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Crowdfunding for the development of smart cities

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Abstract In recent years, many cities have experienced new forms of collaboration that have an impact on citizens and entrepreneurs. The integration of this field of study with civic crowdfunding can influence economic growth and community building, which may be beneficial for both policymakers and practitioners alike. Civic crowdfunding is a financial model through which citizens, in collaboration with government and local authorities, fund projects to provide a community service. The development of smart cities is related to civic engagement, empowerment, and participation intended to be part of crowdsourcing or entrepreneurial activities. In this sense, cities play a vital role as drivers of (open) innovation and entrepreneurship. Based on these considerations, this study proposes an explorative and qualitative approach to investigate the civic crowdfunding phenomenon and its ability to promote community development. Our exploratory analysis of six projects highlights the challenges and opportunities of civic crowdfunding for the creation, development, and improvement of more inclusive cities.

1. Setting the scene: Crowds, crowdsourcing, and crowdfunding for the development of smart cities

Social innovation and digitalization of the economy are new sustainable approaches for growing cities and for creating new relationships between citizens, enterprises, and institutions (Bernardino & Santos, 2017). Several scholars have emphasized that the development of cities offers a wide range of opportunities for emerging types of entrepreneurial activity that improve the urban ecosystem (Muñoz & Cohen, 2016). Research in this vein is oriented toward new frameworks that emphasize the role of the technological shift in the construction of smart cities and the involvement of citizens in developing innovative solutions for civic challenges (Brunswicker, Bilgram, & Fueller, 2017). Specifically, crowdsourcing—or "the use of IT to outsource any organizational function to a

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strategically defined population of human and non-human actors in the form of an open call" (Kietzmann, 2017, p. 151)—leads to citizen feedback or responses to calls made by a city (Almirall, Lee, & Majchrzak, 2014). Numerous organizations involve crowds through open innovation models in the search for new forms of financing via crowdfunding (Almirall et al., 2014). In urban areas worldwide, civic crowdfunding platforms have emerged to support city projects (Muñoz & Cohen, 2016). The rapid rise of civic crowdfunding has attracted widespread attention, particularly due to its ability to channel citizens' funds to specific projects in times of constrained public budgets and to encourage collaboration in shaping the future of cities (Davies, 2015). Furthermore, an integration of studies on civic crowdfunding and smart cities can influence economic growth and community building, which is potentially beneficial for policymakers and practitioners alike. This study explores the civic crowdfunding phenomenon in six smart cities and discusses implications that may be useful for the development of civic crowdfunding experiences in other civic and urban areas.

2. Understanding smart cities as an innovation ecosystem

The smart city label has spread across the world; nevertheless, there is no universal definition that is shared among academics and policy makers (Selada, 2017). The smart city concept encompasses most areas in which local governments operate, such as transportation and civic entrepreneurship; the use of IT is considered the transformative mechanism that makes these areas 'smart' (Almirall et al., 2016). The development of smart cities is related to civic or community engagement and empowerment. Civic projects, which aim to address public concerns, are connected to intangible benefits as well as self-satisfaction derived from contributing to the common good (Charbit & Desmoulins, 2017). Cities play a vital role as drivers for (open) innovation and entrepreneurship (Cohen, Almirall, & Chesbrough, 2016), and in recent years, many cities have witnessed new forms of entrepreneurial ventures. The concept of urban entrepreneurship has attracted increasing attention (Cohen & Muñoz, 2016). Muñoz and Cohen (2016, p. 72) emphasized that "urban entrepreneurship creates solutions resulting in economic and non-economic gains for the urban ecosystem, the public and private sectors, and the entrepreneur. This form of enterprising uses the city as a living laboratory where collaborative, innovative solutions are developed and tested." As stated by Johnston and Blenkinsopp (2017, p. 90), "civic entrepreneurship is characterized by regional actors from business, the public sector and the academy stepping outside of their boxes and joining forces to enable entrepreneurial activity and regional development." The civic entrepreneurial ecosystem is formed by entrepreneurs, civic institutions, and citizens whose three-way interactions form a triangle of civic entrepreneurship (McAnaney, 2015). It is driven by factors such as urbanization, the democratization of innovation, technology, and collaboration (Cohen & Muñoz, 2016; Cohen et al., 2016).

