

## Innovative Solutions for Postal Enterprises as a Contribution to the Creation of Regional Innovation Systems

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### Abstract

*The aim of this paper is to elaborate a proposal to launch further innovation processes of postal companies within the creation and functioning of the national and regional innovation system through the establishment of a logistics information centre. The solution of the problem is based on an analysis of the current state of the researched issue in the international context. Solving this problem also relies on recognition of innovative procedures using knowledge with the solution of this problem in the academic environment. Based on the results of primary research, which pointed out to the need to put the proposed solution into practice, the evaluation of the innovation potential of postal companies is a part of the proposed solution.*

**Keywords:** National and regional innovation systems, postal companies, logistics solutions

### INTRODUCTION

In the regional context, the need for a set of common rules and standards is identified to facilitate interaction and mutual understanding in the process of sharing knowledge and achieving the necessary degree of regional and national cooperation. The regional as well as national innovation system is part of the Triple Helix model, which represents the interconnection of the state, business entities and the academic environment. [13] Companies include postal companies through which postal services, as an essential tool for communication and trade are provided. Čorejová (2006) states that they provide the necessary infrastructure support linked to other sectors (e.g. financial services and e-commerce) and for the population they are an essential element of their social connection. Nowadays, the postal operators offer a few products whose composition depends on historical development, the development of individual sectors as well as the country in which they operate. The postal sector and within its postal services operate at the crossroads of four major markets – information market; communication market; transport and logistics market and banking market. [15] These markets play an irreplaceable role in the

Triple Helix model. From the point of view of processes, postal services can be perceived as part of the transport/logistics market where shipments are distributed through the postal infrastructure. Depending on size, timeframe and other characteristics, parcel, express, courier and logistics services can be distinguished in this market. At the same time, Čorejová (2008) argues that the express and courier market was liberalized in the first place in most countries. These markets have many new companies as well as subsidiaries of multinational corporations seeking to achieve a significant market share. Postal operators entering those markets, offer new value-added services to respond to the threat of e-substitution. They exploit the opportunities arising from the development of information and communication technologies and form a part of national and regional structures. Postal operators are representatives of logistics service providers whose importance is recognized in a regional, national and international context. In a broader sense, logistics can be understood as a thought process that applies wherever the assessment of time-consecutive and ongoing processes leads to the possibility of optimization. In a narrower sense (Viestová, 2008), especially when applied to the corporate sector, logistics refers to material and communication processes before, during and after the provision of services, both inside and outside the enterprise, region, and state. According to ECORYS (2008), most of today's companies work with logistics providers to provide outsourcing for approximately 65% of all logistics activities in Europe. [3] This share is expected to continue to increase. Logistics companies provide services in the field of logistics, including its overall management. Some authors, including Drahotský and Řezníček (2003), consider as logistics providers only specialized companies that provide different types and width of logistics services (for example forwarding company). Others use this term to designate a logistics supplier that offers and implements logistics chain management. [2]

Pernica (2007) defines a logistics service provider as a specialized company that engages in the logistics chain at the external partner level. Such company provides various individualized services (e.g. transport of parts, components or finished products, their storage, sorting and assembly) up to taking full responsibility for satisfying customers' logistics needs.<sup>1</sup> Important criteria in the selection of the provider include the quality of the services offered, the quality of the staff, the price, the level of experience in international and national transport, respectively in the concerned service area. [12]

Based on the scope and complexity of the provided logistics services we distinguish several levels of logistics companies: First Party Logistics – 1PL (occasional provision of selected logistics services); Second Party Logistics – 2PL (provision of selected services, most often in the field of transportation or storage, under a longer term contract); Third Party Logistics – 3PL (providing logistics services at the level of individualized transport, warehousing and other services including provision of shipment information, consolidation and deconsolidation of goods<sup>2</sup> to takeover of the entire logistics chain, oriented towards cost savings for the benefit of the customer); Fourth Party Logistics – 4PL (providing comprehensive services including analysis, design, implementation and management of the customer's logistics chain, linking and harmonizing the activities of multiple specialists). Fifth Party Logistics (5PL) is an unstable term that represents a prospective logistics service comparable to 4PL. In the case of 5PL, the providers' activities consist solely in know-how and in a combination of external resources, capacities, technologies and thus act as virtual logistics service providers. If the scope of the logistics business is comparable to a 4PL or 5PL service provider but the company still has its own logistics

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<sup>1</sup> Customer - who buys (goods) or pays for services.

