Logistic of through shoulderfor container trains

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Annotation. The article presents the results of studies to determine the freight in the system of international freight traffic with the participation of the railways of the Republic of Kazakhstan, the Russian Federation, Azerbaijan, Georgia, and the maritime traffic across the Caspian Sea, Ukraine, and Poland. Presented are the results of calculation of the charge based on the methodology with the tariff fracture and the method of the pass-through route. The scientific novelty of the article is to determine the charge based on the supranational currency EvroNur.

Keywords: International rail transportation, station of departure, station of destination, tariff rate, freight charge, scheme with a tariff fracture, pass-through route scheme, member countries of international freight traffic, Single Transit Tariff (STT).

1. Introduction.

When organizing international rail transport one of the problematic issues is the determination of the freight charge. Since the freight train follows the railways of the countries of international freight traffic, the Swiss franc uses like supranational currency to determine the freight charge. Then, the countries participating in the freight service, transfer the freight to the national currency at the rate of the current day of departure of the freight train. This process is time consuming, takes a lot of time and you need to take the exchange rate difference of national currencies to the Swiss franc in terms of time. But doing so to date.

Therefore, the author of the proposed scientific article proposed a supranational currency EuroNur to facilitate payments for the carriage of goods and reduce the time of delivery of goods to the consumer [1]. In recent years, the main points of the author's ideas have been published in a number of scientific works and essentially form international transport corridors in the direction of Northern Europe and to the ports of the People's Republic of China [2, 3. 4, 5, 6, 7]. The organization of electronic trading based on cryptocurrency PEERCOIN (PPC) is proposed [8].

2. Determination of freight charge according to the method with a tariff fracture

For example, the formation of the freight route by train during the transportation of grain (wheat), sending - carriage. For the carriage of the specified goods, choose a special rolling stock – grain carrier. The Republic of Kazakhstan produces about 20-25 million tons of grain every year, while for exporting from 8 to 10 million tons of grain. In this article, we will present the route and the definition of freight from Astana station (Kazakhstan) to the border station Kostrzyn (Poland). By rail of the Republic of Kazakhstan the route of the freight train follows from Astana station to the border station Dina Nurpeisova. Tariff distance is 2122 km (picture 1). Calculations on the determination of the charge are presented in the national currency (tenge) and supranational currency, Swiss franc (pictures 2,3).

2.1. Determination of freight charge according to the method with a tariff fracture on Kazakhstan
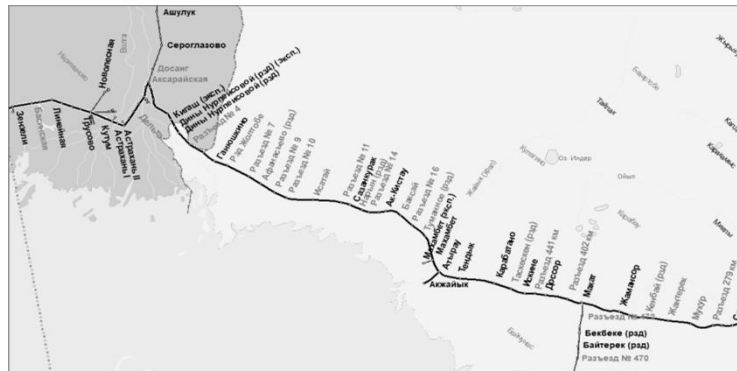
Figure 1. The route of theKazakhstan's railways, border crossings

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1т (без НДС)	за 1 т	Валюта
Казахстан	→	2122	Пр. КЗХ	184639,00	3077,32	0	0	184639,00	22156,68	206795,68	3077,32	3446,59	KZT
	←	2122	Пр. КЗХ	78479,00	0	0	0	78479,00	9417,48	87896,48	0	0	KZT
Итого		4244		263118,00	4385,30	0	0	263118,00	31574,16	294692,16	4385,30	4911,54	KZT
		4244		263118,00	4385,30	0	0	263118,00	31574,16	294692,16	4385,30	4911,54	KZT

