Methodologies for Determining Tariffs for Intermodal Cargo Transportation

Kuanyshbayev Zh.M.

ENU L.N. Gumilev, Astana, Kazakhstan

ABSTRACT

The article presents an analysis of tariffs for international freight traffic along the route Nur-Sultan station (Republic of Kazakhstan) - Mazare-Sharif station (Republic of Afghanistan). The freight charge is determined according to three existing methods for determining the freight charge: based on the Rail-Atlas and Rail-Tarif software package; Uniform Transit Tariff (UTT); International Transit Tariff (ITT). Calculations convincingly show the lowest tariffs for freight transportation, their availability for a wide range of railway customers. Moreover, the advantages of low-price tariffs are given in a tabular format, which creates convenience for users of railway services.

Keywords: Name of the cargo, Name of the rolling stock, Station and country of departure, Station and country of destination, Tariff rates, Freight charges, Cost elements when calculating the cost of a unit of production, Costing for the services of the main railway network (MRN), Locomotive traction (LT), Wagons and containers (WC), Freight and commercial work (FCW)

INTRODUCTION

To determine the freight charge, the tariff break method should be applied. The bottom line is that the freight charge is determined by the railways to the border stations. The starting point of shipment is the Nur-Sultan 1 station (Kazakhstan), and the final point is the Mazare-Sharif station (Afghanistan). Delivery of cargo is planned by rail transport on the railways of the Republic of Kazakhstan, the Republic of Uzbekistan and the Republic of Afghanistan. To determine the freight charge for the transportation of grain by rail, it is necessary to use the Rail-Atlas and Rail-Tariff methods.

To calculate the freight charge, it is necessary to take into account the transit distance between the crossing points for each country separately. Figure 1 shows the grain route from Nur-Sultan station to Mazare-Sharif station.

The next step is to use the Rail-Tariff program to determine the fare. It is planned to send wagons in universal wagons. The transported cargo is grain, the mass of cargo in one wagon is 65 tons, the type of rolling stock is a grain carrier with a carrying capacity of 65 tons, as well as the return of empty wagons to the departure station.

The total distance is calculated using the following formula:

$$S_{sum} = S_{\kappa 3} + S_3 + S_{A\phi}, \quad \text{km} \qquad (1)$$

где $S_{Кз}$ – transit distance on the railways of the Republic of Kazakhstan, km; S_{Uz} – transit distance on the railways of the Republic of Uzbekistan, km; S_{Af} – transit distance on the railways of the Republic of Afghanistan, km.
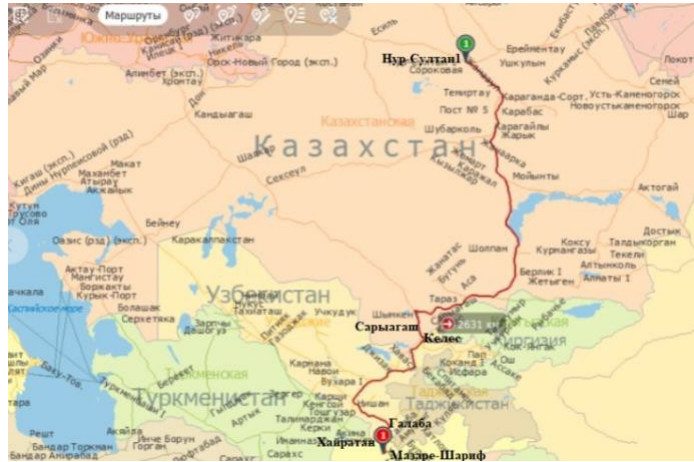
$$S_{sum} = 1668 + 882 + 81 = 2631, \quad km$$

Figure 1: Freight train route, Nur-Sultan st. (Kazakhstan) - Mazare-Sharif st. (Afghanistan).
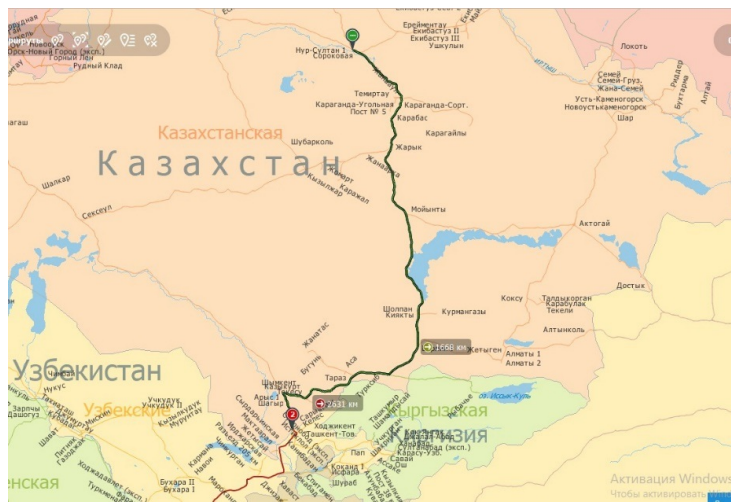

Figure 2: Freight train route, "Nur-Sultan1" st.- "Sary-Agash" st.

