

ENVIRONMENTAL MARKETING OF THE PROVINCIAL CITIES IN POLAND

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Purpose: The survey aims to identify current trends in the green marketing of the provincial Polish cities. The trend analysis will provide an understanding of how cities' authorities promote ecology, what activities and solutions are currently being implemented by them to promote cities from an environmental perspective. The purpose of the analysis is to examine whether the cities' ecological marketing contribute to reducing air pollution?

Design/methodology/approach: The study will use content analysis, and trend analysis. Content analysis will identify elements of green marketing in ongoing projects of the provincial Polish cities. Trend analysis will answer the question of the relationship between green marketing and the level of city pollution.

Findings: Considering that the EU Green Deal guidelines impose air pollution reduction targets on cities and countries, it can be hypothesized that cities should focus their activities on green marketing. It can be assumed that there is a positive (positive) relationship between the marketing activities implemented by the city and the decreasing level of air pollution.

Originality/value: The article makes a significant contribution to the field of urban ecology and municipal marketing research. It combines two key issues: the marketing strategies used by cities to promote ecological activities and the analysis of PM₁₀ air pollution trends. This two-pronged analysis allows for a comprehensive understanding of whether the marketing efforts undertaken have a real impact on improving air quality in Polish cities.

Keywords: marketing, territorial marketing, environmental marketing; Green Deal; air pollution.

Category of the paper: Research paper.

1. Introduction

Environmental marketing of the Polish provincial cities should be an important area of activity for local and regional authorities. The development strategies of Poland's provincial cities include statements of ecological values and objectives, which allows to explore environmental marketing practices. This is increasingly important in the context of sustainable development and growing public awareness of environmental protection and air pollution.

Actions by regional authorities should respond to the needs of achieving the Green Deal goals (European Commission, 2010). They require at the regional level to take appropriate measures in the field of ecology – including renewable energy, changes in urban transportation, increasing green areas, new technologies for sustainable development, education and much more. It is worthy underlining that cities are places where the population and economic activity concentrated the most, caused the problems of air pollution and other environmental issues (Chan, Yao, 2008, pp. 1-42; Mayer, 1999, pp. 4029-37; Zhu et al., 2019, p. 101593).

In the available literature many authors define the term green marketing and explain its meaning in the context of goals, objectives and development prospects (Graczyk, Zarębska, 2000, pp. 107-16). Katrandiev has conducted an in-depth analysis related to the evolution of green marketing (1975-1989) into green marketing (1990-2000), sustainable marketing (post 2000). He has noted that green marketing is part of marketing 2.0, which has been proposed by Philip Kotler (Katrandjiev, 2016, pp. 71-82). Numerous papers address issues associated with the ecological marketing due to the importance of research in the area of sustainable development, as well as practical implications for the EU's Green Economy goals (Śliwińska, 2020; Wilk, 2018, pp. 637-45; Zajkowska, 2015, pp. 359-70). It is worth noting that authors (especially Polish) have connected the concept of green marketing primarily with entrepreneurship (Drapińska, 2015, pp. 277-88; Klonowska, 2002, pp. 12-14; Olejniczak, 2014, pp. 139-44) and consumer needs (Delafrooz, Taleghani, Nouri, 2014, pp. 1-5; Grzybowska-Brzezińska, 2013, pp. 37-58; Hombek, 2019, pp. 1-17; Zaremba, 2002, pp. 151-62). However, few authors have analysed the green marketing from the perspective of city's strategy (Deluga, 2015, pp. 97-108; Guzal-Dec, 2016, pp. 17-27). The international literature often analyses case studies of the use of green marketing in cities (Nas, 2017, pp. 396-422; Reynolds et al., 2023, pp. 2432-58; Schmeller, Pirisi, 2023, pp. 287-309; Sun et al., 2022, pp. 1-10). The researchers also analyse the problem of so-called unreliable environmental marketing, which they call as a greenwashing (Adamkiewicz et al., 2022, p. 100710; Miller, 2017; Seele, Gatti, 2017, pp. 239-52; Wu, Zhang, Xie, 2020). However, in the available literature is lack of comparative studies that have the impact of green marketing toward efforts to reduce air pollution. Therefore, the goal of the analysis is to survey the dependency between environmental marketing in Polish cities and trend of air pollution.

The analysis will help with determining whether the actions carried out by the Polish cities are sufficient to achieve the decreasing of air pollution. Based on the assumptions of Marketing 2.0 by Philip Kotler, it can be assumed that green marketing activities should be correlated with the reduction of urban air pollution. The lack of correlation between variables may indicate the presence of greenwashing.

Ma and others proposed an analysis of city strategies, in which they extracted research tools for analysing city promotion, city marketing and city branding (Ma et al., 2021, p. 3). Based on the proposed indicators for the promotion of cities by Ma, an analysis has been made of Polish provincial cities aimed at reducing air pollution.

The variables used in the analysis:

- dependent variables,
Y – PM₁₀,
- the independent variables,
X₁ – presence of environmental symbol and colours in cities coat of arms,
X₂ – presence of environmental symbol in a city slogan,
X₃ – presence of environmental symbol in city promotion videos, digital brochure,
website.

Two specific questions will be posed in the article:

- 1) Is there differentiation among individual cities in terms of environmental marketing?
- 2) Whether green-oriented marketing efforts are linked to activities to reduce urban air pollution?

The article consists of two parts, in which successively analyses the municipal marketing towards ecology, and in the second part trends of PM₁₀. The analysis will show whether the marketing undertaken to reduce air pollution are sufficient to improve the situation of Polish cities.

2. Polish cities' environmental marketing

There are numbers of reasons why the green marketing is becoming one of the most important areas for Polish cities. First, consumers are increasingly looking for sustainable products and services. Second, governments or the EU are putting pressure on regions to reduce their environmental impact. Third, the growing awareness of climate change is making people more interested in living in cities that are environmentally friendly.

The green marketing of the provincial cities in Poland can take a number of different forms. One approach is to focus on the environmental benefits of the city's natural and built environment. For example, a city might promote its green parks, sustainable transportation system, or energy-efficient buildings. Another approach is to focus on the city's green economy. For example, a city might promote its green businesses, environmental jobs, or sustainable tourism.

