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Issue Article

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ANALYSIS OF INVESTMENT POSSIBILITIES OF INTERMODAL TRANSPORTATION AND TERMINAL IN GEORGIA

Abstract: *The article presents the presentation of the model of new service, intermodal, contrarail shipments in the railway transport system of Georgia. Determination of its value in the railway system of Georgia. The current condition of railway stations and terminals is discussed in the study. Modern technologies of counter-rail transportation for the railway sector of Georgia have been evaluated. The article identifies investment opportunities: through the reconstruction of existing stations and terminals and the construction of a new terminal. Economic analysis makes it possible to make informed and conscious decisions when launching a new sustainable mode of transport. The obstacles considered in the research can become a hindrance in the implementation of contrarail shipments. Such as tunnels, the strength of curves and tracks, volume.*

The study takes into account international standards, including the "International Agreement on Rail Freight Traffic" and "Technical Conditions for Cargo Placement and Fastening". The research helps launch sustainable shipping.

Key words: *Intermodal shipments, type of ized shipment, railway.*

Language: *English*

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Introduction

The main task of the railway transport of Georgia was to fully and timely satisfy the needs of the country's economy and population in transportation. The current state of the market and national economy, which is characterized by an imbalance in the financial system, with a decrease in production and investment in basic industries, together with the previous goal, requires the provision of transportation services and a fundamentally new, competitive transportation service to customers. Over the last decades, the share of intermodal shipments in the transport system of Georgia has increased significantly. Be it, sea, vehicle or truck types of transportation.

It is important for the economy of Georgia to develop the transportation of counter-trailers as a green, ecological type of transport, since the mentioned model will allow the transport market to more fully adapt to the new global system of supplying goods and services. Multimodal transport has the ability to flexibly respond to changes in market conditions.

In general, just like any activity, transport activities related to innovation and its implementation necessarily require improvement of organizational mechanisms and capital investment, for this, it is necessary to make a comprehensive economic assessment, to develop special approaches, especially if the market conditions are highly competitive.

Main part

Contrailer transportation is a type of intermodal transportation where a loaded trailer or trailer/body (empty or loaded) is placed in a specially equipped station by means of a transfer platform on railway tracks, where it continues its way through the railway to the destination station, and the further journey is completed by land vehicle. Both qualitative and quantitative methods of technology have been used to assess the feasibility of such shipments. For this purpose, we identified 3 main tested criteria: technical, technological and economic.

In the technical criteria, we discussed the technical parameters of the load units of the rolling stock and selected a vehicle with acceptable parameters for the rolling stock of the Georgian Railway train.

The technological criteria include the parameters of the horizontal load terminal processing equipment for 4 models (Modalohr, Cargobeamer, Megaswing, Cargospeed) and the economic criteria determine the average investment equipment cost for the selected stations and terminals.

Qualitative methods are used:

Literary works, information and reports, analysis describing the transport market of the region.

Due to its geographical location, Georgia is in a complex terrain transport system, among which railway transport is no exception, and therefore, when transporting large cargoes, we take into account the capacity and volumes of tunnels, curves and tracks. Cargo size is a particularly sensitive issue for contrailerized shipments. The "International Agreement on Railway Freight Traffic" (SMGS) was developed by the Railway Cooperation Organization OSJD, including for countries that must meet zonal requirements in terms of gauges. That's why the "Technical Conditions for Cargo Placement and Fixing" have been developed, according to which the 12th chapter of the first volume is devoted to the loading conditions of countrailer truck shipments and it is established that for contrailer shipments, it is necessary to take into account 2 important parameters, the height and width of the loaded cargo, the maximum data of which is height 5 3 m, and the width - 3.4 m [1].