Table 1. Tariff for the transportation of wheat from "Nur-Sultan1" st. - "Sary-Agash" st.

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого	НДС	Итого с НДС	за 1 т	за 1 т с НДС	Валюта
Казахстан	→	1668	Пр. КЗХ	333,57	5,13	0	8,16	341,73	0,98	342,71	5,26	5,27	CHF
	←	1668	Пр. КЗХ	129,15	0	0	0	129,15	0	129,15	0	0	CHF
Итого		3336		462,72	7,12	0	8,16	470,88	0,98	471,86	7,24	7,26	CHF
		3336		462,72	7,12	0	8,16	470,88	0,98	471,86	7,24	7,26	CHF

Станция отправления 690002 Нур-Султан 1 (Казахстанская ж. д.)
Страна Казахстан
Страна отправления Казахстан

Станция назначения 704101 Сарыагаш (эксп.) (Казахстанская ж. д.)
Страна Казахстан
Страна назначения Узбекистан

Тарифный класс 2 (Прейскурант 10-01)
Код ГНГ 00000000
Не определен
Класс ЕТТ
ОПАСНЫЙ
Не определен

Итоговая таблица

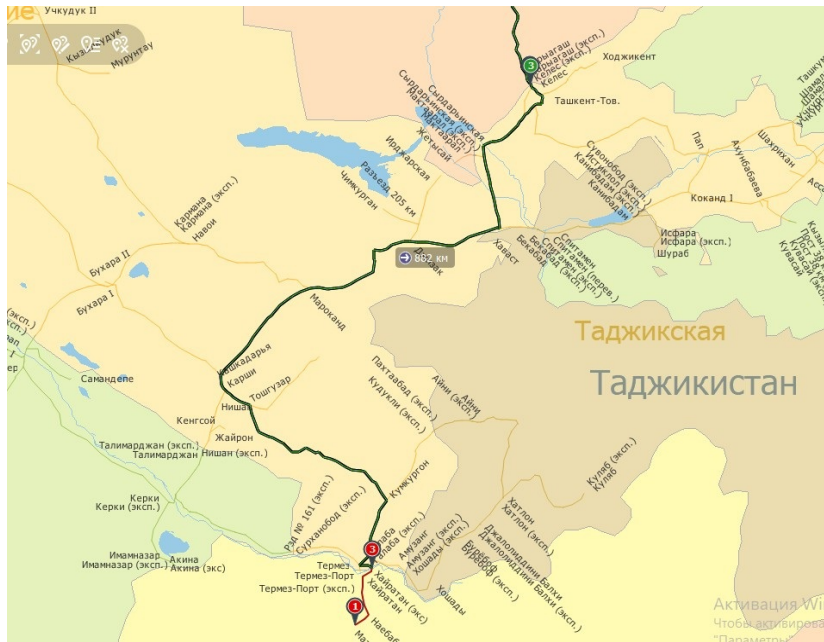**Figure 3:** Freight train route, "Keles" st. - "Galaba" st.

Table 2. Tariff for the transportation of wheat, "Keles" st. - "Galaba" st..
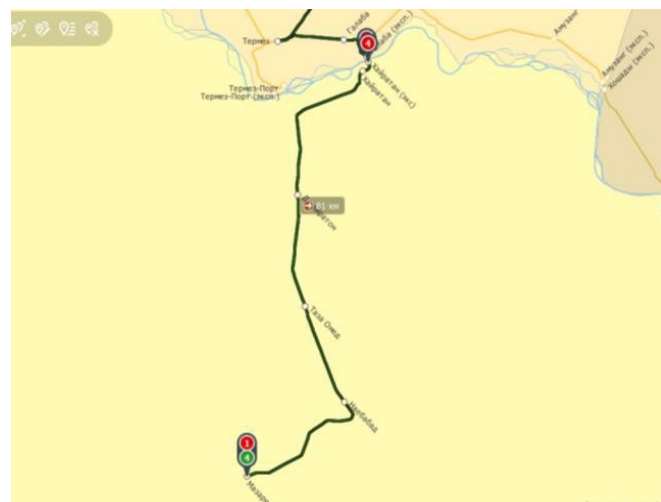

Figure 4: Freight train route, "Hairatan" st.- "Mazare-Sharif" st.

Table 3. Tariff for the transportation of wheat, "Hairatan" st.- "Mazare-Sharif" st.

Thus, the total distance is 2631 km from st. Nur-Sultan 1 to st. Mazare-Sharif (Table 4).

Table 4. Carriage charge for the carriage of wheat.

