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Collaborative process design for waste management: co-constructing strategies with stakeholders

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Abstract

Waste management is currently facing multiple challenges worldwide. The population growth in urban areas and related environmental concerns have increased the need to promote urban sustainability, namely where urban waste is a challenge. Thus, research on efficient waste management to reduce resources overload and to develop more sustainable production and consumption is key. Having this in mind, modern society is now seeking for an active voice and to be part of the decision-making processes that directly affect citizens. Citizens need to play an active role on decision-making to co-construct action guidelines, aiming a higher implementation success for an effective and inclusive management of urban waste. In this sense, UrbanWINS project was developed to promote co-construction and implementation of pilot actions involving citizens. In this paper the authors described the framework developed, and reflect critically on the results achieved.

Keywords Urban waste · Collaboration · Co-construction of knowledge · Participation

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1 Introduction

Nowadays policy makers are often challenged to develop innovative solutions to increasingly complex problems to better serve current society. Policy makers may pursue continuous improvements in decision-making processes through intelligent formulation of alternative Public Policies (Ferretti et al., 2019), including urban waste issues.

The urban population is increasing. In 2018, about 4.2 billion people were living in urban areas, and this trend is predicted to increase more 2.5 billion until 2050 (United Nations, 2019). Consequently, waste generation rates will rise, and annual solid waste generation is expected to increase by 70% from 2.01 billion tons (2016 levels) to 3.40 billion tons in 2050 (Kaza et al., 2018). Waste management is not only a global problem for the legal entities but an individual problem since affects all world citizens. Individuals and governments make decisions about consumption and waste management that influence the daily health, productivity, and cleanliness of communities. To tackle urban waste drawbacks, a holistic view is much needed (Yu et al., 2013) to improve knowledge and link it to economic and social issues. Providing efficient and inclusive waste management and prevention mechanisms will contribute to long-term urban development sustainability.

In the last decades, solid waste management systems have involved controversially complex and multifaceted commitments between technological alternatives, economic instruments, and regulatory frameworks (Kaza et al., 2018; Petts, 2001). Evidences on sustainable waste management need in all phases of waste life cycle that are vital for the resilience of urban areas (Pires et al., 2011). According to Visvanathan et al. (2004, in Joseph, 2006), sustainable waste management requires an integrated three-factor approach:

(1) The use of different prevention and reuse strategies, collection, recycling, energy recovery, and environmental solid waste and a more sustainable landfill;
(2) Involvement and participation of all stakeholders: waste producers (households, industries, commerce, and agriculture), waste processors (formal and informal recyclers) and government institutions (regulators, waste managers, and urban planners);
(3) Interaction between the waste system and other relevant systems related to product design in the industry, which can have a significant impact on its future reuse and recycling.

Thus, to achieve a sustainable waste management it is crucial not only to know how cities consume and dispose products and resources currently, but also to consider how to prevent, reduce, and reuse their waste (Rosado et al., 2014; Bustillos Ardaya et al., 2019; Vasconcelos et al., 2005). Cities' behaviors are influenced by the experiences of its inhabitants. The way citizens adopt or dismiss certain recommendations is highly dependent on the manner how people are involved and assume commitments. The waste sector is very sensitive and dependent on public and stakeholders' co-operation to prevent, reduce, and recycle. In addition, the knowledge of the involved parts and the acceptance of innovative waste management practices are key factors. In the past, communication efforts from waste sectors focused on the traditional approaches of advertising and marketing. Recently, the waste sector opened to new approaches, namely stakeholders' engagement that is one of the most important drivers. This contributed to long-lasting support of decisions and actions in society, promoting behavior changes and responsibility of decisions important for functional waste systems (Kaza et al., 2018).

1.1 Need for a participatory approach in environmental issues

In a top-down and bottom-up approach, dialog, exchange, and deliberation to assess knowledge and causal connections are imperative factors (Bustillos Ardaya et al., 2019; Vasconcelos et al., 2005). Efficient and clear communication is a key cross-subject (Ardaya et al., 2019) that integrates different ways of thinking, different perspectives based on different expertise and knowledge. Involving the dominant players to change their conventional mentalities on 'traditional' procedures leading to long-lasting positive effects, allowing for the construction of capital: social (increased trust and collaboration); human (new capacities and skills); intellectual (new knowledge and learning), and political (new services and infrastructures) (Hassan, 2014; Stratoudakis et al., 2019).

