

Collecting System as a Factor Influencing the Composition of Municipal Waste

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Abstract

The article describes a change in production of separated municipal waste in change of collection system. It verifies the initial general hypothesis, namely that the production of sorted parts depends on collection system of municipal waste. The article describes a change in output of sorted municipal waste when changing the system for collection municipalities trading company STKO s.r.o.

The system was designed with the three pillars of sustainability:

Environmental Sustainability

Authors system came out of the consideration that is environmentally optimal follow the hierarchy of waste management referred to as the Waste Act and the Due to the focus of a company STKO al. s.r.o. Cartage company - their first steps logically focused on ensuring the intensification of recycling.

Economic sustainability

The new system had to be cheaper than the old system.

Social sustainability

The new system had to be more comfortable than the old system. The aim of the changes to the system of waste collection was based on the initial hypothesis (the production of separated components municipal waste is dependent on the system of collection of municipal waste) to achieve maximization indicators for all three dimensions of sustainability of the system.

In May 2011, was introduced haul system of separate collection and collection of biodegradable waste. In October 2011, was introduced haul system of separate collection and transport of paper and plastic. Since 2012 has been introduced financial incentive system. It is shown that the production of separated components of municipal waste depends on the collection system municipal waste. The final collection system is to evaluate according to its environmental, social and economic sustainability in including even the exclusion of current economic instruments.

Keywords: STKO, ISNO, collecting system, separate waste collection

Introduction

Collecting company STKO al. s.r.o. introduced as part of its strategy of product differentiation modified system of waste collection.

Consideration of the change on three pillars of sustainability:

1) Environmental sustainability

Authors system based on the logic that is environmentally optimal follow the waste hierarchy as set out in the Waste Act (§9a Act no. 185/2001 Coll., As amended) and was out of their account (and consider this article) any problematize This way, in Europe generally respected, the waste hierarchy.

Given the focus of a company STKO spol. s.r.o. – Cartage company – their first steps logically focused on the intensification of ensuring the recycling of waste rather than waste prevention, or preparation for re-use.

2) The economic sustainability

Because it is the final bearer of the costs of waste management community of citizens that responds primarily to the amount of these expenses

must be (for the current and future state of the medium-term economic instruments) a new system cheaper than the old system.

3) The Social sustainability

Transport of municipal waste from citizens depends very much on how the system will pick-users of the system adopted. The aim was to ensure the maximum amount of separate collection of reusable components of municipal waste for recycling.

There were used two premises:

a) Man is a creature lazy – it is therefore necessary to develop a highly convenient system for handling waste.

b) Man is a creature greedy see eg.. (Unknown, about 1000 BC.) – it is necessary to financially motivate users of the system to its optimum use.

Area description

Objective changes in the system

The aim of the changes to waste collection system was based on the initial hypothesis (the produc-

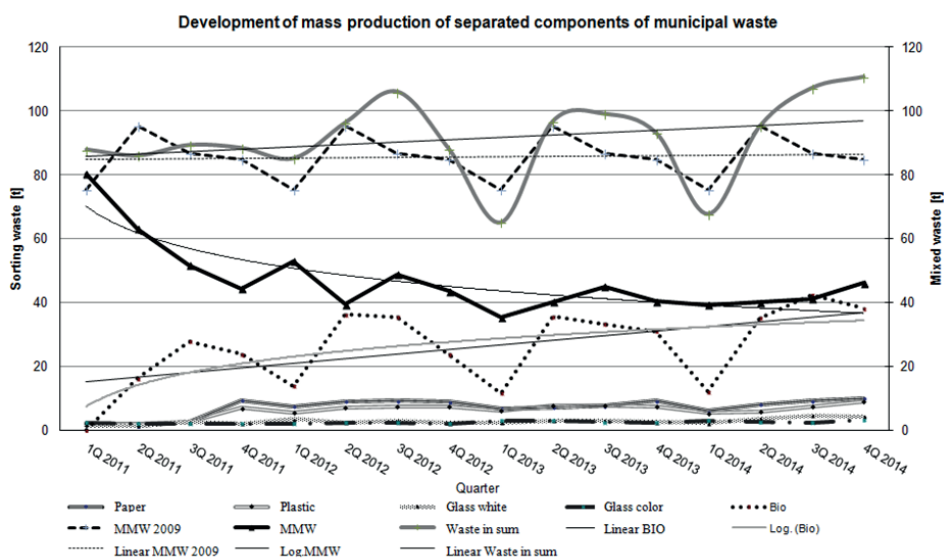


Fig. 1. Development of mass production of separated components of municipal waste

Rys. 1. Ilość frakcji odpadów komunalnych

tion of separated components of municipal waste is dependent on the system of the collection of municipal waste) to achieve the maximization indicators for all three dimensions of sustainability of the system.

