COMMUNICATION & SOCIETY

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Cross-sectional analysis of the environment in Agenda 2030: Public diplomacy on municipal websites in Portugal

Abstract

This article delves into local public diplomacy from the perspective of climate action. A cross-sectional analysis is made of the climate perspective in the international 2030 Sustainable Development Agenda, considering the social, political, and economic challenges implied by human alteration of the environment. The websites of local municipal corporations in Portugal are analysed to identify the information referring to Agenda 2030 and its convergence in climate action. To this end, a content analysis method was designed based on the relationship of the Agenda's sustainable development goals (SDGs) with their associated climate change goals. Attention is paid primarily to the websites' fixed sections, and secondarily to their informational content and external portals. The method is applied to the websites of seven of Portugal's municipalities. Conclusions are drawn concerning whether or not they provide information on climate change so that the effort directed by these local governments towards climate action can be determined. A comparison is made with the international case. This tool contributes to localizing the SDGs and prioritizing environmentally important components.

Keywords
Online communication, international relations, soft power, sustainable development goals (SDGs), climate change, city, transparency.

1. Introduction

The international political communications activity that has grown most over the last decade is that of cities' public diplomacy. This has been a consequence of the new demographic structure, the transformation of political and economic power, the impact of climate change, and citizen empowerment. Of particular interest as a case study in this context is climate change, one of the trends that is on the rise. Compared with the nation states that led the Millennium Development Goals up to 2015, cities and firms are playing a greater role in the new perspective represented by Agenda 2030 and its sustainable development goals (SDGs). There are already international projects that measure compliance with the SDGs in the urban environment. Examples are

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British Columbia 2030, Baltimore Neighborhood Indicators Alliance (BNIA), the City of Winnipeg's Community Indicator system, and Hawaii Green Growth Aloha+ Challenge.

This research is part of the project "Public diplomacy of Ibero-American megacities: communication strategies and soft power to influence global environmental legislation," Diplocity, (RTI2018-096733-B-I00), led by J. Manfredi-Sánchez (UCLM). Its main objective has been to develop a method with which to analyse the diplomacy, transparency, and informational aspects of municipality websites. It was also intended to provide continuity with previous projects related to the information those websites provide. Recent studies related to such information have taken different perspectives, such as projects Globalcom 2013-2015 (CSO2012-34687) led by UAB, Globalcom 2014-2016 (CSO2013-46997-R) led by UCLM o Infogob 2016-2018 (CSO2015-64568-R). The main differences in the present study are: (i) there is now the Law of Transparency which is of obligatory application for public institutions, and (ii) the analyses of previous and ongoing projects have instigated municipalities to implement major improvements.

The passage of the Law of Transparency led to the creation of new indicators adapted to its legal requirements. It therefore became necessary to carry out evaluations based on these indicators in a newly developed platform. This project set out to fulfil this need and to construct methods and models that local governments can use as tools with which to offer quality communication and information for accountability to their citizens.

It should be clarified that, in addition to the disciplinary framework of the History of Communication, this research study also takes into account the contributions of innovative lines of Public Relations studies (Canel-Crespo & Sanders, 2010) and of work oriented to transparency and accountability (Pina, Torres & Royo, 2007; Piotrowski & van Ryzin, 2007; Bertot, Jaeger & Grimes, 2010; Grimmelikhuijsen & Welch, 2012; Caamaño-Alegre, Lago-Peñas, Reyes-Santias & Santiago-Boubeta, 2013).

The present research arises in this context of collaboration to improve the transparency and quality of information of public administrations. It starts from the following research questions: Is it possible to develop and apply an analysis model of municipal websites that focuses on published information related to the SDGs and associated climate change targets? Will different information be found on the websites of different cities according to different criteria, such as demographic or economic ones? Will information on some specific items of the analysis model be preferentially present on the websites? Can a bipartite network be obtained in a complementary way where cities are related to the variables?

As possible answers to the above research questions, it is hypothesised that the design and application of such an analysis model is possible. It is believed that cities with larger budgets and populations are likely to include more information of interest. It is also estimated that there will be information that is recurrent and predominant on the websites analysed. And, likewise, it is understood that it will be possible to create a bipartite network that relates cities and variables.

In order to answer the initial questions and to confirm or not the hypotheses, the main objective of this work is to establish a method for the analysis of the information provided on municipality websites, and to carry out an informational, transparency, and local diplomacy study with respect to Agenda 2030 and SDGs. To this end, a method of evaluation was developed based on the relationship of SDGs with their associated climate change targets. It includes a questionnaire for the analysis of the information, whether or not identified explicitly, on those sites. The method is applied to a sample of cities, and conclusions are established concerning the presence or absence of information on climate change. In this way, it is possible to determine the importance that local governments give to these issues and how they report on the development of related activities. The analytical tool is global as well as local since it compiles not only the climate actions aimed at the particular locality but also relations with other cities and international relations established as a result of the implementation of Agenda 2030.

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The specific objectives are to analyse the data obtained in the analysis in order to study whether there is information on items that is more present than others. And, in a complementary way, to create a graphical representation of the network between cities and variables.

1.1. *State of the issue*

The development of municipal diplomacy is gaining in value as municipal corporations face such political problems as migration and climate change. Global cities are influencing international development and are set to become the middle power in global political organizations (Manfredi-Sánchez, 2022a). For these cities to be smart, sustainable, and inclusive, they must advance towards digital urban governance and the practice of digital citizenship, accessible to all especially the most vulnerable. Although the digital inclusion experiences of Madrid, New York, Toronto, and São Paulo are not easily repeatable, they can nevertheless inspire a change in smart urban governance (Kolotouchkina, Llorente Barroso & Manfredi Sánchez, 2022), bearing in mind that disinformation can also be a tool at the service of the State. At present, the variety of sources and channels of information has led to emotion playing a central role in the information process, including a moral variable in the resolution of international problems. Thus, in addition to being agents and producers of information, the media also have to verify that the content is not harmful to society (Manfredi-Sánchez, Amado & Gómez-Iniesta, 2022d).

