

Innovative Practices for Pollution Prevention and control Implemented by Companies in Romania

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Abstract: This paper explores the practices of companies present on the Romanian market which are preventing and controlling the pollution in their areas of expertise. Many of the companies are trying to find solutions to implement the United Nations Sustainable Development Goals, some of them pleading for the importance of keeping the environment safe, the ecosystems protected, and the degree of pollution at a lower level. Given the massive use of fossil fuels and other non-renewable resources and the international commitment to the Sustainable Development Goals, care to natural resources and pollution reduction becomes essential in ensuring access of future generations to a safe and healthy life. In today's time, technology plays an essential role in the management of a company, naturally it cannot be absent from the solutions thought to reduce air and water pollution. Hence, the importance of the existing solutions which could be considered innovative measures. The purpose of this paper is to determine the pollution situation and the factors that contributed to it. At the same time, it will present the evolution of the practices applied by companies to combat water and air pollution, so far. The methodology is based on an analysis of the Public Sustainability Reports from the past years, of the activity of the companies on the Romanian market. Through sustainability reports, large companies present the evolution and results of the applied solutions. Anti-pollution practices can be classified according to their field of activity and type of activity. The study contributes to the review of the literature by focusing on the practices implemented by companies in relation to work and the natural environment at the borders of Romania. Companies embrace the fight against pollution, including this as part of their sustainability strategy, as a goal which can be achieved only with teamwork, with the stakeholder's involvement: employees, customers, suppliers, and all those stakeholders who stand for the same values, taking action and using concrete facts to follow the strategy to make an impact for the better.

Keywords: sustainability, solutions against pollution, pollution practices, SDGs

1. Introduction

In recent years, pollution has reached the peak, impacted all forms of life, and continued to do so. The massive use of fossil fuels and non-renewable resources are just a few examples that keep high the pollution level.

The values, the management and the technology of a company play essential roles in reducing the environment pollution. Seeing this, large companies have begun to follow the guidance of the European Union policies and take safety measures, develop practices and resort to various strategies to combat and prevent pollution and its spread.

Among the solutions are the practice of the sustainable development objectives, the measures taken by big companies with high degree of competitiveness and even the development of sustainable strategies; The present study follows the analysis of sustainability reports from 2019-2021 of large companies, and presents the concrete measures taken by project implementation. The paper presents an analysis of the literature review, then the main findings and results, followed by the conclusions.

Within this research were identified several large companies existing on the Romanian market, from food retail, technology and IoT services, and petrochemical industry, as a sample, having an implication and correcting their practices related to pollution on the Romanian territory.

2. Literature review

The problem of pollution has been analyzed by many specialists, and despite the progress made in the last decades by the European Union, pollution is still a great threat to any form of life. Even though the European Green Deal is being implemented by EU country members, the environmental improvement is not significant. Another actor involved in fighting pollution worldwide is the World Health Organization (WHO) is pleading to

protect the planet and ensure a prosperous environment for all inhabitants. From this idea in 2015 the Sustainable Development Goals (SDGs) were established.

There are several SDGs which are linked with the concept of pollution. Combating the pollutants, these harmful materials, natural, or artificial affecting the environment is part of at least 9 of the 17 SDGs covering the impact of the environment but also the social and economic sides, as seen in Table 1. (United Nations, 2020)

Table 1: SDGs involved in fighting pollution

SDG Goals	Indicators
3: Good Health and Well-being	Coverage of essential health services; Access to clean and fresh air and water.
6: Clean Water and Sanitation	Proportion of people using safely managed drinking water services; Proportion of domestic and industrial wastewater flows safely treated;
7: Affordable and Clean Energy	Rate of reliance on clean fuels and technology; Installed renewable energy-generating capacity.
9: Industry, Innovation, and Infrastructure	Level of CO ₂ emissions. Rate of R&D investments.
11: Sustainable Cities and Communities	Urban population living in informal settlements or inadequate housing; Solid waste collected.
12: Responsible Consumption and Production	Food waste index; Recycling rates & renewable energy-generating instalments; Rates of hazardous chemical substances.
13: Climate Action	Disaster risk reduction strategies; Total greenhouse gas emissions.
14: Life Below Water	Plastic debris density; Average marine acidity (pH);
15: Life on Land	Rate of deforestation; Mountain Green Cover Index.

