Evaluation of home composting programmes in the frame of urban sustainable development policies

Christos Karkanias[1], Georgios Perkoulidis[1], Dionisios Logothetis[1] and Nicolas Moussiopoulos[1]

[1] Laboratory of Heat Transfer and Environmental Engineering, Department of Mechanical Engineering,

Aristotle University Thessaloniki, Thessaloniki, Box 483, GR 54124, Hellas

Corresponding author: ckarkanias@aix.meng.auth.gr

Abstract

The concept of urban sustainable development, although not new, has been expanded nowadays and included in the strategies adopted by a continuously increased number of national and local authorities worldwide. The major problems of environmental degradation and the lack of energy sources, as a result of the massive industrial growth, have led to a financial crisis that strongly affects local communities. Urban sustainable development derived from the need for local authorities to adopt alternative rational measures making cities viable for their citizens. This paper focuses on the waste management sector where multiple rational systems regarding organic waste management have been implemented during the last decade in several municipalities in Hellas. More particularly, this study aims at evaluating home composting programme implemented in the municipality of Neapoli-Sykies in Northern Hellas, while estimating the effect this programme had on waste generation rate as well as on the citizens behaviour towards urban sustainability. The monitoring of the home composting programme took place both at its early and middle processing phases by conducting in-person interviews with composting bins users.

Keywords: urban sustainable development, home composting, organic waste, environmental degradation, waste management, rational system.

Introduction

The implementation of rational waste management schemes tends to be a trend nowadays in numerous municipalities in Hellas based on the concept of urban sustainable development. The indicators that define urban sustainability and developed in the frame of CAT-MED project include community sectors such as territorial management and urban design, mobility and transport, natural resources management as well as social and economic cohesion. According to this concept, the adoption of rational waste management schemes is a step for the transition from current industrialized cities to sustainable (Turcu 2012 & Bai et al. 2010) and viable ones (Kharrazi & Masaru 2012).

More specifically, minimisation of waste production is considered as sustainability principle in strategic environmental assessment (Lamorgese & Geneletti 2013, Li-Yin Shen et al. 2011). Furthermore, the recent introduction of home composting programme – included in waste minimisation ways - in Hellenic local authorities' waste management strategies has changed the balance between the rational schemes implemented during the last decade in the country. Although recycling of packaging and other materials is by far the most used scheme in Hellas home composting has recently been adopted by an increasing number of local authorities, while in many of these cases comes first in the hierarchy preceding recycling (Karkanias et al. 2012).

The importance of home composting comes from the fact that organic waste represents almost 40% of the total generated waste in Hellas (Technical Chamber of Greece 2006). In this sense, this study aims at evaluating home composting programme implemented in the municipality of Neapoli-Sykies, in Northern Hellas. Particularly, the programme evaluation includes the estimation of the effect this waste management system has on waste generation rate as well as on the citizens behaviour towards urban sustainability.

Materials and methods

The methodology followed for the development of this study includes the monitoring of the home composting programme that took place in the aforementioned municipality in Hellas both at its early and middle processing phases by conducting in-person interviews with composting bins users. The evaluation of the interviews' results and the information derived from the composting bins recording help at estimating the success home composting programme had in the selected municipality, whereas the effect this programme had on the citizens' behaviour was assessed.

The research interviews were conducted from January to June 2013 as part of door-to-door campaign that took place during 2012 and 2013 in the area of Neapoli-Sykies municipality concerning, except for home composting monitoring, provision of information and suggestions for problems solution. It is needed to be mentioned that a number of interviews were conducted twice in composting bins owners that faced significant problems regarding the use of their bin, though another percentage of them addressed to new members of the home composting scheme. In this research the actual situation regarding the bins condition was recorded, while interviewees brought to light any problems related to composting process.

