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TRENDS IN SUSTAINABLE DEVELOPMENT IN THE POSTAL SECTOR

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Abstract
The each major postal system is characterized by a strong infrastructure and appropriate human, technical and technological resources. The activities of these systems are economically demanding and have a negative impact on the environment, which represents some of the most delicate problems of sustainable development. This paper presents the basic principles and proposals for the improvement of sustainable development capabilities in the postal systems.

Keywords
postal system, sustainable development, improvement, reception, transport, delivery

1 INTRODUCTION

The postal system at the global level includes individual systems, composed of a large number of postal companies. Every postal company, whether it is a private or public postal operator (PPO), is based on a branched network throughout the territory where it provides services. This territory may include a part of a district or a specific city, the whole territory of a city, a state or a region. However, if we consider the postal system as unique or global, we can conclude that almost every inhabited territory on the planet is covered by the services of at least one operator. Accordingly, it can be concluded that the global postal system, dimensionally one of the largest business systems that exist.

Postal system includes a highly developed distributive network, whose basic characteristics are the great number of postal items, plenty of business and customers' subjects and developed infrastructure. The functioning of such a system has an important effect on the environment [1].

Universal Postal Union (UPU), which enacts some regulations, decisions and strategies in functioning of postal activity, has the key role in the business of postal companies at a global level. UPU initiated the Program of environmental protection in 1994, founding the Working group for environmental issues. At the same time, the Project group for sustainable development was founded (the Sustainable Development Project Group) with the aim to enable support to the operators in their efforts to integrate sustainable development into their business [2]. Three main dimensions of sustainable development are the following:

- Economic,
- Ecological and
- Social

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In order to achieve the goal of sustainability, it is necessary to act through all of these three dimensions. Postal operators should satisfy the needs of the population, their needs through the economic profit, but also to accomplish the principles of environmental protection.

In October 2012, on the 25th UPU Congress in Doha, Postal Strategy was adopted for the period 2013- 2016, which defines as one of the four aims the promotion of sustainable development of the postal sector [3]. Based on this strategy and the earlier efforts, many postal operators started to apply the global mission of sustainable development through various tendencies and sustainability policy. At the last (26th) UPU Congress in Istanbul (2016), there was also discussion about sustainable development. It was suggested that the member countries and/or their designated operators shall adopt and implement a proactive sustainable development strategy focusing on environmental, social and economic action at all levels of postal operations and promote sustainable development awareness. The following aspects of environmental protection are listed [4]:

- Designated operators should make their products and services as environment friendly as possible within the limits imposed by technologies and resources;
- The consumption of materials and energy should be optimized and be the minimum consistent with the efficient conduct of operations;
- Materials used should comply with non-pollution or non-toxic standards established by the relevant national and international agencies;
- Designated operators should promote the recycling of paper and other materials. They should also promote the use of recycled materials.

It is clear that in order to achieve the sustainability of the global postal system, it is necessary to implement appropriate activities within individual postal systems. The subject of paper is to examine the basic indicators of sustainable development in the postal system. The goal of the paper is to define activities and solutions that should contribute to the improvement of the postal system in the field of sustainability.

2 SUSTAINABLE DEVELOPMENT TRENDS IN THE POSTAL SYSTEM

Despite different development levels of postal operators and systems, a trend applied for all, refers to the approach to the concept of sustainable development. Under authority of Universal Postal Union and according to the strategy from Doha, that has been adopted, postal operators are concentrated to this concept step by step. Economic dimension of sustainable development has been distinguished as alarming dimension.