There are a number of benefits to the green marketing for Polish cities. It can help to attract tourists and businesses, improve the city's environmental image, reduce its environmental impact, and create a more sustainable future. The promotion of green cities focuses on building awareness and encouraging environmental activities through various forms of communication and education and marketing. Promotion plays a key role in green cities, helping to raise public awareness of environmentally friendly measures.

Logo in communication is one of the signs of brand recognition. It is the customer's first contact with a brand through the name and visual features: logo, colours, symbols (Walas, 2014, p. 30). The city's coat of arms can refer to motifs from the world of plants, animals, elements of the landscape, including, for example, water, forests and others. The following table presents the results of the analysis on the occurrence of elements associated with the environment, nature, ecology (see Table 1).

Table 1.
Environmental motifs in the coats of arms of Polish cities

City	Coat of arms	Colours in logos, coats of arms of Polish cities	Environmental elements
<i>Białystok</i>	White eagle on red background and Lithuanian chase	Red-gold	Animal world
<i>Bydgoszcz</i>	Red city wall with blanks, with a gate and three towers	White, red blue	No direct environmental elements
<i>Gdańsk</i>	On the red field a golden open crown and two isosceles silver crosses	Red-gold	No direct environmental elements
<i>Katowice</i>	A hammer mill device with a cogwheel, on a gold background, placed on a beam, and the Rawa River, which flows through Katowice	Yellow and blue	Landscape
<i>Kielce</i>	Crown with floral motif	Red and yellow	The world of plants
<i>Kraków</i>	Shield topped with a lily motif, with a wall with three towers with lily-shaped fittings, with the White Eagle	Red, blue, white	Animal world, plant world
<i>Lublin</i>	Goat on red background climbing from green turf to green vine bush	Red, green, white	Animal world; plant world
<i>Łódź</i>	Golden boat with oar in red field	Red	Landscape
<i>Olsztyn</i>	The figure of St. James the Elder clad in a long robe, with a pilgrim's staff in his right hand and a shell in his left, with a hat on his head and a halo around it	Blue	Animal world, landscape
<i>Opole</i>	Half eagle and half cross with trifoliate ends	White and blue	Animal World, The world of plants
<i>Poznań</i>	A fortified wall with three towers and an open gate. On the middle one supports a shield with an image of a crowned eagle	Blue, white, gold	Animal world; plant world
<i>Rzeszów</i>	Bachelor's cross on a blue field	White and blue	No direct environmental elements
<i>Szczecin</i>	Crowned griffin on a blue background	Red, blue, gold	Animal world
<i>Warszawa</i>	Mermaid with sword and shield, surrounded by waves	Red-gold	Landscape, animal and human world
<i>Wrocław</i>	Shield with symbols of various families and cities	Red, yellow, white	No direct environmental elements
<i>Zielona Góra</i>	Green background with two towers	Green and white	Landscape

Source: (Miasto Białystok, n.d.; Miasto Bydgoszcz, n.d.; Miasto Gdańsk, n.d.; Miasto Katowice, n.d.-b.; Miasto Kraków, n.d.; Miasto Łódź, n.d.; Miasto Lublin, n.d.; Miasto Olsztyn, n.d.; Miasto Poznań, n.d.; Miasto Szczecin, n.d.; Miasto Warszawa, 2024a; Miasto Wrocław, 2024; Muzeum Historii Kielc, n.d.; Powiat Rzeszów, n.d.; Rada Miasta Opole, 2018; Rada Miasta Zielona Góra, 2004).

Analysing the coats of arms of Polish cities, it can be seen that animal motifs are most common (e.g. Białystok, Lublin, Szczecin, Warsaw). The plant world is less frequently depicted, but it is visible e.g. Kielce, Cracow. There are some motifs related to nature in coats of arms, such as water (Łódź, Katowice), greenery (Zielona-Góra). In the case of Rzeszów, Bydgoszcz and Gdańsk, there is no analogy to nature motifs. In turn, the colours in most coats of arms do are not associated with nature, the green of forests or the blue of water. Only in the case of Zielona Góra, Katowice such connotations occur.

Another distinguishing feature of the city is the slogan, which attracts people's attention. As Mathur emphasizes „Principal among these factors is the desire to improve the financial performance of the firm, which should be viewed positively by investors, and should result in a higher market value of the firm” (Mathur, Mathur, 1995, p. 59).

Analysing the slogan as directly advertises natural values, one can point to examples that confirm such a trend. Bydgoszcz's slogan "Bydgoszcz - a city close to the Brda" is interesting. The city is located near the Brda River, it is a part of the landscape and plays an important role in the residents' life. Bydgoszcz's image as a city near the river is highlighted in many promotional and tourist materials. The city also organizes many events related to the river, such as Rudder on Bydgoszcz, the World Championships in River Crossing (Węgielewska, 2017). A similar role to Bydgoszcz, is played by Białystok's slogan "Białystok - a green city", or Poznań - "Poznań - a city of greenery", both of which refer to nature. Białystok has many green areas, such as parks, forests and gardens, which are important parts of its landscape and contribute to the high quality of life of its residents. This is the slogan through which Białystok students planted 300 oak and spruce seedlings in the city. The undertaking took place within the framework of the project "Clean, Green Cities" implemented by the "Association: Clean Poland Program." Seedlings were donated by the Lasy Państwowe for this purpose, and the city donated the land. The students were assisted by Białystok Mayor Tadeusz Truskolaski and City Council Chairman Lukasz Prokorym, along with councilors (Departament Komunikacji Społecznej, 2022). Poznań, on the other hand, is known for its numerous parks, including the Citadel Park, which is one of the largest city parks in Poland. The city also has many botanical and zoological gardens, which are popular tourist attractions. However, the slogan itself has caused controversy among Poznań residents, who note that only with the logo can Poznan be considered as a green city (Matuszczak, 2024). The most important challenges in the area of climate and air pollution are referred to the slogan "Krakow in a good climate," in which the campaign slogans were Segregate, plant, save, breathe (Miasto Kraków, 2022). In addition, it is worth taking note of the slogans: Szczecin - Floating Garden, Olsztyn - Nature's garden, Katowice city of gardens, which refer to gardens, or more broadly the concept of turning a city into a garden (Sharifi, 2016, pp. 1-16). For example, Katowice, despite its industrial heritage, is trying to promote itself as a resident-friendly city with numerous green spaces, parks and gardens. In this way, the authorities emphasize their commitment to creating a friendly and environmentally friendly urban space (Komorowska, 2010). Gdansk's slogan