№	Country	Start station	End station	Distance, km	Freight charge, CHF
1	Kazakhstan	Nur-Sultan1	Sary-Agash	1668,0	471,86
2	Uzbekistan	Keles	Galaba	882,0	2962,52
3	Afghanistan	Hairatan	Mazare- Sharif	81,0	598,0
	ИТОГО :			2631,0	4032,38

Knowing the freight charge for each country, it is necessary to find the total freight charge using formula 2.

$$T_{sum} = T_{Kz} + T_{Uz} + T_{Af}, \textbf{\textit{CHF}} \quad (2)$$

где T_{Kz} – transport tariff on the railways of the Republic of Kazakhstan, CHF; T_{Uz} – transport tariff on the railways of the Republic of Uzbekistan, CHF; T_{Af} – transport tariff on the railways of the Republic of Afghanistan, CHF.

$$T_{sum} = 471,86 + 2968,52 + 598 = 4032,38, \quad \textbf{\textit{CHF}}$$

Determination of the Carriage Fee According to the Method of the Uniform Transit Tariff (UTT)

To determine the carriage charge, the charge for the carriage of loaded and empty wagons is summed up. The payment for the carriage of goods in a wagon is calculated by multiplying the tariff rate for one ton given in Table 2 by the number of tons of the estimated weight of the shipment. The fee for the return of empty wagons is calculated by multiplying the tariff rate for one axle given in Table 2 by the number of axles. The unit tariff rates for carriage charges in CET are set in Swiss francs. When determining the tariff rate of payment for transportation, transit distances between the crossing points (border points) of the transit railway are taken into account. From Table 1, the transit distance between the points of transition along the railways of the Republic of Kazakhstan, the Republic of Uzbekistan and Afghanistan, respectively, is 1668.0 km; 882.0 km; and 81.0 km. Additional information that is necessary when calculating the freight charge, it is established that grain belongs to the second class of cargo; - a grain carrier with a carrying capacity of 65 tons was chosen as a rolling stock (Table 5).

Table 5. Tariff rates for the carriage of goods in wagons.

Distance, km	Country	Tariff rate for 1 ton in Swiss francs		Tariff rate per axle in Swiss francs
		Cargo class		
		1	2	3
75-84	Afghanistan	3,60	1,80	3,96
875-884	Uzbekistan	40,50	20,30	43,46
1650-1749	Kazakhstan	78,30	39,20	83,91

The freight charge for one loaded wagon is determined by the following formula:

$$T_{gr.} = f_{1T} \cdot Q_v, \quad \textbf{CHF} \tag{3}$$

where: $T_{gr.}$ - tariff for the carriage of goods in a loaded wagon, CHF; $f1_T$ - unit tariff rate for 1 ton of transported cargo, CHF; Q_v - carrying capacity of the rolling stock, 65t.

$$T_{gr}^{Kz} = 39,20 \cdot 65 = 2548, \quad \textbf{CHF}$$

Carriage charge for the return of an empty wagon:

$$T_{por.}^{Kz} = f_{1o} \cdot n, \quad \textbf{CHF} \tag{4}$$

where $T_{por.}^{Kz}$ - transport tariff for the return of an empty wagon in Kazakhstan, CHF;

f_{10} - tariff rate for 1 axle, CHF; n - is the number of axles.

$$T_{por.}^{Kz} = 83,91 \cdot 4 = 335,64, \quad \textbf{CHF}$$

Провозная плата за один определяется по следующей формуле за:

$$T_{sum.}^{Kz} = T_{\text{гр}}^{K3} + T_{\Pi op}^{K3}, \quad \textbf{CHF} \tag{5}$$

$$T_{sum.}^{Kz} = 2548 + 335,64 = 2883,64, \quad \textbf{CHF}$$

Thus, the freight charge on the railways of the Republic of Kazakhstan, Nur-Sultan 1 station - Sary-Agash station is 2883.64 CHF. Similarly, it is necessary to calculate the freight charge on the railways of the Republics of Uzbekistan and Afghanistan. The freight charge on the railways of the Republic of Uzbekistan for one wagon will be:

$$T_{gr}^{Uz} = 20,3 \cdot 65 = 1319,5, \quad \textbf{CHF}$$

$$T_{por.}^{Uz} = 43,46 \cdot 4 = 173,84, \quad \textbf{CHF}$$

$$T_{sum.}^{Uz} = 1319,5 + 173,84 = 1493,34, \quad \textbf{CHF}$$

The freight charge on the railway of the Republic of Afghanistan for one wagon will be:

$$T_{gr}^{Af} = 1,8 \cdot 65 = 117, \quad \textbf{CHF}$$

$$T_{por.}^{Af} = 3,96 \cdot 4 = 15,84, \quad CHF$$

$$T_{sum.}^{Af} = 117 + 15,84 = 132,84, \quad CHF$$

Carriage charge for transportation of a rolling stock unit along the route Nur-Sultan 1 *st.* (Republic of Kazakhstan) - Mazare-Sharif *st.* (Republic of Afghanistan) is presented in Table 6. It should be noted that the freight charge is determined according to the scheme with a tariff break.

Table 6. The total cost of transportation according to the method of the Uniform Transit Tariff for one wagon.