Consumer - the buyer consumes goods. (Slex.sk)

<sup>2</sup> Goods - presents products as the object of purchase and sale intended to meet the needs of human being. (Slex.sk)

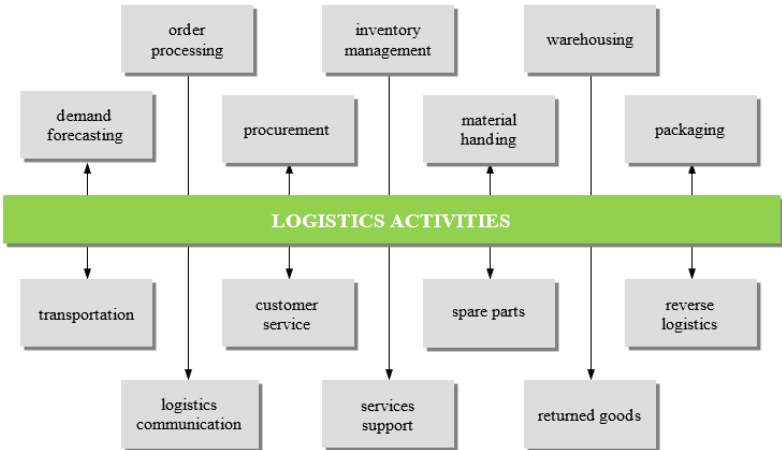
network, it is referred to as a Lead Logistics Provider (LLP). This provider usually acts as the only external logistics partner of the customer and takes over his entire external logistics system - inbound or outbound logistics.

Logistics companies, and therefore postal companies provide various logistics services, which can be defined as logistics activities carried out for the benefit of the customer in the context of logistics outsourcing. [4,7]

**CURRENT STATE OF SOLUTION OF THE RESEARCHED ISSUE**

Structure and characteristics of logistics services in the area of postal companies in Slovakia vary. At present, it is possible to identify the following logistics activities: demand forecasting, order processing, procurement, inventory control, material handling, warehousing, packaging, transportation, logistics communication, customer service, service support and spare parts, return goods handling and reverse logistics [5,9,14] (see Pic. 1).

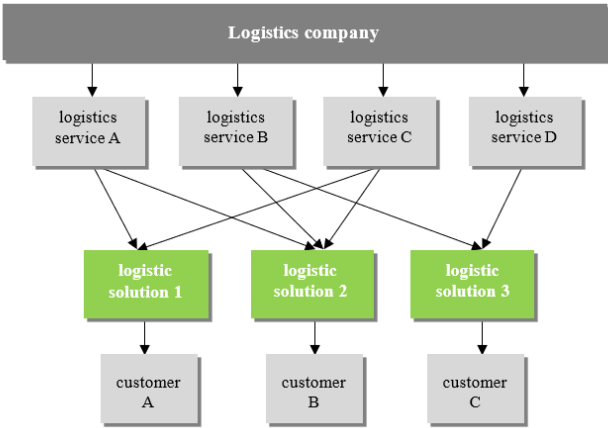
**Picture 1: Logistics activities of company**



Adapted from Chrenkova (2009, [6])

Relationships between logistics enterprises, logistics services and logistics solutions express picture 2.

