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QUESTIONS ON OPTIMIZATION OF TRUNK MAIL TRANSPORTATION

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The questions of optimization of the number and total length of trunk mail postal routes and grounded optimized schemes of trunk mail transportation have been considered.

Key words: postal communications, trunk mail transportation, postal establishments, letter-post.

Розглянуто питання оптимізації кількості та загальної довжини магістральних поштових маршрутів і наземних оптимізованих схем магістралей поштових перевезень.

Ключові слова: поштовий зв'язок, магістральне перевезення пошти, поштові організації, письмова кореспонденція.

Introduction

The purpose of postal communications appears to dramatically reduce of costs on the postal network functioning, to enhance the quality of postal services, to improve the competitiveness of the national postal operator of Ukraine.

One of the main directions of development of technical and technological post infrastructure is to reduce the costs of handling and transportation of mail by the creation one or more sorting postal establishments (PE) in which there are concentrated large postal flows and provided prerequisites of implementation of automatic mail processing and efficient use of vehicles for mail transportation [1].

The basis of postal network functioning is trunk transportations. Since the trunk mail transportation are carried out between sorting PE, optimization of the number and location of sorting PE is primary, and optimization of trunk mail transportation scheme is on secondary priority. It is necessary to determine the number and location of sorting PE in order to optimize trunk mail transportation.

By resolving this logistics problem it should simultaneously take into account the number of handling mail locations, the number and length of routes.

Trunk postal network is one of the main parts of a single postal network of Ukraine, which provides a steady and regular postal communications of main hub (Kyiv) with all regional centers and via regional centers.

The main bulk of postal items is transported on trunk postal routes (almost all periodicals, most of the parcels, and also the bulk of international postal items). Therefore, the rational organization of the trunk postal communications affects on organization of postal communications in general, the quality and efficiency of its work.

Today, letter post (LP) sorting holds in each region of Ukraine, objects for sorting are 25, that use 37 postal routes (except routes for express mail, international routes) accordingly.

To reduce the costs of mail processing, Science research centre "Index" of O. S. Popov ONAT was proposed to enhance regional sorting centers (RSC) with manual sorting of LP on the basis of existing PE

[1]. It will reduce the number of sorting postal establishments in which it is performed sorting of LP to post offices, and will lead to decrease of costs.

It is recommended a few accommodation options for locations of sorting postal establishments, namely with 9 RSC, 4 RSC, 1 MSC. Sorting centers are organized in the major centers of the country, and interconnected by main road routes through Kyiv.

Trunk mail transportation structure

Trunk mail transportation scheme between 25 regional centers has the same right to exist as transportation schemes in the network of 9 RSC, 4 RSC or 1 MSC [2]. In order to improve these schemes it needs to allocate part from existing mail transportation scheme associated with LP transportation [3].

The existing trunk mail transportation scheme has four groups of postal routes [4]-[6]:

- Routes that connect regional centers with the main sorting center (MSC) in Kyiv;
- Routes that connect regional centers of the RSC, for which they are fixed;
- Routes that connect the RSC among themselves;
- Routes that connect some regional centers to each other directly.

Obviously, the existing trunk mail transportation scheme is too excessive. From it, for example, it can be removed all routes of the second, third and fourth groups.

Consider the trunk mail transportation schemes for the proposed options for RSC creation. Although the existing scheme is not given it is sufficient and includes routes of four complicated groups.

In Fig. 1, it is shown the trunk mail transportation scheme in the post network with 9 RSC, for which it is fixed other group areas.

Regional centers are interconnected among themselves by regional routes, and RSC with each other via the main center – Kyiv, by trunk routes. LP sorting is in the regional sorting centers, and exchange carries in Kyiv.