Thus ensuring the greatest possible production of separately collected waste usable as material and energy utilization of mixed waste, reducing the cost of waste management of municipalities, the adoption of a modified system of waste collection system users.

Description of the current system

To simplify data analysis (which will be subject to more comprehensive publications) will be subsequently presented data from a single – pilot – the village with 1577 inhabitants.

In the municipalities served by commercial companies STKO spol. s.r.o. introduced the standard weekly collection and transport of mixed municipal waste and kerbside collection and transport of packaging waste (paper, plastic, glass).

Description of the innovation system

Disposal system of separate collection of bio-waste and cartage

In May 2011, we were introduced haul system of separate collection and transport of biodegradable waste. Investments in the order of the low tens of millions of crowns (collection containers, take-away technique, composting, promotion) were 90% co-funded by the SEF. To economic considerations, however, were included in the total investment costs amount.

The principle function of this innovation is the maximum possible comfort odvozného system of

separate collection and transport (ie the use of the third pillar of sustainability indicated in the introduction as "a", thus ensuring a high amount of separately collected waste material usable.

Disposal system of separate collection of paper and plastic

In October 2011, we were introduced haul system of separate collection and transport of paper and plastic.

ISNO

Since 2012, a system was introduced commercially called ISNO that by identifying each handled by a collecting vessel and knowledge of users of each mounted containers set individual local fee for waste each Participating users of the system.

The system motivates financially users of the system according to three basic criteria:

- 1) If the user has a high proportion of optimal production of paper and plastic, the lower the following year a local fee for waste.
- 2) If the user has a low proportion of optimal production SKO, the lower the following year a local fee for waste.
- 3) If a user is served an optimum volume of containers of paper, plastic and SKO, the lower the following year a local fee for waste.

ISNO aim is that the user of the system being so as to achieve the first and second pillars of sustainability system using the third pillar sustainability indicated in the introduction of this article as "b".

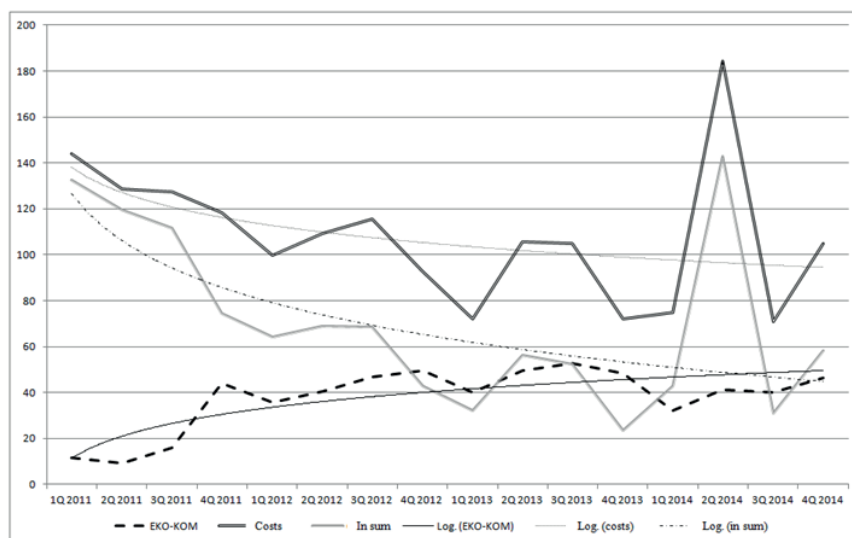


Fig. 2. Development costs and revenues from the authorized packaging company
Rys. 2. Koszt i zysk firmy opakowaniowej

Results and discussion

Due to the commercial nature of the company STKO spol. s.r.o. we are not authorized to publish the tabulated data, but only their artwork. But such differences are so significant that it can be assumed that obvious.