"Gdańsk- sea of possibilities" also refers to the natural environment, but also a possibility to development. The city is located near the Baltic Sea, which is an important part of its landscape (Business Insider Polska, 2020). The city organizes many sea-related events, such as Gdansk Sea Days and Baltic Sailing Week. Zielona Góra presented a new slogan in 2019, "Screw yourself in Zielona Gora". In this case, the authors emphasize that the aim of the slogan was to show that the city is family-friendly, encourages active recreation and "you can involve in cycling, wine tourism, marches with sticks or many recreational, cultural, sports events"(Zielona Góra, 2019).

However, not all Polish cities focus on natural assets. Warsaw's slogan, "Fall in love with Warsaw," focuses on city attractions, culture and history (Miasto Warszawa, 2022). However, the city has many green spaces, such as Łazienki Królewskie, Park Skaryszewski and Pole Mokotowskie, which are important natural features in the urban landscape. This could be a potential direction for future promotional campaigns if the city would like to highlight its green spaces. Also, Kielce currently uses the slogan "Kielce. A city where you want to live" (Kowalczyk, 2022). These slogans do not directly refer to nature, but rather focus on the quality of life in the city. As the capital of the Świętokrzyskie Voivodeship, Kielce is surrounded by beautiful natural areas such as the Świętokrzyskie Mountains, nature reserves and scenic parks, which the city should use to promote tourism. These natural assets could be included in future promotional slogans to emphasize the city's proximity to nature and natural attractions, as well as activities focused on preparing tourist and bicycle routes. Similar conclusions can be drawn by analysing Wrocław's approach to advertising the city. "Wrocław - a city of meetings" does not directly refer to nature, but focuses on the city's role as a place for cultural events, meetings and social integration (Polska Organizacja Turystyczna, n.d.). However, Wrocław is a city that has a lot to offer in terms of nature. There are numerous parks, green spaces and rivers, such as the Oder River, which add to the charm of the city. Although the current slogan does not directly emphasize these aspects, Wrocław as a city has many natural assets. Also, the slogans of Lublin, Rzeszów refer to innovation, culture or the inspiring atmosphere of the city ("Lublin. City of inspiration", "Rzeszów - the capital of innovation", "Łódź - a city that surprises", "Breakthrough Opole") and do not refer to natural assets (Miasto Lublin, 2024).

The third promotional component studied is advertising. Advertisements can effectively educate the public about the importance of environmental protection, sustainability and pro-environmental practices. Analysing examples of advertising campaigns for various provincial cities in Poland, it can be seen that they promote various ecological initiatives. The following table presents selected promotions, referring to ecology and the environment (see: Table 2).

Table 2.
Polish cities' environmental campaigns

City	Ecological Campaign	Ecological goals of campaigns
<i>Białystok</i>	By bicycle through Podlaskie	The broadcast, which was produced by Radio Akadera of Białystok in cooperation with the Marshal's Office of Podlaskie Voivodeship
<i>Bydgoszcz</i>	Segregate well for yourself, loved ones and the environment	Educate residents about the benefits of recycling and introduce systems to facilitate waste separation
<i>Gdańsk</i>	Gdansk Eco Zone - Clean City Gdansk	Event in the form of a picnic ecological
<i>Katowice</i>	Eko bajki	"Eco-fairytales" is a project in which fairytales were recorded on behalf of the Katowice City Council, with ecology as the main theme
<i>Kielce</i>	Plastic not for furnace, furnace not for plastics	Program, which promotes alternative materials and reduce the usage of single-use plastic
<i>Kraków</i>	Warmth counts	Educational campaign aimed at residents to promote energy conservation in homes and the use of energy-efficient appliances
<i>Lublin</i>	Donate electro-waste, get a tree	"Tree for Secondary Resources" is a campaign organized by the Regional Directorate of State Forests in cooperation with Kurier Lubelski
<i>Łódź</i>	Cycling May in Lodz	Promote the use of urban bicycles and bicycle infrastructure in the city to reduce emissions
<i>Olsztyn</i>	Don't be disposable	Presentation of educational octagon on waste reduction and eco-consumption
<i>Opole</i>	Bee in Opole	Awareness campaign on importance of bees in nature
<i>Poznań</i>	We are acting for the Climate!	Webinar entitled "Adapting to Climate Change"
<i>Rzeszów</i>	Rzeszow does not agree on smog!	Initiative to promote the attention of the city government to the issue of ecology by schoolchildren
<i>Szczecin</i>	Szczecin environmental education network for the environment	Comprehensive environmental education project subsidized by the Financial Mechanism of the European Economic Area
<i>Warszawa</i>	Partnership for Climate	Information platform for comprehensive, innovative educational and promotional activities related to climate change issues
<i>Wrocław</i>	Wrocław without plastic	Actions taken by the city authorities
<i>Zielona Góra</i>	The game "Kidnapping of Smog"	Festivities and field game

Source: (Anon, 2015; Anon, n.d.; Bydgoszcz, 2023; Fundacja Odzyskaj Środowisko, n.d.; Kokoszkiewicz, 2019; Masłowska-Bandos, 2018; Miasto Gdańsk, 2022; Miasto Katowice, n.d.-a; Miasto Kielce, 2022; Miasto Warszawa, 2024b; Nowa Energia, 2023; Polskie Radio Lublin, 2024; Radio Akadera, 2021; Szczecińska sieć edukacji ekologicznej na rzecz środowiska, n.d.; Urząd Miasta Łodzi, 2024; Wojnowska, 2022).