Pollution is affecting the European population, one in eight deaths is due to environmental pollution. Specifically, 90% of these deaths are due to chronic diseases - cancer being the most common. Also, air pollution alone is responsible for about 400,000 premature deaths a year. The most affected people are the elderly, children, people with medical problems or disabilities. Also, educated households are more likely to live in a modern environment with electrification, or cleaner energy sources, hence women and children are less exposed to indoor air pollution. At the same time, plants and animals are affected to the same extent. It has been shown that out of a total of 8 million species of plants and animals on our planet, over one million of them are endangered. (EU, 2020, Zeroing Action Plan)

Therefore, this topic has a high importance for the whole society, and to protect the environment from pollutants, to restore ecosystems and biodiversity and to change the current situation, the European Commission developed in May 2021 an action plan to combat and reduce to zero pollution of water, air, soil, consumer products, marine pollution, and noise pollution, until 2050. This plan is involving all actors part of the society including organizations of any type. For situations where pollution cannot be completely prevented at source, it must be minimized, and then remedial measures will be taken; in case of damages, the solution would be to offer compensations. (Union, 2021, EU Action Plan)

As stated by Bhupendra (2015) the companies must come on the market with innovative solutions to increase their competitive advantage. Organizations must be able to integrate and deploy the resources in a way that encourages the fight against pollution. Several variables must be considered, besides the implementation of the SDGs, the culture within the region they do business, the technology used, the human resources possibility of learning and even the power of investment of the business in projects maintaining the environment safe and unharmed.

Companies play an important role for the target planned at the European level. To reduce pollution, it is necessary to introduce on the market eco-friendly technologies that will support the interaction between the companies and the environment. For a start, the European Commission has developed a document in this regard that presents digital solutions and a set of good practices that can serve as a bear for inspiration and innovation in the business environment. (Union, 2021, Digital Solutions for Zero Pollution)

Using a set of practices are encouraging the companies to fight against pollution and transform the European market leading to a resource-efficient and competitive economy and decreasing the greenhouse gasses until the mid of the century. There are several factors which are degrading the natural environment (air, water, and soil) are usually related to how the industry is managing the processes and activities and its interactions. The practices must be adaptable enough to be accepted by the customers and creative to attract more customers, hence these practices must have innovative characteristics.

The main two key aspects to be achieved by global markets are implementation of low-emissions technologies and sustainable products and services, hence the achievement to be climate neutral and circular economy. (Keim, 2019)

Stratos (2021) state the major impact of the industry on the environment is caused mainly by the remaining waste from industrial activities. The production of materials, raw materials, processing leave behind waste. However, Industry creates jobs, provides food, transportation, services and many other facilities and necessities of modern life, and solutions are found to fight ecosystem pollution.

Air, soil, and water pollution appears often due to waste. Garbage contains toxic, radioactive substances or even organic matter. Organic waste increases the production of methane, a gas that is harmful to humans, animals, and plants. Also, decomposing and contamination of water and soil appears when the substances can seep into the groundwater. All industrial activities use raw materials or materials derived from it, from paper, metal, plastic, or glass. Some of them are more polluting than others. However, some of them could be easier to recycle, others may not.

Hazardous waste needs special disposal areas. Industries generate huge amounts of hazardous waste every year leading to more pollution: more and more spaces are needed where they can be disposed of without affecting the urban and rural environments. (Stratos, 2021)

Even if the production of waste cannot be stopped, it can be managed efficiently, so that the negative impact on the environment is as small as possible. Technology is a way of finding and implementing solutions to prevent, fight and control the pollution, namely encouraging the implementation of waste management, recycling and laws encouraging the fight over pollution.

3. Research methodology

This paper attempts to present detail understanding of pollution practices by companies present on the Romanian market which are taking decisions and implementing the Green Deal and the Sustainable Development Goals into their strategies. The companies studied are part mostly of the retail industry and tech industry having a big impact toward the environment.

The methodology consisted in comparing the measures taken by these companies within their sustainability strategy and through projects. There were identified 4 companies in Romania, present in the region with a background and experience on the market from industries directly affecting the environment, the food industry, petrochemical industry, and IT.

