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ORIGINAL PAPER

Knowledge-driven policies for post-disaster recovery: an investigation of dwellers' perception

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Abstract
Human capital is crucial for economic development, and the academic literature has extensively studied the link between education and economic progress. While the number of studies focusing on the impact of academic institutions on local economies is increasing, attention to universities' role as *ex-post* drivers of long-term development in post-shock contexts remains scant. Building on these premises, this study focuses on the case of L'Aquila following the 2009 earthquake. Specifically, building on primary data collected by an independent survey in 2019, our research aim is to evaluate how and whether the establishment of the Gran Sasso Science Institute (GSSI) has generated a positive effect on the city's rebirth after the 2009 shock, focusing on the perceptions of L'Aquila inhabitants. Results show a positive perception of the GSSI as beneficial to the reconstruction policy, particularly regarding the attraction of human capital and the city's image. In contrast, social capital does not seem to play a relevant role in policy perception. To the best of our knowledge, this study represents the first attempt to evaluate the local success of such knowledge-driven policy based on dwellers' perceptions. Moreover, it aims to provide a series of guidelines to evaluate similar projects *ex-post* and to assess the feasibility of future aftershock strategic implementations *ex-ante*.

Keywords Knowledge-driven policies · Post-disaster policies · Policy perceptions · Survey · L'Aquila earthquake · Italy

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1 Introduction

The knowledge economy is crucial in regional and urban development. Human capital – meant as entrepreneurship, creativity, and education – is the essential production factor in knowledge societies (Amendola et al. 2020; Faggian et al. 2017, 2019). The academic literature has extensively studied the link between education and economic progress for decades (Motoyama and Mayer 2017; Rutten and Boekema 2009; Becker, 2009). Policy-wise as well, knowledge-based approaches for fostering economic development, i.e. policies favoring increased employment "in which a significant share of employment is directly or indirectly accounted for by production processes that use highly skilled human capital" (OECD, 2013, pag. 166), are regularly adopted to promote local growth (Pinheiro et al. 2012). However, the effectiveness of such strategies is questionably intricate in lagging and peripheral regions (e.g. Thomas et al., 2020; Fonseca 2019; Rodríguez-Pose and Wilkie 2019; Stephens et al. 2013). While the number of studies focusing on the impact of academic institutions on local economies is increasing (Degl'Innocenti et al. 2019; Valero & van Reenen, 2019), further evidence on the role of universities as *ex-post* drivers (i.e. after a shock or events) for fostering long-term development in post-shock contexts is still much needed. The establishment of universities has always been a strategy for latecomers or lagging regions to build up innovation clusters and collective identity (Pugh 2017; Etzkowitz et al. 2000). However, creating universities in the window of opportunity (Olshansky et al., Platt and So 2017) produced by disasters, hence in shock-induced falling behind contexts, is a strategy that has been implemented in a few cases (e.g. OECD, 2013; SISSA, 2016). And yet, besides the economic benefits, it is commonly recognized that universities are key actors in promoting socio-economic development (Valero & van Reenen, 2019; Benneworth et al. 2017; Harrison Turok, 2017). Content-wise, the largest part of the academic literature (and policy recommendations) on the topic focuses on mitigation, preparedness, and response more than on the post-disaster phase or recovery phase (Radić et al. 2025; Mannakkara and Wilkinson 2014; Olshansky et al. 2012; Berke et al. 1993). In this context, while resilience and post-disaster recovery studies have focused on issues such as emergency governance, housing reconstruction, social capital, and community adaptation (see, for example, Aldrich and Meyer 2015; Berke et al. 2014; Smith and Wenger 2007), considerably less attention has been devoted to the role of universities as long-term institutional actors capable of fostering local development after a disaster. In this sense, this paper adopts a different perspective with respect to the extant resilience and recovery literature exploring whether knowledge-based policy initiatives may foster structural socio-economic transformation. By taking this novel perspective, this paper contributes to resilience and recovery studies by conceptualizing universities not only as actors supporting preparedness or adaptive capacity, but also as ex-post drivers of transformative recovery.

This study examines the specific case of L'Aquila after the 2009 earthquake. It represents a particularly instructive case because a higher education policy was an explicit component of the OECD-inspired post-earthquake recovery strategy. Unlike conventional reconstruction policies centred on physical infrastructure, this intervention sought to foster long-term socio-economic transformation through knowledge production and human capital attraction. Years after the publication of the Organisation for Economic Co-operation and Development report (OECD, 2013), it is commonly recognized that its strategic policy guidance of rebuilding L'Aquila as a city of knowledge is among the most successfully implemented

policy indications. Building on primary data collected through an independent survey, this paper intends to analyze how the establishment of a school of advanced studies – i.e. the Gran Sasso Science Institute (henceforth, GSSI) – has been perceived in L'Aquila's local context. Stated otherwise, the aim of this research is to evaluate how and whether the establishment of the GSSI has generated a positive effect on the city's rebirth after the 2009 shock, ultimately examining the role of universities as recovery institutions. To do that, acknowledging the importance of the target community's sharing of a vision for its realization, it takes citizens' perspective, an under-investigated issue so far. In the first years after the earthquake, in fact, the lack of democracy and the diaspora of L'Aquila inhabitants affected social participation and community involvement in the recovery process (Imperiale and Vanclay 2020; di Giovanni and Chelleri 2019; Calandra 2012a, b). Developing L'Aquila as a city of knowledge, as well as the creation of the GSSI, are bottom-up policies proposed by local actors in different community meetings (OECD, 2012). Although it is not the first case in which a knowledge-driven policy is implemented to foster the rebirth of the local economy[1], this study represents, to the best of our knowledge, the first attempt to evaluate the local success of such a knowledge-driven policy based on dwellers' perceptions. Moreover, it aims to provide a series of guidelines for evaluating similar projects *ex-post* (i.e., after the shock or event) and assessing the feasibility of future aftershock strategic implementations *ex-ante* (i.e., before the shock or event).