Concerning urban waste, social capital growth is relevance since this capital theory is based on the relationship between the actors and values or assets embedded in that relationship. This can be used for identifying knowledge sharing determinants in the mentioned networks (Akhavan et al., 2015). Social capital is "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Mäkelä, 2007; Yu et al., 2013). While creating conditions for the construction of this type of capital, individuals act collectively and share knowledge, representing key enablers for knowledge sharing. This encourages communication and empowers actions that are more effective to achieve the goal (Hage et al., 2010; Putnam, 1995). Current dissemination of knowledge gathers not only scientific, but also societal knowledge (Hage et al., 2010). In this way, people are likely to discuss environmental issues and lead to an affective commitment (e.g., emotional involvement) influencing the individuals' collective behavior (Yu et al., 2013).

However, to achieve this social capital is essential to move from a representative to a participatory democracy, privileging co-construction with the direct involvement of the participants, requiring new approaches at the local level, constituting a add-value to traditional processes (Vasconcelos et al., 2005, 2012), while embracing public participation. Public participation encompass citizen, stakeholders and community participation, covering a broad range of interactions between government and civil society to design, implement, and evaluate policies (Coenen, 2009). European and American environmental policy arenas were developed to turn environmental policy making and risk management more effective and democratic (Newig, 2007; Renn, 2006).

According to Faucheux (1997, as cited in van den Hove, 2000), a desirable practice for the sustainable development involves heterogeneous stakeholders more and more often. Public participation is needed where citizens sought opportunities for innovative and less formal means to have voice and involvement in environmental policy decisions (Newig, 2007; Walker, 2007). Public participation usually leads to the use of terminology such as 'involvement' to connote greater input into decision-making (Chess, 2000). However, some experts assume that participation is a one-way information flow between public and decision-makers (Videira et al., 2006). As a result of this assumption, meetings may have a passive format, without deliberation and involvement (Coenen, 2009), increasing the risk of generating disputes. Contrarily, interactive and participatory approaches could be the best way to expand stakeholders' involvement in this new context, making them interventive citizens and assuming co-responsibility in the decision-making process. Allowing interactive, structured and facilitated meetings, where stakeholders participation is inclusive, creative, and based on true dialog (Vasconcelos, 2007; Videira et al., 2006) that is crucial for a consensual solution (Coenen, 2009). Citizens have no longer a role only as a final recipient

of public services, looking for greater responsibilities as "self-sustaining active individuals" (Ferkany & Whyte, 2012; Gofen, 2015).

Through these participatory approaches, concerning environmental issues, public participation needs are linked to a set of characteristics with consequences at a social level: complexity, uncertainty (Ferkany & Whyte, 2012; Newig, 2007), large temporal and spatial scales, irreversibility, and transversability (van den Hove, 2000). Beyond intrinsic complexity to these issues, pre-existing conflicts of interests between actors may arise, as well as the nature of the problem and potential solution. Generally, environmental concerns are highly cross-sectoral, requiring problem-solving processes that allow coordination across policy areas (van den Hove, 2000).

Participatory approaches represent a tool that increase legitimacy and quality in decision-making processes, namely under conditions of uncertainty (Hage et al., 2010; Newig, 2007) allowing different actors to work in concert, even with uncertainty and limited information. Public participation with a high-level participatory approach may impact the decision-making process, and the results are:

- *Quality* Raises the substantive quality of assessment or decision itself by adding information to the decision-making process in a way that incorporates relevant knowledge (Coenen, 2009). Since participants can raise or prioritize issues that otherwise would be overlooked in the decision-making (Newig, 2007). Incorporating public values, assumptions, and preferences into decision-making (Beierle, 1998);
- *Public support* Increase the public support and acceptance for environment-related decisions will lead to a time gain (shorter decision-making processes in the longer term) and co-implementation (Coenen, 2009; Ferkany & Whyte, 2012; Woltjer, 2009). Reaching easier the decision goals and improving stakeholders' acceptance regarding the decision effects adapted, circumstances, or needs (Woltjer, 2009);
- *Legitimacy* Secures the legitimacy of processes or decisions (Ferkany & Whyte, 2012) and foster trust in institutions (Beierle, 1998);
- *Knowledge transfer* Inform, educate, and capacitate participants about the subject issue (Beierle, 1998);
- *Solutions* Allow for the discovery of win–win solutions (Woltjer, 2009), by constructing consensus and partnerships in anticipation of possible conflicts (Beierle, 1998; Coenen, 2009; Newig, 2007; Woltjer, 2009).