3. Crowdfunding for community development: Opportunities and challenges

Interest in crowdfunding has grown rapidly and it has implications for social innovation and community development (Davies & Roberts, 2015). While creating a framework for European crowdfunding, De Buysere, Gajda, Kleverlaan, Marom, and Klaes (2012, p. 9) defined the term:

> Crowdfunding can be defined as a collective effort of many individuals who network and pool their resources to support efforts initiated by other people or organizations. This is usually done via or with the help of the internet. Individual projects and business are financed with small contributions from a large number of individuals, allowing innovators, entrepreneurs and business owners.

This innovative phenomenon has begun to offer several opportunities, especially when applied to projects that provide services to communities (civic projects). Civic crowdfunding is an excellent example of an alternative financial instrument (Klein, Siegel, Wilson, & Wright, 2014) with great potential for entrepreneurial and community development. Civic entrepreneurship stands alongside social and business entrepreneurship and is a vital part in the process of renewing the public sector. Therefore, entrepreneurs who develop local initiatives can be referred to as civic entrepreneurs because their economic action is shaped by a model of society based on sustainable development (Laville, 2016). Various challenges and opportunities are related to urban-focused entrepreneurship, which has emerged as the driving force behind the surge of city innovation (Muñoz & Cohen, 2016) and has compelled researchers and practitioners to reframe

the scheme of the interaction between place, individuals, and institutions. As Muñoz and Cohen (2016, p. 71) stated, "Urban entrepreneurs . . . are developing alternative forms of private-public-people partnerships and unique business strategies." In this vein, crowdfunding disrupts the promotion of new collaborative schemes between public, private, and civic spheres by developing a new culture of participation.

4. Crowdfunding for the development of smart cities: Key dimensions

There are four main dimensions of crowdfunding for the development of smart cities: community, civic challenges, social innovation, and civic crowdfunding. Community is a crucial aspect to understanding the creation of smart cities. Community is the crowd that provides financial resources for a project and seeks to address specific civic challenges. Brunswicker et al. (2017) defined civic challenges—our second dimension—as wicked problems that are embedded in the local context and that require customized solutions. Communities play a crucial role both in developing smart cities and in generating civic crowdfunding campaigns. The term community incorporates the concept of crowd—the civic entrepreneurs, investors, and institutions that link people, ideas, and money—and also contributes to the stimulation of community development, social inclusion, and smart city development. However, researchers in the fields of social entrepreneurship, cities and urban development, social movements, and community development are focusing on social innovation (Mulgan, Tucker, Ali, & Sanders, 2007). The last considered dimension is civic crowdfunding. This set of key dimensions can facilitate an understanding of the differences among smart city projects that are implemented through civic crowdfunding and which have been used in our cross-case analysis.

5. Research design and methodology

Given the limited number of theoretical studies exploring this emerging research topic, our research adopts a grounded theory methodology based on multiple case studies (Eisenhardt, 1989; Corbin & Strauss, 2008; Yin, 2013). In accordance with the explorative nature of our work, we decided to use a purposeful and non-random sampling process (Eisenhardt & Graebner, 2007). We selected cases to the point of redundancy by following a data saturation approach in which we excluded further cases when nothing new was added. We focused on smart city projects funded through civic crowdfunding initiatives in Italy. We included only six cases because they enabled us to conduct an in-depth analysis of the phenomenon by allowing us to split into different categories (north vs. south, urban vs. suburban), as described in the Appendix.

The ICity Rate Report (Forum Pa, 2015) noted that Milan is Italy's smartest city and that southern cities lag far behind northern cities in this ranking. However, we operate based on the consideration that smart city projects funded through civic crowdfunding can improve community wellness in both developed and undeveloped geographical areas. Therefore, we include other Italian cases located in geographical areas with different socio-economic characteristics, and we consider projects implemented in both northern and southern cities and in urban and suburban areas. With regard to initiatives promoted by the City of Milan, we selected the following cases: CN L'Hub, EcoLab, and So Lunch. Then, we selected the Next Taranto project (located in Southern Italy) and the Attiviamoci project (Saluzzo, Northern Italy), which is in a very small peripheral town (see Table 1). Finally, we selected Naples' Rebuild the City of Science project because it represents a community effort to react against crime. Table 1 provides an overview of our sample.

5.1. Smart city projects

We analyzed six smart city projects. The first three projects (Ecolab, So Lunch, and CN Smart L'Hub) have been developed under the project Milan Smart City, which was launched through a protocol signed by the Municipality of Milan and the chamber of commerce through a private-public partnership model.

- *Ecolab*: Ecolab is a smart project that is based on the idea of promoting the sustainable management of common gardens and vegetable gardens in Milan.