2 Literature review

2.1 Post-recovery policy after a natural disaster

Natural disasters and hazards have been conceptualized as sudden events which disrupt the routine of the affected communities, producing great environmental, economic, and social consequences for both people and the environment (Nasir et al. 2025; Radić et al. 2025; Wearing et al. 2020; Breckner et al. 2016; Faulkner, 2013). As such, they can be considered both a form of collective violence (Aijazi 2015) and wicked problems (Aldrich and Meyer 2015), requiring social repair and recovery processes (Brundiers 2018; Aijazi 2015; Solecki 2015). Furthermore, understanding the factors that support the definition and implementation of effective recovery policies has become increasingly relevant, as the frequency and intensity of disasters have increased in recent years (Nasir et al. 2025; Radić et al. 2025; Song et al. 2017; Lyles et al. 2014; Olshansky et al. 2012).

In line with Heath's 4R model (i.e. reduction, readiness, response and recovery) (Heath 1998; Rodríguez et al. 2006), disaster recovery can be defined as "*the process of restoring*,

[1] A similar case is the Italian Scuola Internazionale di Studi Avanzati (International School of Advanced Studies - SISSA), in Trieste, which, together with the University of Udine, were established thanks to the provisions contained in the first systematic law of public funding for the reconstruction after the earthquake, which on May 06, 1976, hit Friuli region causing a massive devastation (https://www.sissa.it/announcements/40th-anniversary-earthquake-friuli, accessed on November 27, 2024). Only some years later, the University of Basilicata was born in the rubble of the terrible 1980 earthquake that devastated Campania and Basilicata, causing almost 3,000 deaths. The earthquake was followed by state intervention in the reconstruction process of the earthquake-affected areas with the approval of Law 219 of 1981, which effectively set up the project for this new university, although the idea of establishing a University of Basilicata dates back to the previous decade (https://portale.unibas.it/site/home/ateneo/identita/storia-dellateneo.html, accessed on November 27, 2024).

rebuilding and reshaping the physical, *social*, *economic and natural environment through pre-event planning and post-event actions*" (Smith and Wenger 2007, p. 237). In particular, by focusing on post-disaster processes and actions, recovery policy may be conceived as an opportunity for change, going beyond the idea of simply building back better, but modifying the pre-disaster economic, social and environmental conditions (Brundiers 2018; Pelling and Dill 2010; Birkmann et al., 2010; Smith and Wenger 2007). According to this view, post-disaster recovery policy becomes a tool to address socio-economic issues, such as inequalities, communities' vulnerability, economic progress and sustainable development (He 2019; Ingram et al. 2006; Berke et al. 1993).

Extant literature on post-disaster policy focuses on different topics, ranging from housing and shelter recovery (Rahill et al. 2014; Maly and Shiozaki 2012; Mukherji 2010), economic (Hosoya 2016), business (Song et al. 2017) and tourism recovery (Wearing et al. 2020), as well as from different perspectives, such as urban planning, sociology, sustainable development and policy studies (Kitjarak et al., 2025; Song et al. 2017; Smith and Wenger 2007). All these contributions highlight a key point to consider in post-disaster recovery policy definition: the need to focus not only on the short term but also on the long-term impact of such policies to strengthen the sustainability of the recovery process (Paterlow, 2021; Brundiers et al., 2018). However, although the literature does not adopt an unequivocal definition of what constitutes the "long-term" phase of recovery, long-term recovery is generally understood as the stage in which reconstruction, socio-economic revitalization, institutional adaptation and community resilience-building processes unfold, often extending from several months to many years after a disaster depending on the scale of damage, local capacities and governance arrangements (Smith and Wenger 2007; Brundiers et al., 2018).

A more recent stream of literature highlights the fundamental contribution of social capital to designing effective and sustainable post-disaster recovery policies and to supporting community resilience (see, for example, Imperiale & Vanclay, 2024; Paterlow, 2021; Aldrich and Meyer 2015; Joshi and Aoki 2014; Chamlee-Wright and Storr 2011). At a more general level, in fact, human capital is considered a powerful tool to support the economic development of communities, to improve the governance processes of government, to support civic engagement, ultimately leading to the improvement of societal well-being (Chamlee-Wright and Storr 2011; Putnam 2000, 2015; Knack and Keefer 1997). Several authors (see, for example, Paterlow, 2021; He 2019; Rumbach et al. 2016; Joshi and Aoki 2014; Chamlee-Wright and Storr 2011; Chamlee-Wright, 2010; Murphy 2007) also stress that the role of social capital becomes much more relevant in post-disaster contexts since it favors community resilience and supports cooperation and coordination among community members in the management of both the emergency and the recovery phases. This literature also pinpoints the crucial importance of community involvement and citizens' participation in the evaluation of recovery policy alternatives (Berke et al. 2014), thereby promoting the recovery strategy as a bottom-up process (He 2019). Community, indeed, plays a pivotal role in shaping and supporting the definition of post-disaster recovery policy (Rumbach et al. 2016), albeit so far, its attitude toward and perception of the latter have been rather neglected.

Studies on post-disaster recovery policies may cover different issues, such as housing, business, and social capital, but their main limitation is that they focus on the short-term

effects of post-disaster policies, mainly overlooking their long-term impacts (Joshi and Aoki 2014).

2.2 Universities and local development

In the context of the knowledge-based society and considering the evolution from Mode 1 (i.e. knowledge produced mainly in universities as results of research activities) to Mode 2 (i.e. knowledge produced as results of interactions among universities, industries and other stakeholders) of knowledge production, the role of universities in fostering social and economic development is widely acknowledged in the literature (see, for example, Degani et al. 2021; Compagnucci and Spigarelli 2020; Agasisti et al. 2019; Pinheiro et al. 2016).

Higher Education Institutions (HEIs), in fact, are recognized as key players in supporting the socio-economic development of cities and regions, both by disseminating knowledge outside the academic boundaries and by collaborating with private, public and non-profit organizations (Carl and Menter 2021; Sapir, 2022; Choyubekowa et al., 2019; Ierapetritis 2019; Karlsen et al. 2017; Kitagawa et al. 2016; Trippl et al. 2015). The social role of universities acquires even more relevance in lagging regions, where they are considered as crucial drivers to foster local development, thus becoming "developers" (Carrascal Incera et al. 2022; Tomasi et al., 2021; Amendola et al. 2020; Thomas et al., 2020; Choyubekova et al. 2019).