Through advertising campaigns, cities convey information about initiatives such as recycling, saving energy, using public transportation and reducing plastic consumption. For example, during the "Warsaw segregates" campaign, city authorities informed people about the principles of waste segregation, with an emphasis on proper disposal of plastics and other recyclables (Miasto Warszawa, 2019). In Wrocław, as part of the "Wrocław without plastic" campaign, Mayor Jacek Sutryk handed out bamboo cups convincing residents of the idea of zero waste and reducing the amount of trash produced (Kokoszkiewicz, 2019). An interesting promotion was proposed by the authorities of Poznań, who organized a municipal competition for the best arrangements of home gardens, balconies, greens and elevations (Miasto Poznań, 2021). Effective way to involve the entire local community of Gdansk was a picnic for

residents, in which all the city units that carry out their activities, projects and campaigns for environmental protection and sustainable development, come together in one place to pass on all their knowledge and experience to residents in the field of environmental education. For instance, in Rzeszów, an anti-smog tree - a linden tree (*lime Tilia cordata*) - was planted on November 12, 2021 in Rzeszów's Kotowicz Square, with the participation of 17 people, including the Mayor of Rzeszów. A campaign was undertaken for children (from four Rzeszów schools) to write anti-smog "letters to authorities". Students at schools made anti-smog slogans, which they chanted at a happening in front of City Hall (Wojnowska, 2022). The form of preparing eco-stories can, in turn, can be a very good way for the youngest group to understand the importance of ecology at an early stage in their lives. An interesting form was proposed by the authorities of Zielona Góra, where for few moments the Zielona Góra promenade turned into a theatre. There was an outdoor performance of "To the rescue of Clean land", where a commissioner Smog had to take action to save the land and fight the cruel Smog. To his aid rushed the children, who cared a lot about being able to breathe clean, pollution-free air again (Masłowska-Bandos, 2018). These are just selected examples of promotions that cities are adapting to their specific characteristics. Some of them involve local communities and organizations, making their campaigns more effective.

The above analysis has shown that through advertising, green cities can build awareness of their environmental activities. Advertisements can reach a wide audience, increasing public interest and involvement. In addition, advertisements have the potential to influence residents' behaviour and habits. Creative and inspiring campaigns can encourage everyday eco-friendly activities, such as segregating trash, choosing a bicycle over a car, or conserving energy or water in Polish cities.

3. Trends of air pollution in Polish cities

As mentioned above, an effective advertising campaign promoting a city's green activities can significantly contribute to strengthening its image as a leader in sustainable development. Such an image can attract tourists, investors and new residents who value green values. However, in order for advertising not to be greenwashing, there should be measures taken by cities to improve the ecological situation along with it.

The increase in air pollution is related to the burning of fossil fuels, necessary for household heating or transportation. City authorities are obliged to prevent environmental pollution, including air pollution, due to the EU's goals for implementing the Green Deal. Currently, 12 substances are assessed from the perspective of health protection: sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), benzene (C₆H₆), ozone (O₃), PM₁₀ fine dust (up to 10µm in diameter), PM_{2.5} fine dust (up to 2.5µm in diameter), heavy metals: lead (Pb),

arsenic (As), nickel (Ni), cadmium (Cd) determined in PM₁₀, and benzo(a)pyrene determined in PM₁₀. For plant protection, three substances are assessed: sulfur dioxide (SO₂), nitrogen oxides (NO_x) and ozone (O₃). For each of the listed pollutants, air concentrations are specified that should not be exceeded. The purpose of this paper is to analyse one of the indicated substances, i.e. PM₁₀. This dust is a mixture of airborne particles whose diameter does not exceed 10 micrometers. It is harmful due to its content of such elements as benzopyrenes, furans, dioxins - in a word, carcinogenic heavy metals. The WHO standard for average daily concentration of this dust is 50 micrograms per cubic meter, and the annual standard is 20 micrograms per cubic meter (WHO, 2021). The assessment of air quality is carried out according to the criteria set out in the Directive of the European Parliament and of the Council of May 21, 2008 on air quality and cleaner air for Europe (Parlament Europejski i Rada Unii Europejskiej, 2008) and the Directive of the European Parliament and of the Council 2004/107/WE of December 15, 2004 on arsenic, cadmium, nickel, mercury and polycyclic aromatic hydrocarbons in ambient air (Parlament Europejski i Rada Unii Europejskiej, 2004).

The first of the above-mentioned documents obliges member states, including Poland, to continuously monitor air quality. The directive specifies the minimum number of measurement points and how they should be distributed. The data collected is then transmitted to the European Environment Agency and to the European Commission. It is worth noting that the collected data for analysis was incomplete (missing daily measurements). It was not possible to analyse the occurrence of PM 10 in Gdansk, Opole and Bydgoszcz. This was due to the closure of diagnostic stations and the opening of new ones, which prevented analysis in the period 2013-2022. For the city of Kielce, the data covered the period 2013-2021.

Considering air quality standards, it is necessary to look at the average values achieved by Polish cities. The following table shows data on basic statistics on the occurrence of PM₁₀ dust in Polish cities.

Table 3.

Basic statistics on the occurrence of PM10 during 2013-2022 in Polish cities

City	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
<i>Białystok</i>	12.08	17.30	20.36	21.50	24.47	38.00
<i>Katowice</i>	16.33	25.40	33.68	36.72	44.99	114.16
<i>Kielce</i>	15.06	19.23	25.85	28.76	36.00	72.13
<i>Kraków</i>	16.35	23.60	34.00	38.96	48.02	156.45
<i>Lublin</i>	11.60	18.64	22.97	25.47	30.86	50.00
<i>Łódź</i>	16.29	28.02	35.09	39.30	46.54	90.97
<i>Olsztyn</i>	10.16	16.17	20.45	21.67	25.02	48.80
<i>Poznań</i>	10.48	17.54	23.04	25.13	30.59	72.01
<i>Rzeszów</i>	12.78	19.66	24.85	27.11	31.54	73.88
<i>Szczecin</i>	10.47	16.64	19.46	21.42	23.86	42.82
<i>Warszawa</i>	14.69	21.16	26.57	28.52	33.43	61.42
<i>Wrocław</i>	12.28	19.03	25.04	27.67	33.28	59.42
<i>Zielona Góra</i>	11.67	16.43	20.78	22.85	27.04	47.36

Source: (GIOŚ 2013-2022).