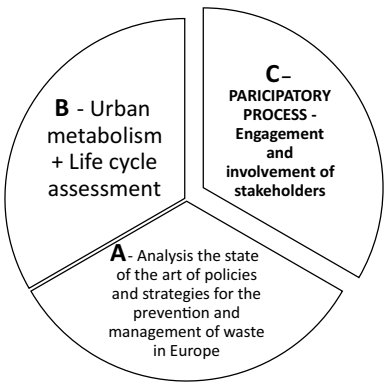

Fig. 1 UrbanWINS project methodology overview

Therefore, participation has emerged as an appropriate approach for enhancing natural resources management and prevention, such as urban waste (Blengini et al., 2012; Newig, 2007), allowing for highlighting the innovative and sustainable opportunities that may came up (van den Hove, 2000) by defining coherent and transversal objectives for efficient waste policies (Coenen, 2009).

2 Collaborative process for waste management

UrbanWINS—Urban metabolism accounts for building Waste Management Innovative Networks and Strategies—was designed to tackle urban waste issues with citizens. Funded by the European Research and Innovation Program Horizon 2020, the project was carried out from June 2016 to 2019 and deepen the study on cities' resources and products consumption and waste disposal mechanisms. The main goal was to develop and test innovative plans and solutions to improve urban waste prevention and management. Under the coordination of Comune di Cremona (Italy), UrbanWINS consortium involved 27 partners from seven different countries (Austria, Italy, Romania, Portugal, Spain, Sweden, and Germany), including municipalities and local authorities, research centeres and universities, companies, and non-governmental organizations (NGOs).

UrbanWINS aimed to develop and test methods for design and implement innovative and sustainable strategic plans for waste prevention and management in various urban contexts based on innovative, inter-disciplinary, and participatory approaches. Strategic plans were built supported by the knowledge of the factors that influence the metabolism of cities and how those factors can be transformed into positive drivers of technological, non-technological, and governance changes. The methods mentioned were extensively tested in eight European pilot cities: Cremona, Torino, Albano Laziale and Pomézia (Italy), Leiria (Portugal), Bucharest (Romania), and Manresa and Sabadell (Spain). To achieve these, the project methodological approach was based on three-axis of action, Fig. 1.

For the present communication, the authors focus on the axis referring to the participatory process (Fig. 1c) under the responsibility of NOVA School of Science and Technology (FCT NOVA, Portugal). This participatory approach was developed along the project having in mind that a real and effective transformation of society occurs when behaviors of organizations and citizens change.

2.1 UrbanWINS: participatory process for a better waste prevention and management in cities

The UrbanWINS participatory approach aimed: (1) to improve the common understanding of the waste problem; (2) to collectively support the waste decision-making process; (3) to explain tacit knowledge, preferences, and values; (4) to enhance the legitimacy of the waste policy processes; (5) to contribute to individual and social learning of waste stakeholders; (6) to develop collective action.

To promote an effective stakeholders' involvement, participatory process team shaped and developed the UrbanWINS Agoras. These spaces of dialog intended to bring people to the process in order to promote the generation of ideas and feedback for better implementation through the Co-creation of Strategic Plans (van den Hove, 2000; Joseph, 2006; Vasconcelos, 2007). This strategy increased the sharing of knowledge, the opportunity to know

the rationale of the project (difficulties/restrictions) (Newig, 2007) and to build a collective understanding and social capital (Yu et al., 2013). Additionally, stakeholders developed ownership (Walker, 2007) and became an active part of the project, defending the project (Wan et al., 2018) and looking for feasible solutions through consensus (Coenen, 2009).

The UrbanWINS Agoras were carried out in two streams:

- *Face to Face Agora* (FF Agoras) Presential sessions in each pilot city in order to promote the societal active engagement of the stakeholders at the local level.
- *Online Agoras*[1] A virtual forum that intended to represent a virtual community and to offer a knowledge sharing platform created and maintained to support the objectives of the UrbanWINS project and to facilitate the engagement of the wider variety of stakeholders at the European level besides the eight pilot cities.