№П/П	Country	Freight charge, CHF
1	Kazakhstan	2883,64
2	Uzbekistan	1493,34
3	Afghanistan	132,84
	TOTAL	4509,82

Determination of the Freight Charge According to the Methodology of the International Transit Tariff (ITT)

The fee for the carriage of goods in a wagon is calculated by multiplying the corresponding tariff rate (Table 7) for the weight category of the shipment by the number of tons of the estimated mass of the shipment. The fee for the carriage of an empty wagon (after unloading or for loading) is calculated at the tariff rate of 0.10 Swiss francs per 1 axle-km.

Table 7. Tariff rates for the carriage of goods in wagons.

Distance, km	Country	Weight category				
		5t	10t	15t	20t	Over 25t
		в швейцарских франках				
81 - 90	Afghanistan	21,65	18,06	15,01	12,08	**11,42**
881 - 900	Uzbekistan	174,08	145,14	120,88	96,72	**91,94**
1654 - 1700	Kazakhstan	231,09	192,58	160,48	128,38	**121,96**

The fee for the carriage of goods in a wagon is calculated according to the following formula:

$$T_{gr}^{Kz} = g \cdot Q_B, \quad CHF \tag{6}$$

где T_{gr}^{Kz} - транспортный тариф за перевозку гружёного вагона по Казахстану, CHF;

g - тарифная ставка за 1 тонну, CHF;

Q_v - грузоподъёмность зерновоза, (65т).

$$T_{gr}^{Kz} = 121,96 \cdot 65 = 7927,4, \quad CHF$$

Fee for the return of an empty grain truck:

$$T_{por.}^{Kz} = p \cdot m \cdot l, \quad CHF \tag{7}$$

где $T_{por.}^{Kz}$ - transport tariff for the return of an empty grain truck in Kazakhstan, CHF;

p - tariff rate for 1 axle, (0,10 CHF);

m - number of axles;

l - distance, km.

$$T_{por.}^{Kz} = 0,10 \cdot 4 \cdot 1668 = 667,2, \quad CHF$$

The next stage is the addition of the charge for the carriage of goods and the charge for the return of an empty wagon.

$$T_{sum}^{Kz} = T_{gr}^{Kz} + T_{por.}^{Kz}, \quad CHF \tag{8}$$

$$T_{sum}^{Kz} = 7927,4 + 667,2 = 8594,6, \quad CHF$$

Now it is necessary to determine the freight charge for a loaded and return of an empty grain carrier along the railways of the Republic of Uzbekistan and the Republic of Afghanistan (Table 8).

For the Republic of Uzbekistan:

$$T_{gr}^{Uz} = 91,94 \cdot 65 = 5976,1, \quad CHF$$

$$T_{por.}^{Uz} = 0,10 \cdot 4 \cdot 882 = 352,8, \quad CHF$$

$$T_{sum}^{Uz} = 5976,1 + 352,8 = 6328,9, \quad CHF$$

For the Republic of Afghanistan: for the Republic of Afghanistan:

$$T_{gr}^{Af} = 11,42 \cdot 65 = 742,3, \quad CHF$$

$$T_{por.}^{Af} = 0,10 \cdot 4 \cdot 81 = 32,4, \quad CHF$$

$$T_{sum}^{Af} = 742,3 + 32,4 = 774,7, \quad CHF$$

Table 8. The total cost of transportation for one wagon according to the method International Transit Tariff (ITT).

№п/п	Country	Freight charge, CHF
1	Kazakhstan	8594,6
2	Uzbekistan	6328,9
3	Afghanistan	774,7
	TOTAL	15698,2

Calculation of the Cost of Services of the Main Railway Network (MRN), Locomotive Traction (LT), Wagons and Containers (WC), Freight and Commercial Work (FCW)

Tariffs for the services of the main railway network (MRN), locomotive traction (LT), freight and commercial work (FCW), the use of freight wagons and containers (WC) are calculated separately. Costing is an extremely important parameter, the definition of which ensures a reduction in the cost of material and labor resources. Costing is the determination of the cost per unit of output. The cost price includes the following costs: wage fund, payroll, fuel, cost of materials and spare parts, etc. (Table 9).

Table 9. Costing for services main railway network (MRN).

№	Name of cost elements	%	Methodology								
			Rail-Tariff			UTT			ITT		
			Value, CHF								
			Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан
1	Payroll fund	25	22,41	140,72	28,41	136,97	70,93	6,31	408,24	300,62	36,80
2	Payroll accruals	4	3,59	22,52	4,54	21,92	11,35	1,01	65,32	48,10	5,89
3	Fuel	5	4,48	28,14	5,68	27,4	14,19	1,26	81,65	60,12	7,36
4	Materials and spare parts	12	10,76	67,55	13,63	65,75	34,05	3,03	195,96	144,30	17,66
5	Depreciation	12	10,76	67,55	13,63	65,75	34,05	3,03	195,96	144,30	17,66
6	Security labor	5	4,48	28,14	5,68	27,4	14,19	1,26	81,65	60,12	7,36
7	Overheads	8	7,17	45,03	9,09	43,83	22,70	2,02	130,64	96,20	11,78
8	Overhaul	15	13,45	84,43	17,04	82,18	42,56	3,79	244,95	180,37	22,08
9	**Profitability**	**14**	**12,55**	**78,8**	**15,91**	**76,7**	**39,72**	**3,53**	**228,62**	**168,35**	**20,61**
10	Total	100	89,65	562,88	113,62	547,89	283,73	25,24	1632,97	1202,49	147,19

Tariffs for the services of the Main Rail Network are 19%, for the services of Locomotive Traction - 23%, for the services of Wagons and Containers - 57% and for the services of Freight and Commercial Works - 1% of the freight rate of each country. Calculations are carried out according to each of the methods and each country separately.