As can be seen in the table, cities such as Katowice, Kraków and Łódź have the highest average PM₁₀ concentrations, indicating greater air pollution problems compared to other cities. In particular, the high quartile and maximum values suggest frequent episodes of high pollution in all three analysed cities. On average, Łódź records the highest pollution during the period under study, while the cities with the lowest PM₁₀ pollution are Olsztyn, Szczecin and Białystok, Zielona Góra. Large spreads between minimum and maximum values in some cities (e.g., Kraków) indicate that there are periods with very high air pollution in winter, which are well above average values.

On the basis of the guidelines set forth in the documents of the European Parliament, the Council, it can be assumed that trends in air pollution should be decreasing. As Magdalena Kuchcik and Pawel Milewski note, for many years of the 20th century, air pollution concentrations remained stable and high in Poland - mainly in Upper Silesia and other heavily industrialized areas. Political, economic and social changes after 1989 - the collapse of many industries, the closure of factories, plants and mines - resulted in a systematic decline in air pollution levels, which have remained at similar levels in Poland since the beginning of the 21st century (Kuchcik, Milewski, 2018). Since 2009, the problem has been diagnosed, and through EU programs, financial assistance is being implemented (under successive editions of the clean air program) for liquidation, changing the heating source from traditional stoves to ecological and 0-emission stoves (Fundusz Ochrony Środowiska w Polsce, 2022). It should be remembered that the reduction of air pollution should be influenced by both functioning EU programs, applied throughout Poland, such as Clean Air, the marketing actions of cities that indicate in their strategies the need to reduce air pollution. The charts below show the trend analysis of PM₁₀ in Polish cities for the period 2013-2022.

Table 4.

Trend analysis of PM10 in Polish cities for the period 2013-2022

City	Time	p-value	Multiple R-squared
<i>Białystok - decreasing</i>	-0.0019811	7.143e-05	0.1256
<i>Katowice - decreasing</i>	-0.004910	0.0001261	0.1176
<i>Kielce - decreasing</i>	-0.003521	0.002044	0.08619
<i>Kraków - decreasing</i>	-0.005954	0.0006274	0.09472
<i>Lublin - decreasing</i>	-0.0031785	1.424e-05	0.1481
<i>Łódź - decreasing</i>	-0.005458	2.881e-05	0.1383
<i>Olsztyn - decreasing</i>	-0.0014884	0.01947	0.04539
<i>Poznań - luck of trend</i>	-0.0012534	0.1566	0.01694
<i>Rzeszów - decreasing</i>	-0.0030264	0.000577	0.09592
<i>Szczecin - decreasing</i>	-0.0022517	0.0001261	0.1176
<i>Warszawa - decreasing</i>	-0.0030180	0.0001109	0.1194
<i>Wrocław - decreasing</i>	-0.0038298	4.41e-05	0.1324
<i>Zielona Góra - decreasing</i>	-0.003086	1.073e-05	0.152

Source: (GIOŚ 2013-2022).

The above analysed models are not satisfactory. The coefficient of determination R² is very low. There is no clearly visible trend, which takes minus values in most models. The changes that occurred in the period 2013-2022 are insufficient to speak of an effective change for the

better in terms of air quality. The model does not describe Poznań, and the p-value for Olsztyn. The coefficient of variation is highest in Łódź, Krakow and Katowice, indicating that these cities are doing the best job of improving the situation, despite the weakest air quality scores.

4. Conclusions

Considering the goals set by the authorities of Polish cities, it should be noted that the measures taken for clean air are not sufficient.

In terms of marketing, it should be confirmed that Polish cities are actively promoting ecology through ecological slogans, as well as campaigns, activities promoting ecology. Analysis of the data confirmed the hypothesis on the decreasing trend of PM₁₀ in Polish cities. On the other hand, it is worth noting that the models slightly explain the actual changes that are taking place in terms of air pollution.

The coefficients of the decreasing trend in most Polish cities indicate little significance of the measures taken. In addition, it can be noted that Poland does not have a large database of long-term air quality measurement capabilities. Often the measuring stations are closed, which prevented analysis for the cities of Bydgoszcz, Opole, and Gdańsk. As a result, it can be pointed out that Polish cities should increase the number of air quality monitoring stations, such points should appear in places most exposed to pollution. Other measures than mere promotion for improving the air quality situation might be important. Investments in renewable energy, infrastructural changes that allow for increased clean transportation can be pointed out here.

References

1. Adamkiewicz, J. *et al.* (2022). Greenwashing and sustainable fashion industry. *Current Opinion in Green and Sustainable Chemistry*, 38, p. 100710.
2. Business Insider Polska (2020). *Morze możliwości - czyli czym przyciąga Gdańsk*, *Business Insider Polska*. Retrieved from: <https://businessinsider.com.pl/firmy/gdansk-miasto-ktore-przyciaga/efy0ccn>, 27.06.2024.
3. Bydgoszcz (2023). *#Segreguj dobrze dla siebie, bliskich i środowiska*, www.bydgoszcz.pl. Retrieved from: <http://www.bydgoszcz.pl/aktualnosci/tresc/segreguj-dobrze-dla-siebie-bliskich-i-srodowisk/>, 25.06.2024.
4. Chan, C.K., Yao, X. (2008). Air pollution in mega cities in China. *Atmospheric environment*, 42(1), pp. 1-42.