**Picture 2: Expression of relationships between key terms**



Adapted from Chrenkova (2009, [6])

The need for logistics solutions can be addressed in one of two ways. The first option is its own logistics department, which carries out all the necessary activities. The second option is to entrust these activities, in whole or in part, to another logistics company. It usually implements logistics services and solutions

through a logistics centre, which is the central element of the logistics chain between suppliers and customers. The insertion of such a link in the logistics chain significantly reduces the number of connections (routes) between suppliers and customers, reduces the necessary range of transport performance and the size of the car fleet. The logistics centre also helps to arch time and spatial mismatch and fulfils multiple functions at once. [8, 11]

Many companies now use outsourcing services, as offered solutions contribute to savings funds and positively affect profit. There is a clear correlation between the degree of logistics outsourcing in all business functions and logistics costs. The higher the degree of outsourcing, the lower the logistics costs. The discussion of this paper will analyse the reasons for using outsourcing, its pros and cons.

## **GOAL**

In national and regional innovation systems, postal companies have found their place as important logistics service providers who see logistics as a platform for diversifying their business. Competition in the logistics services market is strong, that's why logistics service providers need to work on their competitiveness. This depends to a large extent on innovations, the ability to flexibly respond to the changing environment and adding value to the offered services. An innovative logistics service provider can not only gain leadership, but also increase customer satisfaction and loyalty. Such providers can also gain greater market share. The aim of this paper is to propose the initiation of innovation processes of postal enterprises within the national and regional innovation system through the establishment of a logistics information centre. The need to use this solution in practice is supported by the results of primary research. This research was aimed at identifying the innovative potential of postal companies (more details are given in one part of the research activity).

## **SOLUTION METHODOLOGY**

The proposed solution was based on the application of analytical and synthetic methods applied based on secondary research, based on the determination of the research problem, research objectives and research assumptions directly related to the problem.

Measurement of the innovation potential of Slovak postal operators was carried out through primary research using the method of inquiry, which was aimed at determining their readiness for implementation of innovations (research problem). The survey was carried out on a sample of 11 postal companies operating on the Slovak market who showed their willingness to cooperate in this research. The research objectives consisted of identifying the company's innovation potential, strengths and weaknesses, opportunities and threats, and the justification of creating a logistics innovation centre. The research activity used the methodology U-SME Innovation - Design of a Model for Joint University - Enterprise Innovation, which was adapted to the conditions of the postal sector. Based on the knowledge of renowned consulting companies (Ernst & Young, A.T. Kearney) and the standards in force in the European Union, the authors defined the areas that need to be monitored in assessing innovation potential: strategy and planning, technology processes, service quality, environment and marketing. [10,11]

The first area strategy and planning were aimed at finding out how the postal company coordinates its activities with regard to the vision of the future (such as its vision, plans, innovation plans and programs, etc.). In the second area, focused on technological processes, we asked for suggestions leading to a

change in the technologies used, technological processes and acquisition of resources necessary for further development.

In the third area, which concerned quality and the environment, we were interested in changes affecting the quality system in postal companies, the contribution of employees to quality, etc. This section also included questions about the environmental impact of operators' activities and how they approached them. The last area marketing was focused on the evaluation of the market orientation of postal companies and customers. We evaluated the competitive position on the market, monitoring the customer's attitude to the services offered, etc.

For individual responses, postal operators were given points from 1 (for a zero-innovation response) to 4 (for a very high innovation response). The company could reach a minimum of 6 points and a maximum of 24 points in one area. Based on the number achieved for a specific area, operators were assigned to one of four groups:

**Table 1: Criteria for the classification of the postal undertaking in each area**

Group	Score	Assessment of innovation potential
A	21 – 24	postal enterprise with a high innovation potential
AB	16 – 20	postal enterprise with a medium innovation potential
B	11 – 15	postal enterprise with a low innovation potential
C	6 - 10	postal enterprise with a very low innovation potential

Adapted from Chrenkova (2009, [6])

