

Editorial

Waste Strategies Development in the Framework of Circular Economy

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1. Introduction

Current studies proposed that more than 2bn tons of solid waste/year are produced globally [1–3]. Waste, in its general definition (solid and/or liquid), is among the most challenging environmental concerns in many communities. Considering the goals that are raised in the context of the circular economy (which focuses on the recycling of at least 65% of communal waste by 2035, and up to 70% by 2030, according to the common EU target), several strategies are needed. To propose any answer to waste management, strategies related to the hierarchy, as mentioned in the waste framework directive (WFD), must be developed. This special issue invited submissions connected to strategy development at the horizontal level, i.e., solid waste, wastewater, agri-waste, etc. [1–21].

The responses to our invitation had the following statistics:

- Submissions (16);
- Publications (14);
- Rejections (2);
- Article types: research article (13), review article (1)

The authors' geographical distribution (published papers) is:

- Cyprus (3)
- Greece (2)
- Kazakhstan (2)
- Australia (1)
- China (1)
- Oman (1)
- Palestine (1)
- Spain (1)
- Tunisia (1)
- United Kingdom (1)

The published submissions, without limitation, are related to waste strategies management, air pollution, waste valorization, environmental impact evaluation, life cycle analysis and wastewater treatment.

2. Short Review of the Contributions in This Issue

Although waste will continue to grow, and despite several efforts to reduce waste in many levels, there is a total absence of a holistic approach at the political level to solve the crisis of waste management in depth. In fact, since the treaty of Rome, back in 1957, there



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was no common statement from the leaders to take action on environmental protection. For more than 60 years, there were no specific initiatives at the European level. A strategic approach is needed and is essential to solve the problem [1–21].

Ciu et al. [4] presented the subject-object-process model, within the waste classification management system, and proposed a model focused on municipal solid waste (MSW), which also uses several KPIs (Key Performed Indicators)—considering Beijing, China, as an example, and the citizens' behaviors in several household waste management systems (WMS). The proposed research indicates that in the existing WMS the interaction between government management and residents' domestic waste classification behavior varies from 0.40 to 0.68, compared with the behavior between companies and residents, which varies from 0.45 to 0.75. Social behavior is considered a vital issue in any waste strategy plan, as through the analysis of the social attitude and behavior of the participants several weaknesses have been defined in order to improve the existing management system and the appropriate strategy.

Food waste prevention is on the top of the stakeholders' priority list at the global level [5,6]. Several studies mentioned that the households are the main food waste producers. Among the main issues concerning food waste and the predictability of consumers' behavior, Kritikou et al. try to analyse, in their last report, the main factors that affect food waste generation in Greece [7]. The authors have used 921 households from Greece based on a structured questionnaire considering all ethical issues. Using the Theory of Planned Behavior, they examined the relations between the attitude to food waste, subjective norms, perceived behavior at intention, control, and self-reported behavior, considering the knowledge on prevention control in general. The proposed research indicates that the food waste prevention was mainly determined by a general environmental attitude. This has a direct effect on environmental education and food waste prevention behavior. Furthermore, the results of the proposed study can act as a reference point for policy makers and the implantation of a campaign focused on food waste prevention.

Conventional policies and practices cannot be resolved during the COVID-19 pandemic. Furthermore, COVID-19 has a direct impact on many industrial activities, like construction and demolition (C&D) waste management. More than that, Extended Producer Responsibility (EPR) may prevent waste development and promote a circular economy strategy, to be adopted in the construction industry. Shooshtarian et al. [8] reviewed the Australian regulatory environment and practice in order to distinguish barriers to implement a relative strategy on C&D considering EPR. Using multiple selection criteria and 59 diverse causes, the presented results point out that there is an extensive support among diverse stakeholders to develop EPR and extend the existing regulation to other materials. The main obstacles remain the relevant cost and the time implications for the EPR policy. The result of this research could be useful for policy makers dealing with EPR policies.