OMV Petrom, Lidl Romania and Kaufland Romania are part of the top five companies with the highest turnover from Romania, even though Bosch does not have such a significant place, only in top 30, there is an interest related to the IT field in Romania, and one of the industries more relevant for the country's economy. The most important industries as mentioned by the Trade Registry of Romania with about 60 billion euro are: retail sale in non-specialized stores of food, beverages or tobacco, construction works for residential and non-residential buildings, freight transport, retail sale of automotive fuel in specialized stores and pharmaceutical goods.

Best practices

According to the sustainability report for the period March 2020-February 2021, one of the most important objectives of Lidl Romania and Kaufland Romania's sustainability strategy is to reduce its environmental footprint. Lidl Romania has achieved collaborating only with transport suppliers using Euro 5 and Euro 6 vehicles, equipping Lidl stores built in fiscal year 2020 with charging stations for electric cars, increasing product suppliers

in Romania, improving certain products or packaging and the like. Moreover, starting with the previous year, Lidl Romania became a member of the Sustainable Romania Coalition and actively participates, together with the other partners, in the meetings organized by the Department for Sustainable Development of the Romanian Government, looking for solutions to contribute to the SDGs. (Lidl Romania, 2021)

For Kaufland Romania several of the pillars of the community investment strategy are related to a greener and cleaner environment, sustainable environment, and eco-driving support. Similarly with the path taken by Lidl Romania, Kaufland Romania started a partnership with Renovatio in fighting pollution using green mobility under the form of a public network of car charging stations in Romania, expanded on the Bucharest - Chisinau route. The stations are located in the parking lots of Kaufland stores in 30 cities in Romania, allowing electric car users to travel along the country, linking practically Western Romania from Arad to the South-East in Constanta. (Kaufland Romania)

Lidl Romania took another measure; implemented in 2020, for customers, new charging points for electric vehicles (EV). Lidl increased the number from 33 to 104 stations build from 2019 to 2020 and made them available for the Lidl customers. (Lidl Romania, 2021)

According to Eurostat, over 75% of EU citizens believe that environmental issues have a direct effect on their health and life. To comply with the EU action plan to reduce air, water and soil pollution, Lidl Romania and its suppliers of fruit and vegetables have reduced their crop protection products to zero or replaced them with other substances recommended by experts based on risk parameters. (Lidl Romania, 2021)

At the same time, the concern for the collection, sorting and recycling of packaging is constant within Lidl and Kaufland, especially since their core business involves a significant amount of packaging. For example one measure taken by Lidl was to change the cash registers, these days the paper used for the vouchers are made without chemical dyes that can be recycled; thus, reducing the negative impact of using rolls of voucher paper and plastic to wrap those rolls. (Kaufland Romania)

The comparison from Table 2 showing the quantities of the inorganic waste collected by Lidl and Kaufland in Romania, it is different. As seen in the table, there is a gap of plastic several tons used by Kaufland in comparison to Lidl, however Lidl prefers to use more cardboard and paper hence it collects more of it. Kaufland collects more steel over the time, because of the campaigns collecting waste in their parking lots, which Lidl is not doing. Both companies tend to increase their collection of packaging and their rates of recycling.

Table 2: The quantities of inorganic waste collected by Lidl Romania and Kaufland Romania

Types of inorganic waste	Lidl	Kaufland	Lidl	Kaufland
	2019	2019	2020	2020
Plastic	1,605	9,950	2,054	10,308
Cardboard and paper	32,413	17,677	39,701	19,353
Steel (metal)	242	2,587	588	2,062
Wood	2,680	3,090	3,928	3,074
Waste electrical and electronic equipment	277	118.7	196	195
Battery	9	98	36	99
Total (tons)	37,226	33,520.7	46,503	35,091

Besides the inorganic waste, there is an important issue about the oil polluting water from the households. Both companies are raising the awareness about this matter, however there are no visible measures on this side.

Lidl Romania also supports stopping food waste. According to the United Nations Environment Program, food waste in Romania resulting from the annual sale of food exceeds 248.000 tons, which means about 13 kg per capita, and at the level of household consumption, the volume is much higher and more worrying, respectively 1.353.000 tons per year or 70 kg per inhabitant.