Several concepts and models have been proposed in the extant literature to explain universities' contributions to local development. Some of the most cited ones include the "Triple Helix" model (Leydesdorff 2012; Etzkowitz and Leydesdorff 2000), the engaged university model (Thomas and Pugh 2020), the civic university notion (Goddard et al. 2016), terms that highlight the university as actively collaborating with stakeholders outside the academic boundaries (e.g. companies, public administration, civil society).

Various mechanisms through which universities contribute to local socio-economic development have been identified. In the '90s, Goldstein et al. (2004) identified seven university functions supporting economic development: human capital creation, knowledge and technology transfer, technological innovation, capital investment, regional leadership, production of knowledge infrastructure and influence on regional milieu. Some years later, Boucher et al. (2003) suggested that universities generate impact in three main areas:

- *Economic impact*, considering universities as payers of wages, buyers of goods and services and attractors of students;
- *Innovation impact*, through the transfer of knowledge and technology to local businesses;
- *Learning impact*, thanks to their role as educators and retainers of students.

Similarly, Bramwell and Wolfe (2008) highlighted that universities generate benefits along four dimensions: *(i)* attracting talents and human capital; *(ii)* providing formal and informal technical support and specialized expertise; *(iii)* facilitating access to the new knowledge and *(iv)* collaborating with local stakeholders beyond the university "ivory tower". More recently, Rossi & Goglio (2020) identified four main benefits for local communities: *(i)* stimulating the demand for goods and services, generating, in turn, an impact on the local

economy; *(ii)* developing human capital; *(iii)* supporting local business productivity through knowledge and technology transfer and *(iv)* improving local services.

Although there is little doubt about the contribution of HEIs to local and regional socio-economic development, the role of universities in peripheral regions and their impact on local communities are currently under scrutiny (Rossi & Goglio, 2018; Kempton 2015; Asheim et al., 2011). In these areas, in fact, the social role of universities becomes more relevant, particularly in terms of capacity-building, strengthening collaboration and engagement with local communities, and stimulating innovation and the absorptive capacity of places (Rossi & Goglio, 2020; Pinherio et al., 2016; Kempton 2015). Furthermore, in these contexts, where typically a limited number of large universities exist, the impact of local universities on regional development might be greater (Rossi & Goglio, 2020; Harrison and Turok 2017).

2.3 Summary, gaps and relevance of the study

The analysis of the extant literature highlights two main considerations and gaps. First, studies on post-disaster recovery policies have progressively acknowledged the importance of long-term and transformative approaches to reconstruction, emphasizing the relevance of social capital, community resilience and participatory governance (Aldrich and Meyer 2015; He 2019; Imperiale and Vanclay 2024). Nevertheless, most contributions still focus on short-term recovery outcomes or sectoral dimensions such as housing, tourism, and emergency governance, while less attention has been devoted to structural and knowledge-based strategies that can foster durable socio-economic transformation in post-disaster contexts.

Second, the literature on universities and local development widely recognizes universities as key actors in promoting territorial development, especially in peripheral and lagging regions (Pinheiro et al. 2016; Rossi and Goglio 2020; Thomas and Pugh 2020), where they are able to stimulate innovation, attract human capital, support local capacity building and strengthen connections among territorial stakeholders. However, empirical evidence on the role of universities as post-shock recovery drivers remains limited.

This study aims to bridge these two streams of literature by investigating a case in which a university institution was explicitly conceived as a strategic recovery policy after a catastrophic event. Hence, to contribute to the extant literature, this paper seeks to assess the impact of a specific knowledge-driven recovery policy – the construction of a school of advanced studies, i.e. the GSSI, in L'Aquila following the 2009 earthquake aimed at attracting human capital to foster the socio-economic rebirth of the territory, in the direct beneficiaries' opinion.

Building on this, and with the aim of filling the gap on this under-investigated issue, the ultimate goal of this research is to understand and assess the effect produced by the GSSI, as an emblematic post-shock knowledge-driven policy, on the rebirth of L'Aquila and its community after the 2009 earthquake, based on its inhabitants' perceptions, often neglected in policy impact studies.

While the L'Aquila case is distinctive because the creation of the GSSI formed part of an explicit knowledge-driven recovery strategy following the 2009 earthquake, its relevance extends beyond the local context. It represents an analytically informative case that allows us to examine the mechanisms through which a higher education institution can contribute to long-term recovery and how such a policy is perceived by the local community. The

insights derived from this case are therefore intended to inform the design and evaluation of similar knowledge-based recovery strategies in other post-disaster contexts, while recognizing that their implementation and effectiveness will depend on local institutional, governance, and socio-economic conditions.

3 The research background

This section presents the context of our research. More specifically, we first provide an overview of the 2009 earthquake and the related recovery policies, and then we briefly describe the establishment and the history of the GSSI.

3.1 The L'Aquila 2009 earthquake and the following disaster recovery policy

It was Monday, April 6th 2009, at 3:32 a.m., when a seismic tremor of magnitude (Mw) 6.29 affected the city of L'Aquila, Abruzzo Region, in the center of Italy (Modica et al. 2019; Alexander 2010). The consequences of the earthquake were catastrophic: more than three hundred people were killed, 1500 were injured, 60,000 buildings were damaged, and more than 67,000 people were left homeless (Contreras et al. 2014; Alexander 2010; Casarotti et al. 2009; Volpini 2009).

The disaster also affected the economy of L'Aquila and its surroundings. Before the earthquake, in fact, L'Aquila was historically labelled a "university city" given the high presence of students, which had a significant impact on the city's and region's socio-economic development (OECD, 2012). However, the 2009 earthquake had a devastating effect on the research institutions and the university located in this territory: following it, the proportion of resident students dropped by 20% (OECD, 2012).