This paper reports the FF Agoras set up in the eight pilot cities, that represented the pillar for the development of the participatory process, the key to support UrbanWINS activities, especially the development of a Strategic Planning framework and Pilot Actions implementation.

2.1.1 A Methodology overview for setting up the process on the field

UrbanWINS participatory approach, namely the FF Agoras process, was designed following the Collaborative Planning Theory assumptions (Table 1), where a decision can only be as legitimate as the process (Oels, 2006). Moreover, consensus becomes possible as citizens start to listen to each other and to adjust their own views in light of their learning (Oels, 2006; Renn, 2006). All this finds its theoretical anchor in the rational of Habermas Theory of Communicative Action (Honneth & Joas, 1991; Renn, 2006).

Having this in mind, UrbanWINS team set up a dynamic process of capacity-building, aimed at promoting innovative, flexible, and adjustable contributions. Defending as key the co-working of stakeholders with a set of other relevant elements—community activators, city representatives and technicians, the grounds were open the setting to expanded decision-making processes at the local level, using a more direct approach for substantiated resolutions, engaging a diversified set of actors (Table 2).

The FF Agoras were built from the stakeholder identification, selection, and characterization, promoting the integration of all stakeholders and their early involvement in the process, as recommended by Luyet et al. (2012), regarding stakeholders participation at environmental projects. FF Agoras process encompassed three main stages (Fig. 2): (a) Preparation period; (b) Implementation 6–8 participatory sessions and; (c) Process evaluation.

[1] The Online agoras were set up and coordinated by the Asociatia Romania green Building Council and operated as an additional space of interaction for urban stakeholders either from the pilot cities as from other EU regions. It also hosts relevant information related to the Face to Face Agoras.

Table 1 Collaborative planning theory assumptions

Process	Outcome	Capacity-building
Fairness	A consensus followed by action	New contacts and partnerships
Diversity of stakeholders'		Learning
Constructive dialog		Transcending egoistic preferences toward the common good
Participants are experts on their affairs		Scope for innovation
Allowing multiple ways of making validity claims		Learning among the participants
Using all relevant information		Building trust
Systems thinking		Reviving local democracy
		Regenerating community spirit

Source: Oels, 2006

Table 2 Actors involved directly in face to face Agoras session

Actor	Description
Stakeholders	Individuals, group of individuals and/or organization representatives that had interest in the theme of the project and that could have specific interest, affect, or be affected by the decisions and results of the project
Technical partners	Technical partners are considered all the project partners who have supported and collaborated with the pilot cities in the participatory sessions, both in logistical issues or/and in aspects with more technical content required for the project development
Pilot cities municipality	Municipality official representatives, technicians and collaborators that were the main conductors of the participatory sessions in their cities and that had a prominent role in the identification and involvement of stakeholders in the project and throughout the process, as in the organization and in conducting each session
Pilot cities municipality representative	Person that was the "face" of the project. This person had technical capacity, responsibility to follow up the process, to answer to issues related to the project content, operating as intermediary between the process and the project, and supporting the moderator
Community activator/moderator	The community activator was a citizen, member of the community, responsible to follow up the whole process of the participatory sessions in a role of moderator. He/she was also responsible for conducting the sessions, assuring the timings, and promoting the debates

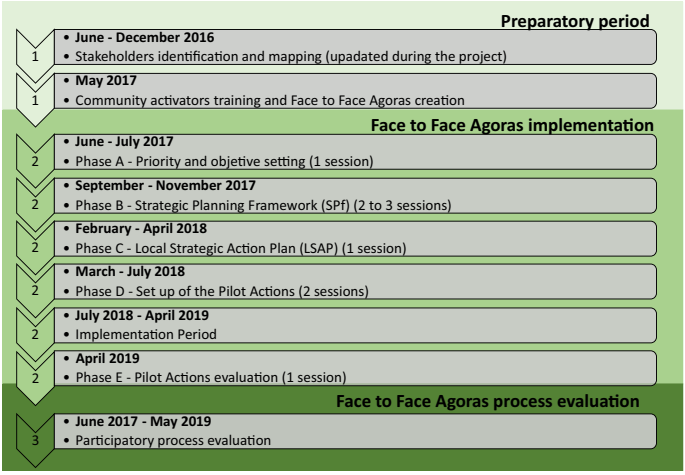

Fig. 2 UrbanWINS participatory process steps

2.1.1.1 Preparatory period FF Agoras implementation in the pilot cities—participatory sessions—was preceded by a training period to prepare the teams for active collaborative methodologies, in order to provide them with tools to create space for active collaboration and a more inclusive participation process. This strategy is defined as a best practice into a successful collaborative process (Walker & Daniels, 2019). For this training, each pilot

