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## Article

# Crowdsourcing framework applied to strategic digital city projects

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## Research Article

## Crowdsourcing framework applied to strategic digital city projects

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## ABSTRACT

If strategically implemented, crowdsourcing helps capture the intelligence of a variety of e-participation actors, enabling them to share the leading role with the government in decision-making processes. The objective is to elaborate an original crowdsourcing framework applied to strategic digital city projects. The research methodology is exploratory and descriptive. On the one hand, the model supports a systematic analysis of empowerment degrees of the e-participation actors to initiate task and innovation-oriented spontaneous crowdsourcing activities for solving wicked problems. On the other hand, strategic digital city projects play the role of passively monitoring spontaneous crowdsourcing activities, and actively planning and implementing government initiatives. The conclusion shows that the framework can encourage local governments to identify talents, influencers, and partners among different stakeholders – to discover what motivates them to participate and the rewards they expect – thus evolving strategies to welcome innovative projects, processes, products, and ideas in a continuous learning cycle.

## 1. Introduction

Local governments implement initiatives for social platforms to stimulate interaction, involvement, and collaboration (Falco & Kleinhans, 2018; Mergel, 2013; Nam, 2016) and provide access to information for promoting accountability and transparency (Bonsón et al., 2012; Royo & Yetano, 2015). Leveraged by information technologies, social platforms give citizens a voice (Criado et al., 2017), and they become partners and co-creators of information and co-producers of services (Bolívar, 2017; Spiliotopoulou et al., 2014) and public policies (Nam, 2016; Svara & Denhardt, 2010). Policymakers must encourage and reward engagement rather than insist on the existing culture of hierarchical control (Medaglia, 2012). Social platforms have been serving as a tool for government self-presentation (DePaula et al., 2018), instead of being a source of insights, opinions, and feedback from citizens (Oliveira & Welch, 2013).

Aimed at solving wicked problems (Royo & Yetano, 2015), public managers seek innovative approaches, and crowdsourcing can be a likely solution for municipal issues (Bertot, Jaeger, & Hansen, 2012; Brabham, 2008; Linders, 2012).

Among the research problems, the lack of strategic planning makes it difficult to measure the impacts of government social platforms use (Mergel, 2013; Sandoval-Almazan & Gil-Garcia, 2012). Governments are attracted to open communication channels, but without the desire to respond to citizens (Macintosh & Whyte, 2008; Mergel, 2013; Sandoval-Almazan & Gil-Garcia, 2012). Social technologies have been used in a unidirectional way (Mergel, 2013; Norris & Reddick, 2013), neglecting conditions for collaboration and participation (Norris & Reddick, 2013). Furthermore, there is a need to know who the political actors are and the role they play as stakeholders (Sæbø et al., 2008; Toots, 2019), and current e-participation models do not support the emergence of spontaneous e-participation, especially those hosted on social platforms (Porwol et al., 2016).

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Studies on government social platforms leave the role of users outside its scope (Medaglia & Zheng, 2017). The range of actors that take part in citizen-led bottom-up initiatives must be extended as part of the e-participation process (Medaglia, 2012).

Citizens may feel frustrated (Font & Navarro, 2013) either by the lack of compensation for their efforts or the lack of influence in decision-making (Font & Navarro, 2013; Royo & Yetano, 2015). Attracting, motivating, and retaining (Alizadeh, 2018; Seltzer & Mahmoudi, 2012) such a diverse group becomes a challenge.

The objective is to develop a crowdsourcing framework applied to strategic digital city projects. The research-question is: Who are the actors that spontaneously engage in crowdsourcing initiatives, and how do strategic digital city projects respond to them?

The research is justified by the perceived benefits of social platforms (Bertot, Jaeger, & Grimes, 2012; Zhang & Xiao, 2017): (a) citizen engagement (Criado et al., 2017; Spiliotopoulou et al., 2014) and participation (Spiliotopoulou et al., 2014); (b) transparency and accountability (Criado et al., 2017; Mergel, 2013); (c) new and better public services (Margetts & Dunleavy, 2013; Mergel, 2013; Nam, 2016); and (d) crowdsourcing solutions and innovations (Brabham, 2008, 2013, pp. 1–42; Criado et al., 2017; Nam, 2016; Reddick et al., 2017) through information sharing, creation in pairs, collective deliberation (Nam, 2012), and access to the vast amount of data and information to be analyzed and crossed with government data (Rosenberger et al., 2017).

Therefore, crowdsourcing stands out as an opportunity for participation and coproduction (Bolívar, 2017; Margetts & Dunleavy, 2013). Citizens with experience and knowledge can contribute with their perspectives, expanding the amount of knowledge and expertise for the decision-making process (Royo & Yetano, 2015).

## 2. Literature review

### 2.1. E-participation

Understanding how e-participation evolves towards crowdsourcing-based e-participation requires analysis of democratic and social-technical aspects of e-participation (Criado et al., 2017; Husin, Evans, & Deegan, 2016; Macintosh & Whyte, 2008; Porwol et al., 2016; Sæbø et al., 2008; Toots, 2019). From the democratic viewpoint, the literature on citizen participation highlights Arnstein's (1969) ladder of participation for iteratively classifying the extent of citizen empowerment (from informing to empowering). Later, other research using the ladder metaphor (Kalampokis, Tambouris, & Tarabanis, 2008, June; Lukensmeyer & Torres, 2006; Macintosh, 2004; Tambouris, Liotas, & Tarabanis, 2007, January; Wimmer, 2007) has explored the basis for e-participation, which relates citizen engagement with technology use for improving deliberation and decision-making (Macintosh, 2004). Overall, these frameworks consider a top-down approach about “to what level, or how far, citizens are engaged” (Macintosh, 2004, p. 1).