Concerning the recovery policies implemented, following Alexander (2010), we can identify three distinct moments. In the short-term period, that is, the immediate aftermath or what was called the "emergency phase", the answer of the national and local government was quick, and it involved the evacuation of the city, particularly the entire historical city center. The "intermediate" period was characterized by a strong "paternalism" of the national government that decided not to implement a housing policy, but to rehouse people in a complex of buildings, a project called "CASE" (Complessi Antisismici Sostenibili and Ecocompatibili). Finally, the long-run recovery policy informed by the OECD Report (2012) was based on four interconnected pillars or visions aimed at fostering the re-birth of the L'Aquila city: "L'Aquila as a knowledge-driven city: higher education and research", "L'Aquila as a smart-city", "L'Aquila as a creative city", "L'Aquila as an open and inclusive city". In this study, we specifically focus on the first pillar, investigating the local community's assessment of the establishment of and the impact generated by the GSSI.

3.2 History and mission of the Gran Sasso Science Institute (GSSI)

The establishment of the GSSI was part of the reconstruction strategy in response to the 2009 earthquake, which devastated the city. The presence of the University of L'Aquila and the National Physics Laboratories (Laboratori Nazionali del Gran Sasso, LNGS) of the Italian National Institute for Nuclear Physics (Istituto Nazionale di Fisica Nucleare, INFN) was

the perfect substrate where to embed an international doctoral school and to make L'Aquila a proper international "city of knowledge". A knowledge-driven city is, according to OECD (OECD, 2013, p. 166), one "*in which a significant share of employment is directly or indirectly accounted for by production processes that use highly skilled human capital*". Rather than creating an isolated institution, the GSSI was conceived to complement and strengthen this existing knowledge ecosystem, linking undergraduate education and internationally competitive research through doctoral training.As a result, also thanks to the endorsement of the OECD and the Italian Minister of Cohesion, the GSSI was established in 2012 as a curiosity-driven science centre to support and foster the rebirth of L'Aquila (Modica et al. 2019).

Moreover, this strategy was also in line with the preferences of L'Aquila citizens: when asked to answer the question "Which slogan would you choose to rebrand L'Aquila?" by the OECD-University of Groningen Community Survey, the vast majority (68,5%) of them selected the option "knowledge-driven city (university, school and research activities)" (OECD, 2012).

After 4 successful years of experimentation, in 2016 the GSSI was officially granted university status, becoming 1 of the now 7 Italian "Schools of Advanced Studies". Totally in line with the OECD strategy, one of the main GSSI goals is to strengthen the scientific excellence of the city of L'Aquila and to attract highly skilled students and researchers to support, in turn, the socio-economic development of both the city and the Abruzzo Region. Since its first establishment, the GSSI has become an attractor of high-skilled human capital, as demonstrated by the growing number of Ph.D. students enrolled, which grew from 43 in 2016 to 226 in 2025. The number of academics has almost quadrupled in the last seven years, passing from 25 professors and researchers in 2018 to 92 in 2025.

Concerning Third Mission activities, since the beginning, the GSSI has engaged with local communities and public authorities. It cooperates with a wide range of stakeholders, including companies, public authorities and other universities, and it organizes several events for both students and researchers, as well as for the whole society.

4 Survey description

Our methodology employs a structured survey comprising five sections. The survey was launched in September 2019 and was conducted by Mètis Community Solutions, an external local company specialized in research, consultancy, training, and participatory tools for involving citizens in public decision-making and territorial governance. The agency was selected because of its experience in social research and citizen engagement processes, as well as its knowledge of L'Aquila's local context. The use of trained external interviewers helped ensure a standardized administration of the questionnaire and reduce potential answer biases related to the direct presence of researchers. Furthermore, to ensure a representative sample, the survey adopted a mixed-methods approach, based primarily on live interviews, complemented by a limited number of telephone interviews. Respondents were randomly selected among L'Aquila inhabitants, and data collection was organized across different survey contexts and time slots, including morning, afternoon, and evening shifts, to improve coverage and sample heterogeneity. The survey was conducted ten years after the earthquake (2009 vs. 2019), to capture citizens' perceptions once the GSSI had become an

established institution and its contribution to L'Aquila's long-term recovery strategy could be meaningfully assessed. Through the survey, therefore, we collected information from L'Aquila citizens about their knowledge about the GSSI (e.g. where is located, what is the meaning of the acronym, when it was established), the perceived impact of the GSSI on the city of L'Aquila (e.g. economic, social and cultural impact); the personal involvement with the cultural life of L'Aquila and with the events organized by the GSSI and the citizens' satisfaction about their personal life and the services provided by the city of L'Aquila. The five sections, together with the specific questions included in them, are reported in Table 1. Before the main survey, a pilot test was conducted to assess the clarity of the questions and the time required to complete the questionnaire; the results were used to refine the data collection strategy. As a reliability check, we computed Cronbach's alpha for the three perceived-impact items—economic, social, and cultural impact—which are measured on the same Likert scale. The resulting alpha is 0.805, indicating good internal consistency.

5 The empirical model

The data collected by the survey include 423 observations, corresponding to approximately 0.61% of L'Aquila's 2019 resident population of 69,478 inhabitants. The sample size exceeds the minimum requirements calculated using the standard formula for finite population sampling (Krejcie and Morgan 1970), supporting the adequacy of the sample relative to the target community. Of the 423 respondents, 306 people, corresponding to 72.34% of the sample, know the GSSI. Developing a binary response model, we investigate the factors that significantly influence opinions on the establishment of the GSSI as a beneficial policy for L'Aquila. The goal of the logistic regression model (Woolridge, 2003) is to establish the probability with which an observation can generate one or the other value of the dependent variable. The model we use to explain whether the creation of the GSSI has been beneficial for the city of L'Aquila in its inhabitants' perception is:

$$P\left(y^{(i)}=1\right)=\frac{1}{1+\exp\left(-\left(\beta_0+\beta_1 x_1^{(x)}+\ldots+\beta_p x_p^{(i)}\right)\right)}$$

where $y^{(i)}$ is the binary response variable *GSSI perception* that assumes the value 1 if the respondent considers the policy beneficial, and 0 if the respondent considers the creation of the GSSI as non-beneficial/does not know.

