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JEL Classification: L20, L92, O22

LOGISTICS DIAGRAM PROJECTING IN INTER-MODULAR TRANSPORTATION OF St. Brest (Belarusian Railways) – St. Lianyungang (Chinese railways)

Kuanyshbaev Zhaken Myngyrbaevich[1], Ossik Yuriy Ivanovich[2], Nestay Yldos[3]
[1] Professor, Doctor of Engineering, [3] Student
ENU named after L. N. Gumilyov (Astana), Kazakhstan
[2] Karaganda State Technical University (Karaganda), Kazakhstan

In article considered problem, connected with definition freight charge for transportation mass loads on railway transport. In article presented calculations of freight charge in intermodal transport system including Belarus, Russian Federation, Republic of Kazakhstan and People's Republic of China. Presented the technique of definition freight charge with tariff fracture and through shoulder scheme using program products Rail-Atlas, Rail-Tarif. Exhibited the economic efficiency of inculcation of definition freight charge on scheme of through shoulder.

Keywords: station of departure, station of destination, route, freight charge, scheme with tariff fracture, the scheme with through shoulder, national currency, swiss franc.

The transport logistics is the system of organization of delivery, specifically transference of some material objects, substances and other things from the one point to another in optimal route.

The aim of the article is to consider the problem, connected with definition freight charge for transportation mass loads on railway transport.

The route:

st. Brest-northern – st. Osinovka – st. Krasnoe – st. Kartaly I– st. Tobol – st. Dostyk– st. Alashankou – st. Lianyungang (Fig. 1).

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The consignor (enterprise) – JSC «Daimler AG»
Destination – Lianyungang
Name of freight – cars
Freight code by ETSNG: 381087
Freight code by GNG: 87039000
Station of departure – Brest (Belarus)
Station of destination – Lianyungang, Chinese railway (P.R.C.)
Border station – Osinovka (Belarusian Railway)
Border station – Krasnoe (Russian Railway)
Border station – Kartaly I (Russian Railway)
Border station – Tobol (Kazakhstan Railway)
Border station – Dostyk (Kazakhstan Railway)
Border station – Alashankou (Chinese Railway)
Shipping: container load

Fig. 1. **The general scheme of route st. Brest – st. Lianyungang**

On this route we create the guide:
Across Belarus: Brest-Northern [26] – Zhabinka [91] – Bronna Gora [85] – Baranovichi-Central [132] – Pomislishche [6] – Minsk-Sorting [21] – Kolodishchi [22] – Smolevichi [173] – Orsha-Central [48] – Osinovka.
Across Russia: Krasnoe [71] – Smolenk [17] – Duhovskaya [85] – Saphonovo [9] – Durovo [65] – Vyazmya [180] – Kubinka [26] – Bekasovo I [51] – Sandorovo-Mikhnevo [16] – Zhilevo [21] – Kashirovo-Passengers [9] – Ojerelie [39] – Uzunovo [69] – Ribnoe [17] – Riyazan I [25] –

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Listvyanka [25]– Perevles [70]– Ushinski [80]– Kustarevka [204]– Ruzaevka [111]– Inza [161]– Uliyanovsk-Central [7]– Uliyanovsk II [10]– Top Terrace [118]-Amirovka (passing track) [213]– Akbash [85]– Urussu [150]– Chishmi [37]– Dema [49]– Karlaman[154]– Yusha(passing track) [51]– Beloreck [98]– Passing track № 22 [149]– Kartaly I.

Across Kazakhstan: Aksu (obgonny point) [105]– Tobol[288]– Esil [376]– Astana [12]– Sorokovaya [83]– Anar [114]– Kokpekty [9]– Karaganda-Sorting [53]– Karabas [91]– Zharyk [215]– Moyunty [338]– Sayak [186]– Aktogay [309]– Dostyk.

Across China: Alashankou – Urumqi – Be rude – Jiayuguan – Uvey – Lanzhou – Tianshui – Baoji – Sinyan – Xian – Huashan – Luoyang – Zhengzhou – Kaifeng – Shantsyu – Xuzhou – Lianyungang.

The total length of guide has composed 9437 km, including: 622 km – across Belarus; 2550 km – across Russia; 2188 km – across Kazakhstan; 4077 km – across China.