More than 600 000 posts in the world form a postal system, which becomes the largest global and distributive network on the planet. More than 1 500 000 vehicles, a large number of motorcycles and airplanes are being used daily to accomplish postal service. Production, technical and technological systems and employees require the energy consumption and other kind of energy every day such as water, paper etc., which have a negative impact on ecology. To reduce this negative impact, it is necessary all the actors to take part in it. Also, it is essential that all companies and organizations accomplish their aims and business policy according to the environmental protection and negative emissions reduction [5, 1]. In 2008, the postal operators received the first questionnaire from Universal Postal Union for greenhouse gas emissions. The goal of this questionnaire, which consists of three parts, is to determine the fuel consumption on an annual basis, as well as the number of passed kilometres for each vehicle and the amount of fuel and electric energy for lighting, heating, microclimate maintenance and other daily consumption. Considering the low level of replies in the first year (mainly because it's not impossible to gather data), the questionnaire was carried out again in 2009. The standard protocol, that refers to the emissions reduction and environmental protection, is based on the internationally accepted resources in this field, such as GHG (Greenhouse Gas) protocol WRI/WBCSD (World Resources

Institute and World Business Council for Sustainable Development), International Energy Agency, Global Reporting Initiative (GRI) and ISO 14000 standard. The purpose of that document is to identify all emission resources that are coming from the postal activities [6, 1].

Despite the fact that the problem of the sustainability of the postal system was mentioned in the years preceding the 25th UPU Congress in Doha, the guidelines adopted at this Congress are the main trigger for the implementation of sustainable development activities in the postal system. Four programs are defined:

1. Improve remuneration systems between designated postal operators - Fair and appropriate remuneration systems among designated operators, in line with market needs and conditions, form the basis of a well-functioning and sustainable international postal network. Remuneration systems that benefit some designated operators but penalize others are not sustainable in the long term. If left unchecked, they jeopardize the sustainability of a universal network. Action is required to harmonize and improve the different remuneration systems for the various postal products (e.g. letters, packets, parcels, EMS).
2. Strengthen the UPU's capacity to respond appropriately to changing needs in the market - Adapt UPU structures, as well as national regulatory frameworks, to the changing needs of the markets. There are two aspects to the objective: first, to make sure that the UPU and its structure remain relevant for its member countries at a time when governments tend to consider postal services no more important than any other commercial activity; and second, to facilitate the broad exchange of views and best practices with respect to postal market developments.
3. Stimulate the inclusion of all segments of the population through greater and/or targeted access to postal services - The postal network is an asset that can be leveraged to increase financial and social inclusion. This programme seeks to use the postal network to advocate and foster financial inclusion, as well as the provision of basic government and communications services to people in remote areas.
4. Promote environmental awareness and social responsibility - Put a framework in place to allow the postal sector to develop in a sustainable way. The UPU has expanded its environmental activities by promoting best practices and measuring the impact of the postal sector on the environment. In this area, synergies with other organizations should be encouraged. At the same time, in cooperation with other United Nations organizations and within the framework of the UN Millennium Development Goals, the UPU has used the postal network to help raise awareness of key social issues, such as the fight against HIV/AIDS. These kinds of activities should feature prominently on the UPU's sustainable development agenda. Finally, the UPU should continue to promote social dialogue and decent working conditions within the postal sector.

Defined programs and adopted guidelines are still the mechanisms and tendencies that postal operators are striving for. 26th UPU Congress in Istanbul (2016), there was also discussion about sustainable development. One of the three main goals of the adopted strategy is - Ensure sustainable and modern products. One of the curiosities was that it is the 26th Universal Postal Congress made strides in sustainability as the first "paper smart Congress", meaning the majority of documents have been presented to delegates in electronic format.

2.1 Sustainable development in the process of postal services providing

Postal service accomplishing means the reception of items and their sorting, transport and delivery to the recipient. These are basic parts of sub-systems in the postal service providing. In the complex process of distribution where a customer is the main actor, from reception to the delivery, it is necessary to manage the items, information and people's flow at the same time, requiring on this way operator has new equipment and organization [7].

Reception of postal items and sustainable development

Reception of postal items is being accomplished in the units of postal network via postal clerks on the terrain via couriers or via postal mail boxes. The units of postal network enable the possibility of postal items reception on their post office counters. The reception is carried out by postal clerk, using the necessary equipment. Reception of items via couriers refers mainly to the express services.