After counting all the points for the four areas, the company could obtain a minimum of 24 points and a maximum of 96 points. Based on the overall results, we have once again divided the postal operators into four groups - in Group A there are postal companies that take care of their development potential and look for further opportunities to improve their business. They are well placed to be highly competitive not only in the medium term but also in the long term. Postal companies belonging to the AB group have the potential to successfully implement innovations. They can harness the potential to secure future prosperity. According to the data obtained, two postal undertakings (18%) belong to Group A, they have a high innovation potential. Seven operators (64%) belong to the AB group and thus have a medium innovation potential and the other two (18%) are in the B group with a low innovation potential. None of the postal operators belong to the group of companies with very low innovation potential (see Figure 13). Thus, it can be stated that Slovak postal operators show mostly medium innovation potential and are prerequisites for effective implementation of innovations. The highest average values for all postal enterprises surveyed are in the field of technological processes. This finding confirms the hypothesis **H1**, which assumed that **postal companies achieve the highest innovation potential in the area of technological processes**. It took the view that operators were able to make the best use of the capabilities and experience of the processes that constitute the backbone in ensuring the provision of postal and logistics services.

**Picture 3: Average value of innovation potential of selected postal enterprises in Slovakia**



Adapted from Chrenkova (2009, [6])

The second highest average value of innovation potential is achieved by postal enterprises in the area of *strategy and planning*, which is closely related to business management. *Quality and the environment* express the level of quality and environmental management. The lowest value was achieved by postal companies in *marketing*. This result should motivate them to pay more attention to marketing activities that are key to their customers. Research has shown that in recent years postal operators have implemented innovations related to new information and communication technologies, modernization of operational procedures, optimization of delivery and collection of shipments.

Several factors influence the innovation potential. To test the hypothesis **H2**, which claims that when a postal company is part of *a postal company with a transnational scope, this does not affect the level of its innovation potential*, we used a dispersion test. The starting point was data obtained from a survey aimed at determining the readiness of postal enterprises for the implementation of innovations, which are presented in Tab. 2. In this case, the postal undertaking's innovation potential was a quantitative variable and the qualitative variable was the fact that the postal undertaking is part of a postal undertaking with a transnational scope. This results in the above-mentioned population groups (A and B).

**Table 2: Innovation potential of postal companies according to the participation of a postal company in a postal company with a transnational scope**

	Innovation potential											Sum	Average value
	PP 1	PP 2	PP 3	PP 4	PP 5	PP 6	PP 7	PP 8	PP 9	PP 10	PP 11		
Postal company is part of a postal company with a transnational scope (Group A)	83	72					62	75				292	73
Postal company is not part of a postal company with a transnational scope (Group B)			75	60	81	65			60	65	67	473	67,6

PP – postal company; Adapted from Chrenkova (2009, [6])

Calculation of the average for individual groups of enterprises using the formula:

$$\bar{x}_i = \frac{\sum_{j=1}^{n_i} x_{ij}}{n_i} \quad (1)$$

where:

$x_{ij}$  = j measuring the i group;  $n_i$  = number of measurements on the i factor variation; k = number of variations (levels) that the factor takes; n - the total number of measurements in the whole sample;  $\bar{x}_i$  = diameter of the i group;  $\bar{x}$  = total sample mean; i = group; j = measurement.

Calculation of group A average:

$$\bar{x}_A = \frac{83 + 72 + 62 + 75}{4} = \frac{292}{4} = 73$$

Calculation of group B average:

$$\bar{x}_B = \frac{75 + 60 + 81 + 65 + 60 + 65 + 67}{7} = \frac{473}{7} = 67,6$$

Total average for all companies:

$$\bar{x} = \frac{\sum_{i=1}^k \sum_{j=1}^{n_i} x_{ij}}{n} \quad (2)$$

$$\bar{x} = \frac{765}{11} = 69,5$$

Calculation of intragroup variability, which is the sum of squares of deviations of measured values from the respective group average:

$$S_V = \sum_{i=1}^k \sum_{j=1}^{n_i} (x_{ij} - \bar{x}_i)^2 \quad (3)$$

$$\begin{aligned} S_V &= (83 - 73)^2 + (72 - 73)^2 + (62 - 73)^2 + (75 - 73)^2 + (75 - 67,6)^2 + (60 - 67,6)^2 \\ &\quad + (81 - 67,6)^2 + (65 - 67,6)^2 + (60 - 67,6)^2 + (65 - 67,6)^2 + (67 - 67,6)^2 \\ &= 589,72 \end{aligned}$$