The definition of freight charge by using scheme with tariff fracture and the scheme of through shoulder. The tariffs – system of payment for transport services. Tariffs create transport profit, in addition rendering documentary services show up consumers' transport spendings. Guided to program the Rail – tariff in dependence from transportation length we determine freight charge for transportation of freight according to above route.

The total length: 9437 km

Table 1. **The fare for the carriage of goods and containers along the route Brest-Dostyk**

Country	Length	Freight charge	Security	Additional charges	Total without VAT	VAT	Total	Currency
Belarus	622 (TP4 606)	25374980,00	0	0	25374980,00	0	25374980,00	BYR
	622	**25374980,00**	**0**	**0**	**25374980,00**	**0**	**25374980,00**	**BYR**
Russia	2550 (TP4 2550)	475100,77	25780,00	1959,97	502840,74	4640,40	507481,14	RUB
	2550	**475100,77**	**25780,00**	**1959,97**	**502840,74**	**4640,40**	**507481,14**	**RUB**
Kazakhstan	2188 (TP4 2188)	1768506,67	0	8199,44	1776706,11	983,93	1777690,04	KZT
	2188	**1768506,67**	**0**	**8199,44**	**1776706,11**	**983,93**	**1777690,04**	**KZT**

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Across Belarus (622 km):

Table 2. **Determination of freight charge on railways of Republic Belarus**

Description	Value	Currency
4 days – 622 km. (200 km/day)		BYR
1 day – preparative.		BYR
Total. Time of delivery 5 days.		BYR
Csheme Б77– Transportation of general-purpose container park	6590904,00	BYR
0,77 The coefficient for the transportation of loaded containers (40 and 45 ft) on railway platforms.	5074996,08	BYR
Total	5074996,00	BYR
The sum of all containers	25374980,00	BYR
Total: Freight charge	25374980,00	BYR
Transportation cost excluding VAT	25374980,00	BYR
VAT	0,00	BYR
Transportation cost	25374980,00	BYR

Across Russia (2550 km):

Table 3. **Determination of freight charge on railways of Russian Federation**

Description	Value	Currency
13 days – 2550 km. (200 km/day)		CHF
Total. Time of delivery 13 days.		CHF
Freight containers	3991,00	CHF
Bet on the distance 2550 km, taking into account the coefficient for a distance of more than 150 km [497,000000+(3991,000000-497,000000)*0,350=1719,90000]		CHF
2271,10 Discount for a distance of over 150 km	1719,90	CHF
The base rate TA	1720,00	CHF
1,15 The index for the transportation of containers in the total fleet of cars	1978,00	CHF
Total	1978,00	CHF
The sum of all containers	9890,00	CHF
Total: Freight charge	9890,00	CHF
Conversion rate: CHF/RUB=48.03850		
The value in the currency of the user	475100,77	RUB
Contractual fee for replacement maintenance and protection	5156,00	RUB
The sum of all containers	25780,00	RUB
Total: Security	25780,00	RUB
18,00 VAT %	4640,40	RUB

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Across Kazakhstan (2188 km):

Table 4. **Determination of freight charge on railways of Republic Kazakhstan**

Description	Value	Currency
11 days – 2188 km. (200 km/day)		
Total. Time of delivery 11 days.		
Freight containers	3865,00	CHF
Bet on the distance 2188 km, taking into account the coefficient for a distance of more than 150 km [497,000000+(3865,000000-497,000000)*0,350=1675,80000]		
2189,20 Discount for a distance of over 150 km	1675,80	
The base rate TA	1676,00	CHF
1,05 Odds for transportation of goods in containers and empty containers of its own.	1759,80	CHF
Total	1760,00	CHF
The sum of all containers	8800,00	CHF
Total: Freight charge	8800,00	CHF
Conversion rate: CHF/USD=1/0,90000 USD/KZT=180,87000		
The value in the currency of the user	1768506,67	KZT
The fee for customs clearance of goods carried	8,16	
The sum of all containers	40,80	
Total	40,80	
Conversion rate: CHF/USD=1/0,90000 USD/KZT=180,87000		
The value in the currency of the user	8199,44	KZT
12,00 VAT %	983,93	KZT

Across China (4077 km):