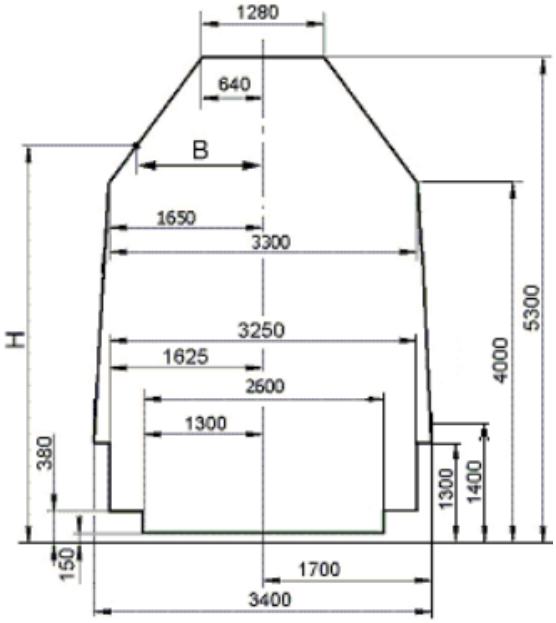


Fig. 1. Cross-section of train

To calculate the area of each module for research, we also need the parameters of the semi-trailers themselves, which means the length and width of the semi-trailers, and we also take into account the weight of the load to determine the number of components and the height depending on the requirements of complex terrain (tunnels, bridges, curves). The data of the wagons also differ according to the models, so we take the maximum lengths of the mentioned wagons, taking into account the length of the semi-trailers. for example; The maximum weight of the trailer for the Modulohr module is 13.7 m; For Cargobeamer - 14.2 m; 16.3 m for Cargospeed and 14.7 m for Megaswing. As for the height, the height of the semi-trailers starts from 2.3 m and the maximum is 4 meters, although in the main form there are trailers with a height of 2.7 m. Which requires the presence of appropriate drawings on the road of

Georgia due to the difficult terrain to determine the dimensions of the cargo [2,3,4].

The given table discusses the maximum capacities of the trailer trailer and the train according to the length and weight of the train:

Table 1.
System-specific options for weight and length

	Modalohr	Megaswing	CargoBeamer	Cargospeed
module width	57	20	21.4	60
Maximum length of car trailer	13.7	10.2	14.2	16.3
Maximum trailer weight (t)	38	48	47	38.5
Wagon Tare (t)	40.7	28.1	31	24
Wagon tare on 1 trailer (t/Lu)t)	20.35	14.05	31	24
The length of the carriage	32.94	21.50	19.3	18.2

Based on the parameters of individual stations, the number of carriages in the train was calculated.

Table 2.
Number of carriages on the train

Depending on the length of the loading dock

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
The length of the loading front	190	420	390	610	750
Modalohr	5	12	11	18	22
Megaswing	8	19	18	28	22
CargoBeamer	9	21	20	31	38
Cargospeed	10	23	21	33	41

According to individual parameters, the number of car trailers at stations according to the maximum length of one train composition, which is given in the form of a table.

Table 3.

Number of car trailers by length (m)

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
Modalohr	10	24	21	36	44
Megaswing	16	38	36	56	42
CargoBeamer	9	21	20	31	38
Cargospeed	20	46	42	66	41

The area required for each module of the loading-unloading operation was calculated by multiplying the length and width of the module composition in m^2.

Table 4.

The required area for the module according to the stations

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
Modalohr	1083.0	997.5	1058.6	965.8	971.6
Megaswing	237.5	221.1	216.7	217.9	357.1
CargoBeamer	452	428	417	421	422
Cargospeed	570	548	557	555	1098

The area required for the module according to the stations, the possibility of performing parallel operations according to the modules, which requires the presence of several similar technologies at the terminal and their number, when the wagon is loaded with this technology, should be taken into account. Besides Megaswing, other modules require the presence of a special similar technology terminal at the point of destination, and Megaswing with its independent system does not require the presence of an automated system at the receiving point. Therefore, other than Megaswing, the terminal arrangement model needs at least 2 terminal systems to function [5].

The investment costs of the considered technical options are studied from the literature and calculated in EURxm^2. The costs are calculated for the creation of the manipulation zone and according to the modules.

Table 5.

Technology investment costs in stations:

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
Modalohr	2,610,030	5,769,540	5,357,430	8,379,570	10,302,750
Megaswing	915,800	2,024,400	1,879,800	2,940,200	3,615,000
CargoBeamer	4,125,000	9,625,000	9,166,667	14,208,333	17,416,667
Cargospeed	2,747,400	6,073,200	5,639,400	8,820,600	10,845,000

It should be noted that there are risks associated with the cash flow forecast, so we make a 15-year forecast, taking into account the operational period of the new equipment. Among the above-mentioned horizontal loading technologies, the Megaswing module receives the most value for the Poti and Ankli

stations, since it contrails less capital costs, and does not require the reconstruction of the stations. It has parametric indicators that meet the technical manufacturing difficulties and as a result of the calculation has the highest current monetary value compared to other technologies.