5. Delafrooz, N., Taleghani, M., Nouri, B. (2014). Effect of green marketing on consumer purchase behavior. *QScience Connect*, 1, p. 5.
6. Deluga, W. (2015). Wybrane aspekty wykorzystania marketingu ekologicznego dla poprawy środowiska naturalnego w Koszalinie. *Europa Regionum*, 23, pp. 97-108.
7. Departament Komunikacji Społecznej (2022). *Zielony Białystok, Białystok - Oficjalny Portal Miasta*. Retrieved from: <http://www.bialystok.pl/pl/wiadomosci/aktualnosci/zielony-bialystok.html>, 25.06.2024.
8. Drapińska, A. (2015). Marketing a społeczna odpowiedzialność biznesu—sprzeczne idee? *Marketing i Zarządzanie*, 41(1), pp. 277-288.
9. *Działamy dla Klimatu!* (no date). Retrieved from: <https://www.centrumcreo.pl/nasze-projekty/dzialamy-dla-klimatu>, 27.06.2024.
10. European Commission (2010). *Making our cities attractive and sustainable: how the EU contributes to improving the urban environment*. Publications Office of the European Union. Retrieved from: <https://data.europa.eu/doi/10.2779/42720>, 18.06.2024.
11. Fundacja Odzyskaj Środowisko (no date). *Kampania edukacyjna – Bee in Opole*. Retrieved from: <https://odzyskajśrodowisko.pl/kampania-edukacyjna-bee-in-opole/>, 27.06.2024.
12. Fundusz Ochrony Środowiska w Polsce (2022). *O programie. Zyskaj do 18 000 zł dofinansowania - Czyste Powietrze 2.0*. Retrieved from: <https://www.czystepowietrze.eu/o-programie>, 19.07.2022.
13. GIOŚ (2022). *Bank danych pomiarowych*. Retrieved from: <https://powietrze.gios.gov.pl/pjp/archives>, 12.07.2022.
14. Graczyk, M., Zarębska, J. (2000). Ekologiczne strategie marketingowe. *Biblioteka Ekonomia i Środowisko*, 26, pp. 107-116.
15. Grzybowska-Brzezińska, M. (2013). Wpływ instrumentów marketingu ekologicznego na zachowania konsumentów na rynku produktów spożywczych. *Marketing i Zarządzanie*, 30, pp. 47-58.
16. Guzal-Dec, D. (2016). Marketing ekologiczny w rozwoju obszarów przyrodniczo cennych województwa lubelskiego—ocena aktywności lokalnych władz samorządowych. *Turystyka i Rozwój Regionalny*, 5, pp. 17-27.
17. Hombek, P. (2019). Marketing ekologiczny jako podstawa kreowania zachowań konsumentów na rynku żywności. *OAFI*, 3(2), pp. 1-17.
18. Katrandjiev, H. (2016). Ecological marketing, green marketing, sustainable marketing: Synonyms or an evolution of ideas. *Economic Alternatives*, 1(7), pp. 71-82.
19. Klonowska, M. (2002). Marketing ekologiczny. *Aura*, 2, pp. 12-14.

20. Kokoszkiewicz, M. (2019). *Wrocław bez plastiku*, *wroclaw.wyborcza.pl*. Retrieved from: <https://wroclaw.wyborcza.pl/wroclaw/7,35771,24691761,wroclaw-bez-plastiku-magistrat-rezygnuje-z-jednorazowych-kubkow.html>, 22.06.2024.
21. Komorowska, A. (2010). Katowice? miasto ogrodów? *PortalKomunalny.pl*. Retrieved from: <https://portalkomunalny.pl/plus/artukul/katowice-miasto-ogrodow/>, 27.06.2024.
22. Kowalczyk, A. (2022). *'Kielce - miasto, w którym chce się żyć' to nowe hasło promocyjne. Prezydent Bogdan Wenta przedstawił strategię, Kielce Nasze Miasto*. Retrieved from: <https://kielce.naszemiasto.pl/kielce-miasto-w-ktorym-chce-sie-zyc-to-nowe-haslo/ar/c1-8936235>, 25.06.2024.
23. Kuchcik, M., Milewski, P. (2018). Zanieczyszczenie powietrza w Polsce. Stan, przyczyny i skutki. *Czasopismo Polskiej Akademii Nauk*, pp. 341-364.
24. Ma, W. *et al.* (2021). From city promotion via city marketing to city branding: Examining urban strategies in 23 Chinese cities. *Cities*, 116, p. 103269. Retrieved from: <https://doi.org/10.1016/j.cities.2021.103269>.
25. Masłowska-Bandosz, M. (2018). Zielono w Zielonej. *Edukacja ekologiczna Abrys*, 7 June. Retrieved from: <https://ekoedu.com.pl/news/aktualnosci/zielono-w-zielonej/>, 27.06.2024.
26. Mathur, L.K., Mathur, I. (1995). The effect of advertising slogan changes on the market values of firms. *Journal of Advertising Research*, 35(1), pp. 59-59.
27. Matuszczak, Z. (2024). *Poznań ma nowe logo. Budzi kontrowersje*. Retrieved from: <https://poznan.tvp.pl/77540978/poznan-ma-nowe-logo-budzi-kontrowersje-galeria-zdjec>, 25.06.2024.
28. Mayer, H. (1999). Air pollution in cities. *Atmospheric Environment*, 33(24-25), pp. 4029-4037. Retrieved from: [https://doi.org/10.1016/S1352-2310\(99\)00144-2](https://doi.org/10.1016/S1352-2310(99)00144-2).
29. Miasto Białystok (no date) *Białystok - Geneza herbu - INFORMATOR BIAŁOSTOCKI*. Retrieved from: http://www.info.bialystok.pl/symbole/geneza_herbu/obiekt.php, 24.09.2024.
30. Miasto Bydgoszcz (no date). *Oficjalny Serwis Bydgoszczy - Herb, barwy i hejnał*, *www.bydgoszcz.pl*. Retrieved from: <https://www.bydgoszcz.pl/miasto/poznaj-miasto/herb-barwy-i-hejnal/>, 24.09.2024.
31. Miasto Gdańsk (2022). *Gdańska Eko Strefa – Czyste Miasto Gdańsk, Gdańsk - oficjalny portal miasta*. Retrieved from: <https://www.gdansk.pl/wydarzenia/Gdanska-Eko-Strefa-Czyste-Miasto-Gdansk,w,28541>, 25.06.2024.
32. Miasto Gdańsk (no date). *Opis i zasady używania herbu, flagi i pieczęci Miasta Gdańska, Gdańsk - oficjalny portal miasta*. Retrieved from: <https://www.gdansk.pl/redakcja/Opis-i-zasady-uzywania-herbu-flagi-i-pieczeci-Miasta-Gdanska,a,4446>, 24.09.2024.
33. Miasto Katowice (no date a). *Eko-bajki*. Retrieved from: <https://www.katowice.eu/dla-mieszka%C5%84ca/ekologia/eko-bajki>, 25.06.2024.