Due to the lack of data on tariffs on the Chinese railroad, we count a carrying payment according to the Contract on the Single transit tariff. As the People's Republic of China is the member of Agreement about the international railway freight traffic (SMGS):

Number of 40-foot containers: 5;

Transit distance along Alashankou – Lianyungang route – 4077 km;

Carrying payment for one 40 foot loaded container according to Single transit tariff on distance from 4050 km to 4149 km: 5668 CHF

Proceeding from it, we receive:

$$C = S*N = 5 \times 5668 \text{ CHF} = 28340 \text{ CHF}$$

Where: S – a carrying payment for one 40-foot container, according to Single transit tariff, on the specified distance; N – number of containers.

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Apparently from pictures of Belarus freight charge compounds: T_{BYR} = **25374980,00 BYR**, Russia T_R = **507481,14 RUB,** Kazakhstan T_{kz} = **1777690,04 KZ,** China T_{chf}= **28340 CHF**.

Table 5. **Results of calculations on definition of freight charge on to scheme with tariff fracture**

Route	Country	Length, km	Freight charge	Swiss franc
1.Brest-Northern - Osinovka	Belarus	622	25374980,00 BYR	2266,36 CHF
2.Krasnoe – Kartaly I	Russia	2550	507481,14 RUB	10572,52 CHF
3. Tobol – Dostyk	Kazakhstan	2188	1777690,04 KZ	9477,47 CHF
4. Alashankou – Lianyungang	China	4077	28340 CHF	28340 CHF
Summary		∑9437		∑50656,35 CHF

The datum from table 1 transfer in united currency:

$$\frac{25374980,00}{11196,35} = 2266,36 \text{ CHF}; \frac{507481,14}{48} = 10572,52 \text{ CHF}; \frac{1777690,04}{187,57} = 9477,47 \text{ CHF}$$

For the calculation of general cost on each route we sum values:

$$T_t= 2266,36+10572,52+9477,47+28340 = 50656,35 \text{ CHF}$$

Carrying payment according to the scheme of a through shoulder (according to data of Single transit tariff (SMGS)

Transit distances of the Belarusian railroad (distance between border stations completely state borders in km): Brest-northern – Osinovka of-622 km;

Transit distances of the Russian railroad (distance between border stations completely state borders in km): Krasnoe – Kartaly I – 2550 km;

Transit distances of the Kazakhstan railroad (distance between border stations completely state borders in km): Tobol – Dostyk – 2188 km;

Transit distances of the Kazakhstan railroad (distance between border stations completely state borders in km): Alashankou – Lianyungang – 4077 km.

Total: the transit distance according to STT is equal – 9437 km.

As The Republic of Belarus, The Russian Federation, The Republic of Kazakhstan, The People's Republic of China are members of the Agreement on the

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international railway freight traffic (SMGS) on all of territories of these countries the tariffs works, which established by the Contract on STT.

Number of 40-foot containers: 5;

Transit distance along a route Brest – Lianyungang – 9437 km;

Carrying payment for one 40 foot loaded container according to STT on distance from 9401 km to 9600 km: 13132 CHF

Proceeding from it, we receive:

C = S*N = 5x13132 CHF = 65660 CHF,

Where:

S – carrying payment for one 40 foot container, according to STT, on the specified distance;

N – number of containers.

Obtained the results of calculations on definition of freight charge on to scheme with tariff fracture and on the scheme of through shoulder presented in Table 6.

Table 6. **Comparative results of calculations on definition of freight charge on to scheme with tariff fracture and on the scheme of through shoulder**

Name of the route	Freight charge		Economic efficiency
	By scheme with tariff fracture	By through shoulder scheme	
1.Brest-Northern - Osinovka	2266,36 CHF		
2.Krasnoe – Kartaly I	10572,52 CHF		
3. Tobol – Dostyk	9477,47 CHF		
4. Alashankou – Lianyungang	28340 CHF		
Summary	∑50656,35 CHF	65660 CHF	**15003,65 CHF**

The freight charge of scheme with tariff fracture from station Brest to the station Lianyungang is 50656,35 CHF; on the scheme of through shoulder freight charge is 65660 CHF. Then economical effect according of scheme with tariff fracture will be 15003,65 CHF.

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