

RESEARCH ARTICLE

Interpreting stakeholder ecosystems through relational stakeholder theory: The case of a highly contested megaproject

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Abstract

Managing stakeholders' concerns in megaprojects with an inclusive and ethical vision is a current open challenge. To overcome company-centered stakeholder-management practices, an ecosystem view, (i.e., one based on the network of relationships among involved stakeholders), should be adopted by designing bottom-up participatory stakeholder mapping processes that include the stakeholders affected by the construction of a megaproject. This paper presents an analysis of the stakeholder ecosystem of a contested megaproject in Italy (the Turin–Lyon high-speed rail) aimed at identifying similarities and discrepancies in stakeholder identification and prioritization between the managers' perception and an ecosystem point of view. The study followed a mixed-method approach. By coding the self-declared statements from 21 interviews with middle and top managers of the organization in charge of the construction and visualizing the emerging network of actors through a social network analysis and the use of centrality degrees, the most relevant stakeholders are identified. Our findings reveal how the prioritization of stakeholders obtained through the centrality degrees significantly differs from what the managers declare in reference to the concept of salience, highlighting how a bottom-up stakeholder mapping process—by including the stakeholders themselves in the mapping process—should be designed and reiterated during the whole life of a megaproject in order to adopt an inclusive stakeholder management approach.

KEYWORDS

megaproject social responsibility, relational stakeholder theory, social network analysis, stakeholder ecosystem, stakeholder management, stakeholder mapping

Abbreviations: ASSO, associations; CIT, local community; COM, communication; COO, coordinator manager; DIR, director; EU, European Union; HITS, Hyperlink-Induced Topic Search; HSR, high-speed rail; IST, public institutions; LOT, middle manager and operational construction site supervisor; LTF, Lyon-Turin Ferroviare; MSR, Megaproject Social Responsibility; NGO, non-governmental organization; OECD, Organization for Economic Co-operation and Development; QUAL, qualitative; QUAN, quantitative; SDGs, Sustainable Development Goals; SEN, senior manager; SIND, trade unions; SNA, social network analysis; SOC, business; TAV, Treno Alta Velocità (high-speed rail); TELT, Tunnel Euralpin Lyon Turin; UN, United Nations.

1 | INTRODUCTION

Sustainable management is undoubtedly an imperative for all megaprojects. In the future, it will not be possible to design and realize large infrastructure without adopting an ecosystem view of sustainability that considers stakeholders' interactions at its core (Flyvbjerg, 2014, 2017; Oliomogbe & Smith, 2012; Van Marrewijk

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et al., 2008). The ecosystem perspective has been inherited from ecology and complex systems thinking, where it is largely used to describe and analyze interactions among actors operating in a specific domain or area (Shaw & Allen, 2018). In this paper, the ecosystem view is applied to map and describe the complex system of actors involved in a megaproject as a living system operating in a specific geographical area in which interconnections may be microscopic, non-linear, and chaotic (Kay et al., 1999). In this sense, megaprojects are suitable contexts of analysis as by definition controversies and stakeholders' concerns are intrinsically melded into their nature (OECD, 2017a). Across the world, large infrastructures such as railways, ports, power grids, and telecommunication lines are needed to achieve the United Nations' Sustainable Development Goals (SDGs) in terms of inclusion, access to basic services, and poverty reduction. However, in the short term, these infrastructures will produce great environmental impacts due to their construction and operation (The New Climate Economy, 2016; United Nations, 2016). Specifically, transportation megaprojects are doubly intertwined with sustainability issues, as transportation globally accounts for 60% of the total carbon emissions released into the atmosphere (Woetzel et al., 2017). To decrease this trend, according to Woetzel et al. (2017) scientists estimate a cumulative global need for less-impactful infrastructures that, in the case of railways for example, would cost \$7.9 trillion for the period 2017–2035. While on the one hand, the need for new investments could be a sign of progress toward the achievement of certain SDGs, on the other hand, the construction phase for such megaprojects poses a myriad of ethical issues that are often the basis of societal conflict and citizens' protest movements. Examples of such issues include the risk of generating social and environmental injustices from the perspective of the communities directly involved (Li et al., 2013; Temper et al., 2015; Temper et al., 2018); cost overruns and the failure to meet the execution plan (Flyvbjerg, 2017); corruption and lack of attention to safety at work and for the final users (Bhattacharya et al., 2016); and conflicts and disagreements with local populations on public expenditures and environmental sustainability (Cuganesan & Floris, 2020). Consequently, in recent years, several academics and decision-makers have focused their efforts on promoting the concept of Megaproject Social Responsibility (MSR; Lin et al., 2017; Ma et al., 2017; Zeng et al., 2015) to provide more accountability toward external stakeholders. This has been further emphasized by the United Nations stressing the need for sustainable management of new infrastructures, as reflected in SDG 9 (Innovation and Infrastructure; United Nations, 2020). The huge size and complexity of megaprojects imply that managers should implement different types of accountability toward a series of interconnected stakeholders whose relationships could be also conflicting (Lezak et al., 2019), long-lasting, uncertain, and rooted in a multi-level environment of politics and administrative duties (Mok et al., 2015).