city selected two community activators (Table 2)—one representative of the municipality team and one local citizen (designated herein as community activator)—based on the guidelines set up by the leading team for supporting that choice. The training "Promoting Dialog among Multi-stakeholders in public governance"—targeting the elements that would be involved in operationalizing the FF Agoras—occurred between 8 and 10 of May 2017, a three-day course, in FCT NOVA, Portugal. The preparatory period was considered closed when the pilot cities set up the date and a venue for their 1st FF Agoras and collected the commitment letters from the community activators that reinforce their compromise with the project and the participatory process.

2.1.1.2 Face to face Agoras implementation: participatory sessions FF Agoras process was set up to feed other project activities, encompassing five-phases in a total of 6–8 sessions in each pilot city (Fig. 3). Each session focus, objective, contents, and base information were defined jointly among project partners, FCT NOVA, Ecossistemi, and Università Iuav di Venezia (IUAV), being the methodology of the sessions and all activities of the responsibility of FCT NOVA. The results of each FF Agoras session were analyzed and worked internally by the project team, allowing a progressive integration of local and scientific knowledge as it became available (Luyet et al., 2012) in order to prepare the following session. Sessions dynamics were organized and managed according to specific techniques and inter-disciplinary methodology for stakeholders' involvement and participation, promoting also mutual learning among participants (Vasconcelos et al., 2005, 2012), ensuring a interactive and effective participation.

In order to ensure a homogenous approach among pilot cities in each FF Agoras session FCT NOVA team designed and prepared a Toolkit. The Toolkit was a support document that contained directions concerning the event promotion, venue choice and organization, room disposal and equipment needed, as well as a complete list of material and a detailed script for the day of the event, that included the methodology and specific directions, as well as some support documents (posters, press release, dissemination texts, program, registration form, participants lists template, activities forms templates, city report template, among other relevant materials). For each session, a synoptic report was produced by the respective pilot city. These reports were developed both in English and in pilot cities' native language and widely disseminated through the participants mailing list, published in the Online Agoras and though the cities platforms in order to reach the general public and the entire community.

Sessions were planned (Fig. 3) to seek the collection of multiple perspectives and used a systematic and structured learning process (Pretty, 1995), in order to achieve the