According to the methodology using the Rail-Tariff software package, the freight charge on the railways of the Republic of Kazakhstan was determined, Nur-Sultan1 *st.*- Sary-Agash, *st.* which amounted to 471.86 CHF; on the railways of the Republic of Uzbekistan, Keles *st.* - Galaba *st.*- 2962.52 CHF; by railway of the Republic of Afghanistan, Hairatan *st.* - Mazare-Sharif *st.*- 598.0 CHF.

According to the methodology of the Uniform Transit Tariff (UTT), the freight charge on the railways of the Republic of Kazakhstan, Nur-Sultan1 st. - Sary-Agash st., is 2883.64 CHF; on the railways of the Republic of Uzbekistan, Keles st.- Galaba *st.*- 1493.34 CHF; and for Afghanistan, Hairatan st. - Mazare-Sharif st.- 132.84 CHF.

According to the methodology of the International Transit Tariff (ITT), the freight charge in Kazakhstan, Nur-Sultan1 st. - Sary-Agash st., amounted to 8594.6 CHF; for Uzbekistan, Keles st. – Galaba st. freight charge amounted to 6328.9 CHF and in Afghanistan, Hairatan st. - Mazare- Sharif st.- 774.7 CHF. The calculation results are shown in Table 9.

$$MRN = 19\% \cdot \frac{T}{100}, \quad CHF \qquad (9)$$

Let's determine the costs for the section of the Main Rail-Tariff, Main Railway Network (MRN):

$$MRN^{Kz} = 19\% \cdot \frac{471,86}{100} = 89,6534, \quad CHF$$

$$MRN^{Uz} = 19\% \cdot \frac{2962,52}{100} = 562,88, \quad CHF$$

$$MRN^{Af} = 19\% \cdot \tfrac{598}{100} = 113{,}62, \quad \textbf{\textit{CHF}}$$

Methodology using the Uniform Transit Tariff: $MRN^{Kz} = 19\% \cdot \tfrac{2883{,}64}{100} = 547{,}89, \textbf{\textit{CHF}}$

$$MRN^{Uz} = 19\% \cdot \tfrac{1493{,}34}{100} = 283{,}73, \quad \textbf{\textit{CHF}}$$

$$MRN^{Ag} = 19\% \cdot \tfrac{132{,}82}{100} = 25{,}24, \quad \textbf{\textit{CHF}}$$

Methodology using the International Transit Tariff:

$$MRN^{Kz} = 19\% \cdot \tfrac{8594{,}6}{100} = 1632{,}97, \quad \textbf{\textit{CHF}}$$

$$MRN^{Uz} = 19\% \cdot \tfrac{6328{,}9}{100} = 1202{,}49, \quad \textbf{\textit{CHF}}$$

$$MRN^{Af} = 19\% \cdot \tfrac{774{,}7}{100} = 147{,}19, \quad \textbf{\textit{CHF}}$$

"Live money" is the Remuneration Fund, payroll and profitability (Table 9). According to the method using the Rail-Tariff methodology, "live money" is 38.55 CHF in Kazakhstan; CHF 242.04 for Uzbekistan and CHF 48.86 for Afghanistan. Total "live money" - 329.45 CHF for the services of the IHC.

According to the methodology of the Uniform Transit Tariff (UTT) - 235.59 CHF in Kazakhstan; CHF 122.01 for Uzbekistan and CHF 10.85 for Afghanistan. In total, the total amount of "live money" for the services of the IHC is 368.45 CHF per wagon.

According to the methodology of the International Transit Tariff (MTT) - 702.18 CHF in Kazakhstan; CHF 517.07 for Uzbekistan and CHF 63.29 for Afghanistan. The total amount of "real money" under the Main Rail Network section for one wagon is 1282.54 CHF.

Now let's make calculations of "live money" for the Locomotive Traction (LT) service section, which make up 23% of the freight charge of each country, (Table 10).

$$LT = 23\% \cdot \frac{T}{100}, \quad \textbf{\textit{CHF}} \tag{10}$$

Table 10. Costing for services locomotive traction (LT).