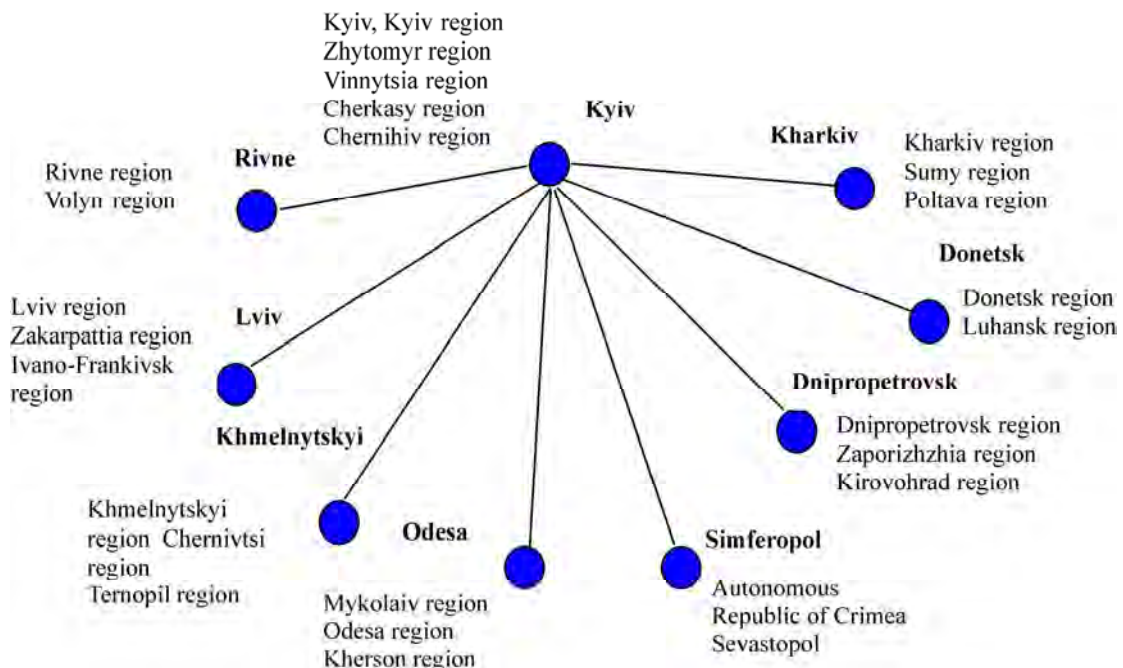


Fig. 1. Trunk mail transportation scheme in the post network with 9 RSC

Optimized trunk mail transportation scheme provides centralized LP sorting of the indicated regions, according to a new optimized transportation network. Existing routes replaced by eight interregional routes: Kharkiv – Kyiv – Kharkiv, Donetsk – Kyiv – Donetsk, Dnipropetrovsk – Kyiv – Dnipropetrovsk, Simferopol – Kyiv – Simferopol, Odesa – Kyiv – Odesa, Khmelnytskyi – Kyiv – Khmelnytskyi, Lviv – Kyiv – Lviv, Rivne – Kyiv – Rivne and 17 regional: Chernivtsi – Kyiv – Chernihiv, Cherkasy – Kyiv – Cherkassy, Vinnytsia – Kyiv – Vinnytsia, Zhitomyr – Kyiv – Zhytomyr, Sumy – Kyiv – Sumy, Poltava –

Kharkiv – Poltava, Lugansk – Donetsk – Lugansk; Zaporozhye – Dnepropetrovsk – Zaporozhye, Kirovograd – Dnepropetrovsk – Kirovograd, Kherson – Odesa – Kherson, Nikolaev – Odessa – Nikolaev, Ternopol – Khmelnytskyi – Ternopil, Chernivtsi – Khmelnytskyi – Chernivtsi, Ivano-Frankivsk – Lviv – Ivano-Frankivsk, Uzhgorod – Lviv – Uzhgorod, Lutsk – Rivne – Lutsk.

The showed post network has 8 main postal routes with the total length 4236 km. and 17 regional postal routes with the total length 2762 km. Time for mail processing and transportation of offered post network with 9 RSC meets the requirements of the Ministry of Transport and Communications of Ukraine of 12 December 2007, N 1149 "On establishing regulatory deadlines for mail forwarding and postal orders". The number and total length of the main postal routes are reduced with the help of removing all postal routes that connect with MSC 16 regional hubs assigned to RSC.

Fig. 2 shows trunk mail transportation scheme in the post network with 4 RSC.