34. Miasto Katowice (no date b). *Herb i logo miasta*. Retrieved from: <https://www.katowice.eu/Strony/Herb-i-logo-miasta.aspx>, 24.09.2024.
35. Miasto Kielce (2022). *Plastik nie do pieca, piec nie do plastików. Kampania informacyjna - Oficjalna strona internetowa Miasta Kielce*. Retrieved from: <https://www.kielce.eu/pl/aktualnosci/plastik-nie-do-pieca-piec-nie-do-plastiku-kampania-informacyjna.html>, 27.06.2024.
36. Miasto Kraków (2022). *Kraków w dobrym klimacie*. Retrieved from: https://www.krakow.pl/aktualnosci/257103,29,komunikat,krakow_w_dobrym_klimacie.html, 25.06.2024.
37. Miasto Kraków (no date). *Barwy i symbole Miasta- Biuletyn Informacji Publicznej Miasta Krakowa - BIP MK*. Retrieved from: <https://www.bip.krakow.pl/?mmi=98> , 24.09.2024.
38. Miasto Łódź (no date). *Herb*. Retrieved from: <https://uml.lodz.pl/dla-mieszkanow/o-miescie/herb-logo-i-symbole-lodzi/herb/>, 24.09.2024.
39. Miasto Lublin (2024). *Lublin - miasto inspiracji, Miasto Inspiracji*. Retrieved from: <https://miastoinspiracji.lublin.eu/>, 27.06.2024.
40. Miasto Lublin (no date). *Herb miasta; lublin.eu - oficjalny portal miasta Lublin*. Retrieved from: <https://lublin.eu/lublin/marketing-miasta/herb-miasta/>, 24.09.2024.
41. Miasto Olsztyn (no date). *Serwis Urzędu Miasta Olsztyna: Herb*. Retrieved from: <https://olsztyn.eu/o-olsztynie/tozsamosc-miasta/barwy-i-symbole/herb.html>, 24.09.2024.
42. Miasto Poznań (no date) *Herb Poznania pod względem treści heraldycznej należy do najbogatszych w Polsce. Fakty i liczby. Poznan.pl*. Retrieved from: <https://www.poznan.pl/mim/s8a/czy-wiesz-ze,doc,576/-,1891.html>, 24.09.2024.
43. Miasto Szczecin (no date). *Załącznik nr 5 do Statutu Miasta Szczecina. Regulamin insygniów miasta*.
44. Miasto Warszawa (2019). *Segreguj odpady właściwie – trwa drugi etap kampanii*. Retrieved from: <https://um.warszawa.pl/-/segreguj-odpady-wlasciwie-trwa-drugi-etap-kampanii>, 22.06.2024.
45. Miasto Warszawa (2022). *Zakochaj się w Warszawie – historia znaku*. Retrieved from: <https://um.warszawa.pl/waw/markawarszawa/-/zakochaj-sie-w-warszawie-historia-znaku>, 27.06.2024.
46. Miasto Warszawa (2024a). *Miasto Stołeczne Warszawa - herb, barwy, hejnał, Warszawa 19115*. Retrieved from: <https://warszawa19115.pl/-/miasto-stoleczne-warszawa-herb-barwy-hejnał>, 24.09.2024.
47. Miasto Warszawa (2024b). *Partnerstwo dla Klimatu*. Retrieved from: <https://eko.um.warszawa.pl/-/partnerstwo-dla-klimatu>, 27.06.2024.

48. Miasto Wrocław (2024). *Herb, logo, barwy, Wroclaw.pl*. Retrieved from: <https://www.wroclaw.pl/dla-mieszkanca/herb-logo-barwy-wroclawia>, 24.09.2024.
49. Miller, T. (2017) *Greenwashing culture*. Routledge.
50. Muzeum Historii Kielc (no date). *Herb Kielc*. Retrieved from: <https://mhki.kielce.eu/zawartosc/herb-kielc>, 24.09.2024.
51. Nas, A. (2017). Between the urban and the natural: Green marketing of Istanbul's gated community projects. *Idealkent*, 8(22), pp. 396-422.
52. Nowa Energia (2023). *Kraków rozmawia jak oszczędzać ciepło. Spotkanie w ramach kampanii "Liczy się ciepło"*. Retrieved from: <https://nowa-energia.com.pl/2023/01/19/krakow-rozmawia-jak-oszczedzac-cieplo-spotkanie-w-ramach-kampanii-liczy-sie-cieplo/>, 27.06.2024.
53. Olejniczak, K. (2014). Zielony marketing jako wyraz odpowiedzialności współczesnego przedsiębiorstwa. *Marketing i Rynek*, 8(CD), pp. 139-144.
54. Parlament Europejski i Rada Unii Europejskiej (2004). *Dyrektywa Parlamentu Europejskiego i Rady 2004/107/WE z dnia 15 grudnia 2004 r. w sprawie arsenu, kadmu, niklu, rtęci i wielopierścieniowych węglowodorów aromatycznych w otaczającym powietrzu (Dz. Urz. UE L 23 z 26.01.2005, str.3) - GIOŚ*. Retrieved from: <https://powietrze.gios.gov.pl/pjp/publications/card/3079>, 12.07.2022.
55. Parlament Europejski i Rada Unii Europejskiej (2008). *Dyrektywa Parlamentu Europejskiego i Rady 2008/50/WE z dnia 21 maja 2008 roku w sprawie jakości powietrza i czystszej powietrza dla Europy (Dz. Urz. UE L 152 z 11.06.2008, str.1) - GIOŚ*. Retrieved from: <https://powietrze.gios.gov.pl/pjp/publications/card/3077>, 12.07.2022.
56. Polska Organizacja Turystyczna (no date). *Wrocław – miasto spotkań*. Retrieved from: <https://www.pot.gov.pl/pl/pcb/news/wroclaw-miasto-spotkan>, 27.06.2024.
57. Polskie Radio Lublin (2024). *Oddaj elektrośmieci, zyskaj drzewko. Ekologiczna akcja w Lublinie*. Retrieved from: <https://radio.lublin.pl/2024/03/oddaj-elektrosmieci-zyskaj-drzewko-ekologiczna-akcja-w-lublinie/>, 27.06.2024.
58. Powiat Rzeszów (no date). *Herb i flaga powiatu. Powiat Rzeszowski*. Retrieved from: <https://powiat.rzeszowski.pl/powiat/herb-i-flaga-powiatu/>, 24 .09. 2024.
59. Rada Miasta Opole (2018). Uchwała nr XXIV/373/12 Rady Miasta Opola z dnia 29 marca 2012 r. w sprawie uchwalenia Statutu Miasta Opola.
60. Rada Miasta Zielona Góra (2004). Załącznik Nr 2 do Uchwały Nr XXIX/267/04 Rady Miasta Zielona Góra z dnia 31 sierpnia 2004 r. Statut Miasta Zielona Góra.
61. Radio Akadera (2021). *Rowerem przez Podlaskie*. Retrieved from: <https://akadera.bialystok.pl/audycje/22037/>, 25.06.2024.