Spain has become a case of digital transformation developed in a public administration, since its Ministry of Foreign Affairs and Cooperation has systematized its digital response through the communication of diplomatic missions (Manfredi-Sánchez, 2022b), which was of great help in the face of the COVID-19 pandemic. The study of political leadership and public governance in China, the United States, the European Union, and Russia during the COVID crisis shows how pandemics have contributed to the deinstitutionalization of public diplomacy. Given its worldwide visibility, the vaccine symbolizes global public health policy, offering prestige and reputation to reinforce political and economic projects (Manfredi-Sánchez, 2022c).

Another noteworthy study related to the subject is that of Sidorenko Bautista, Cortés Selva and Herranz de la Casa (2022) on Agenda 2030 and its SDGs. It focuses on the goals related to habitability, accessibility, protection of the natural and cultural heritage, air quality, economic, social, and environmental planning, and the efficient use of resources, with the objectives of making cities inclusive, safe, resilient, and sustainable. Thus, global cities have set their interests on Agenda 2030 and climate change, especially since the nation state has been unable to resolve global issues, allowing cities to attract investment that has ended up widening the gap between rural and urban areas. The solution comes in the guise of the new technologies that can eliminate these inequalities (Manfredi-Sánchez, Pizarro, Espiñeira-Guirao & Brown, 2021). In short, the SDGs and Agenda 2030 point to the work of governments, nations, cities, and citizens regarding actions in terms of sustainability and social responsibility, establishing global goals. For this reason, it is necessary to have indicators with which both to measure the evolution and fulfilment of the SDGs and to communicate the results to keep citizens informed about the attainment of the goals established at a global level.

Agenda 2030 was ratified on 25 September 2015 in New York by 193 member states of the United Nations General Assembly, establishing 17 SDGs in 5 areas (people, the planet, prosperity, peace, and partnership), with 169 targets. They have their origin in the Millennium Development Goals (MDG) implemented over a 15-year period (2000–2015) for international cooperation in the eradication of hunger, extreme poverty, and climate change. Taking the purpose of the SDGs being to mobilize resources and actions in favour of people and the planet, the studies carried out to date have shown that there are examples of good governance, such as the case of Sweden and such cities as Bristol, Helsinki, Los Angeles, and New York, with the main means of communication being reports, websites, and social networks (Herranz de la Casa & García Caballero, 2021).

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The relationship between the SDGs and public diplomacy is closely linked to the communication dimension. As indicated by Vilches *et al* (2014), Since the conception of the 2030 Agenda, the universal orientation and the importance of its accessibility were established to be understood by citizens and applicable at a global level. As indicated in General Assembly Resolution 66/288, "sustainable development goals should be action-oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries" (UNGA, 2012, art. 247).

In this sense, Vallez *et al.* (2022), in their study on the relationship between the SDGs and university websites, highlight that "the importance of the SDGs to society and the role that politics plays in their implementation makes an analysis of the Web visibility of the 2030 Agenda and the SDGs particularly valuable." Along the same lines, various studies consider the website as a tool for public diplomacy and for the construction of institutional identity (Cakar & Cakar, 2023; Liang & Wang, 2023; Rieiro-García *et al.*, 2023; Arceo, 2018; Lusa & Jakopovic, 2017).

Previous research (Fernández-Falero, Ruano-López & Trabadela-Robles, 2022) analysed the climate action information available on the websites of Portuguese municipalities. In this sense, the objective of the present pilot study was to identify the presence of SDG 13 (Climate Change) in the rest of Agenda 2030's goals. This cross-sectional analysis makes it possible to refine the prioritization and localization of Agenda 2030, with especial attention paid to the preservation and protection of the environment. Likewise, the results allow adjustments to be made to local human development strategies.

2. Material and Methods

2.1. *Methods*

The design of the tool for the cross-sectional analysis of Agenda 2030 from the perspective of climate action is based on a review of the targets of the 17 SDGs and the respective specific indicators.

Various studies that address a specific cross-sectional analysis of the 17 SDGs are taken as starting point. Firstly, there stands out the research carried out by Pradhan *et al.* (2017) which identified the synergies that arise between the 17 goals and the 169 targets they comprise. Specifically, this study observed the presence of specific objectives within the targets of different goals.

Also taken as referents are works involving cross-sectional analyses carried out with different approaches –from a gender perspective (Morgan *et al.*, 2020) or gender equality and education (García Luján & Albareda Tiana, 2020), and, more specifically for the purposes of this present work, from an environmental perspective (Tienda Palop, 2020; Sosa Núñez, 2019; Terzi Ewald, 2019).

For this, the objectives were selected that maintain a relationship with any of the targets of the 17 goals (except for number 13 on climate action). After the process of relating and associating the specific targets with the climate action goal, four categories were identified:

1. Equitable access to resources. This refers to the possibility of a correct distribution of natural resources for social sustainability.
2. Protection and prevention. Measures to avoid or reduce the impact of natural disasters.
3. Consequences. Measures to alleviate and recover a sustainable state after periods of socio-environmental crises.
4. Technical cooperation. Information and technical resources for the empowerment of communities for autonomy and the expression of development based on their social values and geographical conditions.

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With this being an initial study, the categories were reduced to two large groups: (1) Consequences, and (2) Protection and Prevention. The former refers to the goals aimed at solving or mitigating the effects of climate change, and the latter to preventing its impact on the population and urban environments.

Subsequently, variables were defined based on presence on the website and, in specific cases, on communication actions developed by a municipal corporation. The questions address the visibility and accessibility of the different measures associated with the targets of the SDGs analysed.

Table 1. Relationship of the variables to be analysed with Agenda 2030.