- *So Lunch*: This smart project was developed through a digital community and helps unemployed people integrate their income and avoid social isolation.

- *CN Smart L'Hub*: Promoted by a nonprofit association, this project has three main areas of activity. It provides multifunctional labs for professional and educational training, an online platform designed to enable connections between people who are

Table 1. Case studies overview

Case	Civic Challenges	City	Geographical position	Population (2016)	ICity Rate ranking (2016)
1. EcoLab	To build a digital network to connect agriculture producers, urban farmers, urban gardeners, consumers, and citizens	Milan	Northern Italy	3,218,201	1
2. So Lunch	To connect people who cook at home at lunchtime with people who work nearby and want to eat at home				
3. CN Smart L'Hub	To promote a combination of workspace and vocational training courses for young people at risk of social exclusion				
4. Attiviamoci	To promote and develop educational enrichment programs that meet the needs of children and families at risk of social exclusion	Saluzzo	Northern Italy	16,968	n.a.
5. Next Taranto	To build a FabLab as a place for creative innovators	Taranto	Southern Italy	199,561	90
6. Rebuild the City of Science	To rebuild the City of Science of Naples	Naples	Southern Italy	3,107,006	89

trained in the CN Smart L'Hub project and final users, and collaborative training courses.

The next two projects were promoted through the WindForFund initiative (www.windforfund.derev.com). This initiative was promoted by Wind, one of the largest operators in the retail market for mobile telecommunication services, in collaboration with the crowdfunding platform DeRev.

- *Attiviamoci*: This project was established to promote educational programs for children who are at risk of social exclusion in Saluzzo, a small town located in Piedmont (Northern Italy).

- *Next Taranto:* An effort to redevelop an area known for extreme pollution and urban degradation. Taranto is the second largest municipality in Apulia (Southern Italy) and, in recent years, deindustrialization and environment quality have given rise to the decline of the entire city by causing unemployment and social exclusion.

The last project we studied had a blend of both civic crowdfunding and smart city concepts.

- *Rebuild the City of Science*: This project was launched after unknown arsonists destroyed most of Italy's famous City of Science center in Naples in March 2013. In the week after the fire, approximately 10,000 people from Naples marched in protest, demanding the reconstruction of the destroyed area. The campaign was successful; the City of Science complex has been rebuilt.

5.2. Data collection

To confirm the validity of our process, we used multiple sources of information (Yin, 2013): interviews, archival records (i.e., project reports, newspapers articles, website information), and follow-up e-mails and calls to clarify details with participants. The primary source of data was semi-structured interviews conducted with (1) project managers with key responsibilities for managing both crowdfunding and aspects of the smart city project and (2) project proponents that provided us with key information about the project aim and vision. An interview protocol was designed (Yin, 2013) and semi-structured interviews were conducted in December 2016 with an average duration of 90 minutes.

5.3. Data analysis

The data analysis began with the composition of the case histories (Eisenhardt, 1989), which were written by the interviewer and then reviewed by a second researcher. Then, each researcher separately read the field notes and developed a coding scheme by following an open approach (Corbin & Strauss, 2008). In this preliminary coding stage,

we focused on keywords—our first-order coding categories—that reflect the main characteristics of each project. Next, keywords were matched between interviews and researchers; which resulted in our second-order coding categories (summarized in Figure 1).

The coding schemes were the result of an iterative process that intended to (1) identify the extent of adoption of civic crowdfunding practices that might be central to community development, (2) identify major aspects that might leverage civic entrepreneurship to improve community wellness, and (3) identify how smart city projects can lead local/urban development through the same community engagement. We treated our cases to assess similarities and differences among projects, which enabled the generation of theoretical concepts (Eisenhardt, 1989).