№	Name of cost elements	%	Methodology								
			Rail-Tariff			UTT			ITT		
			Value, CHF								
			Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан
1	**Payroll fund**	12	13,02	81,77	16,5	79,59	41,22	3,67	237,21	174,68	21,38
2	**Payroll accruals**	4	4,34	27,26	5,5	26,53	13,74	1,22	79,07	58,23	7,13
3	Fuel	22	23,88	149,9	30,26	145,91	75,56	6,72	434,89	320,24	39,2
4	Materials and spare parts	10	10,85	68,14	13,75	66,32	34,35	3,05	197,68	145,56	17,82
5	Depreciation	1	1,09	6,81	1,38	6,63	3,43	0,31	19,77	14,56	1,78
6	Security labor	0,6	0,65	4,09	0,83	3,98	2,06	0,18	11,86	8,73	1,07
7	Overheads	24,4	26,48	166,26	33,56	161,83	83,81	7,45	482,33	355,18	43,48
8	Overhaul	1	1,09	6,81	1,38	6,63	3,43	0,31	19,77	14,56	1,78
9	**Profitability**	25	27,13	170,34	34,39	165,81	85,87	7,64	494,19	363,91	44,55
10	Total	100	1632,97	681,38	137,54	663,24	343,47	30,55	1976,76	1455,65	178,18

Methodology based on the Rail-Tariff software package:

$$LT^{KZ} = 23\% \cdot \frac{471{,}86}{100} = 108{,}5278, \quad \textbf{\textit{CHF}}$$

$$LT^{Uz} = 23\% \cdot \frac{2962{,}52}{100} = 681{,}38, \quad \textbf{\textit{CHF}}$$

$$LT^{Af} = 23\% \cdot \frac{598}{100} = 137{,}54, \quad \textbf{\textit{CHF}}$$

Methodology based on the Uniform Transit Tariff (UTT):

$$LT^{Kz} = 23\% \cdot \frac{2883{,}64}{100} = 663{,}24, \quad \textbf{\textit{CHF}}$$

$$LT^{Uz} = 23\% \cdot \frac{1493{,}34}{100} = 343{,}47, \quad \textbf{\textit{CHF}}$$

$$LT^{Af} = 23\% \cdot \frac{132{,}82}{100} = 30{,}55, \quad \textbf{\textit{CHF}}$$

Methodology based on the International Transit Tariff (ITT):

$$LT^{Kz} = 23\% \cdot \frac{8594{,}6}{100} = 1976{,}76, \quad \textbf{\textit{CHF}}$$

$$LT^{Uz} = 23\% \cdot \frac{6328{,}9}{100} = 1455{,}65, \quad \textbf{\textit{CHF}}$$

$$LT^{Af} = 23\% \cdot \frac{774{,}7}{100} = 178{,}18, \quad \textbf{\textit{CHF}}$$

"Live money" according to the method using the Rail-Tariff program is payroll, payroll and profitability. In total, they will give 44.5 CHF for Kazakhstan; CHF 279.37 for Uzbekistan and CHF 56.39 for Afghanistan. Total "real money" - 380.26 CHF for Locomotive Traction (LT) services.

According to the methodology of the Uniform Transit Tariff (UTT) - 271.93 CHF per one wagon in Kazakhstan; CHF 140.83 for Uzbekistan and CHF 12.53 for Afghanistan.

According to the methodology of the International Transit Tariff (MTT), "real money" for one wagon in Kazakhstan is 810.47 CHF; in Uzbekistan - 592.82 CHF and in Afghanistan - 73.05 CHF. Thus, the total amount of "live money" under Locomotive Traction (LT) is 1480.34 CHF per wagon (Table 10).

Let's imagine the calculations for determining the costs of the Wagons and Containers (WC) service, which make up 57% of the freight charge of each country.

$$WC = 57\% \cdot \frac{T}{100}, \quad \textbf{\textit{CHF}} \tag{11}$$

Methodology using the Rail-Tariff software package:

$$WC^{Kz} = 57\% \cdot \frac{471{,}86}{100} = 268{,}96, \quad \textbf{\textit{CHF}}$$

$$WC^{Uz} = 57\% \cdot \frac{2962{,}52}{100} = 1668{,}64, \quad \textbf{\textit{CHF}}$$

$$WC^{Af} = 57\% \cdot \frac{598}{100} = 340{,}86, \quad \textbf{\textit{CHF}}$$

Methodology of the Uniform Transit Tariff (UTT):

$$WC^{Kz} = 57\% \cdot \frac{2883{,}64}{100} = 1643{,}67, \quad \textbf{\textit{CHF}}$$

$$WC^{Uz} = 57\% \cdot \frac{1493{,}34}{100} = 852{,}20, \quad CHF$$

$$WC^{Af} = 57\% \cdot \frac{132{,}82}{100} = 75{,}7, \quad CHF$$

Methodology of the International Transit Tariff (ITT):

$$WC^{Kz} = 57\% \cdot \frac{8594{,}6}{100} = 4898{,}92, \quad CHF$$

$$WC^{Uz} = 57\% \cdot \frac{6328{,}9}{100} = 3607{,}47, \quad CHF$$

$$WC^{Af} = 57\% \cdot \frac{774{,}7}{100} = 441{,}579, \quad CHF$$

"Live money" is payroll, payroll and profitability. According to the method using the Rail- Tariff program "Live money" is 123.72 CHF in Kazakhstan; 776.78 CHF - in Uzbekistan; 156.79 CHF - for Afghanistan. Total "real money" for PV services is 1057.29 CHF.

