
LOGISTICS PERFORMANCE IN POSTAL LOGISTICS CENTERS

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***Abstract:** Postal logistics centers (PLC) as places of the concentration of large quantities of shipments, have a function of collecting and distribution in the postal network and represent a important link in the delivery of shipments between the sender and the recipient. Technological processes that are carried out in these centers, arising from defined business objectives of postal service and generally include: sorting of postal shipments, organizing the transport and provision of postal and logistics services. As the logistics and postal processes are integrated in the realization of technological processes of postal services, this paper represent the first step to extract the measurers of logistic performances of postal operations in the PLC. Measuring logistics performances the efficiency, productivity and quality of functioning of the PLC as a logistic system, is measured, and presumption is created for their use when planning and defining future goals of PLC and the global performances of logistics processes in the postal service.*

***Keywords:** postal logistics centre, postal items, logistics process, logistics performances.*

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1. INTRODUCTION

Postal service plays a significant role in the development as a leading commercial and financial region, providing communications between individuals, business and government. In recent years, postal operators are facing with the challenges of rapid technological development, market liberalization, segmentation and increasing competition. In such conditions, the industry has evolved to include traditional post (like package and mail delivery), courier services, freight services and e-services [6], and leading European postal operators (such as: Deutsche Post DHL, La Poste i Royal Mail) have expanded their operations in the logistics sector. This development of the postal sector is conditioned by the rapid development of e-commerce, which, among other things, includes a strong logistics.

2. THE STARTING POINT AND PAPER GOALS

The structure of the postal network and the characteristics of the process in the postal service, makes from postal network, a complex and dynamic

system. Post centers are an important link in the system with the task of implementation of one phase in the delivery of shipments between sender and receiver. According to market-oriented and customer-driven development of postal operators, many of the traditional postal centers, expanded service offerings and grown in postal logistics centers (PLC-s).

A Logistics Centre is the hub of a specific area where all the activities relating to transport, logistics and goods distribution – both for national and international transit – are carried out, on a commercial basis, by various operators [5]. The PLC logistics processes are realized over different postal items as a unit load.

Bearing in mind the global determinants of postal operators and the structure and characteristics of the technological process of postal services, it is clear that the logistics as an instrument of differentiation (logistics as a marketing tool), and rationalization (as a method of reducing logistics costs), is an integral component of the business strategy of the company.

The process of transfer of postal items from the sender to the receiver is determined by the price and quality of service of postal operator. Logistics performance, i.e. efficiency, productivity and quality

of logistics processes, may be expressed with appropriate logistic performance, and represent a result of individual logistics processes. Following the hierarchy of relations, on the same principle, the effect of the PLC, could be described by performances, which are result of performances of individual logistics activities and processes.

The aim of this paper is to give a suggestion of logistics performance, and measurers of postal operations in the PLC, which could potentially represent the foundation for internal controlling and possibly of benchmarking in postal logistics.

3. STRUCTURE OF THE POSTAL NETWORK AND TECHNOLOGICAL PROCESSES IN THE POSTAL SERVICE

The key characteristics of postal services is reflected in the massive user demand for transfer of postal items, and the effect is realized through technological processes that generate physical moving of shipments with aim of their transfer to the recipient. From an organizational point of view, for the implementation of postal services that demands the market (national operators are conditioned to also to provide a universal service) it is necessary to establish a uniform postal network (on national and international level), the use of unique technologies and standardization of equipment. The structure of the postal network and its equipment is conditioned by the economic capabilities of operators, traffic volume, and in the case of a national operator, government influence on investment policies and development of postal services is very influential.

Elements of the postal network in Serbia are: post offices for providing customer service, postal-logistics centers and transportation systems.

As a units of postal network, PLC are located in the traffic hubs in order to achieve the concentration and diffusion of shipments on the geographical area that they cover. Establishment of postal network in PLCs gives them a key role in the concentration of shipments and processing of received of shipments and dispatch of mails. The main tasks of the PLC are: sorting of postal items, sorting of postal reloading units, transport organization, the postal and logistics services. According to responsibilities, PLC may be international (office of exchange), regional (the main postal center) and local (postal centers and transshipments points). There are also specialized PLCs designed to provide specific services, such as providing support to hybrid mail system, development of postal articles, fleet management, etc.