Given the dependent variable *GSSI perception* (Table 2), we hypothesize that a specific set of variables may drive people's opinion on this policy. These variables are:

(1) The level of knowledge of the GSSI
(2) The characteristics of the policy
(3) The expected impact they consider it has/ had on the city of L'Aquila

To examine these four spheres of influence, we create four groups of independent variables collected through the survey to investigate how they impact the probability of having a positive perception of the GSSI creation in the urban context (Table 3). Given this

Table 1 The structure of the survey to L'Aquila citizens (2019)

Survey section	Survey questions	Questions' specification
General information	Sex	Male, Female
	Age	18–25; 26–30; 31–39; 40–60; > 60
	Education	Primary school; Secondary school; High school, degree and post degree
	Occupation	Open question
	Originated in L'Aquila	Yes; No
	Resident/living in L'Aquila	Yes; No
	Time spent living in L'Aquila	Open question
	Reasons for living in L'Aquila	Work; education; family; other (to be specified)
Knowledge about the GSSI	Knowledge the GSSI	Yes; No
	Meaning of the acronym GSSI	Open question
	Year of the GSSI foundation	Open question
	Reason why the GSSI was created	Open question
	How did you hear about the GSSI	Mailing list (to be specified); social network; GSSI website; work reasons; word of mouth; by chance; advertising of GSSI dissemination and scientific events; other (to be specified)
Relationship with/involvement in the cultural life of L'Aquila and with the events organized by the GSSI	Participation, in the last 6 months, in cultural events organized by L'Aquila municipality	None, 1; 2; more than 2
	Participation, in the last 6 months, in cultural events organized by the GSSI	None, 1; 2; more than 2
	Have you ever been involved in the organization of GSSI cultural events?	Yes; No. If yes, specify which event(s)
	Would you like to be involved the organization of GSSI cultural events	Yes; No
	People you know working at the GSSI	Open question
	Origin of people you know working at the GSSI	L'Aquila; Abruzzo; Italy (not Abruzzo); Europe (outside Italy); extra Europe

Table 1 (continued)

Survey section	Survey questions	Questions' specification
Perception of GSSI impact	Impact of the GSSI on the city of L'Aquila	Positive; negative; no impact
	If the impact is negative, which are the reasons	To many persons in the city; funds for the GSSI researches should be spent differently; cultural events detract the attention to more relevant issues; other (to be specified)
	If the impact is positive, which are the reasons	It attracts many persons in the city; it generates a positive economic return on the territory; cultural events favor the image and the development of the city
	Do you agree with the following sentences (1 = totally disagree; 5 = totally agree)	GSSI generates an economic impact on the city of L'Aquila; GSSI generates a social impact on the city of L'Aquila; GSSI generates a cultural impact on the city of L'Aquila
	Do you think that the earthquake and the creation of the GSSI are interrelated?	Yes; No
	Investing in the creation of the GSSI has generated some benefits to the city of L'Aquila after the earthquake?	Yes; No
	In the future, funds devoted to the GSSI should	Increase; decrease; be the same
Personal satisfaction and satisfaction with respect to services of the L'Aquila city, sense of belonging	Quality of the following services (1 = poor quality; 5 = high quality)	Public transport; public health; public education; structures and sport activities; structures and leisure activities; structures and cultural activities; structures and commercial activities
	Which are the services that should be prioritized?	Public transport; public health; public education; sport structures; leisure structures; cultural structures; commercial structures; other (to be specified)
	Do you think that L'Aquila is a tolerant city?	Yes; No
	Do you think that will you stay in L'Aquila for the next 5 years?	Yes; No (if no, why?)
	How much do you accept the risk (1 = low; 10 = high)?	
	How much are you satisfied about(1 = low; 10 = high)	Your life; your work; your health; your family
	Your major sense of belonging is to:	The city of L'Aquila; the province of L'Aquila; the Abruzzo Region; the Center of Italy; Italy; Europe; the world
	Do you want to take part into cultural, social or environmental associations?	Yes; No
	Do you want to donate blood?	Yes; No

Table 2 Perception of the impact of the GSSI establishment on the city

GSSI perception	Freq.	Percent	Cum.
Non beneficial /Not known	69	22.55	22.55
Beneficial	237	77.45	100.00
Total	306	100.00	

set of variables, we produce five nested models, incrementally adding from model 1 to 5 each of the four groups of variables and the demographic controls. In the full specification, the demographic controls include respondents' origin from L'Aquila, which accounts for whether they are originally from the city, as well as age and gender. We acknowledge that unobserved factors inherent to perception-based studies—such as personal beliefs, political attitudes, emotional attachment to L'Aquila, prior disaster experience, or prior experiences with public policies—may influence perceptions of the GSSI. Although these factors cannot be fully observed in our data, the model includes several relevant controls, such as knowledge of the GSSI, policy characteristics, social capital, and demographic variables. As an additional robustness check, we re-estimated the full model including political attitudes and a proxy for potential exposure to the 2009 earthquake based on respondents' time spent living in L'Aquila. The proxy identifies respondents who had lived in L'Aquila for at least ten years at the time of the 2019 survey. Given that this information is only partially available, we treat this check as supporting diagnostic evidence rather than part of the main specification. The results show that additional controls are not statistically significant, and the main results remain qualitatively unchanged. Current practice favours averaging the individual marginal effects when possible (Greene, 2003). For this reason, after reporting the coefficient of the logit model (Table 3), we present the average marginal effects (Table 4) calculated as the average of the individual marginal effects:

$$\partial p/\partial \mathrm{x_j} = \frac{\sum F'\left(\mathbf{x}'\beta\right)}{n}\beta_j$$

The marginal effects for the logit model are:

$$\partial p/\partial \mathrm{x_j} = \Lambda\left(\mathbf{x}'\beta\right)\left[1-\Lambda\left(\mathbf{x}'\beta\right)\right]\beta_j = \frac{e^{\mathbf{x}'\beta}}{\left(1+e^{\mathbf{x}'\beta}\right)^2}\beta_j$$

and they reflect the change in the probability of y = 1 (that is considering the GSSI creation as beneficial for the city of L'Aquila) given a 1-unit change in the independent variable x for continuous variables, or in comparison to the base category (x = 0) for categorical independent variables.