According to the methodology of the Uniform Transit Tariff (UTT) - within Kazakhstan CHF; in Uzbekistan - 391.55 CHF and in Afghanistan - 34.83 CHF.

According to the methodology using the International Transit Tariff (ITT) - 2253.5 CHF in Kazakhstan; 1659.44 CHF - in Uzbekistan and 203.13 CHF - in Afghanistan for one wagon. If you sum up the "real money" for each country, you get 1182.47 CHF per wagon.

Thus, the total amount of "live money" under the section Freight and Commercial Work for one wagon is 4116.06 CHF (Table 11).

Table 11. Costing for services wagons and containers (WC).

№	Name of cost elements	%	Methodology								
			Rail-Tariff			UTT			ITT		
			Value, CHF								
			Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан
1	**Payroll fund**	22	59,17	371,5	74,9892	59,17	187,26	16,66	1077,76	793,64	97,15
2	**Payroll accruals**	2	5,37	33,77	6,8172	5,37	17,02	1,51	97,98	72,15	8,83
3	Fuel	6	16,13	101,32	20,4516	16,13	51,07	4,54	293,94	216,45	26,49
4	Materials and spare parts	15	40,34	253,3	51,129	40,34	127,68	11,36	734,84	541,12	66,24
5	Depreciation	10	26,89	168,86	34,086	26,89	85,12	7,57	489,89	360,75	44,16
6	Security labor	1	2,68	16,89	3,4086	2,68	8,51	0,76	48,99	36,08	4,42
7	Overheads	10	26,89	168,86	34,086	26,89	85,12	7,57	489,89	360,75	44,16
8	Overhaul	12	32,27	202,64	40,9032	32,27	102,14	9,08	587,87	432,89	52,99
9	**Profitability**	22	59,17	371,5	74,9892	59,17	187,26	16,66	1077,76	793,64	97,15
10	Total	100	268,96	1688,64	340,86	268,96	851,20	75,71	4898,92	3607,47	441,58

Freight and Commercial Work (FCW) costs are 1% of each country's freight charge. Freight and Commercial Work (FCW) costs are 1% of each country's freight charge.

$$FCW = 1\% \cdot \frac{T}{100}, \quad CHF \qquad (12)$$

Methodology using the Rail-Tariff software package:

$$FCW^{Kz} = 1\% \cdot \frac{471,86}{100} = 4,7186, \quad CHF$$

$$FCW^{Uz} = 1\% \cdot \frac{2962,52}{100} = 29,6252, \quad CHF$$

$$FCW^{Af} = 1\% \cdot \frac{598}{100} = 5,98, \quad CHF$$

Methodology of the Uniform Transit Tariff (UTT):

$$FCW^{Kz} = 1\% \cdot \frac{2883,64}{100} = 28,8464, \quad CHF$$

$$FCW^{Uz} = 1\% \cdot \frac{1493,34}{100} = 214,934, \quad CHF$$

$$FCW^{Af} = 1\% \cdot \frac{132,82}{100} = 1,3282, \quad CHF$$

Methodology of the International Transit Tariff (ITT):

$$FCW^{Kz} = 1\% \cdot \frac{8594,6}{100} = 85,946, \quad CHF$$

$$FCW^{Uz} = 1\% \cdot \frac{6328,9}{100} = 63,289, \quad CHF$$

$$FCW^{Af} = 1\% \cdot \frac{774,7}{100} = 7,747, \quad CHF$$

The results of the calculations of "live money" in the section Cargo and Commercial work are presented in Table 12.

Table 12. Costing for services freight and commercial work (FCW).

№	Name of cost elements	%	Methodology								
			Rail-Tariff			ETT			MTT		
			Value, CHF								
			Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан	Kazakh-stan	Uzbeki-stan	Афга-нистан
1	**Payroll fund**	**22**	**1,04**	**6,52**	**1,32**	**6,34**	**3,29**	**0,29**	**18,91**	**13,92**	**1,70**
2	Work with documents	35	1,65	10,37	2,09	10,09	5,23	0,46	30,08	22,15	2,71
3	Technical organization	10	0,47	2,96	0,6	2,88	1,49	0,13	8,59	6,33	0,77
4	Informing clients	5	0,24	1,48	0,3	1,44	0,75	0,07	4,30	3,16	0,39
5	Making deeds, etc.	28	1,32	8,3	1,67	8,074	4,18	0,37	24,06	17,72	2,17
6	Total	100	4,72	29,63	5,98	28,8364	14,93	1,33	85,95	63,29	7,75

"Live money" under the section "Cargo and commercial work" is the payroll fund (PAY). According to the methodology using the Rail-Tariff program - 1.04 CHF in Kazakhstan; 6.52 CHF - in Uzbekistan; 1.32 CHF - for Afghanistan. The total value of "live money" for the services of Freight and Commercial Work (GC) is 8.88 CHF per wagon.