On top of these premises, one of the most complex problems for the sustainable management of megaprojects is represented by the inclusion of stakeholders' concerns in designing and realizing such interventions (Eskerod & Ang, 2017; Eskerod & Huemann, 2013; Williams et al., 2015; Winch, 2017). The inclusion of stakeholders'

concerns during the whole megaproject life-cycle represents a fundamental component of a project's social impact assessment (Vanclay, 2020). In this sense, understanding the various networks is pivotal for enabling accountability mechanisms among the companies involved in the construction, the public actors, and the project's other stakeholders throughout the whole process (Vanclay et al., 2015). Only after years of debate has the literature on megaproject stakeholders started including local and national public institutions, citizens, local non-governmental organizations (NGOs), and other actors (Aaltonen et al., 2008; Pizzi et al., 2021). Thus, in addition to internal and primary stakeholders, external and secondary stakeholders—those who do not have a direct or *official* contract with the organization (Beringer et al., 2013)—are now being considered. In general, it is possible to affirm that MSR scholars are unanimous in considering the stakeholder identification phase to be of crucial importance for the success of a project. To be truly effective, this identification process must adopt a relational approach (Rowley, 2017), where all the relationships between external stakeholders, internal stakeholders, and anyone else who may play a role in the project are analyzed. On a managerial level, the complexity of stakeholder relationships in megaprojects leads to the awareness that the management of stakeholder concerns can no longer be tackled simply by applying stakeholder salience (Bondy & Charles, 2020; Mitchell et al., 1997). The concept of stakeholder salience, as originally discussed by Mitchell et al. (1997), refers to the process through which managers assign a prioritization of stakeholders based on power, legitimacy, and urgency—the latter having been introduced by Mitchell et al. (1997) to reflect the dynamism of the stakeholders–manager relationship. Although the dimension of urgency includes dynamism, the classification still lies on a quite static interpretation of stakeholders; thus, as suggested by Rowley (2017), it should be empowered by the use of social network analysis (SNA) techniques and the analysis of the relationships between stakeholders and managers. More recently, novel relational perspectives have emerged, which go as far as considering the environment—and nature itself—as a stakeholder (Heikkinen et al., 2013; Kortetmäki et al., 2022; Kujala et al., 2012, 2018; Kujala, Heikkinen, et al., 2019). Within this paper, the implementation of SNA is seen as a complementary technique that is useful for assessing the dynamic evolution of a project's stakeholder ecosystem (Rowley, 2017) and graphically representing the social and relational capital of a project in its geographical and social setting (Cots, 2011).

Although different schools of thought are currently adopting relational stakeholder theory and are shifting from a company-centric to an ecosystem perspective (Cottafava & Corazza, 2020; Rowley, 1997; Yang & Yan, 2020; Yi et al., 2022), specific studies in which these analyses are conducted at the individual project level are still scarce. An ecosystem perspective assumes that every organization exists within an external network of relations (Basole, 2009, 2016), and a relational stakeholder approach (Rowley, 2017) should analyze such relationships with an awareness of evident challenges, such as the lack of data, difficulties in representing all of the stakeholders' ties and bonds (Cottafava & Corazza, 2020), and the absence of a clear and robust methodology to operationalize such ecosystem perspectives. Thus,

with this paper, the researchers aim to operationalize the abovementioned relational stakeholder ecosystem perspective (Rowley, 2017) and apply an original methodology based on SNA techniques to identify and deal with common manager biases in stakeholder management practices. Specifically, the research aim is to contribute to the development of stakeholder management theory in megaprojects using a twofold approach: (1) a focus on investigating managers' awareness of their stakeholders' network and the networks-of-networks (Millar & Choi, 2009) that represent the external ecosystem of megaprojects, and (2) a secondary focus on the critical role played by the process of prioritizing stakeholders and stakeholders' concerns. Specifically, it is worth investigating when prioritization occurs, whether a mainstream dimension of stakeholder salience still exists, or whether managers have already adopted a relational perspective of stakeholder theory that challenges the salience of interests, preferring the care and nature of relationships. By focusing on the analysis of the stakeholders' network in a case study of a 30-year-long contested binational megaproject for a high-speed rail (HSR) infrastructure (that includes a tunnel of more than 50 km in the Alps between Italy and France), the paper discusses, first, specific findings related to the case study and, second, generalizes the developed approach for future similar case studies.