Figure 2. Definition of a freight charge along the route st. Astana –st.Dina Nurpeisova, tenge

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1т (без НДС)	за 1 т	Валюта
Казахстан	→	2122	Пр. КЗХ	541,88	9,03	0	0	541,88	65,03	606,91	9,03	10,12	CHF
	←	2122	Пр. КЗХ	230,32	0	0	0	230,32	27,64	257,96	0	0	CHF
Итого		4244		772,20	12,87	0	0	772,20	92,67	864,87	12,87	14,41	CHF
		4244		772,20	12,87	0	0	772,20	92,67	864,87	12,87	14,41	CHF

Figure 3. Determination of thefreight charge along the route st. Astana - st.Dina Nurpeisova, Swiss franc

The route of the freight train on the railways of the Russian Federation follows from the Kigash station - to the station Samur-exp., (picture 4). Tariff distance is 748 km. Freight charge is defined in the national currency of the Russian Federation (ruble) and supranational currency (pictures 5,6).
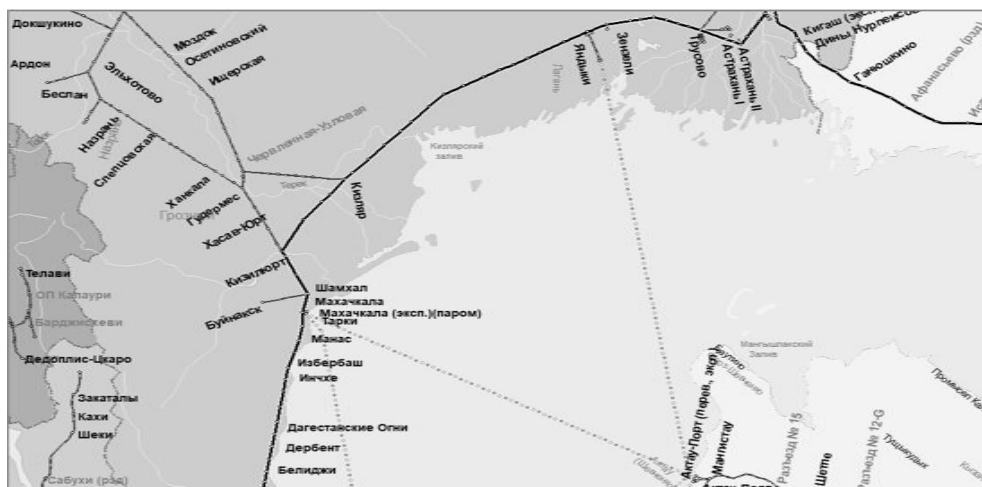

Figure4. The route of theRussian Federation's railways, border crossings.

2.2 Determination of freight charge according to the method with a tariff fracture on Russian

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1 т (без НДС)	за 1 т	Валюта
Россия	→	748 (ТР4 748)	ТП СНГ	91713,66	1528,56	0	503,76	92217,42	0	92217,42	1536,96	1536,96	RUB
	←	748 (ТР4 748)	ТП СНГ	18471,14	0	0	0	18471,14	3324,81	21795,95	0	0	RUB
Итого		1496		110184,80	1836,41	0	503,76	110688,56	3324,81	114013,37	1844,81	1900,22	RUB
		1496		110184,80	1836,41	0	503,76	110688,56	3324,81	114013,37	1844,81	1900,22	RUB

Figure5. Determination of the charge for the route along the route Kigash (exp.), - Samur (exp.), Russia

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1 т (без НДС)	за 1 т	Валюта
Россия	→	748 (ТР4 748)	ТП СНГ	1485,60	24,76	0	8,16	1493,76	0	1493,76	24,90	24,90	CHF
	←	748 (ТР4 748)	ТП СНГ	299,20	0	0	0	299,20	53,86	353,06	0	0	CHF
Итого		1496		1784,80	29,75	0	8,16	1792,96	53,86	1846,82	29,88	30,78	CHF

Figure6. Determination of the charge for the route along the route Kigash (exp.), - Samur (exp.), Russia, Swiss franc

The route of the freight train on the railways of the Republic of Azerbaijan follows from the station Yalama-exp. to station Boyuk-Kasik-exp. (pictures 7,8). Tariff distance by rail of the Republic of Azerbaijan is 680km. Freight charge is defined in the national currency of the Republic of Azerbaijan (manat) and supranational currency (pictures 7,10).