Calculation of intergroup variability, which represents the sum of squares of group average deviations from the total average:

$$S_M = \sum_{i=1}^k n_i (\bar{x}_i - \bar{x})^2 \quad (4)$$

$$S_M = 4 \times (73 - 69,5)^2 + 7 \times (67,6 - 69,5)^2 = 74,27$$

To calculate test F-statistics according to specified degrees of freedom:

$$v_1 = k - 1 = 2 - 1 = 1$$

$$v_2 = n - k = 11 - 2 = 9$$

Calculation of test F-statistics:

$$F = \frac{S_M \times v_2}{S_V \times v_1} \quad (5)$$

$$F = \frac{74,27 \times 9}{589,72 \times 1} = \frac{668,43}{589,72} = 1,133$$

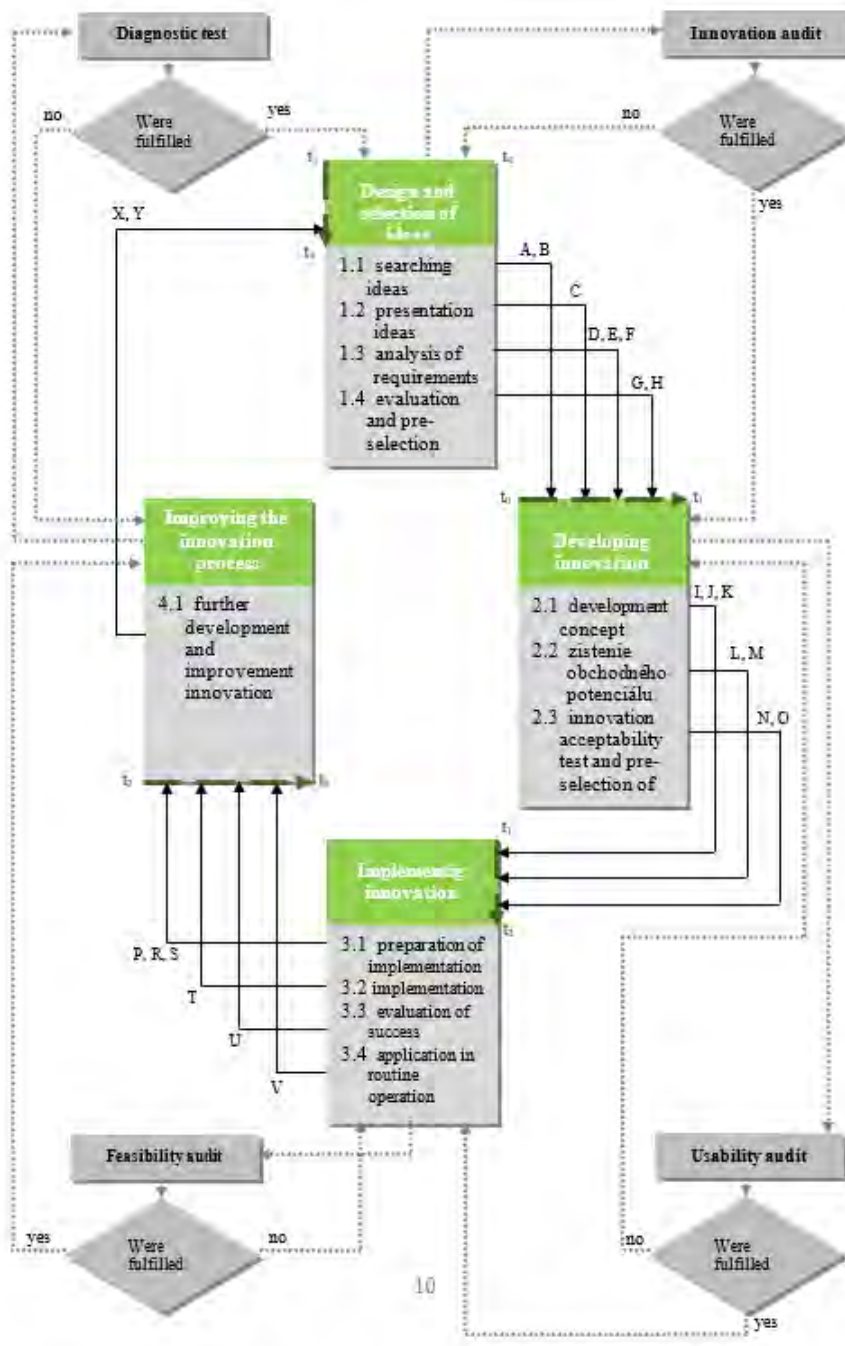
A comparison with the value from the F distribution tables, where  $F_{0,75(1,9)} = 1,09$  showed that for  $\alpha = 0,25$  the rejection area of the hypothesis is an area of F values for which  $F \geq F_{0,75(1,9)}$ . Since the value of the test statistic satisfies the condition, **the hypothesis H2 established has not been confirmed.**