The paper applies a mixed QUAL-QUAN method of subsequential and unplanned design steps (Schoonenboom & Johnson, 2017). QUAL and QUAN respectively refer to qualitative and quantitative methods, according to the notation proposed by Schoonenboom and Johnson (2017) for mixed methods. First, through semi-structured interviews and focus groups with site, middle, and top managers of the company who act as the project's public promoter and, then, through a few centrality degrees and an SNA (Brin & Page, 1998; Freeman, 1977; Kleinberg, 1999; Segarra & Ribeiro, 2014), some discrepancies between what the literature suggests in terms of MSR (Lin et al., 2017; Ma et al., 2017; Zeng et al., 2015) and the management of the stakeholders' network were discovered. This work represents one of the first attempts to empirically apply SNA in a concrete case, answering to Rowley (2017) in terms of enhancing the scientific knowledge and evidence of the suitability of the method for stakeholder theory research advancements further advocated by Mok et al. (2015).

In brief, what emerges from our study is that the well-known salience model (Mitchell et al., 1997) and current practices for stakeholder management based on surveys and interviews are completely inadequate to represent a holistic and dynamic point of view at the ecosystem level, especially in terms of stakeholder prioritization. By adopting the perspective given by Donaldson and Preston (1995) concerning stakeholder theory, our case study reveals that although managers from a normative (What should happen?) point of view are aware of the different stakeholders' interests, at an instrumental level (What would happen if?), their practices and actions are not completely aligned with their beliefs. In this context, our methodology may represent the missing link between a purely descriptive (What does happen?) and a purely normative (What should happen?) approach.

The rest of the paper is structured as follows. Section 2 presents a summary of the evolution of the relational stakeholder perspective

in business ethics, focusing on the limitations of the salience model in a long-term, dynamic, and complex institutional context such as the case of a contested megaproject characterized by strong moments of tension alternating with moments of apparent calm and acceptance. In the same section, a brief excursus on the evolution of stakeholder mapping in project management literature is also presented. Section 3 introduces the research design applied to the case of the Turin–Lyon HSR megaproject and the mixed methods used to analyze the relevant stakeholders with an ecosystem approach based on SNA. Finally, Sections 4–6 detail the main findings obtained through the SNA and the consequent implications for managing stakeholder relations and conclude by highlighting several theoretical implications for a more sustainable governance of megaprojects.

2 | LITERATURE REVIEW

According to stakeholder theory, a stakeholder is any individual or group of individuals who can influence or be influenced by the operations of a company (Freeman, 1984; Freeman & McVea, 2001); however, in project management literature, stakeholders have been traditionally defined according to their connection to the project. This logic has progressively restricted the stakeholders' identification to a much narrower focus, including mainly primary stakeholders such as project managers, contractors, subcontractors, investors, policy-makers, and local governance (Karlsen, 2002; Mahmoudi et al., 2021). In this paper, two existing theoretical frameworks are used, not in juxtaposition, but in a complementary way. On the one hand, we take the view of business ethics scholars, who address, more specifically, the evolution of stakeholder theory from a transactional to a relational perspective in managing stakeholders' relationships. On the other hand, we consider the evolution of project management literature regarding the growing importance of adopting a relational and ecosystem view of a megaproject's stakeholders. With this in mind, it should be noted that the concept of stakeholder salience—the prioritization according to power, legitimacy, and urgency or, in the words of Mitchell et al. (1997, p. 854), “the degree to which managers give priority to competing stakeholder claims”—has become substantially ineffective, especially in highly contested projects with a high risk of marginalizing categories of stakeholders whose interests are very legitimate. Thus, the following brief exploratory literature review aims to discuss specifically two research gaps.

The first research gap could be described as a gap in perspective. According to Donaldson and Preston (1995), there is a substantial missing link in the scientific research between the descriptive, the normative, and the instrumental levels of megaprojects. A second type of gap could be described as a gap in implications, specifically the lack of a robust methodology to operationalize the viewpoint of relational stakeholder theory in the context of megaprojects (e.g., Rowley, 1997). Donaldson and Preston (1995) interpreted and explained the role of stakeholders in stakeholder theory as either descriptive, instrumental, or normative. It is descriptive because it helps to reveal specific features of a corporation in practice (i.e., a

constellation of cooperative and competitive interests). When it comes to having a descriptive intent, Donaldson and Preston (1995) arrive at the determination of the target stakeholder, identifying and describing the importance attributed by the company to the interest of an individual or an influential group. The instrumental perspective stresses the existing link with corporate performance goals that could be increased and realized through an instrumental use of stakeholders' needs. Lastly, with its normative intent, stakeholder theory interprets the “function of the corporation, including the identification of moral or philosophical guidelines” (Donaldson & Preston, 1995, p. 71). Specifically, according to the normative intent, one wonders how the company should behave in order to act pluralistically to safeguard the needs of its stakeholders in their entirety. This proposes specific challenges, both with regard to the alignment between the moral values of the company and those of the stakeholders and the legitimacy of the stakeholders' demands.