2030 Agenda	Goals	Targets linked to climate action	Relation of the targets with the measures against climate change	Variables on the website
SDG1	No Poverty	Meta 1.4; 1.5	Protection and prevention	1. Does the website present information on social programs or public policies to guarantee access to homes with basic services?
				2. Is aid provided to the population for access to land tenure?
			Consequences	1. Programs and/or policies to support the population after a climate-related disaster? (Especially population in conditions of vulnerability)
				2. Specific section with aid to social sectors in vulnerable conditions?
SDG2	Zero Hunger	Meta 2.3; 2.4	Protection and prevention	Are public policies visible to increase agricultural productivity and income from food products through equitable and secure access to land?
			Protection and prevention	1. Does the website present information about programs or actions aimed at ensuring the sustainability of food production systems and the maintenance of the ecosystem?
				2. Is access to social programs and/or assistance facilitated?
				Is information provided on the proportion of agricultural area where productive and sustainable agriculture is practiced?
SDG3	Good health and Well-belong	Meta 3. b	Consequences	1. Is there information on supporting vaccine research and development, and access to essential medicines and vaccines? (Collaboration in the international arena)
				2. Is access to vaccination services facilitated at the local level?

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SDG4	Quality education	Meta 4.7	Protection and prevention	Is there information on programs or actions linked to promoting the acquisition of theoretical and practical knowledge by students to promote education for sustainable development and sustainable lifestyles?
SDG5	Gender equality	Meta 5.a	Protection and prevention	1. Is there information on reforms regarding equal rights related to access to ownership and control of land and/or natural resources?
				2. Is there a specific budget? How much?
SDG6	Clean water and sanitation	Meta 6.3; 6.6	Protection and prevention	1. Information on actions to improve domestic and industrial wastewater treatment?
				2. Is there a specific budget? How much?
				3. Information on actions related to improving water quality?
			Protection and prevention	1. Is there information on programs or actions aimed at protecting and restoring ecosystems related to water?
				2. Is the budget reported? How much?
SDG7	Affordable and clean energy	Meta 7.2; 7.3; 7.a	Protection and prevention	1. Section where measures to increase the proportion of renewable energy are exposed?
				2. Information on advances in renewable energy?
			Protection and prevention	1. Are measures and/or actions exposed to contribute to the improvement of energy efficiency?
			Protection and prevention	Is financial support to developing countries to support research and development of clean energy and renewable energy production, including hybrid systems, made visible or reported?
SDG8	Decent work and economic growth	Meta 8.4; 8.9	Protection and prevention	1. Does the website have information about programs/actions
				2. Is information presented on the web about reducing the impact of the material footprint and consumption?
			Protection and prevention	1. Specific section on public policies aimed at promoting sustainable tourism? (Creation of jobs, cultural promotion and local products)
				2. Information on the progress of this goal? (GDP generated directly by tourism as a proportion of total GDP and growth rate)
SDG9	Industry, innovation and infrastructure	Meta 9.4	Protection and prevention	Specific section or information about the modernization of infrastructure and reconverting the industry to make them sustainable?

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SDG10	Reduced inequalities	Meta 10.7	Consequences	1. Specific section on improvements in public policies related to migration and mobility?
				2. Information on programs or actions related to improvements in immigration processes, or improvements in the management and application of migration policies?
SDG11	Sustainable cities and communities	Meta 11.b; 11.2; 11.4; 11.5; 11.6; 11.7	Protection and prevention	1. Specific section on improving access to the transport system? (Sustainable, safe and inclusive in the social sectors in conditions of vulnerability)
				2. Information on improvements in transport and urban mobility?
			Protection and prevention	1. Do they provide information on increasing inclusive/sustainable urbanization and participatory management of the city?
				2. Is there a specific budget? How much?
			Protection and prevention	Are actions and/or plans made visible to safeguard the cultural and natural heritage of the city?
			Protection and prevention	1. Specific section with information on plans or actions related to the reduction of deaths and people affected by water-related disasters? Special emphasis on people in vulnerable situations
				2. Is there a specific budget? How much?
			Consequences	Are the actions and/or plans to reduce the negative environmental impact in cities visible on the website? (Waste management)
				Are the actions and/or plans to reduce the negative environmental impact in cities visible on the website? (Air quality)
			Protection and prevention	1. Is there information about parks and gardens?
				2. Is there a specific budget? How much?
			Protection and prevention	Is there a section or information on the implementation of measures to adopt and improve policies and/or plans that improve the sustainability of cities? (resources, resilience, inclusion…)
SDG12	Responsible consumption and production	Meta 12.2; 12.8; 12.4; 12.c	Protection and prevention	Actions planned and/or implemented?
			Protection and prevention	Is there information on measures to reduce the release into the atmosphere, water and soil of chemicals and all wastes throughout their life cycle, in order to minimize their adverse effects on human health and the environment?

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			Protection and prevention	Are measures visible on the website so that people from all over the world have the relevant information and knowledge for sustainable development and lifestyles in harmony with nature?
			Protection and prevention	1. Is there information on measures to rationalize inefficient fossil fuel subsidies that encourage wasteful consumption by removing market distortions?
				2. Is there a specific budget? How much?
				3. Are there tax measures?
SDG13				
SDG14	Life below water	Meta 14.1; 14.2; 14.3 14.5	Protection and prevention	1. Does the website compile measures to prevent and significantly reduce marine pollution of all kinds, particularly that produced by activities carried out on land, including marine debris and nutrient pollution? Actions, treatment plants, etc.
				2. Is there a specific budget? How much?
			Protection and prevention	Is there information on measures to sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and taking measures to restore them in order to restore the health and productivity of the oceans?
				2. Is there a specific budget? How much?
			Consequences	Does the website compile actions to increase scientific cooperation at all levels?
			Protection and prevention	Is there information on conservation of at least 10% of coastal and marine areas, in accordance with national laws and international law and on the basis of the best available scientific information?
SDG15	Life on land	Meta 15.1; 15.2; 15.3; 15.5; 15. b	Protection and prevention	1. Is there information on the sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements?
				2. Is there a specific budget? How much?
			Protection and prevention	1. Does the website compile measures to promote sustainable management of all types of forests, end deforestation, restore degraded forests and increase afforestation and reforestation globally?
				2. Is there a specific budget? How much?