Finally, we also control for the main demographic characteristics.

6 Results

The model including all four groups of regressors together with the demographic control variables (Model 5) is the one that maximizes the *log-likelihood* and the *Pseudo* R^2. Model 5 includes 304 observations because it drops two observations (gender *other*).

Table 3 Four dimensions influencing the perception about the GSSI establishment policy

Group 1 - Level of knowledge of the GSSI			Group 2 - Characteristics of the policy			Group 3 - Respondent social and cultural capital			Group 4 - Expected impact on the city		
Variable	Description	Value	Variable	Description	Value	Variable	Description	Value	Variable	Description	Value
Knowing location	They know the exact location of the GSSI	0 – No 1 – Yes	*Link earthquake*	Thinking the GSSI and the earthquake are linked	0 – No / Don't know 1 – Yes	*Volunteering*	Volunteering in cultural, environmental, or social activities	0 – No / Don't know 1 – Yes	*Economic impact*	The GSSI has an important impact on L'Aquila's economy	Scale from 1 (completely disagree) to 5 (completely agree)
Knowing people	Number of people of the GSSI known	0 – None 1 – One 2 – From 2 to 4 4 – From 5 to 9 5 – From 10 to 19 6 – More than 20	*People attraction*	The GSSI can attract more people (e.g. tourists, researchers)	0 – No / Don't know 1 – Yes	*Participation in GSSI events*	Participation in GSSI events in the previous 6 months	0 – None 1 – One 2 – Two 3 – More than two	*Social impact*	The GSSI has an important impact on L'Aquila's social life	Scale from 1 (completely disagree) to 5 (completely agree)
Mission	They know the mission of the GSSI	0 – No / Not known 1 – Yes	*Economic benefits*	The GSSI can have positive economic returns	0 – No / Don't know 1 – Yes	*Participation in cultural events*	Participation in generic cultural events in the previous 6 months	0 – None 1 – One 2 – Two 3 – More than two	*Cultural impact*	The GSSI has an important impact on L'Aquila's cultural life	Scale from 1 (completely disagree) to 5 (completely agree)

Table 3 (continued)

Group 1 - Level of knowledge of the GSSI			Group 2 - Characteristics of the policy			Group 3 - Respondent social and cultural capital			Group 4 - Expected impact on the city		
Variable	Description	Value	Variable	Description	Value	Variable	Description	Value	Variable	Description	Value
			City branding	The GSSI can contribute to the image and development of the city	0 – No / Don't know 1 – Yes	*Sense of belonging*	Which of these areas do you feel you belong to?	1 – L'Aquila city 2 – L'Aquila province 3 – Abruzzo Region 4 – Central Italy 5 – Italy 6 – Europe 7 - World			
						Remaining in the city	Thinking of staying in L'Aquila for the next 5 years	0 – No / Don't know 1 – Yes			

Table 4 Logit on the perception of the impact of the GSSI

	(1)	(2)	(3)	(4)	(5)
	Benefits on L'Aquila	Benefits on L'Aquila	Benefits on L'Aquila	Benefits on L'Aquila	Benefits on L'Aquila
Knowing location	0.947**	0.735*	0.843*	0.882*	1.066**
	[2.357]	[1.711]	[1.823]	[1.802]	[2.081]
Knowing people	0.288**	0.217	0.230*	0.236*	0.282*
	[2.301]	[1.608]	[1.646]	[1.659]	[1.756]
Mission	0.351	0.191	0.422	0.351	0.460
	[1.183]	[0.592]	[1.216]	[0.982]	[1.157]
Link earthquake		1.363**	1.496**	1.477**	1.657**
		[2.369]	[2.487]	[2.383]	[2.456]
People attraction		1.435***	1.549***	1.538***	1.634***
		[3.168]	[3.270]	[3.133]	[3.117]
Economic benefits		0.065	-0.174	-0.286	-0.243
		[0.130]	[-0.338]	[-0.541]	[-0.432]
City branding		1.140***	1.179***	1.027**	1.186**
		[2.772]	[2.719]	[2.251]	[2.349]
Link earthquake x People attraction		-0.931	-1.016	-1.168*	-1.244*
		[-1.387]	[-1.475]	[-1.646]	[-1.658]
Link earthquake x City branding		-0.354	-0.341	-0.259	-0.343
		[-0.552]	[-0.512]	[-0.379]	[-0.458]
Link earthquake x Economic benefits		0.261	0.467	0.588	0.229
		[0.348]	[0.610]	[0.752]	[0.280]
Volunteering			0.746**	0.753**	0.822**
			[2.127]	[2.083]	[2.092]
Participation in GSSI events			0.013	-0.035	-0.099
			[0.065]	[-0.163]	[-0.449]
Participation in cultural events			-0.138	-0.136	-0.073
			[-0.917]	[-0.873]	[-0.434]
Sense of belonging			-0.117	-0.093	-0.070
			[-1.645]	[-1.293]	[-0.915]
Remaining in the city			-1.084***	-0.955**	-1.002**
			[-2.780]	[-2.372]	[-2.109]

Table 4 (continued)

	(1)	(2)	(3)	(4)	(5)
	Benefits on L'Aquila	Benefits on L'Aquila	Benefits on L'Aquila	Benefits on L'Aquila	Benefits on L'Aquila
Economic impact				0.143	0.198
				[0.817]	[1.053]
Social impact				-0.146	-0.195
				[-0.700]	[-0.908]
Cultural impact				0.342**	0.416**
				[1.978]	[2.257]
Origin: from L'Aquila					0.596
					[1.453]
Age 26–30					1.032*
					[1.680]
Age 31–39					0.218
					[0.392]
Age 40–60					-0.736
					[-1.353]
Age 60+					0.731
					[0.949]
Gender: male					-0.028
					[-0.078]
Gender: other					0.000
					[.]
Constant	-0.081	-1.370***	-0.574	-1.700*	-3.100***
	[-0.213]	[-2.638]	[-0.804]	[-1.934]	[-2.990]
Pseudo R^2	0.057	0.154	0.198	0.223	0.286
Log lik.	-154.061	-138.148	-130.947	-126.880	-116.206
Observations	306	306	306	306	304