Routing of shipments (mails) is defined by the topology of postal network and type of connecting of postal network units, which is on the example of Post Serbia shown in Figure 1.

Transfer of postal items consists of the following stages: collection, dispatch, transport, arrival and delivery. Collection phase can be arranged directly or indirectly, depending on whether it is achieved through the counter in post offices, business premises of the user using postman or via of postal box or using self-service postal kiosk.

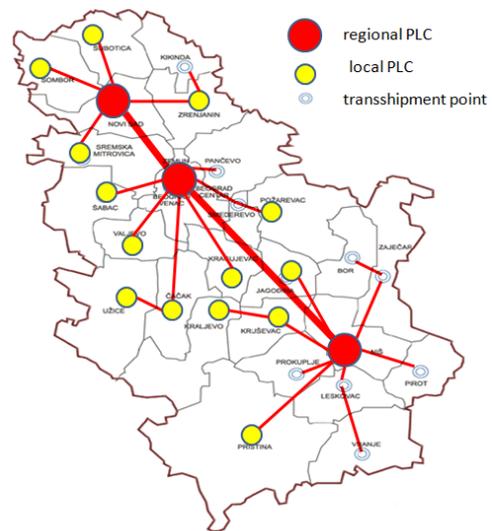


Figure 1. Topology of the postal network in Serbia [9]

The task of shipping is to prepare received items to the transport in direction of the destination post office or in the direction of the route of destination post office. Post offices for customers service achieve this phase dividing received shipments according to whether or not they are routed to: receiving post offices, units that belong to the PLC which belongs to the area of receiving post office, other units in the state, or they are intended for international land or international air traffic.

Transport of postal items is realized between dispatch and arrival of shipments to the destination PLC or delivery post office. In this phase directly or indirectly connecting is carried of all postal network units, from reception to the delivery of shipments using a wide range of transport vehicles. To achieve the most efficient utilization of available resources in the organization of transport connections appropriate forms of concentration and diffusion of items in the transportation chain, are applied. In the Post Serbia this phase of transport of postal items is carried out in the five transportation levels [8]:

- First level - transport shipments between designated operator (international service)

- Second level - the transportation of shipments between the PLC,
- Third level - transport between the PLC and the post offices which belong to the PLC,
- Fourth level - transport in the area of reloading –sorting post offices and
- Fifth level - which involves other transportation (per contract and internal documents of Posts of Serbia).

Arrival of postal shipments include taking over and processing of the mails of the PLCs or items in order to further delivery or dispatch of shipments. After the arrival of mails in the PLC shipments can be processed in order to prepare for delivery via delivery post offices. Also, PLC may only transit the conclusions to the destination post offices. After the arrival of mails in the destination post office there are processed and prepared for hand over.

The process of delivery, as the last stage in the transshipment of postal items, can be realized as a hand over (in the post offices, or through self-service postal kiosk) or delivery (at users address).

4. TECHNOLOGICAL PROCESSES IN THE PLC AND PROCESS INDICATORS

Defining the tasks for processing postal items in the PLC, and from that setting the technologies and work organization is based on the division of relatively homogeneous species and categories postal items in respect of their processing. Therefore there are different processing methods for: ordinary LC shipments of standard sizes, AO shipments and non standardized LC shipments, recommended and valuable shipments, packages, express items etc. Treatment processes, as well as the possibilities of mechanization and automation differ significantly for specified groups. The first group (LC standard size) is numerically the most common and it is very suitable for automation application.

PLC realizes concentration and routing of incoming shipments at defined exit directions with restrictive time limit. In the PLCs simplified analysis of the PLC it can be considered PLCs basic function of redistribution of incoming mail flows to the output directions (Figure 2).