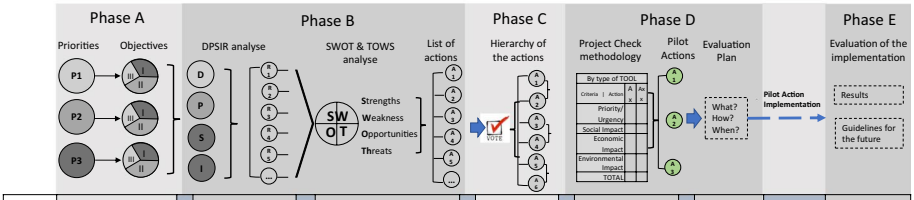

Fig. 3 FF Agoras sessions and dynamic

specific objectives of each phase. Cities were also responsible for the engaging of 30–40 stakeholders from different backgrounds for each session. This is an important aspect because the participation of a wide range of concerned stakeholders confers a higher legitimacy in terms of content to the decisions, taking into account the different knowledges and values, allowing the design of more preventive and pro-active approaches (van den Hove, 2000). FF Agoras sessions were organized in a workshop format ensuring interactive participation and promoting the creation of social capital, driving the collectively, and share knowledge (Yu et al., 2013). Literature suggests that the workshops boost the progress from dialog to deliberation where participants talk with and learn from one another in groups of various sizes (Walker & Daniels, 2019), creating better communication that made decision-making more inclusive and effective (Kapucu & Garayev, 2011). This type of meetings face design challenges that include, among others, when to hold the meetings and for how long (Walker & Daniels, 2019). Each FF Agoras had, approximately, a three-hour duration, and the coordination team recommended the partners to hold it at the end of a weekday, allowing citizens to go after their working hours. FF Agoras had various levels of participation, using a combination of quantitative and qualitative methods that allows more interaction between stakeholders such as participatory SWOT, brainstorming, voting, prioritization, world café, idea rating sheets, etc. The sessions were usually structured following a series of activities: buffer activity, short presentation of the scope of the session by the municipality, group dynamic/working groups, work presentation, debate, and closing remarks. The main work during the sessions was conducted in groups, as problem-solving emerge through synergy between members of the group in the exchange and production of knowledge (Ferkany & Whyte, 2012). Participants were guided to prioritize issues, thereby beginning to develop a collaborative action plan and evaluate its feasibility through the process (Fig. 3) as described below:

- Phase A—Priorities and objective setting:
  - 1st FF Agora— "CITY PRIORITIES in resource consumption and waste prevention", had as objective the identification of three priorities per city and related objectives having as focus environmental issues related with resource consumption and waste prevention.
- Phase B—Strategic Planning framework (SPf):
  - 2nd and 3rd FF Agoras—"From Priorities to Actions—Toward a strategic framework for waste prevention and management", had as objective to move from the priorities defined in the 1st session, to actions. Each pilot city generated a preliminary list of actions to answer city priorities. To support this activity, a DPSI(R) analysis has been done, by the project team, for each priority prior to the session. During the session participants validated the Driver-Pressure-State-Impact-Response (DPSIR) framework, first the DPSI analyse and worked on the analyse component R-Response, generating a set of tools—Voluntary, Regulatory and Awareness—giving place to a preliminary list of potential responses to improving the actual situation.
  - 4th FF Agora "From Priorities to Actions SWOT & TOWS Analysis", in this session participants analyzed the preliminary list of Actions that emerged from the previous session, through a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) and a TOWS analysis (Threats, Opportunities, Weaknesses,

Strengths: a technique that emphasizes external opportunities and threats while analyzing participatory strengths and weaknesses). The recommendations that emerged from these analyses were used to support the formulation of appropriate measures and actions as a response to the current city situation, being included in the SPf.

- Phase C—Local Strategic Action Plan (LSAP)
  - 5th FF Agoras sessions were organized in a seminar format—"CITY WASTE REDUCTION AND MANAGEMENT: From Strategic Planning framework (SPF) to Local Strategic Action Plan"—aimed to present the SPf and the participatory process results until that moment. At the end of the session, participants had the opportunity to vote on their favorite actions, defining the TOP 6 actions to integrate in the LSAP. Stakeholders that were unable to be present at the seminars also had the opportunity to vote using the Online Agoras Platform.
- Phase D—Pilot Actions
  - 6th FF Agoras "Hands on—Waste Management Pilot Actions", in this session participants evaluated the TOP 6 actions through a comparative methodology with the attribution of points—Project Check, selecting the TOP 3 actions (one of each type of Tool—Voluntary, Regulatory, Awareness) to be implemented as pilot actions.
  - 7th FF Agora—"Pilot actions under evaluation"—was focused on setting up the framework for the evaluation plan of each pilot action by the municipalities in partnership with stakeholders. Therefore, participants were invited to identify guidelines answering questions such as what, when, and how, actions should be evaluated to define a set of activities to be implemented to monitor the actions.
- Phase E—Pilot Actions implementation
  - 8th FF Agoras "Pilot actions evaluation"—After the Pilot Actions implementation period, approx. 8 months, the last FF Agoras session marked the end of the participatory process and had as objective the presentation of the pilot actions activities and results and the collectively evaluation of their implementation in each city. The evaluation by the stakeholders took place in two ways, individually, through a set of specific questions for each action based on the action evaluation plan, and collectively, though group work evaluation following a set of general questions applied to all actions. For this, a comparative methodology supported the participants work allowing the comparison among different actions based on a semi-qualitative technique of attribution of points given to each component by the group members.

Throughout the participatory process, FCT NOVA team maintained close contact with pilot cities in order to support them in their needs and, in case of need, adapting the sessions methodologies, providing enough flexibility to cities to tailor the activities according to their own characteristics and situation.

