the current methodology for calculating the IOF, several computational models of IOF were taken in consideration, namely:

- *American model*, which is based on the costs of the market, based on a well defined and flexible formula, approved by the Government;

- *German model*, which assumes full coverage of costs to customers and ensuring an acceptable profitability rate;
- *British model* based on infrastructure costs caused by market factors;
- *Swedish model*, which is based on short-term marginal costs and reflects social objectives related to the use of roads and railways.

Currently IRIS-CALIPSO software application is used. During functional testing, the application (computer engine) proved fully accurate calculations that meet the requirements for trains whose routes and traffic data could be retrieved correctly.

In holistic, we can say that the current trend has real perspectives to lead to successful implementation of IRIS-CALIPSO application as an exclusive support for access to rail infrastructure charging.

#### **4. IRIS – CALIPSO SYSTEM**

IRIS-CALIPSO is a new application that was developed in collaboration with infrastructure access team to help their daily procedures, in trains registration and infrastructure use fee calculation, for the calculation system of infrastructure access tariff.

The application has become necessary to review the method of calculating, in accordance with EU Regulation 14/2001 and Ministerial Order no. 89/2003. New basis of calculation includes rail quality, operating costs on rail classes and a coefficient for gross tons kilometers for each sector. The section uses CALIPSO also to estimate IOF for train paths and tonnage and to stimulate the effect of tariffs changes. It takes into consideration the train weight and traction type [4].

The application uses trains from IRIS-CRONOS, based on daily schedule from IRIS-ATLAS. Errors can be corrected, invoiced and statistically generated. Trains can be manually created and edited, in case they are not reported in IRIS-CRONOS. The infrastructure access sections use the system also to issue precise payment orders, fair, with details for each train or on statistical lines sections.

The application also generates an interface with "*Cashed accounts*" in Oracle Financials. The selected route is displayed for clarity on a map of routes. Infrastructure access staff at central, regional level can use the system for daily processing. IRIS-CALIPSO works daily, in real time and has extensive processes to perform daily and monthly checks.

#### **5. CONCLUSIONS**

Most EU countries have a combination of fares, train kilometer and gross tons kilometer, as in Romania. Most of them use gross tons kilometer, for functionally related costs, which means that freight pays more for heavy trains than passengers. However they pay exactly the same for equivalent train [2-3]. Allocation of activity between freight and passenger transport is very difficult to achieve because there is a sharp decline in freight transport, which is why passenger traffic gradually takes some more significant activity around rail.

Most tariff regimes have multiple categories of lines with different coefficients,

reflecting different speed regimes. And this is applied in Romanian proposals [5]. Formula proposed in Romania is aligned with the best European practices. Collecting mechanism based on IRIS computer system is also aligned with best European practices.

CFR project to use IRIS system as main base, plus payments quotation system (IRIS-CALIPSO) is consistent with best European practices. IRIS-CALIPSO application turns out to be perfectly suited for the implementation of the new methodology for calculating fees for railway infrastructure use.

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