2.3 Determination of freight charge according to the method with a tariff fracture on Azerbaijan
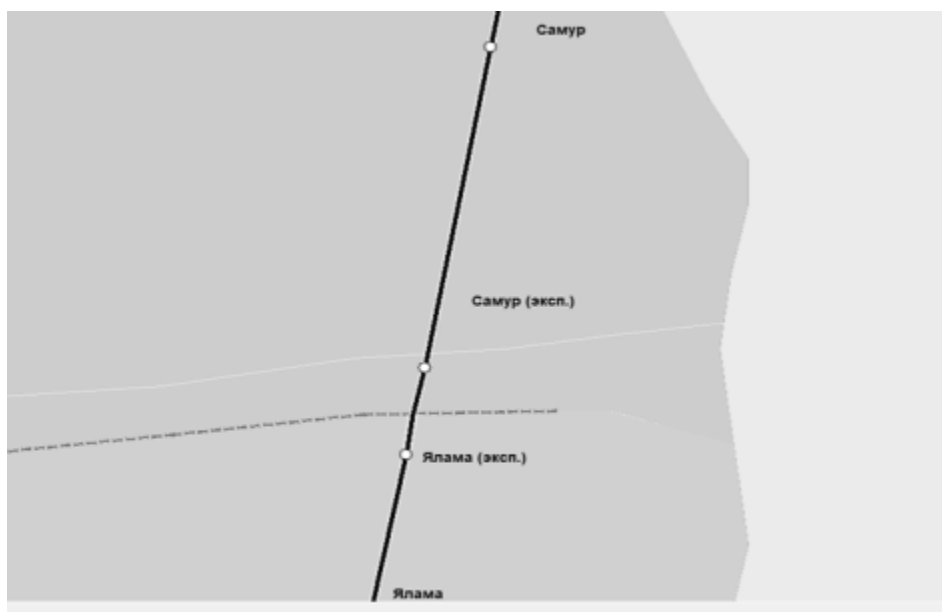

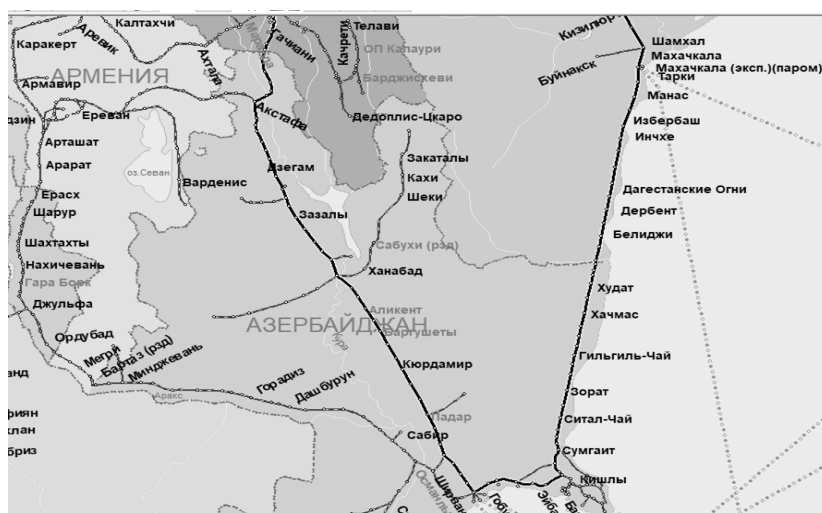*Figure7. Border crossing Samur (exp.), RZD-Yamala (exp.), Azerbaijan*