One of the main challenges that megaprojects pose in terms of managing stakeholder relations is that there is usually a network of actors responsible for implementation at different levels, representing a network of networks. For example, the moral actions of a construction team must be as such, not only toward the outside world but also toward internal partners. With this paper, the researchers present a case to empirically test the importance of visualizing and making sense of stakeholders' networks, and the need for developing an applied methodology to operationalize the management of stakeholders' concerns, starting from the process of mapping their bonds and bridges. The rationale of this paper is that the management of stakeholder interests is not always uniquely representable through the identification of actors with whom a role is uniquely associated (as implied by the concept of stakeholder salience). On the contrary, it is the quality and nature of relationships that can contribute to the effective management of stakeholder concerns. Having said that, without applying appropriate normative emphasis on identifying ethical and moral values and standards underlying a relationship, it is difficult to manage stakeholder relationships in a healthy way. In fact, the construction of megaprojects hinges on the very existence of stakeholder identity values with respect to the meaningfulness and legitimacy of the project itself (Donaldson & Preston, 1995). For example, the recognition of a stakeholder with respect to the importance of an infrastructure project (beyond their own functional connection to it) or, conversely, the need for a stakeholder to be included among the relevant actors living in an area are both examples of normative questions arising in megaprojects.

2.1 | Review of relational stakeholder theory and the stakeholder network

Recently, several authors have stressed the need for stakeholder theory to move away from a transactional approach based on issue-solving to a relational theoretical approach based on managing relationships (Vos & Achterkamp, 2015). This is because, over the years, the excessive emphasis on a transactional approach has led

practitioners to favor managerial tools aimed at prioritizing categories of stakeholders and their interests (Mitchell et al., 1997) rather than adopting inclusive and democratic approaches grounded on the ethic of care applied to relationships (Kujala, Lehtimäki, & Freeman, 2019). This has consequently resulted in some cases of excessive polarization of the interests of those stakeholders that have been marginalized due to favoring business decisions (Kujala & Korhonen, 2017). Recently, the same salience concept has been revised by its creators to include the need for a more pluralistic conception and a more multi-stakeholder-oriented value creation process, where stakeholders play an active role in co-creating value (Mitchell et al., 2016; Mitchell & Lee, 2019; Wood et al., 2021).

Considering the progressively increasing importance of sustainability science and the concept of socio-ecological services and ecosystems (Small et al., 2022), the clear identification and visualization of stakeholder networks presents a compelling case to seriously consider their role in the decision-making process, particularly for institutions aiming to create value for their stakeholders (Cottafava & Corazza, 2020). One of the key features of an ecosystem perspective is the acceptance of the presence (and inclusion) of stakeholders that are not contractually linked to the focal company. Thus, for example, company managers could become more aware of the need to identify indirect stakeholders, interrelations, and the presence of involuntary stakeholders (Byrson, 2004). As clarified by Wood et al. (2021, p. 230), “Now, with a vastly expanded scholarly emphasis on ethical conduct in business, we suggest that a natural extension of this focus would be to better understand and explain involuntary stakeholder relationships, whether primary or not.”

Among the most relevant scholarly contributions in terms of the identification of stakeholders relationships are Rowley (1997); Rowley and Moldoveanu (2003); Rowley (2017), Cots (2011), Steurer (2006), and the school of thought known as Business2Nature (Heikkinen et al., 2013; Kortetmäki et al., 2022; Kujala et al., 2012, 2018; Kujala, Heikkinen, et al., 2019). Rowley (1997) is among the first to advocate for a revision of the firm-centric model of the stakeholder identification process, substituting firm-centrism with networks of relations. Specifically, by applying this model, indirect stakeholders can be included and visualized using SNA techniques (Mok et al., 2015). In Rowley (2017), the notion of the ecosystem becomes even clearer as interactions at different geographical scales and over different time periods are included in the evolution of the existing model. This addition brings new insights to the managerial implications of mapping stakeholders in megaprojects where construction sites can last for decades because managers of multi-year megaprojects should envision current, future, and potential stakeholders at site, local, national, and supranational scales. For this reason, the “names-and-faces” approach (McVea & Freeman, 2005) assumes here a strategic relevance for a project's success. According to McVea and Freeman (2005), a names-and-faces approach to stakeholder management has three main focuses—entrepreneurial value creation, strategic decision-making, and individual relationships—and should move from a generic classification of stakeholders (e.g., suppliers and customers) to specific stakeholders as much as possible, up to specifying the names and

faces of stakeholders and individualized relationships. Thus, such an approach should be replicated scale by scale and site by site, which may help demonstrate its effectiveness in bringing project managers closer to local communities and opponents over time. This could contribute to diminishing the risk of overestimating that a particular disagreement has faded, precisely because managers should, in turn, have a greater awareness of who they are dealing with, especially when relationships are highly adversarial (Leung et al., 2005).