Results and discussion

The majority of the interviews (77%) were conducted to citizens owning composting bin for over a year and only 6% of them to a short period owners. The interviewees using every day their composting bin reached the 19% of the total, when 52% of them are frequent users and only 2% of the total never compost their organic waste (Fig. 1). Furthermore, as observed during the interview, 1 out of 10 bins were full of organic waste, whereas almost half of them presented high filling rate. At the same time, according

to the results analysis just 2% of the citizens taking part in the research expressed their wish to no longer participate in the programme and wanted to return their bin.
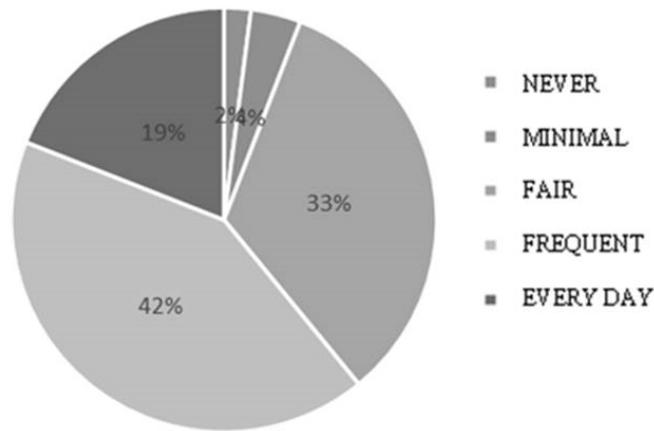

Figure 1: Rate of composting bins use in Neapoli-Sykies municipality.

On the other hand, it is worth to mention that 65% of the interviewees had already used compost produced in their bins, though in many of these cases the owners were highly satisfied with the collected amount.

The research also revealed a number of problems many of the interviewees face during the composting process, although most of them encounter no malfunction of the system after following the guidelines provided before the programme implementation. The most frequent problem faced at the implementation process is the necessary shredding for waste such as pruning followed by the presence of insects close to the composting bin as well as the appropriate moisture and aeration needed to be achieved for the optimal production of compost (Fig. 2).
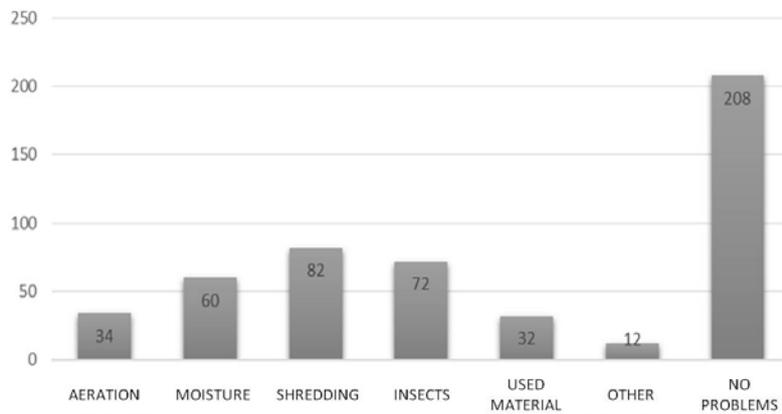
Figure 2: Problems faced during the home composting implementation process in

Neapoli-Sykies municipality.