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			Consequences	Is there information on combating desertification, rehabilitating degraded land and soil, including land affected by desertification, drought and flooding, and striving for a land degradation neutral world?
				2. Is there a specific budget? How much?
			Consequences	Does the web compile urgent and significant measures to reduce the degradation of natural habitats, stop the loss of biological diversity and, by 2020, protect threatened species and avoid their extinction?
				2. Is there a specific budget? How much?
			Protection and prevention	Are measures for conservation and reforestation included in the budget? How much?
SDG16	Peace, justice and strong institutions	16.6, 16.7, 16.9, 16.10. 16.b	Protection and prevention	Is there information on transparency, accountability at all levels of the relevant institutions? E.g., Environmental Department, etc.
			Protection and prevention	Is there information on plans or programs for inclusive, participatory and representative decision-making that respond to needs?
			Protection and prevention	Is the link-up with the participation networks of developing countries in global governance institutions presented on the website?
				Does it show on the website if they are members of international institutions?
			Protection and prevention	Is there a transparency area on the website? They collect the information on the web so that it is accessible to all citizens
			Protection and prevention	Do they compile information on the promotion and application of non-discriminatory laws and policies in favor of sustainable development?
SDG17	Partnerships for the goals	17.7, 17.14, 17.18	Protection and prevention	Is there information on the website on promoting the development of environmentally sound technologies and their transfer, dissemination and diffusion to developing countries on favorable terms, including concessional and preferential terms, as mutually agreed?
			Protection and prevention	Does the website show improvements on policy coherence for sustainable development?
			Protection and prevention	Is there information on the website about capacity building support provided to developing countries to increase the availability of data on individuals and contexts?

Source: Blanco Morett, Fernández-Falero & Ruano López, 2022; INE, 2021.

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2.2. *Considerations and application*

Analysis was limited to the specific sections on the website. In the pilot study, news and external portals (linked to the municipalities) were identified that are oriented towards attaining the targets studied. The different sources were collected, but the analysis focused only on the fixed sections of the local corporation websites studied. Finally, the results proceeding from external portals were validated, as well as exceptionally when there were informational items detailing exact budgetary values.

In the subsequent quantitative analysis, positive responses are scored with a 1 and a 0 is assigned when the requested information is not found. Then the networks of the adjacency matrix are analysed, using the tools Ucinet (Borgatti, Everett & Freeman, 2002) and Network Workbench (NWB Team, 2006).

Based on an expert-heuristic analysis and inspection (Nielsen & Molich, 1990), it can be stated that the user experience in the search for information on the websites was positive, although in some cases the information had to be searched for on the second and even third level of web browsing.

2.3. *Sample*

The material studied consists of the official websites of the municipal corporations of the following Portuguese cities: Lisbon (www.lisboa.pt), Porto (www.cm-porto.pt), Braga (www.cm-braga.pt), Coimbra (www.cm-coimbra.pt), Viseu (https://cm-viseu.pt), Évora (www.cm-evora.pt), and Faro (www.cm-faro.pt).

The cities have been chosen for their leading role in Portuguese public diplomacy, due to demographic (they are the most populated cities), economic (economic focal points linked to tourism and industry), geopolitical (most of them are capitals of their districts, thus exercising regional leadership), cultural and historical criteria, as well as having university centres, thus representing the geo-population map of Portugal (Fernández-Falero, Ruano-López & Trabadela-Robles, 2022).

3. Results

The following Table 2 presents a synthesis of the results of the analysis.

Table 2. Results of the analysis of the information compiled on the municipal websites.

Website variable	SDGs & targets	Lisbon	Porto	Braga	Coímbra	Viseu	Évora	Faro
1. Information on social programmes or public policies to guarantee access to homes with basic services?	A1.4	YES	NO	YES	YES	YES	YES	YES
2. Is aid provided to the population for access to land tenure?	B1.4	NO	NO	NO	NO	YES	NO	YES
1. Programmes and/or policies to support the population after a climate related disaster (especially the population in vulnerable conditions)?	A1.5	YES	NO	NO	NO	NO	NO	YES
2. Specific section on aid to social sectors in vulnerable conditions?	B1.5	YES	NO	NO	YES	YES	YES	YES
Are public policies visible to increase agricultural productivity and income from food products through equitable and secure access to land?	23	NO	NO	NO	NO	NO	YES	YES
1. Information on programmes or actions aimed at ensuring food production system sustainability and ecosystem maintenance?	A2.4	NO	NO	NO	NO	NO	YES	YES
2. Is access to social programmes and/or aid facilitated?	B2.4	NO	NO	NO	NO	YES	YES	YES
Information on the proportion of farmland where productive and sustainable agriculture is practised?	C2.4	NO	NO	NO	NO	NO	NO	YES
1. Information on supporting vaccine research and development, and access to essential medicines and vaccines? (Collaboration in the international arena)	A3.b	YES	NO	NO	YES	NO	NO	NO