According to the methodology of the Uniform Transit Tariff (UTT) - 6.34 CHF in Kazakhstan; CHF 3.29; in Uzbekistan and 0.29 CHF in Afghanistan. The total amount will be - 9.92 CHF "live money" per wagon.

According to the methodology of the International Transit Tariff (ITT) - 18,908 CHF in Kazakhstan; CHF 13.92 for Uzbekistan and CHF 1.70

for Afghanistan. Thus, the total amount of "live money" is 34.54 CHF per wagon.

Summary and Comparative Analysis of Methodologies for Determining Freight Charges

To determine the fare from Nur-Sultan 1 station to Mazare-Sharif station, three methods were used: based on the Rail-Tariff and Rail-Atlas software package; methods of the Common Transit Tariff (ETT); methodology of the International Transit Tariff (MTT). Now let's compare the freight charges for each of the methods and identify the most cost-effective of them for organizing the transportation of grain from the Nur-Sultan 1 station (Republic of Kazakhstan) to the Mazare Sharif station (Republic of Afghanistan). We present a comparative analysis of the indicators of the freight charge in Table 13.

Table 13. Comparative analysis of freight transportation methods.

Methodology	Country	Name of service				Total	Total amount
		Main Rail Network	Locomotive Traction	Wagons and Containers	Freight and Commercial Work		
Rail-Tariff	Kazakhstan	89,65	108,53	268,96	4,72	471,858	4032,38
	Uzbekistan	562,88	681,38	1668,64	29,63	2962,52	
	Afghanistan	113,62	137,54	340,86	5,98	598,0	
UTT	Kazakhstan	547,89	663,24	1643,67	28,84	2883,64	4509,82
	Uzbekistan	283,73	343,47	852,2	214,93	1694,33	
	Afghanistan	25,24	30,55	75,7	1,32	132,81	
ITT	Kazakhstan	1632,97	1979,76	4898,92	85,95	8597,6	15698,2
	Uzbekistan	1202,49	1455,65	3607,47	63,29	6328,9	
	Afghanistan	147,19	178,18	441,58	7,75	774,7	

Thus, the most economical way to transport cargo is the method that uses the Rail-Tariff program. The freight charge is 4032.38 CHF per wagon. In second place is the CTT method with a freight charge of CHF 4509.82 per wagon, and the most expensive transportation method is the MTT method with a freight charge of CHF 15698.2 per wagon. Table 14 provides a matrix that shows the difference in freight charges between different methods.

Table 14. Economic efficiency matrix.

Methodology	Rail-Tariff, CHF	UTT, CHF	ITT, CHF
ITT, CHF	11665,82	11188,38	-
UTT, CHF	477,44	-	-
Rail-Тариф, CHF	-	-	-

Thanks to this matrix, we can conclude: how much money can be saved per wagon. Table 11 shows that by choosing the Rail-Tariff method, CHF 11,668.82 can be saved compared to the MTT method; 477.44 CHF - in relation to the method using ETT. The next cost effective method is the ETT

method. In this case, you can save 11188.38 CHF compared to the method using MTT. And the most uneconomically effective method is the method using MTT. The next step is to compare "live money" between countries and different methods (Table 15).

Table 15. Comparative analysis of "live money".

Methodology	Country	Name of service				Total	Total amount
		Main Rail Network	Locomotive Traction	Wagons and Containers	Freight and Commercial Work		
Rail-Tarif	Kazakhstan	38,55	44,5	123,72	1,04	207,81	**1775,84**
	Uzbekistan	242	279,37	776,78	6,52	1304,67	
	Afghanistan	48,86	56,39	156,79	1,32	263,36	
UTT	Kazakhstan	235,59	271,93	756,09	6,34	1269,95	**1986,13**
	Uzbekistan	122,01	140,83	391,55	3,29	657,68	
	Afghanistan	10,85	12,53	34,83	0,29	58,5	
ITT	Kazakhstan	702,18	810,47	2253,5	18,91	3785,06	**6909,48**
	Uzbekistan	517,07	592,82	1659,44	13,92	2783,25	
	Afghanistan	63,29	73,05	203,13	1,7	341,17	

"Live money" in the method using the Rail-Tariff program is 1775.84 CHF in total; according to the ETT method - 1986.13 CHF; according to the MTT method - 6909.48 CHF. Their value depends on the freight charge for the carriage of goods. Thus, thanks to the performed comparative analysis, it was concluded that the most cost-effective method of freight transportation is the method using the Rail-Tariff software package, the amount of "live money" is 1775.84 CHF per wagon.

REFERENCES

INTERNATIONAL RAILWAY TRANSIT FARE (ITT) is valid from January 01, 1997 (as amended and supplemented as of January 1, 2022). Tariff 8100. Official publication. OSJD Committee, Warsaw.

Software package Rail-Atlas, Rail-Tariff. Nur-Sultan, Republic of Kazakhstan.

UNIFIED TRANSIT FARE (UTT) is valid from July 01, 1991 (as amended and supplemented as of January 1, 2020). Official publication. OSJD Committee, Warsaw.