Some e-participation frameworks provide alternatives for more collaborative strategies, enabling citizens to become partners and co-creators of information and co-producers of services (Nam, 2016; Spiliotopoulou et al., 2014) rather than mere consumers (Husin et al., 2016; Macintosh, 2004; Sandoval-Almazan & Gil-Garcia, 2012). Sandoval-Almazan and Gil-Garcia (2012) affirm that the increasing ability of local government to use technology affects the way citizens participate and collaborate. Span et al. (2012) trace the levels of governance – commissioner, co-producer, facilitator. Porwol et al. (2016) contribute integrating traditional government-led e-participation (top-down) and spontaneous citizen-led e-participation (bottom-up), reiterating demands for knowing the stakeholders involved in the e-participation process (Macintosh, 2004; Sæbø et al., 2008; Tambouris et al., 2007, January; Toots, 2019).

From a socio-technical perspective, e-participation is still mostly stuck on first-generation government-run e-participation initiatives (Toots, 2019), although social platforms are available (Spiliotopoulou et al., 2014). Bonsón et al. (2012) state that social platforms are the next generation of official websites, while Mergel (2013) considers them as additional communication channels. Nevertheless, the authors agree social platforms are tools that allow new forms of interaction with citizens (Mergel, 2013) as they create a favorable environment for crowdsourcing (Royo & Yetano, 2015).

#### 2.1.1. Crowdsourcing as a tool for e-participation

Crowdsourcing as an e-participation strategy (Linders, 2012) addresses the distribution of power (Arnstein, 1969) migrating from government to citizen. According to Loukis and Charalabidis (2015), crowdsourcing can promote the pillars of open government: participation and collaboration (White House, 2009). As crowdsourcing brings in the contributions and perceptions of citizens, it could be a digital tool that complements traditional public participation programs (Brabham, 2013, pp. 1–42).

Although research is still insufficient to determine its effectiveness, crowdsourcing may become a reference in citizen engagement and in solving problems locally (Royo & Yetano, 2015). However, the quality and quantity of ideas rely on the managers' ability to attract creative participants with relevant knowledge and to understand what motivates them to participate (Brabham, 2010; Nam, 2016).

### 2.2. Crowdsourcing

Crowdsourcing refers to organizations and institutions that seek external resources to fulfill tasks previously carried out internally, based on the concept that anyone can have valuable information (Howe, 2006). Alizadeh (2018), Hossain and Kauranen (2015), Liu (2017), Zhao and Zhu (2014), among other authors cite the research studies of Estellés-Arolas and González-Ladrón-de-Guevara (2012), who sought convergences and divergences of several crowdsourcing definitions to create one encompassing any crowdsourcing activity. The authors identify three elements and eight crowdsourcing characteristics: (a) crowd – who forms it, what it must do and what it gets in return; (b) initiator – who it is and what it gets in return; (c) process – type of process, type of call and the medium used.

In local governments, crowdsourcing is the use of innovative technologies to capture the citizens' knowledge to search for solutions

previously found in organizations and groups of specialists (Bertot, Jaeger, & Hansen, 2012; Brabham, 2008, 2013, pp. 1–42). Loukis et al. (2017) and Spiliotopoulou et al. (2014) classify crowdsourcing as active and passive: active, when the government releases information about a problem or public policy seeking opinions or solutions; and passive, when the government monitors social platforms by extracting and analyzing the content created by citizens.

Crowdsourcing seeks to mobilize the competence distributed in various ways (Zhao & Zhu, 2014) by exploring citizens' knowledge to create or improve public services and policies (Linders, 2012; Loukis et al., 2017; Nam, 2012) that are more realistic, balanced, and connected with social issues (Spiliotopoulou et al., 2014).

### 2.2.1. Crowdsourcing initiatives

This research classifies crowdsourcing initiatives into task-oriented or innovation-oriented (Liu, 2017) and into public service or public policy-driven. The classification combines the concepts: (a) the conditions for crowdsourcing – the “how to create” and “how to decide” genes of collective intelligence – (Malone et al., 2009); (b) the co-production initiatives of “citizen sourcing” and “government as a platform” (Linders, 2012); (c) the type of problem – information management or ideation problems (Brabham, 2013, pp. 1–42); the degrees of citizen involvement (Zhao & Zhu, 2014); the crowdsourcing strategies (Nam, 2012), among others.

Task-oriented crowdsourcing initiatives – public service-driven.

*Knowledge discovery and management* – crowdsourcing initiatives for collecting, organizing, and reporting problems, complaints (Brabham, 2013, pp. 1–42; Linders, 2012).

*Micro-tasks* – distribution of micro-tasks that require human intelligence to be solved (Brabham, 2013, pp. 1–42; Linders, 2012) and depend on the skills and knowledge of semi-professionals (Nam, 2012).

*Evaluation/Classification/Crowd evaluation* – evaluation of ideas (Falco & Kleinhans, 2018), monitoring of services (Linders, 2012; Liu, 2017), and crowd evaluation (Sivula & Kantola, 2016), to bring citizen's perceptions and feedback that could improve products and/or processes.

*Collaboration* – joint work of individuals to create something relevant (Malone et al., 2009) to seek ideas, opinions, and feedback on strategic planning (Alizadeh, 2018).

Task-oriented crowdsourcing initiatives – public policy-driven

*e-Voting* – to create new ideas, permitting local governments and citizens to publish and rate ideas as well as make comments asynchronously (Falco & Kleinhans, 2018; Nam, 2012).

*Community building* – communities of common interest (Svara & Denhardt, 2010; Tambouris et al., 2007, January).