Figure8. The route of Azerbaijan Republic'srailways st.Yalama (exp.) –BoyukKesik (exp.)
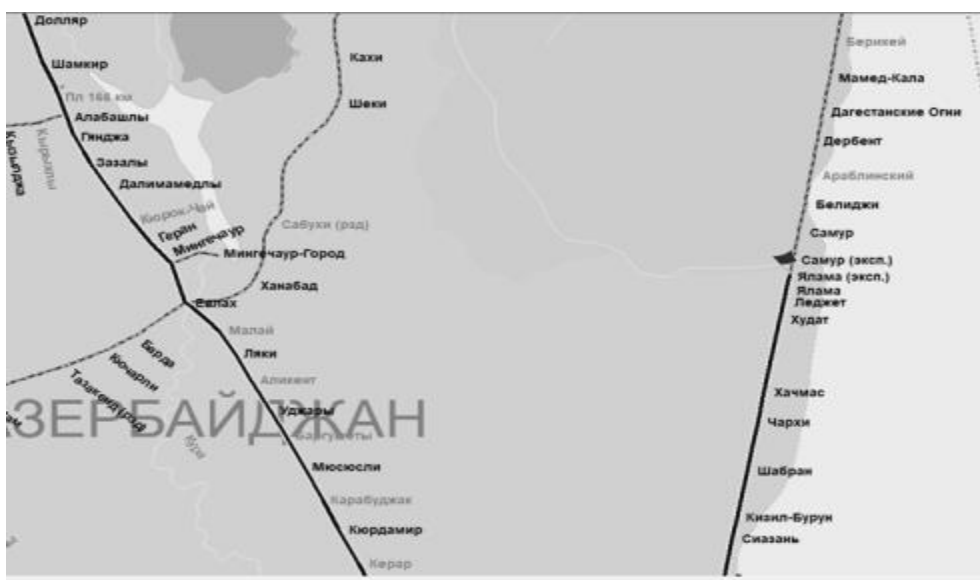

Figure 9. Yalama border station (exp.), Azerbaijan

Picture10. Determination of the charge for the route along the route of Yalama station (exp.), - Boyuk-Kesik (exp.), Azerbaijan, Azerbaijan manat

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1 т (без НДС)	за 1 т	Валюта
Азербайджан	→	680 (ТР4 680)	ТП СНГ	1455,00	24,25		0	8,16	1463,16	0	1463,16	24,39	24,39	CHF
	←	680 (ТР4 680)	ТП СНГ	272,00	0	0	0	272,00	0	272,00	0	0	CHF
Итого		1360		1727,00	28,78	0	8,16	1735,16	0	1735,16	28,92	28,92	CHF
		1360		1727,00	28,78	0	8,16	1735,16	0	1735,16	28,92	28,92	CHF

Figure 11. Determination of the charge for the route along the route of Yalama station (exp.), - Boyuk-Kesik (exp.), Azerbaijan, Swiss franc

2.4 Determination of freight charge according to the method with a tariff fracture on Georgia

The route of the freight train on the railways of the Republic of Georgia follows from the station Gardebani - to the station, the port of the same name Poti (Pictures. 12-13). Tariff distance by rail of the Republic of Georgia is 360km. Freight charge is defined in dollars and supranational currency (pictures 14,15).

Figure 12. The route of Georgia'srailways, through the border crossing st.BoyukKesik–st.Gardebani(exp.)

Figure13. The route of Georgia's railways st.Gardabani–st.Poti

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1т (без НДС)	за 1т	Валюта
Грузия	→	360 (ТР4 362)	ГР	690,00	11,50	0	113,50	803,50	0	803,50	13,39	13,39	USD
	←	360 (ТР4 362)	ГР	169,92	0	0	16,48	186,40	0	186,40	0	0	USD
Итого		720		859,92	14,33	0	129,98	989,90	0	989,90	16,50	16,50	USD
		720		859,92	14,33	0	129,98	989,90	0	989,90	16,50	16,50	USD

Figure14. The transportation charge on the route of Gardebani station (exp.) - the port of Poti, the Republic of Georgia, the US dollar