Post office counters in the units of postal network are workplaces, which contain certain equipment, necessary for the clerk's work. Equipment means computer terminal, precise electronic scales, franking machines and the other extra equipment.

Reception of items via courier implies that a sender will contact the call centre, then this application will be forwarded to the courier, that goes to the address and accomplishes the reception of postal items. It is essential to pay attention to the processes, which are on the border with economic profitability and affect the environment. Driving to the reception address and later transport of postal items are basic influential factors.

Postal mail boxes are set on certain locations in certain areas, manly of narrow city districts. The organization of visiting these locations and collection of items by a postal employee is not enough developed, i.e. the emptying of mail boxes is not often. This kind of reception of postal items is not enough developed in the real system. In ideal case, the presence of mail box increases significantly availability to the postal system. There's no need for clients to use transport means to the mail box, because the locations are various. Therefore, it contributes notably to the costs reduction and environmental protection [1].

Table 1 shows the appropriate impacts on sustainable development in the reception segment as well as the proposed activities and the aim of their realization.

Tab. 1 Sustainable development on the reception of postal items

Impacts	The way of acting	Aim
Unused powerful, outdated and energy ineffective computer configuration	Introduction of new technologies, e.g. hardware and software virtualization	Increase of system's use, reduction of required resources and systems for their feed, development of green IT
Outdated systems for franking and unreliable scales	Purchase of new efficient franking machines and introduction of new more qualified electronic scales	Increase of energy efficiency, noisy reduction, increase of efficiency of counter's place
Inappropriate territorial organization and schedule of couriers	Constant tracking and analysis of customers' requirements	Establishment of the appropriate territorial organization and schedule of couriers, which should prevent preventive delays in receiving items, but also to efficiently perform the service with certain savings.
Inefficient routes to which couriers transport items	Application of appropriate tools and algorithms for finding the best route	Defining the best (the most efficient, the cheapest ...) route, which will be the most environmentally and cost-effective

Sorting of postal items and sustainable development

Sorting of postal items represents the process of items classification based on the addresses, by destination. The classification is the complex logistic process, which generates maintenance costs, electricity consumption, etc. Overload mechanization and systems for items classification have the biggest potential for improvement according to the sustainable development in this part of postal service providing.

Table 2 shows the appropriate impacts on sustainable development in the sorting segment as well as the proposed activities and the aim of their realization [1].

Tab. 2 Sustainable development on the sorting of postal items

Impacts	The way of acting	Aim
System of main transport flow	Use of the most modern means, low energy consumers, tracking flow of items and its analysis	Use of energy efficient and economically profitable systems and system of increased productivity according to the right dimensioning
Outdated systems	Tracking and efficiency analysis of outdated systems, delay in the use of self-sustaining systems, such as gravity means and ejection from the use of ineffective	Reduction of energy consumption and negative impact on the environment with the delay level of system efficiency
Capacity dimensioning	Tracking of the items transfer and analysis of their flow	Right dimensioning of system for classification

Transport of postal items and sustainable development

For purposes of postal items transport, the means of road traffic, air traffic and ship transport are being used. Various factors have an impact on sustainable development of this sector: different characteristics of transportation mode, regulatory and legislative bodies, providers of services, financial systems, technologies of land use and behavior of people, which take part on all levels and all segments of system. Transport is in rapid growth, and accordingly to that, it represents the sector with the fastest growth of environment pollution [8]. Road transport is one of the greatest pollutants of air, water and ground, noisy etc. [1]. Satisfaction of the sustainable development in road traffic can be achieved on many ways [8]. Two ways that are often applied are the following: combined ground transportation and the use of alternative fuels in road traffic. Combined ground transportation is being used in the postal traffic, which includes road and railway traffic. Combined transport is the solution that has all advantages of transport modes, which take part in it. On the other hand, there is a need all deficiencies should be minimized. Also, sometimes, because of the geographical limits, it is not possible to accomplish direct transport, but the combined transport is being used. The sector of road traffic cannot be replaced, but its economic and ecological impact is not on good level. The basic cause, for mentioned bad impacts, is the fact that is expensive and “dirty” fuel that is used. In road transport of postal items, diesel and petrol are mostly being used as fuel. The use of alternative fuels is necessary and it reduces negative impact on environment. Table 3 shows the appropriate impacts on sustainable development in the transport segment as well as the proposed activities and the aim of their realization [1].