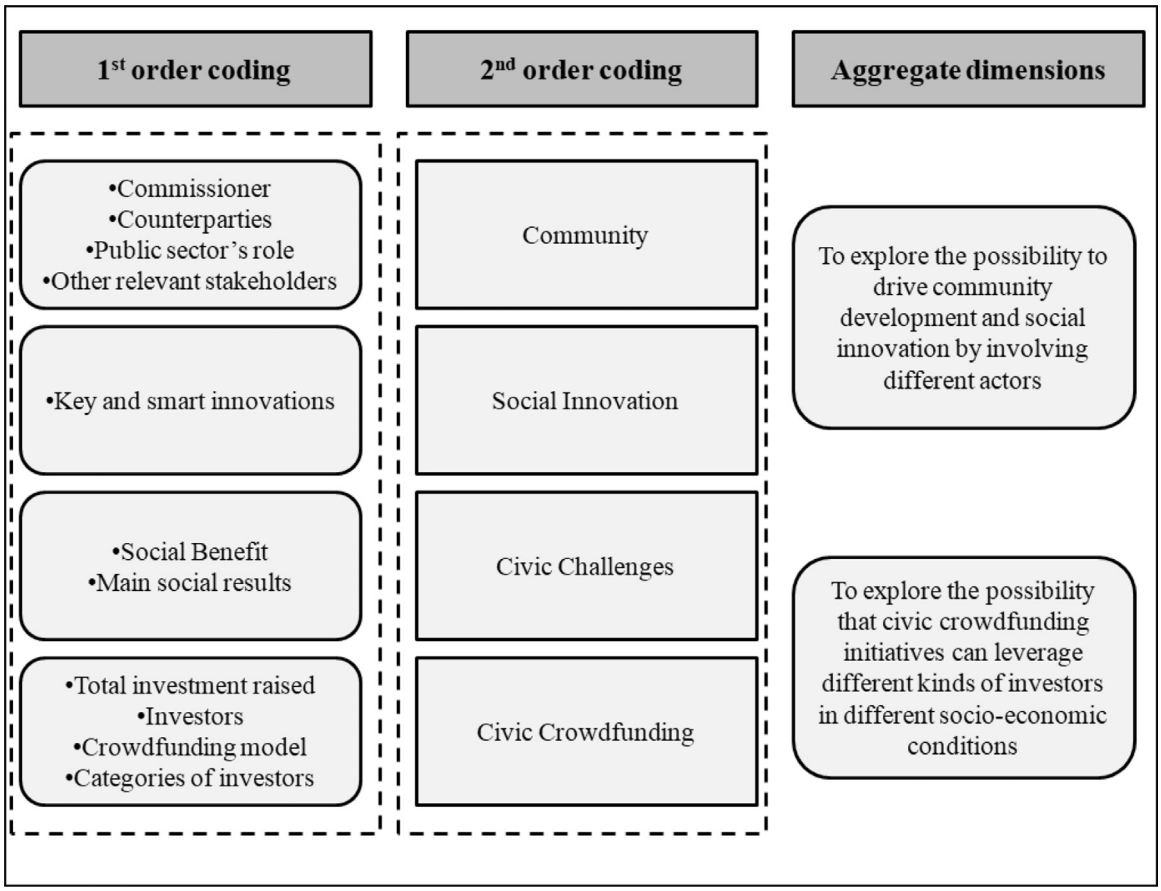
6. Insights from case studies

Based on our data structure and our cross-case analysis, we identified two main aggregate dimensions: (1) the possibility to drive community development and social innovation by involving both private and public entities in promoting civic crowdfunding initiatives and (2) the possibility that civic crowdfunding initiatives can leverage different kinds of investors in different socioeconomic conditions. Figure 1 highlights the relationships between our four dimensions of analysis and our two aggregate dimensions. Thus, in the Sections 6.1 and 6.2, we identify the specific factors (listed on the left side of Figure 1) that influence community development and urban entrepreneurship, which represent our aggregate dimensions (listed on the right side of Figure 1).

6.1. Addressing community development through smart city projects: A focus on involved parties

The projects included in our sample were promoted by both private and public entities. Three projects—EcoLab, CN Smart L'Hub and Rebuild the City of Science—were promoted by nonprofit organizations (Area Ridef, Comunità Nuova, and Idis Foundation). Two projects—Attiviamoci and Next Taranto—were promoted by municipalities

Figure 1. Data structure



(Saluzzo and Taranto). One—So Lunch—was promoted by a consulting society. The Milan smart city project is the result of cooperation between the City of Milan and the Milan Chamber of Commerce. Following a public-private partnership scheme, these two actors signed a protocol for the development of the Milano Smart City Strategy. Private firms such as Wind have helped develop the smart city project as well as nonprofit organizations and startups by providing both direct grants and crowdfunding platforms to promote projects. Although it was launched through the WindForFund initiative, the Next Taranto project was funded only through crowdfunding and due to the absence of formal requirements, Wind provided no grants. The project was completed by the Municipality of Taranto. A further key element that can be observed is the use of technologies and social innovation tools. In this sense, the case of Naples shows the power of social networks (i.e., Facebook, Twitter) to promote social projects and raise funds.