In addition, the rate of composting bins use is strongly related to the implementation period of home composting programme. The analysis of the results presented in Fig. 3 show that the longer is the implementation period of home composting the higher is the rate of the bin's use. As it has been proven in the case of Neapoli-Sykies municipality, the citizens participating in home composting scheme for over a year is most likely to use their bins in an everyday rate than those who just started compost their organic waste.
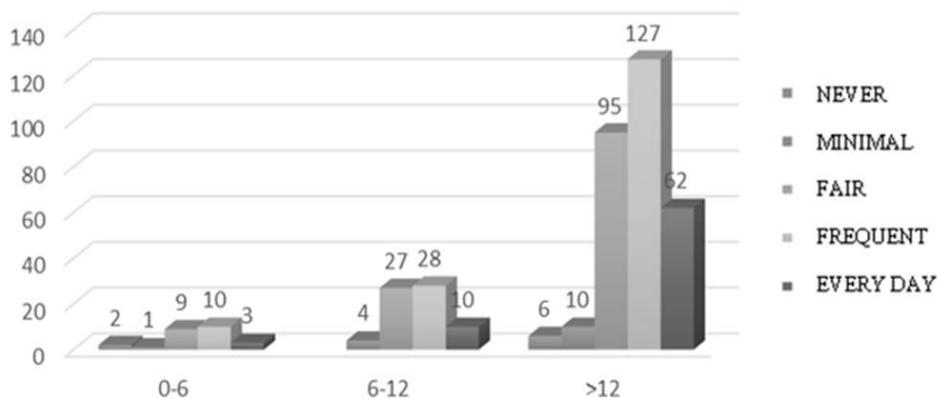

Figure 3: Rate of composting bins use in respect to home composting implementation period in

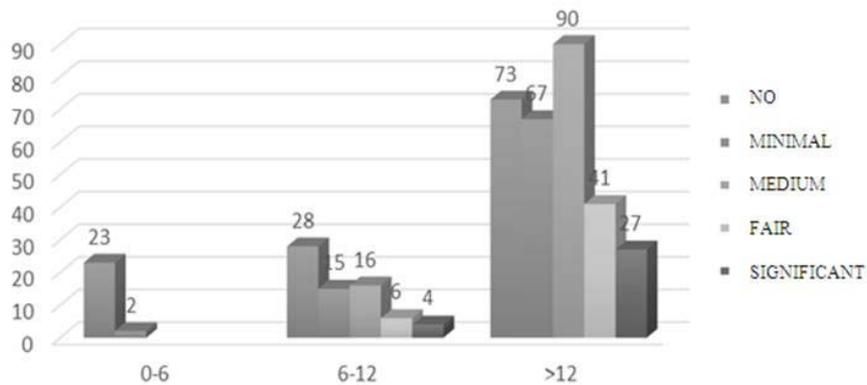Neapoli-Sykies municipality.

Figure 4: Compost production in respect to home composting implementation period in

Neapoli-Sykies municipality.

Another result derived from the research was that the production of compost starts after a 12-months implementation period of home composting (Fig. 4). The long period required for citizens to collect and use their compost is based on the one hand on the specific time needed for organic waste digestion and on the other hand on the difficulties and problems they face during the composting process. As Fig. 4 presented, compost production tends to increase from medium to significant after citizens' familiarization with the use of composting bin.
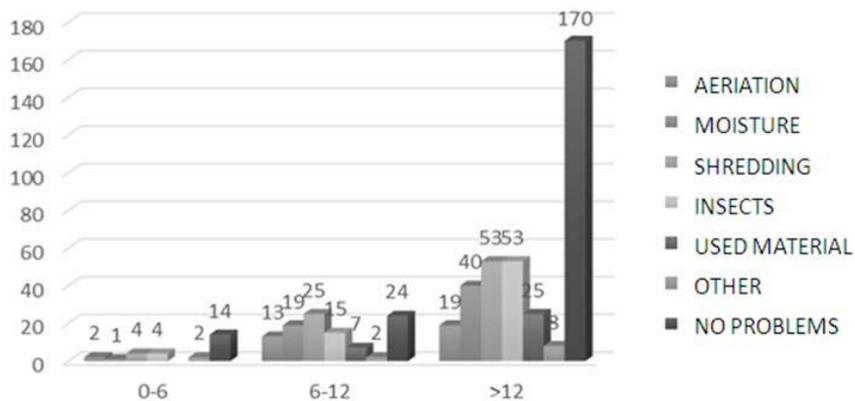

Figure 5: Problems faced during the home composting process in respect to implementation

period in Neapoli-Sykies municipality.

Finally, as expected, the multiple problems the composting bins owners faced during the implementation process started being eliminated after a 6-month period, while disappeared in most of the cases after a 12-month period (Fig. 5).