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1т (без НДС)	за 1т	Валюта
Грузия	→	360 (ТР4 362)	ГР	662,40	11,04	0	108,96	771,36	0	771,36	12,86	12,86	CHF
	←	360 (ТР4 362)	ГР	163,12	0	0	15,82	178,94	0	178,94	0	0	CHF
Итого		720		825,52	13,76	0	124,78	950,30	0	950,30	15,84	15,84	CHF
		720		825,52	13,76	0	124,78	950,30	0	950,30	15,84	15,84	CHF

Figure15. The transportation charge along the route of Gardebani station (exp.) - the port of Poti, the Republic of Georgia, the Swiss franc

2.5 Determination of freight charge according to the method with a tariff fracture on sea transportation (Ukraine)

At the 16'spicture shows a scheme of the sea route along the Black Sea, from the port of Poti (Georgia) to the port of Odessa (Ukraine). The distance of the route is 1040km.

Figure16. The sea route between the port of Poti (Georgia) and the port of Odessa (Ukraine)

The route of the freight train on the railways of Ukraine follows from Odessa station to Yagodin station (picture 17). The tariff distance by rail of the Republic of Ukraine is 932km. Freight charge is defined in national currency, hryvnia and supranational currency, Swiss franc (pictures 18,19).
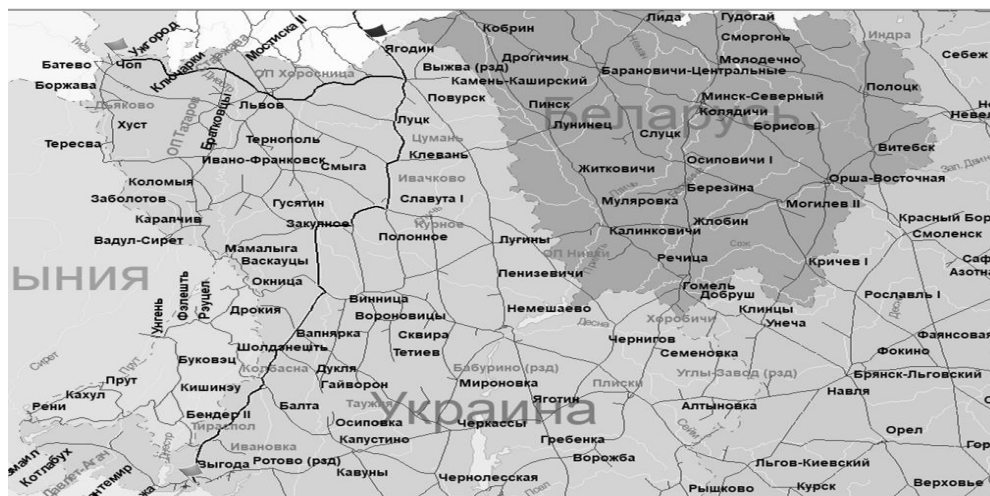

Figure17. The route by rail of the Republic of Ukraine,st.Odessa - st.Yagodin

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1т (без НДС)	за 1т	Валюта
Украина	→	932	ТР УЗ	15326,00	255,43	0	1020,20	16346,20	0	16346,20	272,44	272,44	UAH
	←	932	ТР УЗ	3757,70	0	0	970,10	4727,80	0	4727,80	0	0	UAH
Итого		1864		19083,70	318,06	0	1990,30	21074,00	0	21074,00	351,23	351,23	UAH
		1864		19083,70	318,06	0	1990,30	21074,00	0	21074,00	351,23	351,23	UAH

Figure18. The transportation charge on the route Odessa - Yagodin, hryvnia

The freight charge by the railway of Ukraine is 21074 *UAH* (Ukrainian currency, UAH).