Sig. * 0.10 ** 0.05 *** 0.01

Table 5 Logit GSSI perception - Average marginal effects

	(1)	(2)	(3)	(4)	(5)
Knowing location	0.155**	0.106*	0.115*	0.116*	0.128**
	[2.436]	[1.741]	[1.858]	[1.836]	[2.135]
Knowing people	0.047**	0.031	0.031*	0.031*	0.034*
	[2.340]	[1.622]	[1.664]	[1.679]	[1.782]
Mission	0.057	0.028	0.057	0.046	0.055
	[1.190]	[0.593]	[1.226]	[0.987]	[1.166]
Link earthquake		0.197**	0.203***	0.194**	0.199**
		[2.473]	[2.604]	[2.483]	[2.560]
People attraction		0.208***	0.211***	0.202***	0.196***
		[3.360]	[3.477]	[3.309]	[3.289]
Economic benefits		0.009	-0.024	-0.038	-0.029
		[0.130]	[-0.339]	[-0.541]	[-0.432]
City branding		0.165***	0.160***	0.135**	0.142**
		[2.913]	[2.853]	[2.325]	[2.434]
Link earthquake x People attraction		-0.135	-0.138	-0.153*	-0.149*
		[-1.408]	[-1.498]	[-1.674]	[-1.683]
Link earthquake x City branding		-0.051	-0.046	-0.034	-0.041
		[-0.555]	[-0.514]	[-0.380]	[-0.459]
Link earthquake x Economic benefits		0.038	0.063	0.077	0.028
		[0.348]	[0.611]	[0.753]	[0.280]
Volunteering			0.101**	0.099**	0.099**
			[2.173]	[2.127]	[2.136]
Participation in GSSI events			0.002	-0.005	-0.012
			[0.065]	[-0.164]	[-0.449]
Participation in cultural events			-0.019	-0.018	-0.009
			[-0.920]	[-0.876]	[-0.434]
Sense of belonging			-0.016*	-0.012	-0.008
			[-1.668]	[-1.305]	[-0.920]
Remaining in the city			-0.147***	-0.125**	-0.120**
			[-2.897]	[-2.444]	[-2.163]

Table 5 (continued)

	(1)	(2)	(3)	(4)	(5)
Economic impact				0.019	0.024
				[0.820]	[1.057]
Social impact				-0.019	-0.023
				[-0.700]	[-0.910]
Cultural impact				0.045**	0.050**
				[2.014]	[2.312]
Origin: from L'Aquila					0.074
					[1.416]
Age 26–30					0.110*
					[1.726]
Age 31–39					0.027
					[0.390]
Age 40–60					-0.108
					[-1.371]
Age 60+					0.083
					[1.006]
Gender: male					-0.003
					[-0.078]
Gender: other					0.000
					[.]
Observations	306	306	306	306	304

dy/dx for factor levels is the discrete change from the base level

Sig. * 0.10 ** 0.05 *** 0.01

It shows that greater knowledge of the GSSI increases the likelihood of considering the policy beneficial. More specifically, people who know the exact location of the university are 12.8% more likely to have a favorable opinion about its creation. Consistently, an increase in the number of known members working at the GSSI increases the probability of a positive view of the policy by 3.4%.

Interestingly, what most significantly influences citizens' opinions on the creation of the GSSI is their interpretation of this policy. In fact, people who consider the university's creation as part of the reconstruction policy after the earthquake are 19.9% more likely to consider it as beneficial. This positive opinion is not derived from the assumption of the institution's economic impact. Most of the benefits are considered to be linked to attracting new people (such as tourists or researchers) and to the idea that the GSSI can help define and shape the city's image. Participants who argue that the GSSI can attract more people to the city are 19.6% more likely to have a positive opinion of the policy. The same for those who think it can contribute to city branding, who are 14.2% more likely to consider the policy beneficial. This paper aims to explore the perceived impacts of the creation of the GSSI as a policy closely linked to the earthquake. The interaction terms within the group describing the characteristics of the policy indicate that perceiving the GSSI as part of the post-earthquake recovery strategy, when combined with its potential to attract more people, has a negative and marginally significant effect (-14.9%). This result should not be interpreted as indicating that attracting people is perceived negatively. Rather, both variables have a positive direct association with the probability of considering the GSSI beneficial, while their combined effect is weaker than the sum of their separate effects. A possible interpretation is that people's attraction is generally viewed as a positive feature of the GSSI, but becomes more nuanced when evaluated within the sensitive frame of post-earthquake recovery. In this context, respondents may weigh the attraction of external human capital against expectations that reconstruction policies should primarily respond to local needs and directly benefit the affected community. The other interaction terms are not statistically significant.

The social capital sphere does not seem particularly relevant in explaining positive perceptions of the post-earthquake policy. Only volunteering in cultural, environmental, or social activities influences the positive opinion on the presence of the GSSI for L'Aquila, as respondents participating in volunteering organizations are 9.9% more likely to consider its implementation as beneficial. This finding should be interpreted in light of the specific research question addressed in this study. While the post-disaster recovery literature typically examines how social capital contributes to recovery processes and community resilience, our analysis investigates whether individual social capital shapes the perception of a specific knowledge-driven recovery policy. In this context, policy evaluations appear to depend more strongly on citizens' understanding of the policy's objectives and perceived contribution to the city's future development than on the stock of social capital. It is also worth highlighting that our measures primarily capture individual-level social capital, whereas the recovery literature more often focuses on its collective dimension.