Regarding the plastic pollution problem, Kaufland launched in Romania the project “Broscuța” (The turtle shaped container) – collection system, for collecting empty bottles of hygiene or cleaning products, which will be recycled to protect the environment. The customer can deposit empty plastic bottles of beauty and personal care products as well as empty containers for cleaning products for the kitchen, bathroom, floors or windows. The collected packaging is periodically picked up by a company specialized in collection, and transported to the

factory in Romania for recycling, through a three-step process: sorting of materials at the automatic station, preparation for recycling and actual recycling through thermoforming. The initiative comes as a solution to the need for a circular economy, to counter the phenomenon of the uncontrolled spread of plastic. (Kaufland Romania)

From the perspective of a company with an expertise in sensor technology, software, and services, Bosch Group has as a strategic goal to provide solutions for a connected life, through products and solutions that either include artificial intelligence (AI) or have been developed or manufactured using it.

The Bosch Group comprises Robert Bosch GmbH and its approximately 440 regional subsidiaries and companies in more than 60 countries. Including business and service partners, as well as the global production, engineering and sales network, Bosch covers almost every country in the world, including Romania. The basis for the company's future growth is its power of innovation. Bosch contributes to its technology and knowledge throughout the value chain, increasing its influence on reducing greenhouse gas emissions, and its business operations have reached climate neutrality since 2020.

The company has a different approach compared with the other two mentioned previously. They use a global strategy for sustainability, which is focused more on minimizing the impact of their operations on the environment without involving the community and stakeholders using visibility campaigns. Bosch is focused minimizing the material and wastewater through treatment in-house, using processes such as ultrafiltration to separate solids and liquids or physical-chemical treatment methods depending on the local conditions.

In 2020 Bosch Group purchased a total of 1,762 tons of key materials, such as steel (1,3 tons), aluminum (197 kg) and plastic (265 kg). They recycled around 4.6 % of the total volume of plastic purchased. In 2020 Bosch group managed to recycle 521.9 kg of the material resources. (Bosch, 2021)

The final example is related to a company, OMV Petrom, from the petrochemical industry, as Romania is a country with such resources. To minimize its environmental impact, OMV Petrom has implemented several innovative measures such as: reducing water abstraction and improving water efficiency, recycling / recovery of generated waste as much as possible, protection of biodiversity with the help of a mobile application enabling employees to easily identify protected species observed within their operational boundaries.

For example, in 2019, our total Water Withdrawal decreased by 55% compared to 2010, and by 2% compared to 2018. Also, the Freshwater Intensity of OMV Petrom decreased by 4.7% in 2019 vs. 2018 based on a 7.2% decrease in Downstream Oil (excluding Power Plants), a 4.7% increase in Power Plants (CCPP Brazi, OMV Petrom City Power Plant) and a 7.3% decrease in Upstream.

In 2019, compared to 2018, OMV Petrom recycled / recovered 53% of the total waste generated during the year. Also, in 2019, OMV Petrom, in partnership with Oceanic Club, launched the mobile application, enabling employees to easily identify protected species. This project contributes to improve the monitoring of biodiversity conservation and increase awareness on this topic. (OMV Petrom, 2021)

4. Results and findings

There are many aspects which can be analyzed related to pollution, following the data extracted from the 2020 sustainability reports. A mapping of the projects implemented for fighting against pollution can be done. For this a list of pollution practices was identified for each one of the companies and the related SDGs, as see below in table 3.