Страна	Напр.	Расстояние	ВИД	Пров. пл.	за 1т Пров. пл.	Охрана	Доп.сборы	Итого без НДС	НДС	Итого	за 1т (без НДС)	за 1 т	Валюта
Украина	→	932	ТР УЗ	565,47	9,42	0	37,64	603,11	0	603,11	10,05	10,05	CHF
	←	932	ТР УЗ	138,64	0	0	35,79	174,43	0	174,43	0	0	CHF
Итого		1864		704,11	11,74	0	73,43	777,54	0	777,54	12,96	12,96	CHF
		1864		704,11	11,74	0	73,43	777,54	0	777,54	12,96	12,96	CHF

Figure19. The transportation charge along the route st.Odessa - st.Yagodin, Swiss franc

3. Determine the payment by method on the through-shoulder technique

The freight charge for the transportation of grain in a specialized rolling stock by rail of Ukraine is 777,54*ChF*. The transportation fee is indicated for the unit of rolling stock, i.e. for one grain carrier.

Figure 20. The route of the Poland's railways, st.Dorohusk -st.Kostrzyn(exp.)

Tariff distance between the st.Dorohusk (PKP) to the st.Kostrzyn is 744 *km*. Kostrzyn station is on the border with Germany.The transportation charge on the route st.Dorohusk (PKP) – st.Kostrzyn (exp.), Poland is determined by the method of the Single Transit Tariff (STT) (*picture20*). The essence of this technique lies in the fact that according to the tariff distance (744 km), 2 tariff class of the cargo being transported, we determine the specific tariff rate for 1 ton of transported cargo. In this case, the specific tariff rate is 17,10*ChF*. To determine the freight charge for the wagon rate, you need to multiply the specific tariff rate by the weight of the cargo in the grain carrier:

17,10*60,0=1026,0ChF

Расстояние в км	Плата за 1 тонну в швейцарских франках		Плата с оси в швейцарских франках	Расстояние в км
505-754	к л а с с ы			505-754
	1	2	3	
705-714	32,70	16,50	35,06	705-714
715--724	33,30	16,70	35,55	715-724
725-734	33,60	17,00	36,03	725-734
735-744	34,20	17,10	36,53	735-744
745-754	34,70	17,40	37,02	745-754

4. TheComparemethodsonthetariffbreak and through-shoulder technique

The results of freight charges calculations by railways of the countries participating in the railway communication will be summarized in tabular form (Tables 1, 2).

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Table 1. Determination of the freight charge according to the scheme with a tariff fracture

№ п/п	Destinationstations	Tariffdistance, km	Thefreightcharge	
1	st. Astana- st. Dina Nurpeisova, Kazakhstan	2122,0	294692,18*Tg*	864,87*ChF*
2	st.Kigash - st.Samur, Russia	748,0	114013,37*RR*	1846,82*ChF*
3	st.Yalama (exp.), - Boyuk-Kesik (exp.), Azerbaijan	680,0	3072,68*AZN*	1735,16*ChF*
4	st.Gardabani (exp.) - the port of Poti, Georgia	360,0	989,90*$*	950,30*ChF*
5	*Port of Poti (Georgia) - Port of Odessa (Ukraine)*	*1040,0*	-	*685,0ChF*
6	st. Odessa - st.Yagodin, Ukraine	932,0	21074,0*UAH*	775,54*ChF*
7	st.Dorohusk (PKP) - st.Kostrzyn (exp.), Poland	744,0	1026,0*ChF*	1026,0*ChF*
	The length of the intermodal route	6626,0 *км*	-	7198,69*ChF*
	The length of sea route	1040,0*км*	-	*685,0ChF*
	The length of multimodal route	7666,0*км*	-	7883,69*ChF*

The transportation charge according to the door-to-door haul scheme, the route st.Astana (Kazakhstan) - st.Kostrzyn (Poland) is determined by the method of the Single Transit Tariff (STT). The essence of this technique is that the tariff distance (6626.0 km), 2 tariff class of the cargo being transported, we determine the tariff rate for 1 ton of cargo transported. In this case, the specific tariff rate is 154.40ChF. To determine the freight charge for the wagon rate, you need to multiply the specific tariff rate by the weight of the cargo in the grain carrier, then:

$$154,40*60,0=9264,0ChF$$

Расстояние в км	Плата за 1 тонну в швейцарских франках		Плата с оси в швейцарских франках	Расстояние в км
4550-8000	к л а с с ы			4550-8000
	1	2	3	
6050-6200	282,20	141,20	302,34	6050-6200
6201-6400	290,30	145,20	310,98	6201-6400
6401-6600	299,60	149,70	320,85	6401-6600
6601-6800	308,70	154,40	330,71	6601-6800
6801-7000	318,00	158,90	340,59	6801-7000