*Networking* – social platforms to connect governments and citizens so they can get involved in the political process (Khan et al., 2014), through technologies that enable bidirectional interactions (Mergel, 2013; Sæbø, Rose, & Nyvang, 2009, September) agencies to mobilize the population for supporting what they are doing and planning (Nam, 2012); to allow citizens to find information in the opinions of other citizens (Malone et al., 2009).

*Coordination* – individuals working together to provide real time information; when actions only make sense at that moment and in a specific context (Surowiecki, 2005).

*Public projects* – citizen participation in public projects to harness citizen knowledge (Hossain & Kauranen, 2015); initiatives to collect ideas, knowledge, and opinions from citizens (Linders, 2012; Spiliotopoulou et al., 2014).

*Civic journalism* – citizens voluntarily collecting, registering, analyzing, and disseminating information and news (Tambouris et al., 2007, January) to increase credibility (Hossain & Kauranen, 2015);

*Crowdfunding* – fundraising activity (Bretschneider & Leimeister, 2017; Howe, 2008); civic crowdfunding (Carè et al., 2018).

Innovation-oriented initiatives – public service and policy-driven.

*Broadcast search* – search for specialists or a group of experts to solve complex tasks (Brabham, 2013, pp. 1–42; Mergel, 2012). Citizens are invited to use their abilities and expertise for solving problems (Linders, 2012).

*Gamification* – gamified activities to engage (Ronzhyn, Wimmer, Viale Pereira, & Alexopoulos, 2020, June) and motivate citizens (Morschheuser et al., 2019).

*Contests/peer-vetted* – competitions that encourage crowdsourcing with or without a financial reward (Mergel, 2013; Nam, 2012; Spiliotopoulou et al., 2014); when the aggregate decision of many is used (Howe, 2008; Tripathi et al., 2014).

### 2.3. Strategic digital city projects

One of factors that affects the success of social platforms use in government is clear strategic planning (Gil-Garcia, 2012; Picazo-Vela et al., 2012). Strategic digital city projects, a concept created by Rezende (2012) consolidated for over 10 years (Almeida & Rezende, 2021; Flores & Rezende, 2018; Fumagalli et al., 2021, 2022; Rezende, 2018; Ribeiro et al., 2019), can ease the strategic IT planning and implementation in local governments. In strategic digital city projects, the municipal strategic planning is the umbrella for municipal information planning and information technology planning. It is carried out as a project and, later, as a dynamic, interactive, collective, and participatory process to determine the objectives, strategies, and actions related to municipal functions (e.g., education, culture, sports, health, mobility, and security). Information models for each municipal function serve for planning information and knowledge systems as well as human and technology resources to provide information and public services (Rezende, 2012, 2018). Strategic digital city projects (Rezende, 2012, 2018) rely on citizen participation. The strategic use of social media can strengthen the bonds between local governments and citizens, and serve as a channel for communication, interaction, and collaboration to harness the collective intelligence by implementing crowdsourcing initiatives (Flores et al., 2018),

### 3. Research methodology

The research was exploratory and descriptive (Nachmias & Nachmias, 2010). Three bibliometric analyses followed by a systematic literature review looked for convergences between the domains of government social media, crowdsourcing, and e-participation. The search was conducted according to the guidelines provided by the Knowledge Development Process Constructivist (Ensslin et al., 2013).

The search strategies were: (a) articles published in English with more than 10 citations; (b) date range: 2006–present [2006 – the creation of the term crowdsourcing (Howe, 2006); the first use of social media in local government (Mainka, Hartmann, Stock, & Peters, 2014, January); the e-participation Demo-net Consortium (2006)]. After the duplicate papers were deleted, 527 remained of the 1177 papers found during the searches, and 137 papers were chosen for the final list after the SLR was concluded. From the final list of articles and through the snowballing process, 26 models, frameworks, strategies, and initiatives were retrieved to support the crowdsourcing framework.

After the research gaps were identified, the framework was developed according to the cycles of theory building (Carlile & Christensen, 2005). The observational phase combined crowdsourcing with that of social media and e-participation. During the categorization phase, the typology for crowdsourcing e-participation typified the e-participation actors according to the various levels of capabilities for strategically initiate crowdsourcing activities, and the government's passive and active roles to respectively monitor spontaneous crowdsourcing initiatives and to elaborate its own. Subsequently, the research describes how the framework functions.

### 4. Crowdsourcing framework applied to strategic digital city projects

The original crowdsourcing framework (Fig. 1) responds to two research gaps found in the literature review: (a) who the e-participation actors are (Sæbø et al., 2008; Toots, 2019) that spontaneously participate in political activities not sponsored by governments (Porwol et al., 2016) and the role that they play (Mergel and Bretschneider, 2013); and (b) how governments can passively monitor crowdsourcing initiatives to avoid the low diversity of opinions and ideas resulting from the use of active crowdsourcing approach (Loukis & Charalabidis, 2015, 2017).

The response for the first research gap is the typology for crowdsourcing-based e-participation, with the citizen or a collective of citizens motivated to co-participate in the solution of municipal issues, elaborating their own crowdsourcing initiatives (Linders, 2012; Nam, 2012). The typology relates the domains of crowdsourcing and e-participation. While several authors (Arnstein, 1969; Macintosh, 2004; Svava & Denhardt, 2010; Tambouris et al., 2007, January) focus on the top-down view of e-participation, the typology has a bottom-up perspective inspired by the work of Li et al. (2007) cited by Porwol et al. (2016).