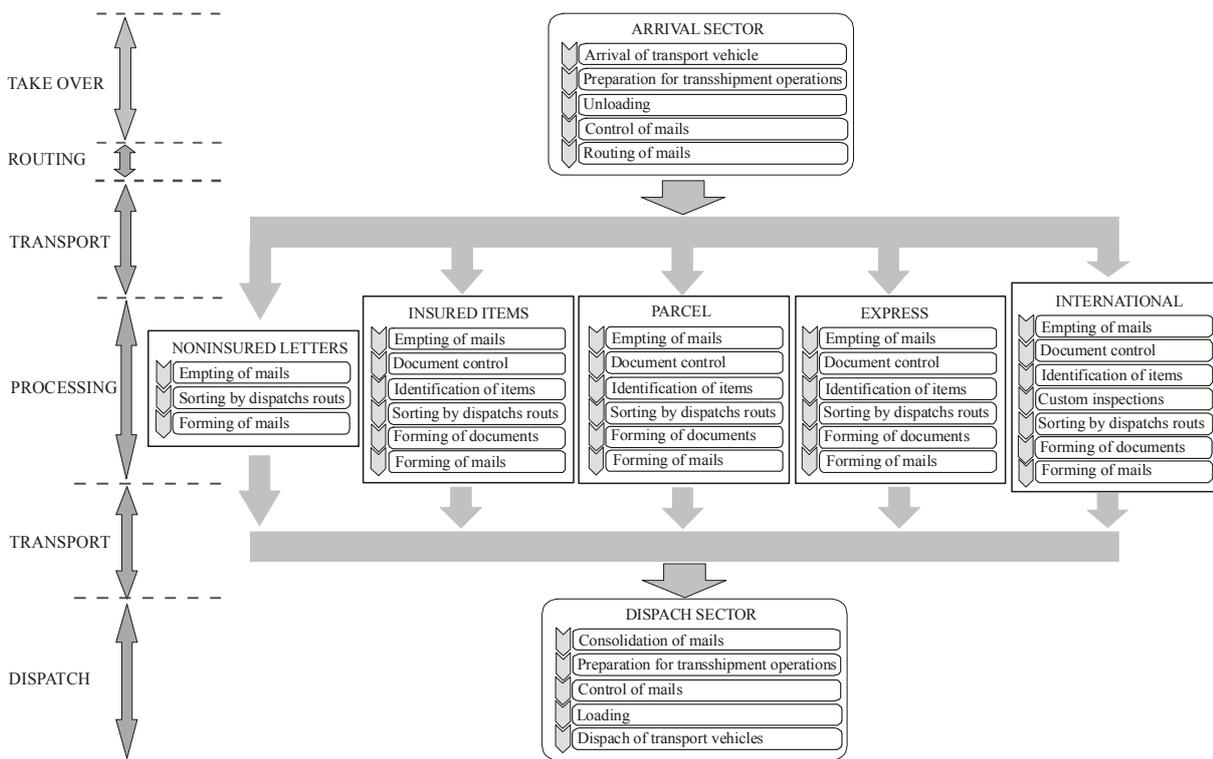


Figure 2. Flow of shipments in PLC

Input flows as independent values are the result of various external factors, while the output flows can be viewed as dependent variables which define the functioning of the PLC. Output flows are imposed by the limitations which PLC should fulfill

as a subsystem of a superior system of postal network. Generally, the shipments flow in the PLC can be described as follows: after the arrival of conclusions there are separated by type and opened, after that comes preparing shipments for sorting,

sorting by directions dispatch, and in the case international shipments submission to customs inspection, the formation of conclusions for the units of postal network organizationally belong to PLC or to other PLCs, the concentration formed of conclusions and loading in transportation vehicles. Quality of functioning of PLC can be viewed through the lost shipments, processing delays, rational use of resources and so on.