We use the weighted average cost of capital (WACC) to calculate today's cash flows [6].

To calculate the WACC, we consider the following factors:

1. Cost of capital (KE) in dollars at 14.16% by the formula:

$$Rf + \beta lev * EMRP + CRP + SRP \quad (1)$$

where Rf is the risk-free rate;

βlev is beta and defines industry-specific risk;

EMRP- is market risk;

CRP- is country risk;

SRP- is additional size risk;

2. The cost of the loan in the form of monetary obligations Kd(at) 5.78% with the formula:

$$Kd(pt) * (1 - T) \quad (2)$$

where Kd(pt) is the value of borrowed capital for the day of analysis, taking into account railway bonds;

T-Income tax rate, according to the Tax Code.

To calculate the WACC of the weighted cost itself as 12.43%, we use the following formula:

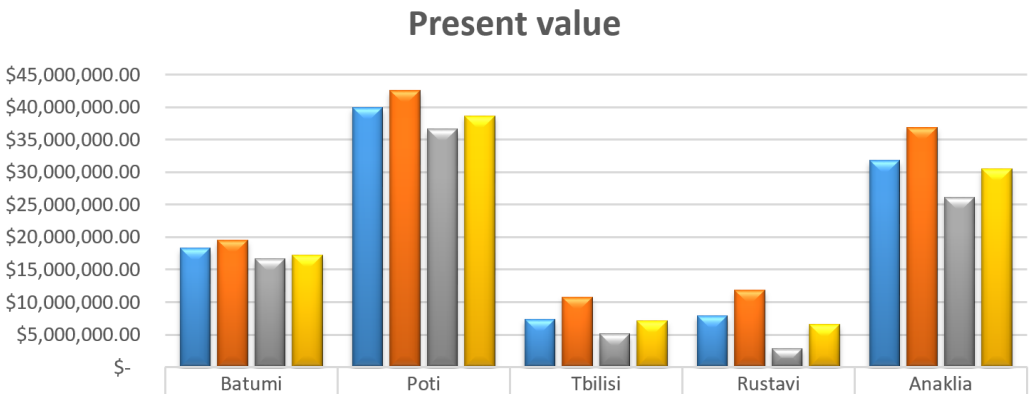
$$Ke * We + Kd(at) * Wd \quad (3)$$

where Ke is the cost of capital;

We- is the equity share;

Kd(at) – is the cost of borrowed capital;

Wd - loan share.



	Batumi	Poti	Tbilisi	Rustavi	Anaklia
Modalohr	$18,326,587.69	$39,976,633.39	$7,398,602.45	$7,919,504.01	$31,846,117.89
Megaswing	$19,525,263.85	$42,611,358.10	$10,818,295.34	$11,855,402.30	$36,878,428.80
CargoBeamer	$16,682,161.37	$36,657,769.92	$5,115,305.26	$2,884,165.33	$26,149,201.99
Cargospeed	$17,247,696.11	$38,695,192.22	$7,092,817.68	$6,547,485.93	$30,500,262.80

Current value of the terminal module

Fig. 2.

CONCLUSION

In modern conditions, when transportation has to undergo significant changes with the transition to green technologies, thereby reducing 90% of greenhouse gases, a sustainable and intelligent mobility is required, which requires conclusions based on facts and research, which may be associated with high investments to counterbalance its social importance.

Taking into account the international standards and the parameters of the stations, the areas of the manipulation modules of the contrarail shipments and their investment value were calculated.

Our goal was to describe, compare and evaluate the presented modern technologies based on the operational and technological analysis for the implementation of counter-trailer transportation in terms of space and investment costs of the transportation facility. Each implemented technology is a unique complex with its own advantages and disadvantages, such as scale, flexibility, processing time and costs. The study highlighted 2 investment opportunities, when the development of terminal operations is possible by completing the infrastructure of existing terminals, i.e. reconstruction, and the second option, when the construction of a new terminal is required, for example, in case of a potential breakdown.

As a result of the study, it was revealed that the Kargobeamer and Megaswing systems are wagon-based technologies that require minor modifications to the terminal infrastructure for Batumi, Poti, Tbilisi Sakvandzo and Rustvai stations, while the Anaklia station requires construction.

On the basis of the economic analysis, we concluded that the cost of the mentioned project for Poti and Anakli with a horizontal load module for Megaswing is valuable and gives the basis for

equipping the terminals for the mentioned stations to carry out counter-trailer shipments.

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