6.2. The crowd that funds: Civic projects and civic entrepreneurship

Table 2 summarizes the primary case findings, the different types of crowdfunding models associated with the projects, and the total funds raised for each campaign. The crowd's composition is likely to correlate with the nature and scale of the project (see Table 2).

Although the projects appear similar, various and customized settings can be identified. In the cases of CN Smart L'Hub, So Lunch, and Attiviamoci, the funders' motivation to participate in the project was to help people who are at risk of social exclusion. The investors of the Rebuild the City of Science project were driven by the desire not only to obtain a reward but also to send a signal against crime. In our sample, this is the only case that was based on a donation model and this campaign reached the highest level of contributions. Moreover, in selecting our cases, we included both urban and suburban areas. Our findings revealed that civic crowdfunding projects can help both typologies by considering that the size of projects is strictly related to the communities' needs and the civic challenges addressed. For example, the project in Milan, which is included in the urban category, raised €115,000 with €57,500 in public funding, whereas the other urban project, Naples, raised more than €1.4 million without public intervention. In contrast, projects in the suburban category raised small amounts, €12,378 in the case of Saluzzo and €15,301 in the

Table 2. Overview of the crowdfunding campaigns

	Crowdfunding platform	Funding model	Total investment raised	Number of private investors	Public funding
EcoLab	www.eppela.com	Donation-based and reward-based crowdfunding	15,000€	63[1] small private investors, 3 private firms, urban farms	Milan City Council - 7,500€
So Lunch	www.eppela.com	Donation-based and reward-based crowdfunding	40,000€	More than 150 small private investors, 4 private firms, 2 big private contributors	Milan City Council - 20,000€
CN Smart L'Hub	www.eppela.com	Donation-based and reward-based crowdfunding	60,000€	Approximately 85 small private investors, 3 foundations, and the Rotary Club Milano Manzoni	Milan City Council - 30,000€
Attiviamoci	www.derev.com	Donation-based and reward-based crowdfunding	12,378€	More than 123 private investors	0
Next Taranto	www.derev.com	Donation-based and reward-based crowdfunding	15,301€	112[2] small private investors, 5 private firms	0
Rebuild the City of Science	www.derev.com	Donation-based crowdfunding	1,463,867€	2584[2] small private investors	0

[1] Source: www.eppela.com
[2] Source: www.derev.com

case of Taranto; however, Saluzzo raised money through a direct grant of €5,000 from Wind, and Taranto drew money exclusively from crowdfunding. Our cross-case analysis suggests that both the donation-based and the reward-based crowdfunding models are suitable for the development of smart city projects. Finally, the absence of public support is not a limiting factor when particular civic challenges need to be addressed, as in the case of Naples.

7. Looking ahead: Implications for research and practice

Our cases reveal that the projects differ in many aspects. According to Selada (2017), there are no one-size fits all solutions. Each smart city is based on a different background (including social, cultural, and institutional features) and on different innovation ecosystems, which means that each city requires a different approach. However, despite the variations in the dimensions and characteristics of the cases, our insights may be relevant in other countries, and many implications for research and practice can be highlighted, as described in the sections below. The Italian cases show that civic crowdfunding can be adapted everywhere and that it can leverage empathy and community engagement involving a wide range of actors. In this sense, our findings recall the model proposed by Muñoz and Cohen (2016), which is based on collaborative partnerships that emerge from urban entrepreneurial action and engage actors who act collectively in pursuit of the common good.

Crowdfunding contributes to the changing landscape of innovation and entrepreneurship and to the growth of urban entrepreneurship (Cohen & Muñoz, 2016). In bypassing the problems that are related to traditional financial schemes, civic crowdfunding can help people—including the crowd as well as urban and civic entrepreneurs—to be part of smart city projects by leveraging aspects such as a sense of civic duty, empathy, and a sense of belonging to a specific urban area or territory. Civic crowdfunding is not simply an alternative funding model; it can be considered a form of smart funding. Civic crowdfunding has seven vital characteristics:

1. It overcomes the lack of financial resources for the development or regeneration of urban space;
2. It can leverage the crowd's empathy in funding urban projects;
3. It promotes the creation of partnerships between a wide range of actors;
4. It stimulates urban or civic entrepreneurial creativity by providing financial resources;
5. It can be used for both large and small projects;
6. It can be used to fund projects promoted by public authorities, urban or civic entrepreneurs, private firms and non-profit entities; and
7. It can stimulate the growth of local ecosystems.