In a strategic approach to help communities and local economies, the entire hospitality industry plays a fundamental role. At the same time, the entire hospitality industry led to opposing environmental effects, particularly in coastal regions which are documented as being of strategic importance. In addition, coastal areas are facing lots of pressure from the hospitality industry due to the massive amount of waste production. Loizia et al. [2] provided responses to the hypothesis that the COVID-19 pandemic lockdown scenario would advance the environmental performance in this area. Until now, there are very few studies focused on the environmental dimensions in any coastal area due to the pandemic. Using a number of KPIs, the environmental performance was measured considering the clean coast index (CCI), waste accumulation index (WAI) and waste accumulation rate (WAR), as well as through micro-, meso- and macroplastic concentrations on the beach. The proposed research could serve as a reference point for competent authorities in order to reorganize their waste management plan, by expanding their waste infrastructures to defend the coastal environment.

Air quality is considered a vital indicator for human health. The World Health Organization pointed out that, on a yearly basis, approximately 7–9 million citizens are

dying due to air pollution issues. In general, air pollution is strictly related to energy production, climate change and human health. Especially in modern cities, air pollution plays a fundamental role in human health, and especially the concentration of PM₁₀, PM_{2.5} and PM₁ μm . The PM concentrations were measured in the city of Limassol in Cyprus from natural (e.g., dust events) and anthropogenic (i.e., traffic, cement works, restaurants) activities in two seasons: summer and spring [9]. The results were useful to monitor the air quality in cities.

A Life Cycle Analysis (LCA) is an environmental tool that is very useful to assess any strategy put in place [10–12]. Litskas et al. [10], using an LCA approach, assess grapes' environmental footprint (EF). Using data from three several production systems from wineries in Cyprus and the database from AGRIBALYSE (life cycle inventory—LCI data), they calculate the EF of the vineyards through the Open LCA software. The system boundaries were chosen from “cradle to winery door”, and 1 ton of grapes carried to the winery was chosen as the functional unit. Machinery, oil and sulfur production were recognized as EF hotspots for organic grapes, while the production of fertilizer was recognized as the EF hotspot for high-input grape manufacture. This research points out that future studies need to enrich the LCI databases.

Considering the effectiveness of wastewater treatment technologies on real conditions is vital for the effective monitoring of wastewater [13]. Poultry slaughterhouse wastewater generated from defeathering, cooling and evisceration processes was preserved using an electrochemical method with Fe-Gr, Fe-Fe and Al-Gr electrode groupings [14]. In addition, water and sanitation is considered as one of the main SDGs—more specifically, the SDG 6. There are many studies focusing on the competence of the wastewater treatment. For this special issue, Meiramkulova et al. [15,16] examined the effect of wastewater behavior in a poultry slaughterhouse. The proposed systems include membrane filtration, electrolysis and ultraviolet irradiation. The study took place in a poultry farm slaughterhouse in Kazakhstan. The water quality index (WQI) was used to provide answers on the quality of the drinking water that were used as a reference point. The engineering plants exposed a high purification productivity for most of the parameters.

Jellali et al. [17] assessed the environmental, technical and economic viability of the anaerobic digestion (AD) sludge formed in a wastewater treatment plant (WWTP). Based on the characterization of the sludge samples, it was mentioned that for a 20-year project the production of electricity through AD was 43.9 GWh, while at the same time the reduction of greenhouse gas (GHG) emissions was greater than 37,000 ton. equivalent CO₂.

Hindiyeh et al. [17] proposed a valuable explanation for avoiding the predicted Sea Level Rise (SLR) by the seawater desalination and storage within the des-plants distributed globally, which in a strategic approach is considered as a very promising scenario.

The agri-sector plays an important part concerning the food safety and scarcity. In addition, the agri-sector contributes to air quality contamination and the associated effects on the human health, and produces huge numbers of several waste types [12]. Olive mill wastes received huge attention due to the high waste volumes, mainly due to their toxicity and their negative impacts on the environment [19,20]. The oil extraction process produces huge seasonal quantities of olive by-products that require noteworthy attention because of their high organic content and significant toxicity due to the phenolic substances with extremely vital environmental issues [21–25]. A promising strategic approach beside composting [21,22] is the thermal conversion of olive mill solid wastes and olive mill wastewaters into a rich nutrient biochar.

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