#### 4.1. The typology for crowdsourcing-based e-participation

The typology seeks to answer questions posed by Malone et al. (2009), Zhao and Zhu (2012), and Estellés-Arolas and González-Ladrón-de-Guevara (2012) – Who is the e-participation actor that carries out crowdsourcing initiatives? How does the

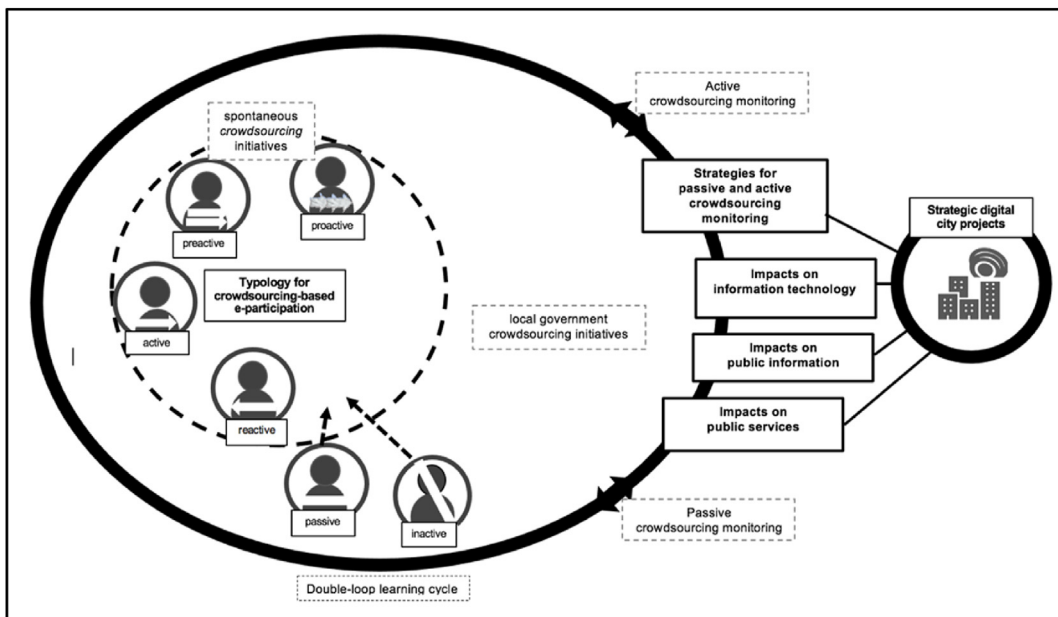


Fig. 1. Crowdsourcing framework applied to strategic digital city projects  
Source: the authors (2021).



e-participation actor carry them out? What does the e-participation actor do to accomplish it? Why does the e-participation actor participate?

#### 4.1.1. “Who?” – six types of e-participation actors

The typology describes the six types of e-participation actors from the lowest to the highest level of strategy; however, the same actor can participate in a more or less active, engaged, and participative manner, at different times and on different social platforms. The bottom-up perspective of the typology in the framework opposes the top-down perspective of e-participation frameworks and models. Nonetheless, the highest levels of the typology are consistent with citizen empowerment (Arnstein, 1969; Kalampokis et al., 2008, June; Macintosh, 2004; Svara & Denhardt, 2010; Tambouris et al., 2007, January; Wimmer, 2007), the do-it-yourself dimension (Linders, 2012; Margetts & Dunleavy, 2013), the role of facilitator (Span, 2012), and with the participative and collaborative levels of Sandoval-Almazan and Gil-Garcia (2012).

**4.1.1.1. The inactive e-participation actor.** The inactive e-participation actor does not participate for one or more of the following reasons: digital exclusion (Brabham, 2008; Linders, 2012); digital illiteracy (Bolfvar, 2017); limited influence in government decisions (Royo & Yetano, 2015); sense of apathy (Reddick et al., 2017); lack of confidence that the government shares information properly (Mergel, 2012); no knowledge of the e-participation channels (Bertot, Jaeger, & Hansen, 2012); some kind of disability (Macintosh & Whyte, 2008).

**4.1.1.2. The passive e-participation actor.** The passive e-participation actor chooses to consume information; reads, watches videos, lives, stories, listens to podcasts (Li et al., 2007); is a passive consumer of information (Macintosh, 2004; Sandoval-Almazan & Gil-Garcia, 2012); finds no reason to engage; is a passive user on some government portals and social platforms and active on others; collects information; has no social connection (Rosenberger et al., 2017); and is susceptible to manipulation and tokenism (Arnstein, 1996).

**4.1.1.3. The reactive e-participation actor.** The reactive e-participation actor consumes information; reacts to publications, expresses feelings with emojis and emoticons; has a low level of involvement with municipal issues; is susceptible to manipulation and tokenism (Arnstein, 1969); is less motivated to participate actively; reacts to some government e-participation initiatives, such as e-consultation, e-voting, e-petitioning (Sæbø et al., 2008), as long as they do not require time and cognitive effort; and is susceptible to the cascade effect (Surowiecki, 2005).

**4.1.1.4. The active e-participation actor.** The active e-participation actor interacts with the local government and other individuals on social platforms, government and third-party portals, and civic apps; behaves as the passive and the reactive e-participation actors, and participates and collaborates in crowdsourcing initiatives, such as contests, collaborative projects, crowdfunded initiatives, e-consultations, e-petitions, e-voting, referendums, e-ratings, crowd evaluations, content creation and sharing, discussions and deliberation in discussion groups, and online public hearings; is connected and civically engaged, and motivated to participate, both in official government accounts, Web portals, applications, other citizens' accounts (friends on social platforms), civic applications, etc.; creates and maintains contents; can become an influencer; and creates accounts and groups in communication apps to connect with others, e.g., neighborhood groups to plan events, discuss, engage in collaborative projects, ensure neighborhood safety.