2.1.1.3 Assessment of face to face Agoras participatory session Like any other scientific field, participatory settings to be productive and successful have to consider a sound conceptual support and the critical factors that have to be observed. The sessions can be conducted with more and/or less success depending on how the specific requirements that constitute the guidelines provided by the FCT NOVA team are followed, and also, the level of each city

Table 3 Actors involve in the UrbanWINS participatory process

Question/topic	Pilot cities	Technical partner	Community activator
Analyse your role in the participatory process (Sessions)	NA	NA	X
Involvement/engagement of stakeholders	X	X	NA
Agoras general appreciation	X	X	X

NA Not applicable

stakeholder's engagement. Tendency and willingness of the actors to participate influence their willingness for engagement, co-operation, and intervention (Newig, 2007).

Given the complexity of the phasing and structuring of the participatory process, as well as the variety of elements involved (e.g., stakeholders, citizens, technicians) for the evaluation of the process it is essential to take into account the opinion of all the actors involved in the process in order to keep them engaged and evaluate the impacts of the participatory process in decision-making (Luyet et al., 2012). This way, the evaluation encompassed two components:

A. Face to face agoras implementation

- *Analysis of the individual evaluations carried out by the stakeholders*, during the FF Agoras sessions. This analysis had as objective to identify the main positives and negatives points and collect suggestions for improvement. These evaluations were collected at the end of each session, and they constituted a basis for the transversal assessment along the process, to the continuous improvement during its development since it implied adjustments whenever necessary.
- *SWOT analyses accomplished by the partners and project collaborators that were directly involved*. In order to optimize the analysis, a set of topics were established by the team and commented by each actor (technical partners * pilot cities * community activators), Table 3.

B. The impact of the participatory process in decision-making (in each pilot city)

The participatory process success not only depends on the actors involved and the design and mediation of the process but likewise on a multitude of influencing factors including the political and economic context (Newig, 2007). An important input for the process evaluation was to describe what really happen along the participatory process and its impact in each pilot city implementation, since this process was distinct from the municipalities' usual procedures. This gave an important insight to the process evaluation. And also the understanding if the cities have previously used or use now this type of process is important since could play a role in the municipality acceptance of this type of participatory process and make it easier the internal procedures conducted.

Pilot cities were hence called to explain the impact of the implementation of each of the pilot actions, by answering the following questions:

- What constraints emerged out of the implementation of the actions since they were defined by dynamics external to the municipality?
- What was different about the procedures that you performed to implement the action? (Comparing if the same action has emerged by a municipal decision)
- Did you ever use this type of process before?
- What is your general appreciation of the incorporation of this type of process in the decision-making process?

After collecting these data, a qualitative analysis was made by comparing the different cities and their dynamics and external constrains.

Further detailed information regarding the UrbanWINS participatory process implementation and assessment can be found in Part 3 of UrbanWINS toolkit—3 Stakeholder engagement process, available at www.urbanwins.eu/toolkit/.

2.2 Participatory process results and discussion

Between June 2017 and April 2019, pilot cities carried out six to eight FF Agoras sessions. Generally, all the cities managed to involve a significant number of participants and sometimes successfully achieved the goal of 30 participants per session. A total over of 1400 stakeholders were involved in the sessions (e.g., representatives of local authorities, companies from the waste industry, academic environment, NGOs, local initiatives groups, and local citizens) with a significant intensity of participation, 45% of the stakeholders participated in more than one session, Table 4.

During this period, the municipalities jointly with stakeholders worked throughout the identification of 31 city priorities for waste prevention and management and 91 related

Table 4 Total participants in the face to face agoras sessions per pilot city

City	Different stakeholders involved	*N* of presences	% Intensity of participation
ROME			
Albano Laziale	70	134	48
Pomézia	86	143	40
Bucharest	182	277	34
Cremona	84	149	44
Leiria[(i)]	139	214	35
Manresa	91	230	60
Sabadell[(ii)]	51	105	51
Torino	86	183	53
TOTAL	789	1435	45

(i) In Leiria, an initial conference at the beginning of the participatory process increased the number of stakeholders engaged to 230, but this number is not included here because this analysis only took into account the participants in the Physical Agoras sessions.

(ii) In Sabadell, the last Physical Agoras session was held in association with a public event; therefore, it was not possible to include these participants in this analysis.