As mentioned before, the conduction of interviews to composting bins owners took place as part of a recycling and home composting campaign in Neapoli-Sykies municipality. The aforementioned campaign led to a significant (almost 40%) increase of the citizens' network participating in the home composting scheme (Fig. 6). The increase of the installation rate of new composting bins in households in the municipality area refers to the period of the information campaign and indicates the importance of building up knowledge.
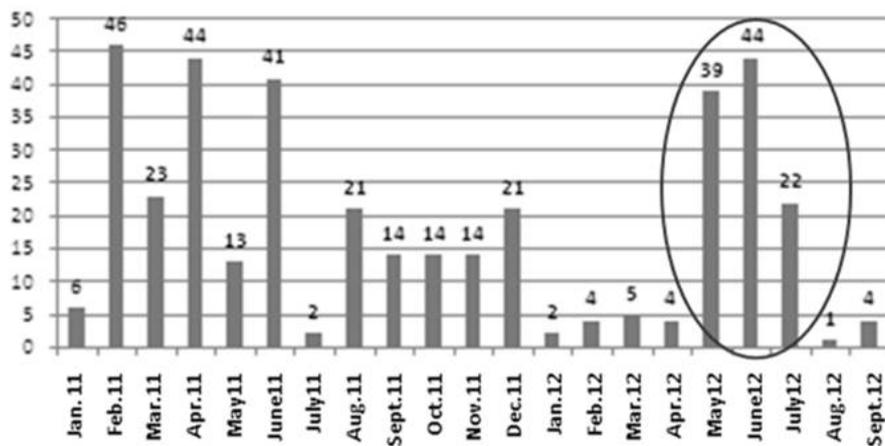

Figure 6: Number of composting bins installation in Neapoli-Sykies municipality.

Conclusion

The implementation of rational waste management schemes tends to be a trend among local authorities in Hellas, while including them in the adoption of strategies in the frame of urban sustainable development. In the case of Neapoli-Sykies municipality the implementation of a home composting scheme brought

significant results on waste generation rate as well as on citizens' behaviour towards sustainable waste management. The research that took place via interviews conducted with composting bins owners in Neapoli-Sykies municipality brought to light multiple aspects of this waste prevention programme and indicated its significant contribution in this purpose. Besides, it revealed several problems faced by citizens during the implementation of home composting scheme, whereas identified the relation between these aspects and the implementation period.

In conclusion, the conduction of information and sensitivity campaigns is a very important factor for such programmes to succeed. Building up knowledge increases the participation of citizens in new rational waste management schemes and help in achieving the targets of these programmes.

Acknowledgements

References

Bai, X., Roberts, B. & Chen, J. (2010) Urban sustainability experiments in Asia: patterns and pathways. Environmental Science and Policy, 13, 312-325

Karkanias, C., Karagiannidis, A., Antonopoulos, I.S., Samaras, P. (2012) Adopting rational waste management schemes: The case of Preveza municipality. Economics and Policy of Energy and the Environment, 3, 65-79

Kharrazi, A. & Masaru, Y. (2012) Quantifying the Sustainability of Integrated Urban Waste and Energy Networks: Seeking an Optimal Balance between Network Efficiency and Resilience. Procedia Environmental Sciences, 13, 1663-1667

Lamorgese, L. & Geneletti, D. (2013) Sustainability principles in strategic environmental assessment: A framework for analysis and examples from Italian urban planning. Environmental Impact Assessment, 42, 116-126

Shen, L.Y., Ochoa, J.J., Shah, M.N. & Zhang, X. (2011) The application of urban sustainability indicators – A comparison between various practices. Habitat International, 35, 17-29

Technical Chamber of Greece (2006). Solid waste management in Greece. The case of Attica region

Turcu, C. (2012) Local experiences of urban sustainability: Researching Housing Market Renewal interventions in three English neighbourhoods. Progress in Planning, 78, 101-150