62. Reynolds, L. *et al.* (2023). Engagement and estrangement: A “tale of two cities” for Bristol’s green branding. *European Journal of Marketing*, 57(9), pp. 2432-2458.
63. *Ruszyla ekologiczna akcja* (2015). *Telewizja Olsztyn*. Retrieved from: <https://www.telewizjaolsztyn.pl/artukul/971,ruszyla-ekologiczna-akcja>, 27.06.2024.
64. Schmeller, D., Pirisi, G. (2023). Green capital East of the Leitha? The chances and disadvantages of major cities in the Pannonian Basin to win the European Green Capital Award. *Hungarian Geographical Bulletin*, 72(3), pp. 287-309. Retrieved from: <https://doi.org/10.15201/hungeobull.72.3.5>.
65. Seele, P., Gatti, L. (2017). Greenwashing revisited: In search of a typology and accusation-based definition incorporating legitimacy strategies. *Business Strategy and the Environment*, 26(2), pp. 239-252.
66. Sharifi, A. (2016). From Garden City to Eco-urbanism: The quest for sustainable neighborhood development. *Sustainable Cities and Society*, 20, pp. 1-16.
67. Śliwińska, P. (2020). Marketing ekologiczny jako koncepcja zarządzania sprzyjająca idei zrównoważonego rozwoju.
68. Sun, F. *et al.* (2022). Model of Urban Marketing Strategy Based on Ecological Environment Quality. *Journal of Environmental and Public Health*. F.-S. Tsai (ed.), pp. 1-10. Retrieved from: <https://doi.org/10.1155/2022/8096122>.
69. Szczecińska sieć edukacji ekologicznej na rzecz środowiska (no date). *O Szczecińskiej Sieci Edukacji Ekologicznej*. Retrieved from: <https://ekologia.szczecin.pl/o-sieci/>, 27.06.2024.
70. Urząd Miasta Łodzi (2024). *Rowerowy maj w Łodzi. Przesiądź się na rower i zgarnij nagrody!* Retrieved from: <https://lodz.pl/artukul/rowerowy-maj-w-lodzi-przesiadz-sie-na-rower-i-zgarnij-nagrody-szczegoly-61335/>, 27.06.2024.
71. Walas, B. (2014). Znaczenie logo miast w rozpoznawalności miejsca docelowego. *Studia*, 2(3), p. 264.
72. Węgielewska, J. (2017). Bydgoszcz – miasto nad Brdą. *PolskaZachwyca.pl*, 22 August. Retrieved from: <https://polskazachwyca.pl/ciekawostki/bydgoszcz-miasto-nad-brda/>, 25.06.2024.
73. WHO (2021). *WHO global air quality guidelines*. Geneva. Retrieved from: <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>.
74. Wilk, I. (2018). Istota marketingu ekologicznego w warunkach zrównoważonego rozwoju. *Zeszyty Naukowe. Organizacja i Zarządzanie. Politechnika Śląska*, 118, pp. 637-645.
75. Wojnowska, M. (2022). *Rzeszów nie zgadza się na smog*. Retrieved from: <https://bip.erzeszow.pl>, 27.06.2024).
76. Wu, Y., Zhang, K., Xie, J. (2020). Bad greenwashing, good greenwashing: Corporate social responsibility and information transparency. *Management Science*, 66(7), pp. 3095-3112.

77. Zajkowska, M. (2015). Marketing zrównoważony—od tradycyjnego do innowacyjnego nurtu zarządzania marketingowego. *Marketing i Zarządzanie*, 41(2), pp. 359-370.
78. Zaremba, S. (2002). Marketing ekologiczny-odpowiedź na proekologiczne potrzeby konsumentów. *Prace Naukowe Akademii Ekonomicznej we Wrocławiu*, 21(936) - *Aspekty makro-i mikroekonomiczne*, pp. 151-162.
79. Zhu, L. *et al.* (2019). Do economic activities cause air pollution? Evidence from China's major cities. *Sustainable Cities and Society*, 49, p. 101593.
80. Zielona Góra (2019). *Zielona Góra: Wkręć się w Zieloną Górę! Kusimy nowym hasłem. Mamy nowe logo, Wkręć się w Zieloną Górę! Kusimy nowym hasłem. Mamy nowe logo.* Retrieved from: <https://zielonagora.naszemiasto.pl/zielona-gora-wkrec-sie-w-zielona-gore-kusimy-nowym-haslem/ar/c1-7426366>, 25.06.2024.
81. *Zielony Poznań - znamy laureatów konkursu* (2021). Retrieved from: <https://www.youtube.com/watch?v=O0IhRGUG1DQ>, 22.06.2024.