The work of Cots (2011) discusses and elaborates a new normative stakeholder relationships model, grounding the discourse on social capital. This study presents four perspectives: the structural perspective, centered on the intensity of the firm–stakeholder relationship; the relational perspective, which concerns trust and norms of reciprocity; the cognitive perspective, which implies the identification of a meta-purpose upon which dialogue is constructed; and, finally, the evaluative perspective, which is linked to the orientation of stakeholders' social capital to a greater common good. Although the study sheds light on the different types of normative application of stakeholder relationality and benefits, it lacks a deep discussion on how conflicts can be resolved, especially once relationships are irreconcilably polarized among opponents and proponents (as these are the typical contextual situations of megaprojects when stakeholders are not involved at an early stage; Olander, 2007). Nevertheless, Cots (2011) provides interesting insights into how crucial it is for managers to create awareness of the existence and composition of stakeholder networks, and to develop metacognitive skills to understand how to interact with these networks, hence taking a step forward from a dyadic view of the relationships between the organization and its stakeholders.

A third relevant contribution of stakeholder theory is given by Steurer (2006), who proposed a general framework to highlight the various approaches among different stakeholder analyses. Based on a three-level perspective—corporate, stakeholder, and conceptual—and the second-order theory classification of Donaldson and Preston (1995)—normative, instrumental, and descriptive—the framework allows the movement from firm-centric descriptive analyses to normative and conceptual ones. The descriptive aspect aims at describing “What does happen?” while the instrumental aspect answers the question “What would happen if?,” and the normative one refers to “What should happen?” In this sense, the three aspects, from descriptive to normative, move the analysis from a pure static representation of stakeholders' networks to an ethical and moral analysis of the quality and the care of the relationships. On the other side, the three perspectives (firm-centered, stakeholder-centered, and conceptual) focus, respectively, on how an organization affects its stakeholders, how stakeholders impact the organization, and how specific concepts such as sustainable development, biodiversity conservation, climate change, or the common good interrelate and influence the relationships between an organization and its stakeholders (Steurer, 2006). In this sense, moving from a corporate-centric and descriptive analysis to a conceptual and normative one is crucial for long-term, sustainable strategies. Such reasoning and stakeholder perspectives (i.e., the conceptual and normative ones) are particularly crucial for megaproject planning and management, and they may enable democratic dialogues, especially with secondary stakeholders

such as environmental NGOs that typically act as guardians and watchdogs for the preservation of the environment (Atkins et al., 2021).

In this sense, the Finnish school of thought, known as Business2-Nature, moves one step forward. Indeed, it focuses precisely on the understanding of the deepest relations within socio-ecological ecosystems, where nature is seen from a holistic and ecosystem point of view. According to this approach, strategic management and stakeholder analysis need to consider not only traditional stakeholders but also nature herself and the relations between the natural and built environments and the stakeholders, with a dynamic and multilevel approach (Heikkinen et al., 2013; Kortetmäki et al., 2022; Kujala et al., 2012, 2018; Kujala, Heikkinen, et al., 2019). Thus, as each territory has a precise identity, and societies and economies are grounded on place-based ecosystem services, elements such as water resources, land use, the quality of the environment, and the preservation of biodiversity should be part of a stakeholder analysis (Heikkinen et al., 2019). When it comes to developing a megaproject, especially those in which construction work could last decades, planners and managers must acquire an awareness of the ecosystem functioning of the territories and populations involved. Such reasoning must not be limited to a socio-demographic analysis but should consider nature as a pivotal element in the relationships between local stakeholders and nature herself (with the latter being a potential actor). This is even more fundamental in the case of greenfield megaprojects, where the environment, understood in an ecological sense, is very likely to suffer an irreversible impact that must be compensated for. In such cases, there is no unique answer or strategy. For instance, the Environmental Impact Assessment Directive of the European Parliament (European Parliament and the Council, 2011) includes a mandatory evaluation *ex ante* of alternatives. This implies that irreversible damage, theoretically, could and should be avoided. However, whenever this is not possible, according to Enetjärn et al. (2015, p. 107), “Finding the right balance between avoiding, minimizing and compensating is an important aspect of the cost-effectiveness of environmental protection.” Thus, before compensating environmental impacts, the priority should be to avoid and minimize negative consequences. Finally, in case of irreversible damage (e.g., the destruction of a specific habitat), identical resources (e.g., same habitat but in a different location) should be identified for a compensation scheme (thus, not only considered in monetary terms; Enetjärn et al., 2015). Similarly, the Organization for Economic Co-operation and Development (OECD, 2017b) established a mitigation hierarchy, from avoiding and minimizing strategies, to restoration and rehabilitation, and up to biodiversity offset (where biodiversity loss at the project site is unavoidable). However, how to compensate for biodiversity loss or species extinction remains an open question worldwide (Choi et al., 2012).

2.2 | Managing stakeholder issues in Project Management

In the context of project and megaproject management, the definition of project stakeholders, as opposed to business stakeholders, is

generally adopted (Aaltonen et al., 2008). In one of the first works regarding the importance of stakeholder involvement in projects and megaprojects, Karlsen (2002) adopts a very pragmatic and instrumental vision oriented toward stakeholder management in the strict sense, making classifications to prioritize, exclude, and prevent the onset of uncertainties and problems to be solved. Newcombe (2003) broadened the perspective of stakeholder inclusion from being focal-oriented to client-oriented, embracing a pluralistic view. This paper presents two models for mapping and classifying stakeholders: the power/predictability matrix and the power/interest matrix, which are adapted from Eden and Ackermann (1998). As a result, two stakeholder management principles are presented. The first stresses the importance of considering the benefit of all stakeholders while managing long-term projects, while the second refers to the role of project managers, who serve an intermediate function between stakeholders and the project (intended as an abstract entity).

