

ENVIRONMENTAL ACTIVITIES IN WASTE MANAGEMENT OF MUNICIPALITIES

VYBRANÉ ENVIRONMENTÁLNÍ AKTIVITY V ODPADOVÉM HOSPODÁŘSTVÍ OBCÍ

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Abstract

Questions of the environment are very actual. Companies make steps to be differentiated e.g. by certifications, to show that they are not indifferent to the environment. People cannot be certified the same way as companies can, still people's impact on the environment is substantial. Municipalities are obliged to treat waste that people produce, at the same time people often have no possibility to influence the way of the waste treatment. Environmental management accounting or similar environmental activities applied in waste management can help to optimize the system and find hidden environmental costs and benefits. Data connection of financial and management accounting in local agenda can answer lots of questions.

Abstrakt

Otázky životního prostředí jsou velice aktuální. Podniky se před svou konkurencí odlišují mj. i tím, že svému okolí ukazují, že přístup k životnímu prostředí pro ně není lhostejný. Obyvatele nelze certifikovat tak, jako výrobní podniky, přesto vliv každého člověka na stav okolní přírody je nezanedbatelný. Jsou to obce, které likvidují lidmi vyprodukovaný odpad jako vlastní, přitom obyvatelé často nemají možnost způsob nakládání s odpady v obci ovlivnit. Environmentální manažerské účetnictví nebo podobné environmentální aktivity aplikované na oblast odpadového hospodářství můžou vyplnit prostor při optimalizaci systému a pomoci nalézt skryté environmentální náklady a výnosy. Propojení dat z finančního a manažerského účetnictví v obecní agendě může přinést odpovědi na mnoho otázek.

Key words

waste management, environmental management accounting, ecological footprint, Local Agenda 21, EMAS

Klíčová slova

odpadové hospodářství, environmentální manažerské účetnictví, ekologická stopa, Místní agenda 21, EMAS

INTRODUCTION

Waste management is a developing discipline attracting deserving attention. Many experts or laymen on all levels deal with this topics. There are many studies and projects of the Ministry of the Environment of the Czech Republic, also many other institutions try to solve the questions of the environment. Then there are many initiatives, associations or joint municipalities dealing with the task – what to do with waste and how much does it cost.

Experts of the environmental departments agree, that attitudes as Environmental Management Accounting (EMA), Local Agenda 21 (LA 21) or ecological footprint can be useful tools in environmental questions, specifically within waste management. Efficient setting of the system of waste management could help to find hidden reserves in cost. Public sector is trying successfully to implement different methods or techniques form business regarding monitoring and managing environment issues.

The article aims at the possibilities of environmental activities in municipalities, especially at EMA, that is already applied abroad.

1 ENVIRONMENTAL ACTIVITIES IN A MUNICIPALITY

Waste treatment is a legal duty of municipalities, and is considered as a service necessary for residents life. The municipality is considered as waste producer since residents lay waste in given places. The municipality is then an owner of waste and has a duty to treat waste according to the law No. 185/2001 Sb.

The aim of public administration is according to Půček (2005) “to increase the quality of live of residents together with respecting the rules of sustainable development, and to increase the performance and quality of public services”. The aim reflects the principles of so called “good governance”, that was introduced by the UN in 2000 (Soukopová, 2015).

Půček (2005) in the chapter about the environment mentions topics leading to the satisfaction survey:

- quality systems and respect for nature according to **ISO 9001** and **ISO 14001** at municipal companies,
- Balanced Scorecard method applied in municipalities, regions and at strategic planning.

Eco-Management and Audit Scheme (EMAS) motivates the organisations positively to the responsible access and improving environmental performance beyond the framework of legal requirements (Cenia, 2012). It was created by the EU in order to identify and monitor companies' impact on the environment and to publish information through Environmental Statement.

One of the differences between EMAS and ISO 14001 is according to Hájek (2011) in the focus in “*indirect environmental aspects, that are typical for public organizations (offices, financial institutions etc.)*”.

There are 27 subjects in the Czech Republic registered in EMAS database. Four of them are public institutions, specifically:

- Chrudim Municipality,
- Jilemnice Municipality Office,
- Regional Authority of Moravskoslezský kraj,
- University Hospital u sv. Anny in Brno.

Implementation of tools for **environmental management systems (EMS)** and information change can help according to Hájek (2011) to the effective reduction of negative impacts on the environment. *“Since beginning the projects are aimed at tools and particular measurements connected with the system of environmental management, e.g. Projects of cleaner production and pollution prevention, application of the best available techniques, growing of energy efficiency, or support of methodical tools as handbooks for local government, manual EMS easily!, websites and others.”*

To ensure the functional EMS system, it is necessary according to Fildán (2008) to create measurable indicators of the environmental profile of the company. The indicators must be objective, verifiable and repeatable.