7.1. Civic crowdfunding: Beyond pure entrepreneurialism

Communities increasingly seek to play an active role in addressing civic and local challenges, and the use of crowd-based models for raising funds from a large number of people can be considered a disruptive innovation in civic entrepreneurial financing. This is particularly true if we consider how civic crowdfunding and urban entrepreneurship can help address civic challenges as they intersect with smart city development. Our cases highlight that projects can be promoted in the sphere of urban entrepreneurship, but they also emerge from societal need. In this sense, the case of Naples presents a series of peculiarities that make it unique in our sample and perhaps around the world. The emergence of the project idea is not related to a civic entrepreneurial activity or to a public and/or private call for projects; it is simply related to a social cause.

7.2. A participative model: Civic crowdfunding as a driver of innovation and community development

Our findings reveal that civic crowdfunding can stimulate urban entrepreneurial activities both in developed urban areas (i.e., Milan and Naples) and in less developed areas (i.e., Taranto and Saluzzo) through a common thread: the mix between innovation, technology, alternative funding mechanisms, and community support. This aspect brings to mind many academic researchers in the field of urban economics and factors such as clustering or agglomeration, density, and diversity, which are considered key drivers of innovation (Florida & Mellander, 2016) and of venture capital investments. Considering the geographical distribution of our case studies, we can affirm that civic crowdfunding is a viable funding mechanism for innovation and smart city development both in as-yet developed

urban environments (i.e., Milan) and in urban ecosystems in which the collaboration between different stakeholders can lead to social inclusion through the implementation of small but relevant community projects.

7.3. Enabling smart civic entrepreneurship: The use of IT

The analysis underscores how the connection between technology and civic projects allows for innovative forms of civic entrepreneurship by offering unprecedented opportunities for a crowd intelligence to be involved in social innovation processes of tackling problems collectively through online crowd platforms. Such forms of social innovation create new forms of value that are not limited to financial or economic value, but rather improve social impact.

8. Final thoughts

The explored case studies reveal a certain number of local initiatives that have been funded through civic crowdfunding models that offer opportunities for participation. This emergent phenomenon facilitates the creation of new forms of collaboration that are directed toward improving social impact due to value creation. The crowd seems to favor ideas that facilitate civic participation and sustained single self-financed efforts supporting urban entrepreneurial ideas that have a substantial budget target. Furthermore, the presence of interactions between local governments, the crowd, and civic and/or urban entrepreneurial initiatives contribute to the creation of new forms of urban community development by promoting new spheres of relationships between the public and private sectors and civic crowds. Our work opens up various new directions for future research that may be useful to explore in terms of both further civic crowdfunding experiences and the creation of new paradigms for the concept of civic collaboration.

Appendix: Methodological notes

Multiple case studies enable us to build more robust, generalizable, and parsimonious theory than a single case can (Eisenhardt, 1989; Eisenhardt & Graebner, 2007), and they are appropriate for describing complex contemporary phenomena within their contexts. In selecting cases, we followed some qualitative research methodologies that present general guidelines regarding sample size. For instance, Eisenhardt (1989) clarified that there is no ideal number of cases, but a number between 4 and 10 usually works well. In selecting cases, we considered the following criteria: (1) scientific interest in which each case highlights a specific characteristic of the phenomena under investigation; (2) transparency, which includes only cases with adequate availability of information; and (3) reliability and trustworthiness, which includes only cases with certainty regarding data and information.

Moreover, we focused on Italian projects. In our opinion, Italy—which is located in the European Union and has launched several initiatives to promote smart city experiments—represents an advantageous laboratory for studying this growing phenomenon given that linkages between Italian civism and community development have been studied over a long period of time. The civic crowdfunding phenomenon is difficult to quantify because of the definition of civic and because few studies have examined civic crowdfunding to date; therefore, no estimation of market size is available (Colasanti, Frondizi, Meneguzzo, & Santini, 2016; Charbit & Desmoulins, 2017).

We selected our case studies based on the consideration that in recent years, Italy has suffered significant reductions in public expenditure, which has resulted in an increasing historical developmental gap between the northern and southern parts of the country (European Commission, 2017; Salvati, Venanzoni, & Carlucci, 2016). The selected cases are the only ones with available secondary data (e.g., newspaper articles, reports, websites) that allowed us to triangulate the information gathered with the interviews and study information that can be derived from the projects' heterogeneity.

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