The efficiency of dispatch in the PLC is represented by the tendency to achieve the minimum number shipments sharing. The coefficient of handling multiplication is used to describe mentioned efficiency and it is determined as follows (1):

$$k = \frac{x + y}{x} \quad (1)$$

where x is the total number of shipments for processing, and the y is number of shipments that are two or more times sorted. The values of the above ratio which are less than or equal to 1.4 are considered satisfying.

Work operations within these phases are time-dependent by the type and category of shipments. The application of automated systems for sorting, opens the possibility of reducing costs and improving quality of shipping. Manual sorting has capacity about 2000 shipments per hour [13] while tens of thousands shipments per hour can be sorted in the automated systems. In addition to the significantly higher capacity achieved by automated systems they also have significantly lower degree errors. Taking into account the wide range of postal shipments, the most appropriate indicator of worker productivity are norm minutes.. Processes during the processing of postal shipments are standardized, i.e. there are defined norm minutes for different operations, which serve as a unit of measure for productivity. The ratio between actual norm minutes and total time is a measure of worker productivity.

5. LOGISTICS PROCESSES AND PROCESS INDICATORS

During the transfer of shipments from the sender to the recipient, numerous logistics activities and processes are detected: transport, transfer, processing (sorting), preparation for shipment, as well as design of all supporting information flows. Logistics processes in the postal sector represent range of logistics management activities: informational, technological, organizational and controlling and all have their goals which are

harmonized with the goals of postal service as a superior business system.

The effect of logistics processes as a series of successive and parallel logistics activities is measured through logistics performance. The goal of performance measurement and control activities in the logistics is to monitor logistics performance versus operating plan and in that way identification of opportunities to improve the effectiveness and efficiency [2]. Although there are many papers dealing with the study of logistics performance measurers [1, 3, 4, 10, 11, 12, 14, 16], in the literature, there is dispersion in the conceptual interpretation, coverage, methods of evaluation and grouping criteria. In the latest research in the field of logistics and supply chain, for the evaluation and monitoring of logistics processes, following performance classification is often used [7]:

- Financial performance,
- Productivity performance,
- Qualitative performance and
- Time performance.

The above classification is very convenient in terms of structuring, measurement and monitoring of logistics processes and in this work represent a base in the selection of logistics performance in the PLC.

In order to describe complex processes in logistic systems it is necessary to establish a hierarchical structure of the process, understand the relationships between processes and relationships between processes and performance, that is, it is necessary to logistic processes appear as a specific series of individual logistics activities and processes which can be quantified [15]. It is advisable to use some of the graphical techniques that take into account the time and space components of logistics processes. Defined set of indicators allows to establish a reference value level, determine changes in time perform verification of compliance of achieved and target values and identify opportunities for improvement.

Legal regulations which regulates the work of post, goals of postal service and competition in the market represent a framework for defining the objectives and tasks of the logistics during the delivery of shipment from the sender to the recipient. If we start from the global performance of postal services that are important to the user, such as the time of delivery and the price charged for the delivery, for each stage in the delivery it is possible to define lower level logistics performance or performance of individual logistics processes. By the same principle, and the effect of PLC as a node in the postal and logistics network can be characterized

with performance that are the result of the performance of individual logistics processes, which affect the global performance of logistics processes in the postal service.

Given the logistical processes that are implemented in the PLC (Figure 2) in Table 1 for each process is proposed list of measurers for logistics performance. Described process structure

and a list of measurers given as a suggestion can be adapted to the structure depending on the needs and circumstances of the business system. One must not forget that the PLC is a link in the implementation of the delivery of shipments, so that the goals and indicators PLC subordinated to objectives and indicators of superior systems (to post service and posts integrated logistics).