Table 3: Mapping the pollution practices from the analyzed companies

Company Name	Industry Type	Pollution Problem	Pollution Practices	SDG goals
Lidl Romania	Food Retail	Air Water Soil	Developing the charging infrastructure for electrical cars Remove harmful substances from food Replacing refrigerated display cases with modern ones Implementing a system for remote monitoring of water consumption Joint use of reusable pallets for carbon footprint decrease Donating bakery products not bought at the end of the day	9, 11, 12, 13

Company Name	Industry Type	Pollution Problem	Pollution Practices	SDG goals
Kaufland Romania	Food Retail	Air Water Soil	Eco-driving support, forming a public network of car charging stations in Romania, Bucharest - Chisinau route. Reducing the plastic packaging Collection system of plastic bottles, glass containers and aluminum cans for recycling and the self- service machine Encouraging tourists to stop throwing waste on the beach and to choose to collect it separately in the specially designated areas. Launching the turtle shaped container for beauty and cleaning products packaging	9, 11, 12, 13
Bosch Romania	IT	Air Water	Levels of air pollutants in the relevant business processes and manufacturing Using plastics based on recyclates Introduction of vacuum distillation and ultrafiltration for wastewater Usage of centrifugal treatment for oil elimination from wastewater	6, 7, 9, 12, 14
OMV Petrom	Gas and Oil	Air Water Soil	Water Management Plans to reduce the water withdrawal and improve the water efficiency Waste Management to recycle / recover the waste generated as much as possible Biodiversity protection initiative - a mobile application which can identify protected species observed within their operational boundaries	9, 7, 11, 13, 14

Innovative practices

The characteristic of innovativeness is represented by the eagerness of the organization to gradually changes the process while simultaneously preparing for a drastic transformation in the use of technology to develop goods and projects that are environmentally justifiable (Bhupendra, 2015). There should be a shift from the current mindset **and technology to cleaner technologies and an eco-friendly mindset.**

Table 4: Measures taken against pollution

Company Name	Pollution Prevention	Pollution Control
Lidl Romania	Installing charging points for EVs. Use of biodegradable materials. Sanitation activities in the Danube Delta and in cities on the Danube - waste collection. Changing the billing machines in the supermarkets.	Analysis of the resulting effects before the installation of prevention measures and after in the Sustainability Reports.
Kaufland Romania	Installing charging points for EVs. Replacing plastic nets with cellulose nets, reducing the density of certain packaging. Organizing teaching sessions regarding basic environmental information in a pleasant seaside setting. Developing volunteering programs to collect waste from polluted rivers and lakes in Romania. Introducing a collection system, for collecting empty bottles of hygiene or cleaning products, which will be recycled to protect the environment.	Monitoring the measures taken. Maintaining the infrastructure. Coming with proactive solutions for future pollution problems.
Bosch Romania	Reduce carbon footprint intensity for operations. In-house wastewater treatment.	Monitoring the wastewater and improving the technologies for treatment.
OMV Petrom	Reduce carbon footprint intensity for operations. Triple volume of recycled polyolefins. Increase waste reuse and recycling from operations. Reduce freshwater withdrawal.	Monitoring the biodiversity conservation. Monitoring the impact of OMV Petrom's activities (pollution levels) on both groundwater and surface water. Analysis of the resulting effects before the installation of prevention measures and after in the Sustainability Reports.

The companies analyzed are introducing measures against pollution as a reactive approach, mostly because the environment already has suffered and because the need to follow the SDGs to reduce the environment harm.

5. Conclusions

The quality of water, soil, air and their protection from pollution are interdependently related to the health of the environment, plants, animals and humans. Large companies in Romania are trying to implement innovative solutions or practices to improve the current situation. The industrial activity has generated, for the most part, the consequences that can be seen and felt at present.

To save the planet from pollution and ensure a healthy environment for the current generation, but also for future generations, we need constant involvement and desire, ambition to want, to do, to change. In addition to pollution, people must be careful to ensure a balanced use of resources.

At the same time, the Sustainable Development Goals must be met, and the system must be designed and adapted so that it works in a sustainable way, and the economy moves from a linear model to a circular, efficient, responsible, innovative one.

The topic of pollution will be considered a hot topic on the long run, sadly this could not be the peak of it, hence some solutions should be sought. The EU is continuously trying to understand this phenomenon and trying to implement regulations accordingly, and probably the research quest is not done.

As further directions of research could be considered some analysis for each type of pollution (soil, air and water) correlated to a comparison of EU pollution indicators and a specific European region, for example Eastern Europe, or even comparisons between regions. Another direction could be to identify the patterns of pollution, because is already happening, the inhabitants of a region and the organizations behave in certain way, and the questions is what they do to stop pollution if that region is already affected by a medium or high level of it.

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