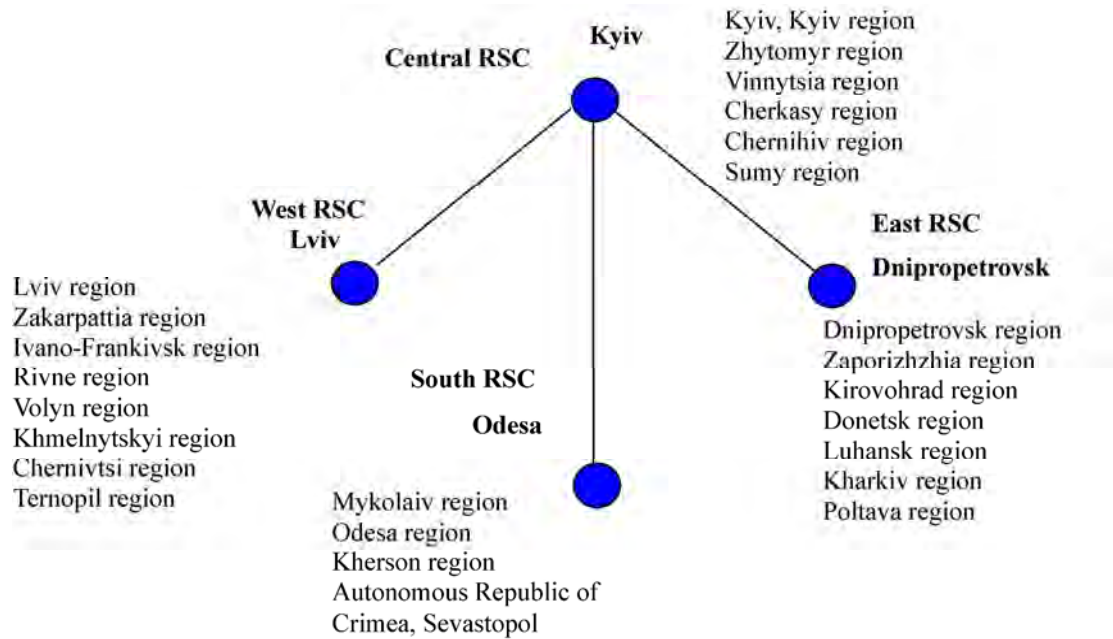


Fig. 2. Trunk mail transportation scheme in the post network with 4 RSC

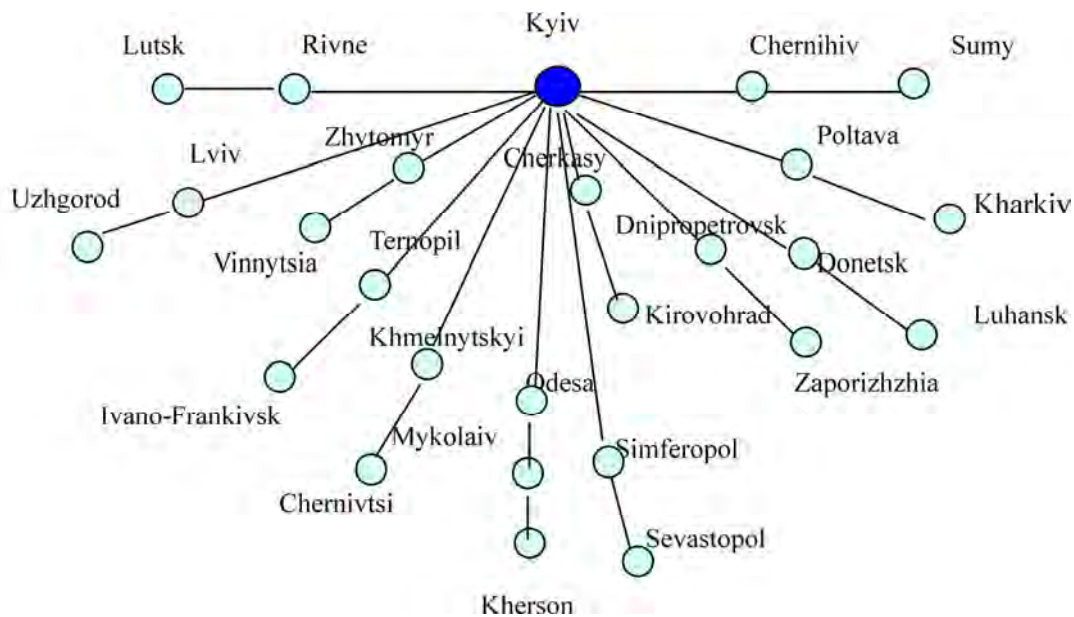


Fig. 3. Trunk mail transportation scheme in the post network with MSC

The showed post network with 4 RSC conventionally divided into Central RSC, South RSC, West RSC, East RSC and contains 3 trunk mail routes with the total length 1496 km. and 21 regional postal routes with the total length 4792 km.