Indicators of waste management are in Table 1, as Fildán (2008) introduces in his text.

Tab. 1 Indicators for waste treatment

Indicator	Unit	I. Q	...	Σ / year	Last year	Progress in %
Total production of waste	t					
Total production of waste per the production unit	t/PU					
Production of hazardous waste per production unit	t/PU					
Rate of waste recovered (inner)	%					
Rate of waste recovered (external)	%					
Costs for waste disposal	CZK					
Costs for waste disposal per production unit	CZK/PU					
Products in waste management	CZK					

Source: Fildán (2008)

Local Agenda 21 (LA 21) is often used abroad as a quality standard in the field of public relations and sustainable development (Ball, 2002; Schaltegger, Hahn and Burritt, 2001). In the Czech Republic it is introduced through the methodology of Healthy

Cities of the Czech Republic. The current status of the process is shown in Table 2 (Category A – the best ones).

Tab. 2 Current status of LA 21 in the Czech Republic

Category	Number	Category	Number	Category	Number
category A	2	category C	45	interested	93
category B	3	category D	32	others	44

Source: Ministry of the Environment of the Czech Republic (2016)

Ecological footprint (also called green accounting) is according to TIMUR (2016) a global indicator of people's impact on the environment. It is the size of the area that is necessary for the production of resources and waste disposal that some unit (nation, state, community etc.) drawn from the nature and nature into stores to meet their needs. This is the part of demand. The offer is called bio capacity, so the sum of productive areas (e.g. arable land, forests or water bodies) that a person (city, nation) has at the disposal. When comparing the ecological footprint and bio capacity, it is possible to find out, if the given unit creates an ecological reserve or a shortage.

Table 3 compares ecological footprint, bio capacity and ecological reserve/ shortage in selected countries. The Global hectare (gha) means the sum of biologically productive dry land and water bodies at the disposal for one inhabitant of the planet.

Tab. 3 Ecological footprint, bio capacity and ecological reserve/ shortage in selected countries

	Ecological footprint per inhabitant (gha)	Bio capacity per inhabitant (gha)	Ecological reserve (+)/ shortage (-) per inhabitant (gha)
World	2,7	1,8	-0,9
USA	8,0	3,9	-4,1
China	2,2	1,0	-1,2
India	0,9	0,5	-0,4
Russia	4,4	5,8	+1,4
Japan	4,7	0,6	-4,1
Brazil	2,9	9,0	+6,1
Great Britain	4,9	1,3	-3,6
Congo	1,0	13,3	+12,3
Czech Republic	5,7	2,7	-3,0

Source: Tomšík (2016), according to Ewing et al. (2010)

Ecological footprint of the city is a complex indicator of environmental sustainability of the city. It converts sources (e.g. electricity, natural gas, gasoline, building materials, food, timber, etc.) consumed by residents and institutions of the city together with their waste, to

corresponding bio productive areas. Then it is compared with bio capacity, thus sources that the city has at disposal. Twenty-four towns and one region used the calculation of this indicator in 2010-2015 in the Czech Republic.

2 ENVIRONMENTAL MANAGEMENT ACCOUNTING

Environmental accounting terminology often uses such words as ‘full’, ‘total’, ‘true’, ‘comprehensive’ and ‘life cycle’ to emphasise that conventional organisational management and accounting approaches are incomplete in scope because they overlook important environmental benefits and costs (EPA, 1995; Qian, Burritt and Monroe, 2008, 2011).

EMA can be generally defined as identification, measurements, accumulation, analysis, preparation, interpretation and communication of information about material and energy flows, information about environmental costs and other value terms information that are base for the decision making processes in company (Remtová, 2006; Farský, Ritschelová and Sidorov, 2006). The aim is to find out, how the activities linked to environmental questions are displayed in financial flows of the company. So EMA puts emphasis at accounting linked to the environmental costs.

According to Hyršlová and Vaněček (2003) EMA works with identification, accumulation, presumptions, analysis, reporting and communication of:

- informations about material and energy flows,
- informations about environmental costs,
- other value terms information that are base for the decision making process.

EMA uses two subsystems, which is not very common at the traditional management accounting. It puts side by side EMA in monetary units (MEMA) and EMA in physical units (PEMA). Non-financial aspects of the company's performance are for EMA management substantial. EMA tools specific for MEMA and PEMA, past oriented and future oriented, are summarized in Table 4.