Interestingly, model 2 shows, at a 10% significance level, that moving from "feeling of belonging to L'Aquila" to "feeling a citizen of the world" decreases the likelihood of having a positive opinion about the GSSI creation by 1.6%. In other words, the closer the respondent feels to the city, the greater the likelihood of having a positive perception of the doctoral school. Nevertheless, this variable loses its significance in the full model (model 5). What is noteworthy is that the willingness to remain in the city is strongly but negatively

significant. People who intend to stay in L'Aquila for the next five years are 12% less likely to consider the establishment of the GSSI as useful for urban life. This result may reflect the higher expectations of long-term residents regarding post-disaster recovery policies. Those with a long-term stake in the city's future may assess interventions more critically, expecting them to generate direct improvements in everyday living conditions alongside broader strategic benefits. In this sense, while the GSSI is widely perceived as contributing to the city's image, cultural vitality, and ability to attract highly skilled people, these long-term, indirect benefits may not fully meet the immediate expectations of residents who plan to build their future in L'Aquila.

Regarding the expected impact of the GSSI on the city of L'Aquila, the model indicates that economic and social impacts are not significant. On the contrary, the assumed cultural impact of the university explains people's perception of its effect on the urban context. The increase of 1 unit in the view that the GSSI has a cultural impact on the city is associated with a 5% higher probability of considering its establishment a helpful policy for the city.

The model does not reflect relevant differences in terms of individual characteristics, namely origin, gender, or age. However, using the 18-25-year-old group as the reference category, the probability of having a positive opinion on the GSSI's creation is 10% statistically significant for individuals aged 26–30. The group aged 26–30 has, in fact, 11% more chance of having a positive perception of the doctoral school. It is interesting to notice that the age group that is closest to the average age of students enrolled in the doctoral program, hence potentially the ones who know it best, has a positive opinion of the institution.

7 Discussion and conclusion

In the large academic and policy literature on policy evaluation, people's perceptions of specific implemented strategies, their intended or unintended consequences, and, even before, their underlying vision, are rather neglected. It has, however, gained increasing attention following the Brexit referendum (Capello & Perruca, 2018). This aspect is salient in general, but it may be vital when it comes to post-disaster policies, given the community's emotional distress, which is often associated with shocking, disruptive events, such as a devastating earthquake. However, this is rarely done in formal assessments. And yet, a community's approval or rejection of a policy intervention may influence its final outcomes (even if outputs are achieved) and its legitimization.

Against this backdrop, we aim to contribute to filling this gap by investigating – through a direct, on-field survey – how an urban knowledge-driven post-shock policy, issued from the suggestions and indications of an independent international organization (the OECD), is perceived by the local community hit by a catastrophic earthquake (L'Aquila in 2009). Consistent with this aim, the analysis focuses on dwellers' perceptions instead of the objective causal impact of the GSSI on L'Aquila's post-disaster recovery. Estimating such an impact would, in fact, require causal inference strategies, such as a counterfactual design, which is particularly challenging in a context marked by multiple overlapping reconstruction policies and broader recovery dynamics. Nevertheless, future research could build on the pres-

ent study by complementing this perception-based approach with objective indicators and causal inference strategies.

Building on this perception-based perspective, our first result shows that people who consider the university's creation as part of the reconstruction policy after the earthquake are more likely to consider it as beneficial. Individuals arguing that the GSSI can attract more people to the city are more likely to have a positive opinion of the policy, and those who think that the new institution can contribute to city branding are more likely to have a positive opinion of the implemented strategic choice. Very interestingly, this suggests that, even before assessing the impacts, people's perception of a policy, alongside individual values and beliefs, may be influenced by their understanding of its overall objectives and long-term vision. From a policy-making perspective, it seems crucial to make the goals and scope of a strategy explicit and to invest (efforts, time, and money) in its broad dissemination across as many members of the recipient community as possible. Attention should be paid to how a policy is communicated and to the vision within which people understand it. Few efforts are devoted to communication in policymaking, yet it should be integral to the entire policy cycle, across all its phases. The two things are, in fact, related because a widely shared vision aggregates people around a project, which thus has more chances to be performative. People's prioritization of the same fields of intervention foreseen within a specific policy leads, in fact, to its legitimization. The extent to which "*actors perceive themselves as sharing a common interest*" (Breathnach 2014: 2269) is one of the determinants of what is called "organizing capacity" (Meijers and Romein 2003) and of the formation of coalitions (Healey 2004) around a common idea of the future development of a community (Urso 2021). What is more, this result is a testament to the importance of city branding in the minds of common people.

Second, our findings show that recognition of the GSSI's cultural impact on the city is associated with a higher likelihood of considering its establishment a helpful policy for the territory. Neither the economic nor the social perceived impacts seem to have an effect in this sense. This is very interesting. In fact, previous studies have found that people do differentiate impacts, although there is a widespread public perception that many policy decisions fail to reflect concerns about a range of social and cultural impacts (Dieckmann et al., 2021). Knowing more about public perceptions of impacts could help policymakers understand people's opinions and assessments of a policy. This, in fact, suggests that evaluation is not merely influenced by objective outcomes but also by the perceived byproducts of those outcomes. The "spillover" of this high-education institute into the widening of the cultural offer is the most appreciated benefit, probably because it affects a wider pool of people. In designing a policy, therefore, its intended and unintended byproducts, on the one hand, and its broad return to the territory, on the other, are to be carefully taken into account.

Finally, we show that the smaller the scale of place belonging, the greater the likelihood of having a positive perception of the doctoral school. Feeling attached to L'Aquila, or, better, conceiving oneself primarily as a citizen of the city, influences one's opinion on the post-shock knowledge-driven intervention in question. This could mean that, contrary to how it might seem (i.e., an international project detached from the local community), the policy has been well received by people in L'Aquila and is well embedded in the urban

context. Moreover, it may also highlight that place attachment can function as an aggregator around a vision of development. Besides the inner drive motivating people to feel to belonging to a certain place, a future, shared project for the territory may become an opportunity to further feel it, being hence either an enabler of this sense of affection or acting to remove/reduce the barrier to feel it, activating a feedback mechanism through a positive experience when "connecting". Not failing to meet people's expectations regarding a policy's outcomes and ensuring transparency in this regard are therefore crucial. This finding suggests that a robust place attachment should be cultivated to improve individuals' and communities' resilience to any kind of shock, but also that no policy, however well-conceived it may be, can take root and produce performative and transformative effects on the territory if it is not grounded in a widespread sense of belonging to it.

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