In the following decades, academics analyzed in detail the fundamental phases (i.e., identification, mapping, classification, and prioritization) and the corresponding issues of the stakeholder engagement process in order to face the main challenges for strategic management and to tease out the added value for companies (Aaltonen et al., 2008). Unfortunately, it is only in recent years that scholars have started questioning the linearity of the process, highlighting the importance of considering dynamism as part of the equation. For instance, Park et al. (2017) use clear examples of long-term complex mega construction projects to stress how project managers should consider reiterating stakeholder identification and prioritization processes over the entire duration of the project due to the endemic and natural changes that occur over time. In Yang (2014), both phases of identification and prioritization are explored using an SNA and the stakeholder circle methodology. The author clarifies that applying an SNA could be useful for cases where it is important to build an aprioristic knowledge of the stakeholder network and where it is essential to determine the existence of mechanisms of reciprocal liaisons between stakeholders. In the vast work of Mok et al. (2015), the authors affirm that the analysis of stakeholder relationships through visual identification is essential to explain how value is created in stakeholder relationships (Myllykangas et al., 2010). Indeed, according to Davis et al. (2010), the context directly affects how different stakeholders may interact with the project, and traditional models cannot take into account the different levels where stakeholders act (e.g., institutional, media, opinion, cultural, and political) and the importance of the internal dimension. Internal stakeholders are all the actors directly involved in the achievement of a project's goals, and it is fundamental to identify those playing a crucial and pivotal role. On the other hand, external stakeholders are all those actors without a direct or official contract who can still affect the project itself (Beringer et al., 2013). In particular, according to Aaltonen (2011), Olander (2007), and Rowlinson and Cheung (2008), although engaging secondary stakeholders at the very beginning of a project to empower them and involve them in a pluralistic dialogue is necessary, stakeholders are generally involved and considered only when all the crucial decisions have already been taken. This aspect, typically,

generates controversial and, occasionally, violent reactions and manifestations (Nederhand & Klijn, 2019; Schormair & Gilbert, 2021). To understand the dynamics of stakeholder relationships in a highly contested situation, managers should spend more effort and resources to grasp the ecosystems of stakeholders and the interactions happening among individuals in their social networks (Pizzi et al., 2021; Rowlinson & Cheung, 2008).

Two specific streams were identified in this literature review: the first comes from business ethics studies on the evolution of stakeholder theory toward a relational approach, and the second is derived from the project management literature. It was demonstrated that organizations should adopt an ecosystem view of their stakeholder relationships and that SNA is seen as a methodological tool that validates these reflections through its practical application. The next section will outline the methodology and introduce the specific case under study.

3 | METHODOLOGY

3.1 | Research design

Although several authors support the relational view of stakeholder theory, empirical studies demonstrating its applicability are still scarce. To this end, the deployment of SNA tools can be useful in providing a visual representation of stakeholder ties and relationships (Rowley, 2017). In this paper, the authors propose the application of SNA to the case of the Turin–Lyon HSR megaproject in the Susa Valley in Italy, which has been highly contested by opponents for more than 30 years. Nowadays, the project is still debated by French and Italian politicians, despite being considered one of the key European (funded) projects for enabling the European network for sustainable mobility infrastructures.

The study follows a multi-step structure classifiable as mixed methods (Johnson & Onwuegbuzie, 2004). As explained in Johnson et al. (2007, p.129), mixed research methods “should be used when the nexus of contingencies in a situation, in relation to one's research question(s), suggests that mixed methods research is likely to provide superior research findings and outcomes.” In this study, we use two research techniques representing a mixed method, where the QUAL and the QUAN components are triangulated (Johnson et al., 2007; the QUAL–QUAN notation is derived from Schoonenboom & Johnson, 2017). This research design aims to understand (1) whether the managers of the megaproject are aware of their stakeholders' network and networks-of-networks, which requires understanding the level of complexity, if any, in the stakeholder mapping phase and having a consequent level of awareness of the external ecosystem, and (2) if and how a prioritization of stakeholders occurs, whether a main-stream dimension of stakeholder salience still exists, or whether managers have already adopted the mindset of a relational perspective. To do so, we developed an original approach by applying an SNA to identify and graphically represent stakeholders' interconnections as an ecosystem of actors around the Turin–Lyon case. Figure 1 shows a