**4.1.1.5. The preactive e-participation actor.** The preactive e-participation actor forecasts and plans the future (Ackoff, 1981); takes part in any crowdsourcing initiatives; is a coproducer and producer of content, services, information. The preactive e-participation actor creates marathons to develop applications that offer improvements in public services and in the provision of information services; creates and develops proprietary applications to request, monitor, and rate public services; educates other e-participation actors; participates in online public consultations, helps individuals to leverage social projects with public resources (incentive laws); uses local-based social networks (LSBN) and volunteer geographic information (VGI) technologies; creates observatories to fight against corruption; participates in and creates collaborative projects, campaigns, and contests; and can become an influencer mobilizing other citizens.

**4.1.1.6. The proactive e-participation actor.** The proactive e-participation actor creates the future (Ackoff, 1981); forges disruptive innovations that affect previous paradigms; develops platforms for service delivery, for example, platforms that challenge the tradition of taxi drivers, causing changes in laws and creating competition that results in the improvement of mobility services; platforms to deliver traffic information, informing street potholes, accidents, traffic conditions, etc.; data labs, e.g., Mare Slum Data Lab. They develop software for counting incoming visitors, assisting in forecasting, and saving water, energy, etc. The proactive e-participation actor is the civic hacker who alters practices and artifacts related to information technology to bring about new ideas, technologies, and methodologies (Lievrouw, 2011).

E-participation actors can be individuals, civic hackers, developers, artists, “makers”, entrepreneurs, academic institutions, non-governmental organizations, change makers, journalists, researchers, and scholars who can access government and citizen data and information, create content, blogs, microblogs, video channels, talk pages, apps, campaigns, platforms, etc. On the various municipal functions or themes.

#### 4.1.2. “What? And “how?” – types and examples of crowdsourcing initiatives

The “What” question stands for the types of crowdsourcing activities according to the results: task-oriented and innovation-oriented

activities (Liu, 2017), and the “How” question classifies the application of active and passive crowdsourcing ideas (Loukis & Charalabidis, 2015) (Tables 1 and 2):

Spontaneous crowdsourcing initiatives have a bottom-up perspective, where the e-participation actor initiates the process (Porwol et al., 2016) in the integrated e-participation framework. Spontaneous initiatives relate to the local government in a passive manner, indicating the need for the government to understand the purpose and motivations of these initiatives to harness the citizen's knowledge and intelligence.

Active crowdsourcing initiatives depend on local government planning, implementing, and post-implementing (Brabham, 2013, pp. 1–42), from a top-down perspective (Kalampokis et al., 2008, June; Macintosh, 2004; Tambouris et al., 2007, January; Wimmer, 2007), and aligned with the expectations of the citizen addressed by the passive crowdsourcing initiatives.

#### 4.1.3. The “Why” question – motivations to participate in crowdsourcing initiatives

Motivations fall into one of the two classifications: intrinsic and extrinsic (Allahbakhsh et al., 2013; Zhao & Zhu, 2012, 2014). Active, preactive, and proactive citizens are motivated by both of them: (a) intrinsic – altruism, love for the community (Brabham, 2010); and (b) extrinsic: reputation (Brabham, 2008; Tran & Park, 2015), financial return (Tran & Park, 2015), or goods and services (Royo & Yetano, 2015). According to Brabham (2013, pp. 1–42), public managers must know the motivations and plan initiatives aligned with

**Table 1**

Task-oriented crowdsourcing initiatives.

Types of crowdsourcing	Crowdsourcing initiatives – active approach	Crowdsourcing initiatives – passive approach
<b>Public service-driven</b>		
<b>Knowledge discovery and management</b>	.citizen relationship centers, mobile applications, social platforms for citizen complaints, service requests, ratings, and tracking. .location-based social network platforms to passively monitor urban mobility, tourist sights, etc.	.web platforms and apps to monitor the quality of public services and encourage popular participation in decision-making. .platforms to monitor governmental activities to report abuse. .messaging apps to monitor neighborhood security and public service failures.
<b>Microtasks/Distributed human intelligence</b>	.programs and projects involving citizen engagement in voluntary tasks, e.g., monitoring of CO <sub>2</sub> , water, and energy expenses, whose reward for participation can be made with tax reduction policies.	.citizen projects to map information, with defined regularity, e.g., urban mobility, information on sanitation, safety, health conditions, tourist sites, etc. .LBSN technologies allowing information to be aggregated and shared (Zimmerman et al., 2014).
<b>Assessment/Rating/ Crowd evaluation</b>	.government portals, mobile applications to assess and rate public services. .social platforms and forums for public policy crowd evaluation.	.citizen's pages, profiles, and video channels for evaluating, classifying, and proposing ideas for public services and public policy formulation.
<b>Collaboration</b>	.partnerships with startups to develop applications aimed at improving public services and formulating public policies. .campaigns. .online public hearings and consultations. .crowdsourcing to collectively elaborate the urban and/or strategic planning of the municipality.	.collaborative development of applications and platforms for public services delivery and co-creation. .platforms to control government transparency in the use of public resources. .financially supported project management platforms.
<b>Public policy-driven</b>		
<b>E-voting</b>	.e-voting, e-petitions, opinion polls to propose and draft public policies, laws, and new public services.	.spontaneous e-voting and opinion polls proposed by citizens on municipal issues. .e-voting and opinion polls driven by sensitive subjects such as minority groups, violence, destruction of urban space, and physical-territorial changes.
<b>Community building</b>	.virtual communities that share, discuss, and deliberate about common interests and problems.	.virtual communities that share, discuss, and deliberate about common interests and problems.
<b>Networking</b>	.networking in social media official accounts to exchange information, engage in activities, and discuss public policies agenda and public services, e.g., government Web portals and mobile applications.	.networking in social platforms to exchange information and knowledge, engage in activities, discuss and create strategies to deal with a variety of subjects.
<b>Coordination</b>	.coordinated publications in cases when time is a relevant factor e.g., for reporting natural disasters – earthquakes, floods – riots, terrorist attacks. .warnings about events that happen in real time.	.coordinated publications to disseminate information between citizens and local government in crisis situations, e.g., natural disasters. .movements in favor of causes related to municipal themes that can result in marches, flash mobs, riots, etc.
<b>Public projects</b>	.wiki projects for collective elaboration of laws, formulation of government agendas, public policies, and urban planning. .projects/campaigns that allow the sharing of results between cities.	.wiki projects to discuss and write laws and public policies to submit to government officials. .projects/campaigns on different municipal themes to share results and best practices among cities.
<b>Civic journalism</b>	.sharing of citizens' publications, videos, podcasts on local news, opinion articles and discussions on sensitive topics for the population.	.spontaneous production and sharing of content, in different channels and formats (videos, podcasts, texts), as an alternative for streaming media to increase the credibility of news and facts.
<b>Crowdfunding –</b>	.government support to civic crowdfunding by publicizing the initiatives.	.civic entrepreneur crowdfunding platforms (Carè et al., 2018). .fundraising platforms allowing individuals and companies to donate part of their income taxes to social projects.