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2. Is access to vaccination services facilitated at the local level?	B3.b	YES	NO	YES	YES	NO	NO	NO
Information on programmes or actions linked to promoting students' acquisition of theoretical and practical knowledge to promote education for sustainable development and sustainable lifestyles?	4.7	NO	YES	NO	YES	YES	NO	YES
1. Information on reforms regarding equal rights related to access to ownership and control of land and/or natural resources?	A5.a	NO	NO	NO	NO	NO	NO	NO
2. Is there a specific budget? How much?	B5.a	NO	NO	NO	NO	NO	NO	NO
1. Information on actions to improve domestic and industrial wastewater treatment?	A6.3	YES	YES	YES	YES	YES	YES	YES
2. Is the budget reported? How much?	B6.3	YES	NO	YES	NO	NO	NO	YES
3. Information on actions related to improving water quality?	C6.3	YES	NO	YES	NO	NO	YES	YES
1. Information on programmes or actions aimed at protecting and restoring ecosystems related to water?	A6.6	YES	NO	YES	NO	NO	NO	YES
2. Is the budget reported? How much?	B6.6	NO	NO	YES	NO	NO	NO	NO
1. Section on measures to increase the proportion of renewable energy?	A7.2	YES	NO	YES	YES	YES	YES	YES
2. Information on advances in renewable energy?	B7.2	YES	NO	NO	NO	NO	NO	NO
1. Measures and/or actions to contribute to improving energy efficiency?	7.3	YES	NO	YES	YES	YES	YES	YES
Is financial support to developing countries made visible or reported for the support of research and development on clean energy and renewable energy production, including hybrid systems?	7.a	NO	NO	NO	NO	NO	NO	NO
Information on programmes/action?	A8.4	YES	NO	NO	NO	YES	YES	NO
2. Information about programmes/actions to reduce the footprint of materials consumption?	B8.4	YES	NO	NO	NO	NO	YES	YES
1. Specific section on public policies aimed at promoting sustainable tourism? (Job creation, cultural promotion, and local products)	A8.9	YES	YES	YES	NO	NO	NO	YES
2. Information on the progress of this goal? (GDP generated directly by tourism as a proportion of total GDP and the growth rate)	B8.9	NO	NO	NO	NO	NO	NO	NO
Specific section or information about the modernization of infrastructure and reconverting industries to make them sustainable?	9.4	NO	NO	NO	YES	YES	YES	YES
1. Specific section on advances in public policies related to migration and mobility?	A10.7	YES	NO	YES	YES	YES	YES	YES
2. Information on programmes or actions related to improvements in immigration processes, or improvements in the management and application of migration policies?	B10.7	NO	NO	NO	YES	YES	YES	YES
Specific section on improving access to the transport system? (Sustainable, safe, and inclusive in social sectors in conditions of vulnerability)	A11.2	YES	YES	NO	YES	NO	YES	YES
2. Information on improvements in transport and urban mobility?	B11.2	YES	YES	NO	YES	NO	YES	YES
1. Information on increasing inclusive/sustainable urbanization and participatory city management?	A11.3	NO	YES	NO	YES	YES	YES	NO
2. Is there a budget item? (Amount)	B11.3	NO	NO	YES	NO	NO	NO	NO
Are actions and/or plans to safeguard the city's cultural and natural heritage mentioned or made visible?	11.4	YES	NO	YES	YES	NO	YES	YES
1. Specific section with information on plans or actions related to the reduction of deaths and people affected by water related disasters? Especial emphasis on people in vulnerable situations.	A11.5	NO	NO	NO	NO	NO	NO	NO
2. Is there a budget item? (Amount)	B11.5	NO	NO	NO	NO	NO	NO	NO
Are actions and/or plans to reduce the negative environmental impact in cities mentioned or made visible? (Waste management)	A11.6	YES	NO	YES	YES	YES	YES	YES
Are actions and/or plans to reduce cities' negative environmental impact mentioned or made visible? (Air quality)	B11.6	NO	NO	YES	NO	NO	NO	YES
1 Is there information on parks and gardens?	A11.7	YES	YES	YES	YES	YES	YES	YES
2. Is there a budget item? (Amount)	B11.7	NO	NO	NO	NO	YES	NO	NO

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Question	Code							
Is there information on the implementation of measures to adopt and improve policies and/or plans that improve cities' sustainability? (Resources, resilience, inclusion…)	11.b	YES	NO	YES	YES	YES	YES	NO
Are actions planned and/or implemented?	12.2	NO	NO	NO	NO	YES	NO	NO
Is there information on measures to reduce the release into the atmosphere, water, and soil of chemicals and all wastes throughout their life cycle, in order to minimize their adverse effects on human health and the environment?	12.4	NO	NO	NO	YES	NO	YES	YES
Are measures visible for people around the world to have the relevant information and knowledge for sustainable development and lifestyles in harmony with nature?	12.8	NO	NO	NO	YES	NO	YES	YES
Is there information on measures to rationalize inefficient fossil fuel subsidies that encourage wasteful consumption, removing market distortions?	A12.c	NO	NO	NO	NO	NO	NO	NO
Is there a budget item? (Amount)	B12.c	NO	NO	NO	NO	NO	NO	NO
Are tax measures presented?	C12.c	NO	NO	NO	NO	NO	NO	NO
Are there measures to prevent and significantly reduce marine pollution of all kinds, particularly that produced by activities carried out on land, including marine debris and nutrient pollution? Actions, wastewater treatment plants, etc.	A14.1	NO	NO	NO	NO	NO	NO	NO
Is there a budget item? (Amount)	B14.1	NO	NO	NO	NO	NO	NO	NO
Is there information on measures to sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and taking measures to restore them in order to re-establish the health and productivity of the oceans?	A14.2	NO	NO	NO	NO	NO	NO	NO
Is there a budget item? (Amount)	B14.2	NO	NO	NO	NO	NO	NO	NO
Are there actions to increase scientific cooperation at all levels?	14.3	NO	NO	NO	NO	NO	YES	NO
Is there information on conservation of at least 10% of coastal and marine zones, in accordance with international law and national laws, and on the basis of the best available scientific information?	14.5	NO	NO	NO	NO	NO	NO	NO
Is there information on the sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular woodlands, wetlands, mountains, and drylands, in line with obligations under international agreements?	A15.1	YES	NO	YES	YES	YES	YES	YES
Is there a budget item? (Amount)	B15.1	NO	NO	NO	NO	NO	NO	NO
Are there measures to promote sustainable management of all types of woodlands, end deforestation, restore degraded forests, and increase afforestation and reforestation globally?	A15.2	NO	NO	NO	NO	YES	NO	YES
Is there a budget item? (Amount)	B15.2	NO	NO	YES	NO	NO	NO	NO
Is there information on combating desertification, rehabilitating degraded land and soil, including land affected by desertification, drought, and flooding, and striving to attain a land-degradation neutral world?	A15.3	NO	NO	YES	YES	NO	YES	NO
Is there a budget item? (Amount)	B15.3	NO	NO	NO	NO	NO	NO	NO
Is there information on urgent and meaningful measures to reduce the degradation of natural habitats, halt the loss of biological diversity, and, by 2020, protect threatened species and prevent their extinction?	A15.5	YES	NO	NO	NO	NO	NO	NO
Are they in the budget? (Amount)	B15.5	NO	NO	NO	NO	NO	NO	NO
Are measures for conservation and reforestation included in the budget? How much?	15.b	NO	NO	YES	NO	NO	NO	NO
Is there information on transparency, accountability at all levels of the relevant institutions? E.g., an Environmental Department, etc.	16.6	YES	YES	YES	YES	NO	YES	YES
Is there information on plans or programmes for inclusive, participatory, and representative decision making that respond to needs?	16.7	NO	NO	YES	YES	NO	NO	NO
Are there networks of developing countries' participation in global governance institutions?	A16.8	YES	NO	YES	NO	NO	NO	NO
Are they members of international institutions?	B16.8	YES	NO	NO	NO	YES	NO	NO