## DESIGN OF MODEL OF INNOVATION PROCESS CARRIED OUT THROUGH LOGISTIC INNOVATION CENTER

By diagnosing the current state of the art and proposing therapeutic approaches to increase the innovation potential of postal enterprises as part of regional and national innovation systems, it is possible to create a **framework model of innovation process for the design and implementation of innovative logistics solutions in the postal sector**. The interconnection of the proposed activity blocks is shown in Pic. 3. Each block of activities should be followed by an audit of the activities undertaken (e.g. feasibility audit, innovativeness audit, etc.) and a diagnostic test to avoid inefficient use of resources for innovative solutions.

**Picture 4: Framework diagram of the innovation process model for the design and implementation of innovative logistics solutions**



- ▶ interconnection of blocks of activities from the content point of view, indicating the key factors for their successful implementation
- ▶ expressing the sequence of activities over time
- .....▶ the process of carrying out inspection activities by individual blocks of activities
- A – Y key success factors for each innovation process model activity (each factor is marked with a letter - see Figure 3)

Adapted from Chrenkova (2009, [6])

## DISCUSSION AND CONCLUSION

As already mentioned, the subject of discussion on the proposed solution is the possibility of using logistics outsourcing in all innovative systems, without using the capacities of postal companies. There are several reasons for using outsourcing:

- A company that uses logistics services can focus on core business. By transferring a significant part of the processes to the supplier of logistics solutions, it will gain more space and opportunities to improve and streamline processes directly affecting its core business.
- A logistics service company is usually a specialist in the field, who has a wealth of experience and is able to estimate potential risks or pitfalls because he has met them in the past.
- A well-designed logistics solution should increase the efficiency of individual company processes and thus contribute to significant financial savings.
- Lack of licenses or permits for certain special activities may be another reason for outsourcing (e.g. permits for the transport of oversized loads, storage of hazardous substances, etc.).
- The company may lack human resources (especially during seasonal fluctuations). It does not have to be only about securing the workforce, but also the wage agenda, the necessary administrative formalities, etc.

By using outsourcing, the company gains several **advantages**. In addition to the ability to focus more closely on its core activities, it will achieve cost reductions and better control, use the money saved for other purposes, gain access to cutting-edge know-how and the latest technologies, obtain high quality services provided by industry experts, etc.

**The disadvantages** include, in particular, dependence on the supplier of logistics services, the possibility of emerging risk situations in the event of failure or error by the provider and the resulting threat to the company, or a partial loss of control over supply or distribution channels, etc.

When designing and implementing logistics innovations in postal enterprises, the logistics innovation centre should follow the proposed model of innovation process with a significant impact on the development of the region as well as at the national level. It is based on theoretical knowledge and the results of research carried out by logistics experts, taking into account the specific environment of postal enterprises. In addition to the characteristics of each activity, the model also contains key factors relevant to their successful implementation (A - Y), and also serves as a tool to identify bottlenecks in the process of implementing innovative logistics solutions, the timing of innovation process model activities and suggesting improvements to relevant solutions.

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