Table 1. Processes in PLC and the logistics performance indicators

Identified processes	Qualitative performances	Financial performances	Time performances	Productivity performance
Taking over postal mails	<ul style="list-style-type: none"> The degree of harmonization of documents and mails 	<ul style="list-style-type: none"> The costs of unloading Cost of receipt 	<ul style="list-style-type: none"> The time of receipt 	<ul style="list-style-type: none"> The number of taken mails per personnel hour
Classifying conclusions by type of shipments	<ul style="list-style-type: none"> The accuracy of classification 	<ul style="list-style-type: none"> Cost of classification 	<ul style="list-style-type: none"> Classification time 	<ul style="list-style-type: none"> Number of processed mails per personnel hour
Transfer to a sorting area	<ul style="list-style-type: none"> a) The degree of damage of shipments during the manipulation 	<ul style="list-style-type: none"> The costs of transfer and manipulation of shipments Cost of shipments damage Cost of additional handling due to mistakes 	<ul style="list-style-type: none"> Transfer time of shipments 	<ul style="list-style-type: none"> The level of capacity utilization of transport and handling equipment The degree of time utilization of resources
Sorting	<ul style="list-style-type: none"> The number of incorrectly sorted shipments 	<ul style="list-style-type: none"> Cost of sorting per shipment Additional costs due to mistakes 	<ul style="list-style-type: none"> Sorting time Sorting time per shipment 	<ul style="list-style-type: none"> The number sorted shipments per hour Achieved norm minutes per personnel hour
Mails forming	<ul style="list-style-type: none"> Accuracy formation of mails 	<ul style="list-style-type: none"> Costs of forming the mails (resource utilization and raw materials costs) 	<ul style="list-style-type: none"> Time for creating mails 	<ul style="list-style-type: none"> The number of formed mails on hour The number of formed mails per personnel hour The number of formed mails per personnel hour
Waiting for shipment	<ul style="list-style-type: none"> The level of items that exceeded planned waiting time. 	<ul style="list-style-type: none"> The costs of space 	<ul style="list-style-type: none"> Waiting time 	<ul style="list-style-type: none"> N/A
Transfer to the shipment zone	<ul style="list-style-type: none"> The degree of damage of shipments during the manipulation 	<ul style="list-style-type: none"> The costs of transfer and manipulation of shipments Cost of damaged shipments Additional handling costs due to mistakes 	<ul style="list-style-type: none"> Transfer time of shipments 	<ul style="list-style-type: none"> The level of capacity utilization of transport and handling equipment The degree of time utilization of resources
Shipment (issuance of formed mails)	<ul style="list-style-type: none"> The accuracy of document formation 	<ul style="list-style-type: none"> Loading costs 	<ul style="list-style-type: none"> Loading time 	<ul style="list-style-type: none"> The number of submitted mails on personnel hour
Logistics performances of PLC	<ul style="list-style-type: none"> Degree of shipment damage The degree of shipments losses Degree of shipments delivered on time 	<ul style="list-style-type: none"> The total logistics costs The total logistics cost per processed shipment 	<ul style="list-style-type: none"> Process time Waiting time 	<ul style="list-style-type: none"> The number of shipments processed per hour The number of shipments processed by personnel hour

Some of these indicators are already present in the planning and manage the work in the PLC but not integrated into the logistics management system. Only by defining the structure of the process of logistics, establishing the relationship between the process and logistics performance with measurement systems of performance with, creating the basis for controlling logistics. The purpose of the internal

controlling of the PLC, the proposed list of indicators should be supplemented with: the use of indicators, the formula for calculating and the sources of collecting the necessary data. In this way preconditions are created the for the standardized collection of data, identification of performance, systematic comparison of their own performance.

6. CONCLUSION

Based on the structure of the processes which are implemented in the processing of postal shipments in the PLC with regard to the basic determinants of postal services, this paper proposed a list of logistics indicators as a base for the implementation of logistics controlling-in PLC. Proposed list of indicators should be accepted conditionally (selection procedure for logistics indicators is much more complicated) until PLC managers give their opinion about their importance and influence on the management of logistics processes during the realization of postal services. It is also one of the guidelines for future research in this area. In addition, the logistics indicators of PLC must be integrated into the system for logistics indicators of integrated postal service.

Despite mentioned limitations and bearing in mind existing practice in the Republic of Serbia, we hope that this study will be a little contribute to the improvement of logistics in the implementation in postal services.

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