Table 5 Outcomes from the FF Agoras sessions

City	Priorities	Objectives	Actions	Pilot actions
ROME				
Albano Laziale	3	6	14	3
Pomezia	3	6	10	3
Bucharest	3	16	16	3
Cremona	4	17	18	5
Leiria	5	8	35	3
Manresa	5	22	35	3
Sabadell	4	15	22	3
Torino	4	4	7	3

objectives. The amount of priorities is similar among all the cities (from three to five); the number of objectives is more diverse, with a minimum of four in Torino and a maximum of 22 objectives in Manresa. Theses priorities and objectives contributed for the development and discussion of 157 action proposals that led to the 26 pilot actions implemented by the pilot cities, Table 5.

Pilot cities discussed essentially topics related with the circular economy, waste management and prevention, recycling of materials/products, collection of waste, food waste and reduction of packaging, upstream waste reduction, education and awareness campaigns, incentives, energy recovery, territorial planning, sustainable production, and proximity consumption. This discussion engenders by FF Agoras contributed in terms of policies and planning for waste prevention and management to the development of the eight Strategic planning frameworks and eight Local Strategic Action Plans, one of each for each pilot city.

The co-implementation of 26 pilot actions during approximately 8 months, covering different economic sectors and waste streams (e.g., food and agriculture, events, tourism, plastic, manufacturing, households), affected close of 758,085 citizens counting both individuals that participated in the development and implementation and those that were directly and/or indirectly affected by them.

Pilot cities were challenged to implement Pilot Actions that emerged out of the participatory process and not from the internal decision of the municipalities. These resulted at higher participatory impact levels since decision-makers promise active collaboration with the different actors involved in the formulation and implementation of the Pilot Actions (Huitema et al., 2007; Videira et al., 2006). Nevertheless, pilot actions were defined externally, and sometimes did not follow the internal procedures of municipalities, such as timelines, legal framework or the way key actors got involved to successfully achieve the actions' implementation, that can set an additional pressure on the action implementation. The mains obstacles reported by pilot cities are related to legalization and internal procedures, namely in the actions that the objective was to do guides or regulations and in the ones that needed a purchasing process and municipality internal departments involved in the actions. Pilot cities were able to manage and overcome these difficulties, the ones that have already used this type of stakeholders' involvement, and participation in the decision-making process, faced less constraints and gave better feedback regarding the inclusion of this process. Furthermore, pilot cities perceptions of the importance and efficacy of this process evolved during the project. From some cities' perspective, the methodologies used promoted the search for new and consensual solutions and could be a good improvement in the municipality dynamics.

3 Conclusion

Overall, UrbanWINS project made possible stakeholders actively involvement through the pilot cities' and technical partners' continuous and close contact. UrbanWINS approach and the sessions format led to an effective engagement of involved stakeholders, which is confirmed by the 45% intensity of participation. The creation of such an inclusive and hight participatory process (Gofen, 2015; Videira et al., 2006), in which equity among participants was key, resulted in stakeholders' capacity-building contributing to a more representative and holistic approach (van den Hove, 2000; Newig, 2007; Yu et al., 2013). This process respected the FAAITH principles−fairness, accountability, access, inclusiveness, transparency and honesty (Walker, 2007), a success factor. The UrbanWINS participatory process shows that the incorporation of public values and the integration of stakeholders contributions in decision-making contributed to empowerment, hence providing an opportunity to achieve win–win solutions on environmental issues (Ardaya et al., 2019; Newig, 2007). This component of the project can have a potential high impact on the implementation of the circular economy strategy in European municipalities, with societal acceptance, which is the core for success.

In summary, UrbanWINS allowing pilot cities to experience this type of process and to operationalize it, contributed to the creation of additional value for both civil society and the municipality. Additionally, these processes allow to go beyond traditional politics what in coordination across different policy areas are more effective and generate democratic practices/ policies (Coenen, 2009; Renn, 2006). Participation constitutes an important vector to meet Principle 10 of the Rio Declaration 1992, since it is a key principle for environmental governance. Moreover, it follows the Aarhus Convention that recognizes that improving public participation in decisions related to the environment as one of its three pillars, re-enforcing the importance participation for environmental decision-making at regional, and local levels.

For more information about the UrbanWINS project: www.urbanwins.eu.

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