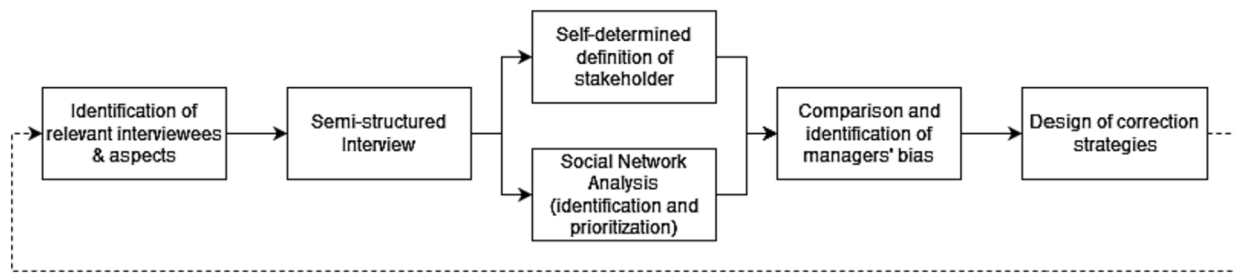


FIGURE 1 Overview of the developed methodology. The self-determined definition of stakeholders (i.e., the definition given by the managers during the interviews) is then compared with the emergent prioritization from the social network analysis (SNA).

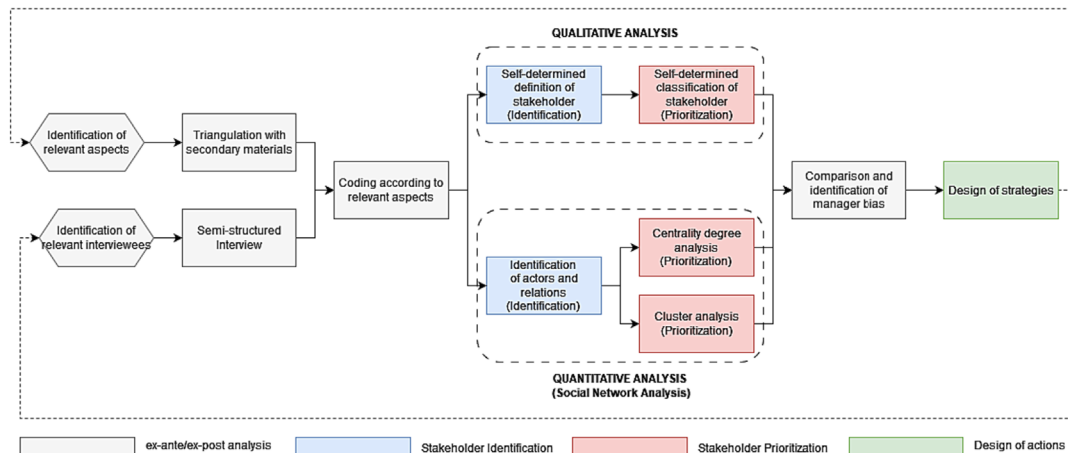


FIGURE 2 Details of the developed methodology. The two main blocks, qualitative and quantitative, are underlined.

simplified overview of the entire process, from the ex ante data analysis and collection to the ex post analysis of the managers' perceptions, passing through the quantitative (SNA) and qualitative (coding of the semi-structured interviews) modules. The detailed methodology is shown in Figure 2, which highlights the intermediate steps necessary to identify and prioritize stakeholders within both the qualitative and quantitative analyses.

According to Schoonenboom and Johnson (2017), the purpose of applying a mixed-method approach is justified by the context and uniqueness of the phenomenon considered (in this case a highly contested binational megaproject). Indeed, this study aims to discover the existence of paradoxes, contradictions, and biases in managers' perceptions and definitions of stakeholders, as well as in their (potential) prioritizations. In other words, by comparing the definitions given during the interviews and the subsequent classifications from the SNA, the study seeks to analyze the complexity of the stakeholders' relationships according to the managers' visions and actions. For this purpose, face-to-face interviews are the starting point to identify and prioritize the stakeholders of a construction project (Aaltonen, 2011).

The first step of the analysis involved 21 semi-structured interviews (Barriball & While, 1994) and a focus group (Krueger, 2014). The interviews were analyzed through a coding protocol that is discussed later in this section. The focus group was run as a collective interview, and the data analysis followed the same logic. A day-long

field visit to the Italian construction site was also included, which required researchers to receive special clearance as access to the area is forbidden to the public, with the site under 24/7 surveillance by military forces to prevent raids, boycotts, vandalism, and violence against staff by antagonistic groups. During the field trip, representatives of the research group had the chance to conduct additional informal interviews with onsite personnel, which were functional in further interpreting the general framework but have not been used as a data source for this study. The use of different QUAL methods was motivated by the need to understand the phenomenon from different perspectives and to determine interactions between interviewees.