Source: the authors (2021).

**Table 2**  
Innovation-oriented crowdsourcing initiatives.

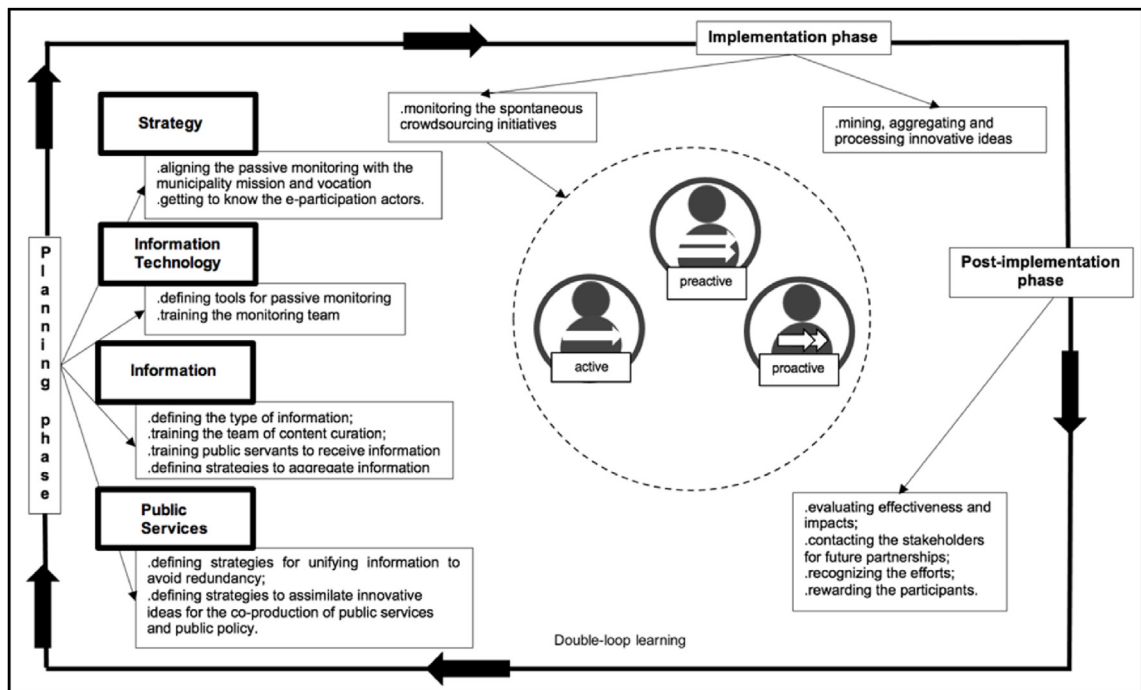
Types of crowdsourcing	Crowdsourcing initiatives – active approach	Crowdsourcing initiatives – passive approach
Public service and public policy-driven		
<b>Broadcast search</b>	<ul style="list-style-type: none"> <li>.events to develop solutions for wicked problems resulting in disruptive innovations.</li> <li>.living labs to include various political actors in the research and innovation process.</li> </ul>	<ul style="list-style-type: none"> <li>.activities involving interaction between groups of entrepreneurial citizens who divide tasks to develop applications with data from multiple sources, (Fab Labs, Living Labs).</li> <li>.groups of volunteer researchers to solve wicked problems.</li> </ul>
<b>Gamification</b>	<ul style="list-style-type: none"> <li>.competitive, inter-competitive, or individual platforms dealing with different topics, such as traffic, weather information, city landmarks. (Morschheuser et al., 2019).</li> </ul>	<ul style="list-style-type: none"> <li>.gamified challenges related to citizenry themes and municipal functions allowing citizens to experience and solve problems in the city.</li> <li>.mobile storytelling platforms with tools to develop location-based tours and games.</li> </ul>
<b>Contest - peer-vetted</b>	<ul style="list-style-type: none"> <li>.contests to gather information on certain issues, to develop improvements in public services, to propose new public policies, and new designs in public facilities with or without monetary reward.</li> </ul>	<ul style="list-style-type: none"> <li>.contests promoted by independent groups or entrepreneurs to seek solutions for municipal problems.</li> </ul>

Source: the authors (2021).

the target audience they want to reach (Macintosh, 2004; Mergel, 2013). To discover what motivates citizens, crowdsourcing initiatives must entertain, connect citizens socially (Rosenberger et al., 2017), and be meaningful (Macintosh, 2004; Mergel, 2013). Experimenting with different types of initiatives can be a way to map those that provide the best and worst results in a learning cycle.