Tab. 4 EMA tools

EMA – Environmental Management Accounting			
MEMA (Monetary Environmental Management Accounting)		PEMA (Physical Environmental Management Accounting)	
specific MEMA tools		specific PEMA tools	
past oriented	future oriented	past oriented	future oriented
<ul style="list-style-type: none"> • environmental costs accounting • accounting for environmental benefits 	<ul style="list-style-type: none"> • monetary environmental budgeting • monetary environmental investment appraisal 	<ul style="list-style-type: none"> • material accounting • energy flow accounting 	<ul style="list-style-type: none"> • physical environmental budgeting • physical environmental investment appraisal

Source: Schaltegger, Hahn and Burritt (2001)

Tab. 5 EMA information

Physical and monetary accounting for waste and recycling activities	Hidden and external cost and impact accounting
<i>Garbage waste - physical</i>	<i>Indirect costs</i>
Quantity of garbage waste collected	Public waste education and outreach costs
Quantity of garbage waste incinerated	Administrative costs for waste management
Quantity of waste sent to landfill	Waste reporting and auditing costs
<i>Garbage waste - monetary</i>	Landfill disposal costs avoided via recycling and reduction
Garbage waste collection costs	<i>Future-oriented costs</i>
Garbage waste to energy sales revenue	Costs associated with expected closure of landfills currently being used
Garbage waste disposal costs	Expected costs of long-term post-closure, rehabilitation and monitoring of landfills currently being used
<i>Recyclables and green waste – physical in total</i>	Expected costs of landfill site and facility replacement
Quantity of total recyclables collected	Anticipated costs of regulatory changes
Quantity of total recyclables recovered	Anticipated remediation costs
Contamination rate of total recyclables	<i>Externalities</i>
Quantity of total green waste collected	Environmental benefits from current recycling services
<i>Recyclables and green waste – monetary in total</i>	Environmental impacts generated by current recycling services
Total recyclable collection costs	Economic value of resources being buried as waste in landfill
Total recyclable sorting and recovery costs	Cost associated with reducing greenhouse effects contributed by waste streams
Total recyclable sales revenue	Costs associated with controlling toxic and odorous landfill gas emissions
Total collection costs for green waste	Costs associated with landfill leachate collection and treatment for protection of ground water
Total processing costs for green waste	Costs associated with the loss of land capacity and value because of waste disposal
<i>Integrated in total</i>	Cost associated with the loss of amenity because of waste disposal
Cost per tone for total recyclables	
Cost per household for total recyclables	

Source: Qian, Burritt and Monroe (2011)

According to Qian, Burritt and Monroe (2011), methods of full costs and life cycle method were developed since 90. of 20th century, in order the 'full', 'total', 'true', 'comprehensive' and 'life cycle' costs, together with cost linked to negative externalities (as environmental quality degradation costs, resource depletion costs) can be integrated to the waste management of companies. Only limited information is available on how this works within local governments. There are only studies of the authors Qian, Burritt and Monroe (2008, 2011) from Australia.

The case studies of Qian, Burritt and Monroe (2011) were aimed at EMA practices and motivation to its application. By interviews, data collecting and sorting and analysis at 12 local Australian governments of different size, EMA information in waste management were recorded (Table 5).

There are two aspects in the studies of Qian, Burritt and Monroe (2011): level of EMA in local governments and motivation for use of EMA in waste management of the municipality. Particular EMA information, as stated in Table no 5, were completed by the number of municipalities that follow the given information. Conclusion of the study is, that most of the municipalities follow 30 - 60 % of the EMA information, mostly dates in total without deeper specification. Hidden and indirect costs are mostly ignored. One of the municipality applies 95 % of EMA information.

Although local governments cannot be fully aware of the EMA concept, the same information are collected and communicated as in business.

One of the outcomes of the study is the growing concern in EMA information in waste management. If the information will serve as a useful tool that will help local governments to reach efficient outcomes, they will be use widely.

CONCLUSION

Many municipalities solve the problem of growing costs for waste treatment by growing fees for residents. The questions of waste management should be solved as a complex of activities with the aim of waste reduction, reuse and recycling. Waste can be considered as a source in economically sustainable environment, and in such system where it is able to provide information for decision making support.

Environmental management accounting presents such approach that combines data from financial and management accounting and data about material and energy flows in order to use material and energy efficiently, to ease the impacts on the environment, to reduce risks, to lower environmental costs and to improve net income of the company. Environmental management accounting means a certain form of external report, and experts of the environmental departments suggest to apply EMA or ecological footprint as a useful tool in local agenda.

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