Tab. 3 Sustainable development on the transport of postal items

Impacts	The way of acting	Aim
Energy efficiency	Combination of road and railway traffic, wherever it is possible and deadlines permits	Railway traffic is more energetically more efficient, with its role it increases the total energy efficiency of system.
Mobility	Combination of road and railway traffic, wherever it is possible and deadlines permits	Road traffic has notably better mobility, with its role, it increases the total system mobility
Costs		Including the savings of both systems, total costs are being reduced
Negative impact on environment	The use of renewable resources to the level of their regeneration and use of non-renewable resources to the level of possibility of renewable substitute development	Reduction of negative impact on environment

The basic principles of sustainable development in part of postal items delivery, we can consolidate through the perception of sustainable development parameters of some activities in segment of items reception and transport. New trends in the postal items delivery, which will be discussed below, can contribute to sustainable development in this segment, but also at the level of the entire postal system.

3 NEW TRENDS IN THE POSTAL ITEMS DELIVERY AND SUSTAINABLE DEVELOPMENT

Delivery of the postal items represents the last and one of the most important activities in the process of their distribution to the users. Modernizing the delivery system is an essential step to effectively respond to user requests and possible unforeseen situations, which can be a disruptive factor. Due to the numerous possibilities it offers, the application of new technologies for this purpose is a convenient solution. In the field of organization and technological development of items and packages, the most up-to-date tendencies relate to the development of systems for the use of unmanned aircraft - drones and autonomous vehicles. The application of these systems should have a positive impact on sustainable development.

3.1 Delivery by drone

Drone is a type of unmanned aircraft. The most common and traditional use of drones is for military purposes, but more and more are being tested for their use in various special services (police, fire-fighters, health care ...) and civil sectors (various forms of delivery, agriculture ...). Drones consist of a large number of technologically advanced components, which enable them to operate efficiently and reliably. In addition to physical parts, software support, which is a connection between the parts, the drone and the control centre, is also very important, and together with the sensors and between the drones and the environment [9].

Based on the technology they use in flying, the drones are divided into two basic types:

- Independent aircraft - drone flying autonomously according to pre-defined and stored data;
- Remote control drone - The flight is controlled via a remote control, operated by a pilot (operator, navigator ...).

The basic advantages of drones in the field of delivery of packages relate to their speed, the ability to access difficult terrain and remote locations, overcoming obstacles and potential traffic congestion, positive environmental impacts, etc. In addition to numerous advantages, there are

numerous limitations. First of all, the underdeveloped and defined legislation, low transport capacity, the possibility of errors due to incorrect GPS data.

Amazon and DHL are companies that are among the first to test the delivery by drone and work on their development. One very positive argument to consider is that drones can increase the delivery time available. Based on the tests carried out, by Amazon (the territory of Chattanooga, Tennessee), there have been some indications of the functioning of the drones in the delivery system. First of all, the cost of the package delivered to the drone, depending on certain details, is about $ 0.07, while the cost of the courier per package is about $ 1.2. Significantly lower costs of delivering packages are noticeable, than by courier. Due to the expected market expansion in the future, this cost will be further reduced. On the other hand, there are additional costs that are not introduced into the analysis, and they relate to investments in the drone stations [10].

The drive that the drones use is based on an electric battery. For this reason, their positive impact on the preservation of the environment is extremely important. Positive economic performance, as well as ecological characteristics, represent the basic potential of drones to contribute to the sustainable development of the postal system through the delivery system of items. The positive impact on the sustainable development of the postal system is reflected in the following:

- Lower costs - better economic performance;
- The use of environmentally cleaner drives - minimum emissions of harmful gases;
- Indirect reduction of harmful emissions due to reduction of number of delivery vehicles;
- It indirectly affects the reduction of congestion in traffic;
- The ability to access difficult terrain and remote locations;
- Expanding territorial accessibility, which is of great importance for users.