4.2. Strategies for crowdsourcing initiatives

Strategies for crowdsourcing initiatives are part of a more comprehensive planning. The municipality's strategic planning (Rezende, 2012, 2018) sets the goals, the strategies for putting them into action, and the process of monitoring and evaluating to guide the framework for passive monitoring of spontaneous crowdsourcing initiatives as well as the elaboration of the government's crowdsourcing initiatives. The iterative and cyclical process of passive monitoring of citizen's spontaneous crowdsourcing initiatives, over which the municipality has no control, should discover the expectations, and wishes of the citizen, in addition to learning from innovative practices that can generate future partnerships. Simultaneously, the government can develop its own crowdsourcing strategies, establishing an active citizen-centered learning system. Both strategies for monitoring spontaneous crowdsourcing initiatives and for the elaboration of those initiated by the government materialize in three phases: planning, implementation, and



**Fig. 2.** – Framework for passive monitoring  
Source: the authors (2021).



post-implementation. These follow the premises that the government must be honest, transparent, and responsive (Bolívar, 2017; Mergel, 2012; Reddick et al., 2017; Rosenberger et al., 2017) and must seek the diversity of audiences who are representative of the population with different initiatives and rewards.

4.3. How does the framework work? – insights for practitioners

The framework first considers the passive monitoring of spontaneous crowdsourcing activities (Fig. 2) to establish a synergy between the municipality and the citizens. One of the outcomes of the passive monitoring is the crowdsourcing-based e-participation typology.

4.3.1. Planning phase

Strategy - aligns the passive monitoring strategies with the municipality's mission (Mergel, 2013), vision, and vocation and defines the monitoring indicators and goals to be accomplished, which should be included in the ITSP (Rezende, 2012, 2018).

IT strategies - chooses tools for monitoring proprietary and third-party social platforms to retrieve information and for content curation (Mergel, 2013); defines strategies for applying the crowdsourcing-based e-participation typology to identify stakeholders; and trains human resources for monitoring and content curation (Mergel, 2013).

Information strategies - decides on information the government wants to access; trains public servants to receive and use the crowdsourcing monitoring information; defines strategies to organize ideas and contributions (Brabham, 2013, pp. 1–42; Mergel, 2013); and sets out strategies to assimilate innovative ideas for the co-production of new public services (Nam, 2012) and public policy (Linders, 2012).

4.3.2. Implementation phase

The implementation phase passively monitors the crowdsourcing initiatives (Loukis & Charalabidis, 2015), by mining, processing, and aggregating (Surowiecki, 2005) the information, ideas, and contributions of e-participation actors (Brabham, 2013, pp. 1–42; Mergel, 2013). The crowdsourcing-based typology from the dynamic analysis of the spontaneous e-participation initiatives help public managers to discover the e-participation actors' degrees of empowerment, to design call-to-action strategies for each type of actor, to discover what motivates them (Brabham, 2013, pp. 1–42) and their expectations (Toots, 2019), and to reward them (Brabham, 2008) with better services and quality information.

4.3.3. Passive monitoring – post-implementation phase

Eventually, the post implementation phase evaluates the effectiveness and impacts of the solution (Nam, 2012) that can be financial by stimulating tax payment, reputation (Mergel, 2013), transparency, and trust in government (Nam, 2016); identifies top users, influencers, and partners among the typified citizens (Anthopoulos et al., 2016; Naranjo-Zolotov et al., 2019); contacts those involved in the activities to establish partnerships (Lukensmeyer & Torres, 2006); rewards citizens (Allahbakhsh et al., 2013; Brabham, 2008); and discovers what motivates them to participate (Brabham, 2013, pp. 1–42).

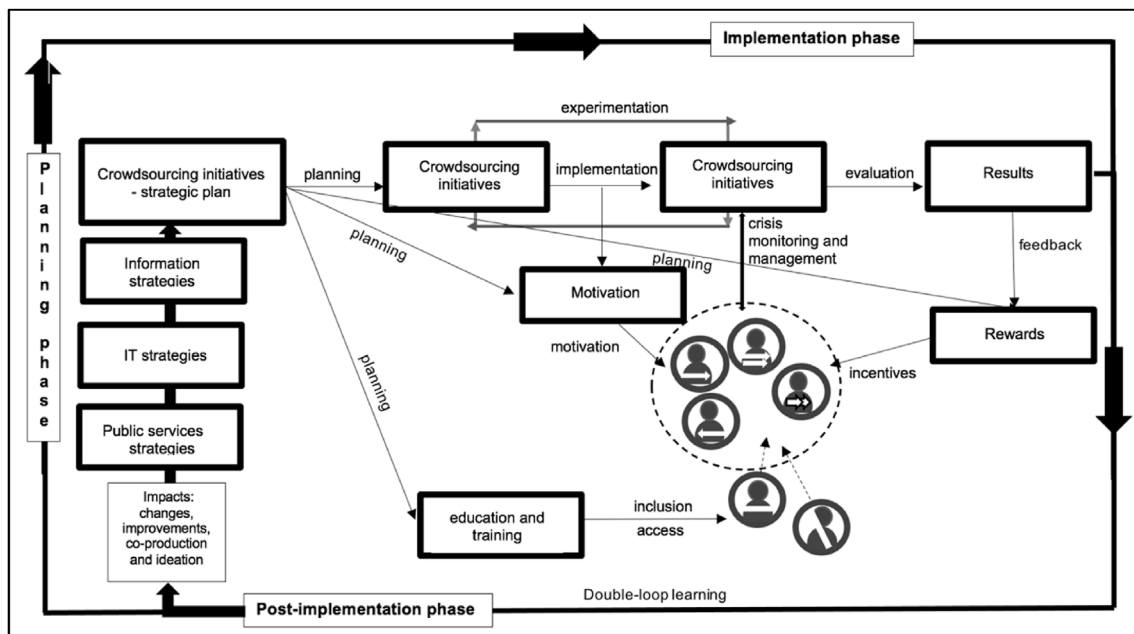


Fig. 3. – Framework for active monitoring  
Source: the authors (2021).