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Is there transparency? Is the information on the website presented so as to be accessible to all citizens?	16.10	YES	YES	YES	YES	YES	YES	YES
Is there information on the promotion and application of non-discriminatory laws and policies in favour of sustainable development?	16.b	NO	NO	NO	NO	NO	YES	YES
Is there information on promoting the development of environmentally sound technologies and their transfer, dissemination, and diffusion to developing countries on favourable terms, including mutual agreement on concessional and preferential terms?	17.7	NO	NO	YES	NO	NO	NO	NO
Does it include improvements on policy coherence for sustainable development?	17.14	NO	NO	YES	NO	NO	NO	NO
Is there information on support for developing countries to create the capacity to increase the availability of data on individuals and contexts?	17.18	NO	NO	NO	NO	NO	NO	NO

Source: Own elaboration.

Analysing the methodological results, one observes that 18 of the 71 variables analysed are not validated, i.e., no municipal council includes information concerning them on their website. It stands out that 8 of them correspond to the amount budgeted to achieve eight of the targets indicated in Agenda 2030. The 18 for which there is no data are:

1. Information on reforms regarding equal rights related to access to ownership and control of land and/or natural resources? (SDG5, Target 5.a).
2. A specific budget? How much? (SDG5, Target 5.a).
3. Financial support for developing countries to support research and development of clean energy and renewable energy production, including hybrid systems is made visible or reported? (SDG 7, Target 7.a).
4. Information on the progress of this goal? (GDP generated directly by tourism as a proportion of total GDP and the growth rate) (SDG8, Target 8.9).
5. Specific section with information on plans or actions related to the reduction of deaths and people affected by water-related disasters? Especial emphasis on people in vulnerable situations (SDG 11, Target 11.5).
6. Is there a budget? How much? (SDG11, Target 11.5).
7. Information on measures to rationalize inefficient fossil fuel subsidies that encourage wasteful consumption by removing market distortions? (SDG12, Target 12.c).
8. Is there a budget for it? How much? (SDG12, Target 12.c).
9. Are tax measures presented? (SDG12, Target 12.c).
10. Are there measures to prevent and significantly reduce marine pollution of all kinds, particularly that produced by activities carried out on land (including marine debris and nutrient pollution), actions, wastewater treatment plants, etc.? (SDG14, Target 14.1).
11. Is there a budget? How much? (SDG14, Target 14.1).
12. Is there information on measures to sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and taking measures to restore them for the sake of the health and productivity of the oceans? (SDG14, Target 14.2).
13. Is it in the budget? How much? (SDG14, Target 14.2).
14. Is there information for conservation of at least 10% of coastal and marine areas, in accordance with national laws and international law and based on the best available scientific information? (SDG14, Target 14.5).
15. Is there a budget, and how much, for the sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements? (SDG15, Target 15.1).
16. Is there a budget, and how much, for combating desertification and rehabilitation of degraded lands and soils, including lands affected by desertification, drought, and floods, and striving to achieve a land-degradation neutral world? (SDG15, Target 15.3).

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17. Does the budget include, and for how much, urgent and meaningful measures to reduce the degradation of natural habitats, halt the loss of biological diversity, and, by 2020, protect threatened species and prevent their extinction? (SDG15, Target 15.5).
18. Is there support for developing countries to create the capacity to increase the availability of data on individuals and contexts? (SDG17, Target 17.18).

3.1. *Quantitative analysis*

Analysis of the results by municipality (Table 3, left) shows their websites to include information on different numbers of variables. Faro (33 variables), Évora (29 variables), and Lisbon (28 variables) provide the most information on Agenda 2030, and the last three are Coímbra (25), Viseu (22), and finally Porto (9).

Table 3. Relationship of cities and number of variables validated (left), and absolute frequency of the number of cities that include the same variable (right).

City	Nº of variables validated	Nº of cities per variable	Frequency
Faro	33	7	3
Évora	29	6	7
		5	5
Lisbon	28	4	6
Braga	27	3	9
Coímbra	25	2	11
Viseu	22	1	12
Porto	9	0	18

Source: Own elaboration.

One observes in Table 3 (right) that only 3 variables are present in all 7 municipalities. These are: Information on actions to improve the treatment of domestic and industrial wastewater? Is there information on parks and gardens? Is there transparency? On the contrary, there are 12 variables which are dealt with by only a single municipality.
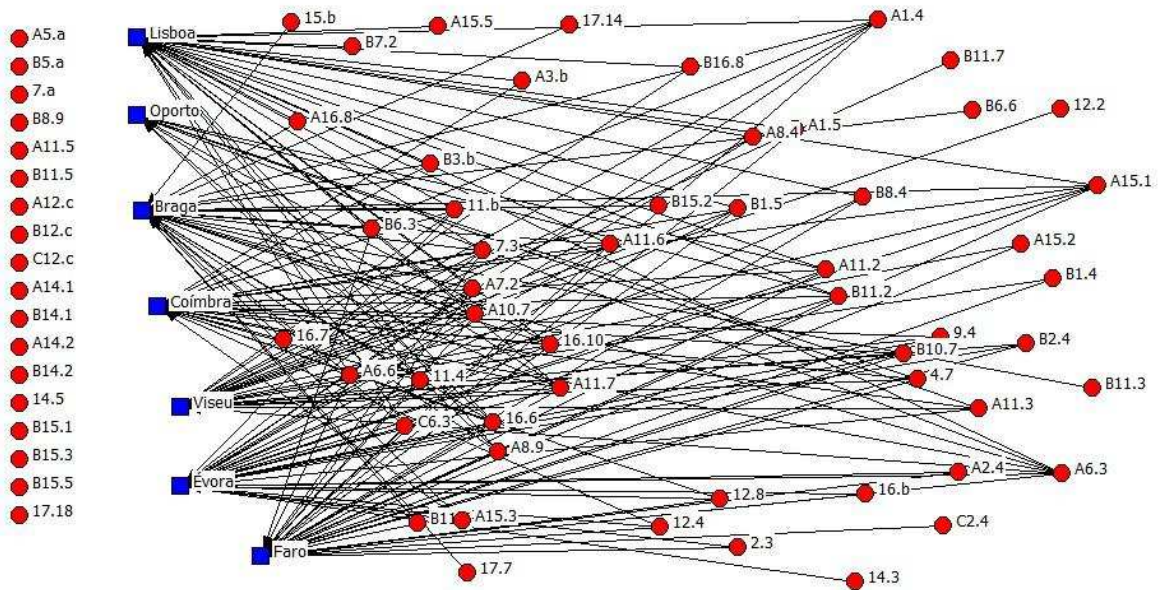
Of the municipalities analysed, 6 compile information on the following variables: Information on social programmes or public policies to guarantee access to homes with basic services? A section of measures to increase the proportion of renewable energy? Measures and/or actions to contribute to the improvement of energy efficiency? A specific section on advances in public policies related to migration and mobility? Actions and/or plans to reduce cities' negative environmental impact (waste management)? Information on the sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular, woodlands, wetlands, mountains, and drylands, in line with obligations contracted under international agreements?