3.2 Delivery by autonomous vehicles

After the introduction of automatic dispatch processing machines, the automation of other parts of the chain of postal items was started. At this point, various pilot projects for the use of autonomous vehicles are being implemented worldwide as solutions for automated delivery or collection of shipments. The first delivery by autonomous truck took place on October 25, 2016 between Fort Collins and Colorado Springs [11].

The potential application of autonomous vehicles in the postal sector is divided into two main categories: delivery to the end user - last mile delivery and line transport of items. Five suitable technologies are identified [12]:

1. An autonomous vehicle operated by a delivery agent - is a semi-autonomous vehicle in which the delivery agent is located, who can manage or perform the tasks of preparing or optimizing the delivery route while the vehicle carries a greater part of the responsibility for driving. Certainly, upon arrival at the desired address, the delivery agent realizes the delivery;
2. An autonomous vehicle parked independently - the activity of finding parking spaces by the delivery agent can negatively affect the efficiency of the delivery process. A vehicle that only locates parking eliminates this problem. After the delivery agent turns on the parking assistant and leaves the vehicle, the vehicle only finds the closest available parking space. After the delivery has been completed, the delivery agent finds the location where the vehicle is located via GPS coordinates.
3. An autonomous vehicle tracking delivery agent - This approach is based on the concept that the vehicle is accompanied by a delivery agent who moves on foot so that the items is always nearby (no loss of time to go to the parked vehicle). This reduces the fatigue of the delivery agent and diminishes the possibility of his injury.

4. An autonomous vehicle that complements the quantity of items on delivery - it implies that at some point in the delivery process the vehicle goes only to the postal network unit on the supplement of the items, and then returns again on the route to the delivery point.
5. Mobile packing box - the vehicle contains partitions that act as mailboxes for themselves. Charged with items, the vehicle would go on delivery, and users could access through the code or bar code to the appropriate partition and take over the items.

Due to the electric drive of the vehicle, their positive impact on the environment is remarkable. It would also indirectly affect the reduction of the number of vehicles that are significant polluters of the environment. Economic indicators are not very accurate, but the fact that further development of technology will influence the increase in the economic availability of these systems.

Depending on which concept is being applied, the positive impact on the sustainable development of the postal system is reflected in the following:

- The use of environmentally cleaner drives - minimum emissions of harmful gases;
- Indirect reduction of harmful emissions due to reduction of number of delivery vehicles;
- It indirectly affects the reduction of congestion in traffic;
- Reducing the possibility of injury of the delivery agent;
- More efficient use of the cargo space - saving time, reducing the number of departures on delivery…

Based on the above mentioned characteristics and possible impacts, it is concluded that the implementation of these innovative systems can lead to the improvement of the sustainable development of the postal service. Also, attention should be paid to different variants of combined delivery.

4 CONCLUSION

The impact of postal operators on the parameters of sustainable development is reflected through the all segments, which are necessary for functioning of the postal system. It is of global importance that postal companies take the initiative that leads to sustainable business as soon as possible. This requires raising awareness first of management, and then indirectly to all employees in the system. Aspirations and activities in the process of promoting sustainable development are part of the strategies adopted at the congresses of the Universal Postal Union. Some of the most important approaches are the application of different business concepts and solutions, such as combined transport, the use of alternative and renewable fuels, the improvement of economic accessibility, etc. New technologies and innovative systems for performing appropriate activities in the process of shipments of items, such as the use of drones and autonomous vehicles for delivery, show great potential for the improvement of sustainable development through all its dimensions. In the future, the issue of sustainability of business systems will be increasingly sensitive. Postal companies, which together constitute a logistic system of enormous proportions, have the responsibility to act in accordance with the adopted strategies. In this way, it will give a good example of successful and responsible business for smaller business systems.

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