Following the same phases, the local government sets the active crowdsourcing strategies resulting from passive monitoring (Fig. 3).

#### 4.3.4. Planning phase –

The cycle starts by aligning crowdsourcing initiatives with the municipality mission (Mergel, 2013), vision, and vocation (Rezende, 2012, 2018); defining the purpose of the initiative (Nam, 2012); classifying the target-audience (Macintosh, 2004; Mergel, 2013); determining and publicizing the time period of the activity (Macintosh, 2004; Mergel, 2013); discovering the motivations that lead citizens to participate (Brabham, 2013, pp. 1–42), which is a trial and error learning cycle; creating customized campaigns and reward systems (Brabham, 2013, pp. 1–42; Mergel, 2013); choosing the social platform(s) (Macintosh, 2004; Nam, 2012); training human resources (Picazo-Vela et al., 2012; Sandoval-Almazan & Gil-Garcia, 2012); setting the rules of communication etiquette (Mergel, 2013); defining the problem or subject clearly (Brabham, 2013, pp. 1–42; Mergel, 2012; Seltzer & Mahmoudi, 2012); communicating how crowdsourced ideas will affect government decision making (Brabham, 2013, pp. 1–42); training the content curator team (Mergel, 2013) for proposing activities aimed at each target audience (Flores et al., 2018, October) servants to receive and use information resulting from the crowdsourcing initiatives; and defining strategies to aggregate (Surowiecki, 2005) information, ideas, and contributions (Brabham, 2013, pp. 1–42; Mergel, 2013).

#### 4.3.5. Active monitoring – implementation phase -

During the implementation phase, public servants try out the initiatives internally to reduce risks of failure (Toots, 2019); give feedbacks to citizens (Macintosh & Whyte, 2008; Mergel, 2013); manage crises (Brabham, 2013, pp. 1–42); engage the e-participation actors in the crowdsourcing activities (Brabham, 2013, pp. 1–42); combine their ideas and contributions (Brabham, 2013, pp. 1–42; Mergel, 2013); and find influencers and top users of social platforms (Anthopoulos et al., 2016; Naranjo-Zolotov et al., 2019) who can turn from critics to supporters when they feel their demands are met.

#### 4.3.6. Active monitoring – post-implementation phase -

During this phase, public managers evaluate the project (Brabham, 2013, pp. 1–42; Mergel, 2013); show the practical result of the initiatives (Mergel, 2013; Nam, 2012); thank citizens for their participation (Brabham, 2009, pp. 1–42; Mergel, 2013); offer rewards (Royo & Yetano, 2015); and ensure a continuum of experimentation and learning (Liu, 2017; Reddick et al., 2017).

After the loop ends, public managers evaluate the actors' response and satisfaction, results achieved, and objectives accomplished. Eventually, the impacts on information technology and on the quality of information gathered are evaluated. Modifications for improving and/or creating public services as well as formulating, implementing, and monitoring new public policies linked to any municipal theme are made.

The continuum of lessons learned aims at increasing the local government maturity to relate to its citizens. The cycle ends when the lessons learned feed the municipality's strategic planning back, and local managers make the adjustments and decisions for the next loop. The local government may choose to advance iteratively or repeat the same loop until the municipality reaches the desired maturity.

Some challenges should be overcome during the learning process. Local governments might have to make open data regulations about data consumption. This concerns making data available, easy to find, updated, and reusable. Other laws, acts, and regulations might be necessary to welcome third-party public service and innovative public policy solutions.

## 5. Conclusion

The research study sought the convergences of research studies on e-participation, social media in government, and crowdsourcing. The analysis of 26 frameworks grouped different approaches (Malone, 2008) on these constructs, and researchers are invited to search for other convergences. On the one hand, the typology of the framework responds to a need for attention to citizens' initiatives (Royo & Yetano, 2015) not sponsored by governments (Porwol et al., 2016; Sæbø et al., 2008) that may lead to future partnerships. By knowing the role users play (Medalgia & Zengh, 2017), the typology is useful for the municipality to analyze its target audiences and to propose public policies addressed to different actors; to survey the digitally excluded; to encourage the participation of passive and reactive actors; and to use the call-to-action approach to stimulate the active, preactive, and proactive ones so they can contribute. On the other hand, strategic digital city projects (Rezende, 2012, 2018) foster the planning of action-driven (Khan et al., 2014; Mergel, 2010) participatory and engaging initiatives (Mergel, 2013; Sandoval-Almazan & Gil-Garcia, 2012) aligned with the municipality strategic planning and vocation to welcome crowdsourced ideas, projects, and products for improving the provision of information, services, and public policies. In a broader perspective, the framework helps to identify talents and influencers among the e-participation actors, to discover their motivations and expected rewards, thus stimulating an ideation process for the solution of wicked problems in a continuous learning cycle adherent to the double-loop learning for citizen-centric processes by Reddick et al. (2017). The framework is in its descriptive phase. Ongoing research is currently applying the crowdsourcing framework to strategic digital city projects in Brazilian municipalities.

## Declaration of competing interest

The authors declare that there is no conflict of interest.

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