Fig. 3 shows trunk mail transportation scheme in the post network with a single main sorting center in Kyiv. Sorting and LP exchange performs in Kyiv.

The mail transportation scheme with one sorting center has 12 trunk mail routes, the total length of which is 6965km., but regional postal routes are lacking.

According to this mail transportation scheme it is realized the cancellation of all postal routes connecting with the zonal hubs among themselves and with their assigned regional hubs.

It should be noted that the trunk mail transportation scheme with MSC coincides with the existing mail transportation scheme. The difference lies only in the fact that the existing scheme of LP processing carries in sorting PE of regional centers, and only in MSC it is performed exchange of LP packages coming from the regional centers, while in the network from MSC it is perform LP sorting coming from the regional centers.

As a result of this association of postal routes in the trunk transportation scheme with MSC it may not be possible, while in the scheme with 25 sorting PE it may be.

Table shows the comparative analysis of trunk mail transportation schemes. In order to correct comparison of the mail transportation schemes in the scheme with 25 RSC, all postal routes of the 2, 3, 4 groups were removed.

A comparative analysis of the trunk mail transportation scheme

INDICATORS	Number of RSC			
	25	9	4	1
Number of the trunk mail transportation, ps.	12	8	3	12
Net length of trunk mail transportation routes, km.	6965	4236	1496	6965
Number of regional postal routes, ps.	-	17	22	-
Net length of regional postal routes, km.	-	2762	4792	-
Total number of the trunk and regional postal routes, ps.	12	25	25	12
Total net length of trunk and regional postal routes, km.	6965	6998	6288	6965

If we have n RSC, the number of trunk routes that connect with each other through the RSC via MSC in Kyiv, comprises $n-1$, and the number of regional routes that connect regional centers with RSC, comprises $26-n$, so the total number of main and regional postal routes is $n-1 + 26 - n = 25$, regardless the number of regional PE. (Having 26 regional centers of any graph-tree contains 25 edges, i.e., postal routes). With the increase of the n value the number of regional postal routes also is reduced per unit. Including this, the total length of regional postal routes is reduced not only by reducing the number of regional postal routes, but also by fixing regional centers closer to RSC.

Due to the analysis of mail transportation schemes for the considered options of RSC creating it can be concluded that the total number and net length of the trunk postal routes significantly depend on the number and locations of sorting PE in Ukraine.

Conclusions

1. It was installed substantial sufficiently differing of the existing trunk mail transportation scheme.
2. It was considered optimized trunk mail transportation schemes, in which the number and net length of the postal routes are significantly reduced.

3. It was established that after the extracting of additional postal routes, the existing trunk mail transportation scheme (sorting is effected in 26 regional hubs, exchange is realized in Kyiv) coincides with the optimized trunk mail transportation scheme (sorting is realized in Kyiv).

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POLARITY LEXICON DEVELOPMENT FOR SENTIMENT ANALYSIS

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This paper describes a method for building sentiment lexicon for Ukrainian.

Key words: sentiment analysis, lexicon generation, polarity lexicon, polarity of words.

Описано створення тонального словника української мови.

Ключові слова: емоційно-смісловий аналіз, генерація словника, лексикон полярності, полярні слова.

1. Introduction

With the increasing amount of opinionated resources available on the Web (e.g. blogs, forums), sentiment analysis has recently received a lot of attention.

Sentiment Analysis concerns with the opinion an author of a document expresses. The problem of sentiment analysis includes several tasks. Among other things, it has to be investigated whether a document or sentence is subjective or objective and identify the expressed opinion as positive or negative. Furthermore, the strength of the expressed opinion and the target of an opinion have to be found out. Due to the richness of human language, its large expressiveness and ambiguities the problem of sentiment classification is nontrivial.

Most of the approaches include advanced tools like POS-taggers, N-grams, MPQA corpus and rich lexical resources such as General Inquirer [9] and WordNet [7]. Sentiment analysis has been mostly focused on the English language, therefore, this claim could be proved by the variety of lexical resources such as SentiWordNet [3], [2], Q-WordNet [1], WordNet-Affect [10]. In other words, some of sentiment analysis techniques cannot be applied for other languages due to missing lexical and linguistic resources.

A common approach to sentiment analysis is to use a lexicon of opinion words that express positive or negative opinions. In order to collect the opinion word list, three main approaches are used: manual approach, dictionary-based approach, and corpus-based approach.