Table 2. Comparison of the freight charges on the route st.Astana - st.Kostrzyn, ChF

№ п/п	Destinationstations	Tariffdistance, km	Freightcharge, *ChF*	
			according to the scheme with a tariff fracture	the door-to door haul scheme
1	st. Astana- st. Dina Nurpeisova, Kazakhstan	2122,0	864,87	-
2	st.Kigash - st.Samur, Russia	748,0	1846,82	-
3	st.Yalama (exp.), - Boyuk-Kesik (exp.), Azerbaijan	680,0	1735,16	-
4	st.Gardabani (exp.) - the port of Poti,	360,0	950,30	-

№				
	Georgia			
5	*Port of Poti (Georgia) - Port of Odessa (Ukraine)*	*1040,0*	*685,0*	
6	st. Odessa - st.Yagodin, Ukraine	932,0	775,54	-
7	st.Dorohusk (PKP) - st.Kostrzyn (exp.), Poland	744,0	1026,0	-
8	Astana-st.Kostrzyn, the door-to- door haul scheme		-	-
	The length of the intermodal route	6626,0km	7198,69ChF	9264,0ChF
	The length of sea route	1040,0km	685,0ChF	685,0ChF
	The length of multimodal route	**7666,0km**	**7883,69ChF**	**9949,0ChF**

5. Conclusion:

Income to the budget when using the technique of the door-to- door haul scheme is **2065,31ChF**. Let's present the obtained data of the freight charge in the supranational currency EvroNur. The exchange rate of a supranational currency is equal to the euro. At the moment, the ratio between the Swiss franc and the euro is **1ChF = 0,87 EUR** (Table 3). The course of the supranational currency €^N is chosen equal to the rate of the European currency **EuroNur**. Then we get the following results (Table 3).

Table 3. Comparison of the freight charges along the route st.Astana - the port of Poti, €^N

№ п/п	Destinationstations	Tariffdistance, km	Freightcharge, €^N	
			according to the scheme with a tariff fracture	the door-to door haul scheme
1	st. Astana- st. Dina Nurpeisova, Kazakhstan	2122,0	752,4369	-
2	st.Kigash - st.Samur, Russia	748,0	1606,733	-
3	st.Yalama (exp.), - Boyuk-Kesik (exp.), Azerbaijan	680,0	1509,589	-
4	st.Gardabani (exp.) - the port of Poti, Georgia	360,0	826,761	-
5	*Port of Poti (Georgia) - Port of Odessa (Ukraine)*	*1040,0*	*595,95*	
6	st. Odessa - st.Yagodin, Ukraine	932,0	674,72	-
7	st.Dorohusk (PKP) - st.Kostrzyn (exp.), Poland	744,0	1026,0	-
8	Astana-st.Kostrzyn, the door-to-door haul scheme		-	-
	The length of the intermodal route	6626,0km	6262,86	8059,68
	The length of sea route	1040,0km	595,95	595,95
	The length of multimodal route	**7666,0km**	**6858,81**	**8655,63**

The economic effect of the introduction of the door-to- door haul technique in determining the freight charges along the route st.The port of Poti will cost 1796,82 €^N per wagon (wheat). The indicated route is laid on the railways of the countries of the participants (Republic of Kazakhstan, Russian Federation, Republic of Azerbaijan, Republic of Georgia) of intermodal communication. In the port of Poti, cargo is reloaded to sea transport with the assignment to the port of Odessa (Ukraine), as well as the ports of Bulgaria, Romania. In terms of one million tons of cargo transported it will be:

$$16666,667*2065,31= 34\ 421\ 819,564\ ChF$$
$$16666,667*1796,82=29\ 946\ 988,021\ \text{€}^N$$

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