3.2. *Network analysis*

A bipartite network is obtained from the results matrix, relating just the cities with the variables (Figure 1).

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Figure 1. Network of relationships between the cities and the variables compiled on their websites.
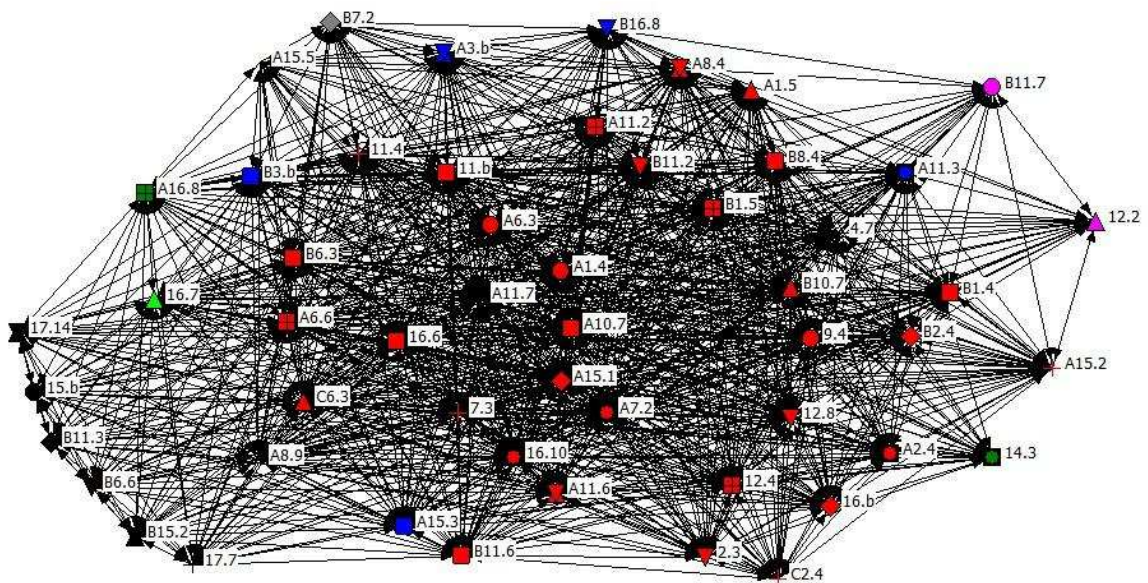

Source: Own elaboration.

Shown at the left in Figure 1 are the 18 isolated nodes that correspond to the information on Agenda 2030 that was not included on any municipal website.

The bipartite co-occurrence network of the variables is shown in Figure 2 (in red are the nodes that form part of the core.) The links in this graph are formed by the relationships established between two variables when present on a municipal website.

Figure 2. Graph of co-occurrences between the variables and their core.

Source: Own elaboration.

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The network comprises 53 nodes joined by 1065 links. The graph's core consists of the 35 nodes for which if any one of them were to be eliminated the graph would disappear. These nodes correspond to the following variables:

- Are actions and/or plans to safeguard the city's cultural and natural heritage mentioned or made visible? (11.4).
- Is there information on the implementation of measures to adopt and improve policies and/or plans that improve cities' sustainability? (Resources, resilience, inclusion...) (11.b).
- Actions planned and/or implemented? (12.2).
- Is there information on measures to reduce the release into the atmosphere, water, and soil of chemicals and all wastes throughout their life cycle, in order to minimize their adverse effects on human health and the environment? (12.4).
- Is there information on measures to reduce the release into the atmosphere, water, and soil of chemicals and all wastes throughout their life cycle, in order to minimize their adverse effects on human health and the environment? (12.8).
- Are there actions to increase scientific cooperation at all levels? (14.3).
- Are measures for conservation and reforestation included in the budget? How much? (15.b).
- Are measures for conservation and reforestation included in the budget? How much? (16.10).
- Is there information on transparency, accountability at all levels of the relevant institutions? E.g., an Environmental Department, etc. (16.6).
- Is there information on plans or programmes for inclusive, participatory, and representative decision making that respond to needs? (16.7).
- Is there information on plans or programmes for inclusive, participatory, and representative decision making that respond to needs? (16.b).
- Does it include improvements on policy coherence for sustainable development? (17.14).
- Is there information on promoting the development of environmentally sound technologies and their transfer, dissemination, and diffusion to developing countries on favourable terms, including mutual agreement on concessional and preferential terms? (17.7).
- Are public policies visible to increase agricultural productivity and income from food products through equitable and secure access to land? (23).
- Information on programmes or actions linked to promoting students' acquisition of theoretical and practical knowledge to promote education for sustainable development and sustainable lifestyles? (4.7).
- Measures and/or actions to contribute to improving energy efficiency? (7.3).
- Specific section or information about the modernization of infrastructure and reconverting industries to make them sustainable? (9.4).
- Information on social programmes or public policies to guarantee access to homes with basic services? (A1.4).
- Programmes and/or policies to support the population after a climate related disaster (especially the population in vulnerable conditions)? (A1.5).
- Specific section on advances in public policies related to migration and mobility? (A10.7).
- Specific section on improving access to the transport system? (Sustainable, safe, and inclusive in social sectors in conditions of vulnerability) (A11.2).
- Information on increasing inclusive/sustainable urbanization and participatory city management? (A11.3).
- Are actions and/or plans to reduce the negative environmental impact in cities mentioned or made visible? (Waste management) (A11.6).
- Is there information on parks and gardens? (A11.7).
- Is there information on the sustainable use of terrestrial and inland freshwater ecosystems