Environmental sustainability

From Fig. 1 it is evident that there was a significant increase in production biowaste substantially immediately with the introduction of the separate collection and collection. The key was that due to the reduction of the frequency of collection SKO weekly to fortnightly decreased production of SKO (the cost of removal/energy recovery are highest, as well as the environmental aspects of the handling).

It is further obvious that by introducing odvozného collection and transport system of paper and plastic, has a similar effect described in the previous paragraph.

Conversely, there are no indications that the influence of the introduction of an incentive system ISNO been some other drastic changes in the production of separated waste components. It is therefore obvious to conclude that the user is more important to ease when the system before its financial motivations. Perhaps that can be generalized into account the entire plane, that man is lazy rather than greedy.

Not very remarkable that the production has BRKO after a step change due to the introduction of constantly increasing production – see logarithmic interpolation series "BIO".

Economic sustainability

From Fig. 2 it is clear that due to the innovation system has been a noticeable drop in the cost of waste management community and to increase revenue from the AOS.

In 2011, the costs excluding VAT, after deducting the proceeds from AOS 438 CZK per person in 2012 CZK 244 in 2013 to CZK 164 in 2014, 275 CZK.

Excellent results of 2012 and 2013 were due to the full operation of efficient and functional innovated system. Deterioration in 2014 brought both a step increase in costs in one of the quarter and a reduction in royalties from the authorized packaging company due to policy changes of the EKO-KOM.

Critical look at innovative system in case of change of economic instruments

Liability of packaging producers

In 2011, revenues from royalties from AOS EKO-KOM 81 CZK / person (pulpwood system of separation of packaging waste was functional only in the 4th quarter in 2012 CZK 173, in 2014 191 CZK, 2014 CZK 160.

It is obvious that these yields are essential for the economy of the entire system, it must be noted therefore that it is a typical economic tool which only ekonomizuje responsibility of packaging producers for their products.

In the event of changes in the Packaging Act, or AOS situation in the Czech Republic can be expected some fluctuations in the amount of such rewards, as already indicated reality of 2014.

Yet the cost of operation of the modified system in 2011 519 CZK per head in 2012, when the system is fully running, CZK 417 in 2013 CZK 355 and CZK 435 in 2014.

The fee for landfilling

Outside the scope of this article - and the probable medium- and long-term development of legislation in the Czech Republic is worth reflection of changing economic system in case of reduction (cancellation), or increased charges for waste deposited in landfills.

It is obvious that the proposed increase in the fee mentioned tweaks comparison intense "recycling" systems, while very unlikely fee reduction would have been touched in comparison with the conventional system, while negatively, but not fatally.

Abbreviations used

SFŽP – *The State Environmental Fund of the Czech Republic*
SKO – *Směsný komunální odpad*
ISNO – *Intelligent waste management system*
BRKO – *Biodegradable municipal waste*
AOS – *Authorized packaging company*

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Sposób zbierania jako czynnik wpływający na skład odpadów komunalnych

Artykuł opisuje różnicę w morfologii segregowanych odpadów miejskich w zależności od sposobu ich wywozu. Zweryfikowano założenie, zakładające że produkcja frakcji części odpadów zależy od systemu zbierania i wywozu odpadów komunalnych. W artykule opisano zmianę wydajności posegregowanych odpadów komunalnych po zmianie systemu zbierania w spółce STKO s.r.o. odbierającej odpady gminne.

System został opracowany z uwzględnieniem trzech filarów zysku:

Zysk dla środowiska:

Opracowany system z założenia miał być optymalny z uwzględnieniem hierarchii postępowania z odpadami na bazie danych ze spółki STKO s.r.o.

Zysk ekonomiczny:

Nowy system musiał być tańszy od starego.

Zysk dla społeczeństwa:

Nowy system musiał być wygodniejszy od starego. Cel zmian w systemie zbierania odpadów był oparty na wstępnym założeniu (produkcja frakcji odpadów miejskich jest zależna od systemu zbierania odpadów miejskich).

W maju 2011 wprowadzono system wywozu odpadów segregowanych i transportu papieru oraz plastiku. Od 2012 stosuje się finansowy system motywacyjny. Pokazano, że produkcja segregowanych odpadów miejskich zależy od obranego systemu zbierania tychże odpadów.

Słowa kluczowe: STKO, ISNO, system zbierania, selektywne zbieranie odpadów