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and the services they provide, in particular woodlands, wetlands, mountains, and drylands, in line with obligations under international agreements? (A15.1).

- Are there measures to promote sustainable management of all types of woodlands, end deforestation, restore degraded forests, and increase afforestation and reforestation globally? (A15.2).
- Is there information on combating desertification, rehabilitating degraded land and soil, including land affected by desertification, drought, and flooding, and striving to attain a land-degradation neutral world? (A15.3).
- Is there information on urgent and meaningful measures to reduce the degradation of natural habitats, halt the loss of biological diversity, and, by 2020, protect threatened species and prevent their extinction? (A15.5).
- Are there networks of developing countries' participation in global governance institutions? (A16.8).
- Information on programmes or actions aimed at ensuring food production system sustainability and ecosystem maintenance? (A2.4).
- Information on supporting vaccine research and development, and access to essential medicines and vaccines? (Collaboration in the international arena) (A3.b).
- Information on actions to improve domestic and industrial wastewater treatment? (A6.3).
- Information on actions to improve domestic and industrial wastewater treatment? (A6.6).
- Section on measures to increase the proportion of renewable energy? (A7.2).
- Does the website have information about programmes/actions? (A8.4).
- Specific section on public policies aimed at promoting sustainable tourism? (Job creation, cultural promotion, and local products) (A8.9).
- Is aid provided to the population for access to land tenure? (B1.4).
- Specific section on aid to social sectors in vulnerable conditions? (B1.5).
- Information on programmes or actions related to improvements in immigration processes, or improvements in the management and application of migration policies? (B10.7).
- Information on improvements in transport and urban mobility? (B11.2).
- Is there a budget item? (Amount) (B11.3).
- Are actions and/or plans to reduce cities' negative environmental impact mentioned or made visible? (Air quality) (B11.6).
- Is there a budget item? (Amount) (B11.7).
- Is there a budget? How much? (B15.2).
- Are they members of international institutions? (B16.8).
- Is access to social programmes and/or aid facilitated? (B2.4).
- Is access to vaccination services facilitated at the local level? (B3.b).
- Is the budget reported? How much? (B6.3).
- Is the budget reported? How much? (B6.6).
- Information on advances in renewable energy? (B7.2).
- Information about programmes/actions to reduce the footprint of materials consumption? (B8.4).
- Information on the proportion of farmland where productive and sustainable agriculture is practised? (C2.4).
- Information on actions related to improving water quality? (C6.3).

The following table (Table 4) lists the SDGs that correspond to the website variables and the goals of the SDGs that form part of the core.

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Table 4. Relationship between the SDGs that form the core and their frequency (left), and the goals of the SDGs that are part of the core and the corresponding frequency (right).

SDG	Absolute frequency		SDG goals	Frequency %
SDG11	10		Cities	18.87
SDG15	6		Woodlands, desertification, and biodiversity	11.32
SDG16	6		Peace and justice	11.32
SDG6	5		Water and sanitation	9.43
SDG1	4		End to poverty	7.55
SDG2	4		Hunger and food security	7.55
SDG7	3		Energy	5.66
SDG8	3		Economic growth	5.66
SDG12	3		Sustainable production and consumption	5.66
SDG3	2		Health	3.77
SDG10	2		Reduce inequalities between and within countries	3.77
SDG17	2		Alliances	3.77
SDG4	1		Education	1.89
SDG9	1		Infrastructure	1.89
SDG14	1		Oceans	1.89
SDG5	0			

Source: Own elaboration.

4. Conclusions

With regard to the main objective, which was to establish a methodological approach to analysing the information compiled on the municipalities' websites that is related to Agenda 2030 and the SDGs, it has to be said that the hypothesis is confirmed and the correct application of the designed method of analysis was possible, although data were not obtained for several variables.

As conclusions to the results obtained and as a response to the hypothesis related to the specific objective of studying whether information on some items is more present than on others, budgetary information is the hardest to locate or cannot directly be found on the websites. This may generate mistrust in the implementation of Agenda 2030, at least in the affected SDGs (5, 11, 12, 14, 15, and 17) due to the lack of explicit communication of the allocated funding (if any).

It was presumed that cities with a larger budget and population could perhaps include more information of interest, but it can be concluded that the implementation and information on the development of the SDGs related to climate change does not depend on the population, nor on the larger or smaller municipal budget. Thus, in the analysis carried out, it is the municipality with the smallest population (Faro) that provides the most information. This hypothesis is therefore refuted.

With respect to the type of information included, the variables that are found most frequently and the information most readily located on the municipal websites correspond to transparency and waste management.

The specific objective of creating a graphical representation of the network between cities and variables has been fulfilled, thus confirming the hypothesis. A bipartite network is obtained where the cities are related to the variables and it is concluded that, the 35 variables that constitute the core nodes are those which really report on the SDGs present on the municipal websites. They therefore reflect the most clearly identified and developed aspects

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of Agenda 2030 in these Portuguese municipalities. The most clearly developed information on these websites corresponds to citizenship related aspects (18.87%) such as transportation, inclusion, and accessibility. These are followed by woodlands, desertification, and ecological diversity (11.32%), specifically, maintenance and the fight against desertification. On the contrary, the least frequent goals (1.89%) are Education, Infrastructure, and Oceans, even though they form part of the core and are therefore highly valued aspects on the websites.

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