The QUAL data were used for clarification purposes, and, following the analysis of the interviews, a subsequent and unplanned second phase of the study was designed. The second phase was grounded on the results derived from the identification of relevant stakeholders and their relationships with the respondents. Invoking Rowley (1997, 2017), we reconstructed the ecosystem of relations (i.e., the network of stakeholders) and the quantitative analysis in terms of centrality degrees to apply and test the type of prioritization technique used for managing stakeholders' concerns. The mixed method approach has been exploratory and sequential (i.e., first qualitative and consequently quantitative), with transformative potential, as the test of already existing theory (i.e., the methods for stakeholder mapping and stakeholder salience) revealed the need to adopt a new method to represent

stakeholder networks. The expansion of the QUAL results with the SNA is justified by the research questions, which, according to Schoonenboom and Johnson (2017), are interrelated and, as in this case, can sometimes evolve during the first phase of the study. With this purpose and through the application of an SNA, this study contributes to advancing practical knowledge of how stakeholders' management happens in a complex and highly contested setting (Brad et al., 2023).

3.2 | Qualitative analysis

As Figure 2 shows, the first step (i.e., the ex ante analysis) involved analyzing the literature (both gray and scientific) and any relevant websites and reports to identify relevant aspects of the case study (see the next subsection for a brief discussion of the case study) as well as identifying the relevant interviewees. The interviewees were chosen by consulting the internal hierarchical and horizontal structures of the company in charge of the megaproject to comprehensively represent the internal points of view. Following the principle of learning a phenomenon from different perspectives (Schoonenboom & Johnson, 2017), the respondents were selected from throughout the hierarchical structure and included nine directors (DIR category) at both the institutional and functional levels, two coordinators/project managers (COO category), eight middle managers and operational construction site supervisors (LOT category), and three senior managers (SEN category). Almost all interviews (21 out of 22) were recorded and transcribed verbatim, while for one respondent, detailed notes were taken during the interview (due to the respondent's choice of privacy). In terms of gender distribution, 27% of the respondents were women, while in terms of roles, 40.9% represented different directorates, 9.1% were coordinators, and the remaining 36.4% and 13.6% were site and middle managers, respectively. Table A1 lists the roles of all respondents.

Consequently, in July 2020, the initial focus group was held with the researchers, while the 22 semi-structured interviews were conducted from November 2020 to March 2021. According to Adams (2015), semi-structured interviews are privileged for the understanding of complex phenomena (such as a contested binational megaproject) as they allow researchers to thoroughly explore multiple aspects of respondents' opinions and avoid unanswered questions in comparison to surveys or questionnaires. Indeed, with this technique, various aspects related to the identification, prioritization, and management of stakeholder issues have been deeply discussed without losing the personal narratives of the participants. The interviews ranged from 60 to 100 min and were conducted through the Webex platform both in Italian and French (both parties were helped by a professional translator when needed). The WebEx meetings were recorded after consent was given by interviewees and then transcribed verbatim, or notes were taken if consent was denied.

The interviews followed a general structure in order to obtain and code information about (i) the recognition of a self-determined definition of stakeholder, (ii) prioritization and contextualization, (iii) the stakeholder-oriented organizational culture, and (iv) the influence of the binational context in describing the complexity of stakeholder mapping.

Examples of the questions and a link to the literature review are provided in Table 1. The coding phase was conducted manually. First, the qualitative stage of the research followed both a deductive and inductive approach. The deductive approach lies in the construction of the common questions for the semi-structured interviews. The inductive approach arises from our goal to go beyond mere theory testing (Deterding & Waters, 2021) to understand if other approaches to stakeholders (definition, mapping, prioritization) than those analyzed in the academic literature exist in practice. Arguably, the categories we created and to which we attached meanings (Basit, 2003) are useful both in organizing the data and, at the same time, as an outcome of the analysis (Tesch, 1990). To increase reliability and validity, all researchers conducted parallel rounds of coding, with peer-checking at the end. As Miles and Huberman (1994) argue, in qualitative research, researchers both collect and analyze data, with potential biases arising; hence, we conducted a member-checking activity—the co-validation of transcripts and notes together with the respondents (Carlson, 2010; Doyle, 2007). In this step, we first returned the interview transcripts and notes to participants to check for potential inconsistencies. Then, the coding was performed by applying a model previously tested by Norese and Salassa (2014) through which researchers break down the complexity of a topic, identifying patterns of cause-effect relationships in the transcription of the interview. Using this coding, the researchers drafted mind-map representations of the contents of the interviews, highlighting aspects of continuity, inconsistency, lack of coherence, and potential opposition. This activity helped revise the interview transcripts and create a whole network of knowledge between the different interviewees.

Finally, a participant observation (Musante & DeWalt, 2010) in the form of an onsite visit to one of the (most contested) construction sites and an analysis of secondary materials (internal documents and reports) were triangulated with the information collected in the interviews as shown in the last step of the ex ante analysis in Figure 2. Triangulating multiple, although secondary, sources is in line with the procedure presented in Schoonenboom and Johnson (2017). Starting from the interviews, then, the managers' point of view regarding the identification and prioritization of stakeholders was elucidated. We defined this perspective as the *self-determined definition* in opposition to the emergent definition obtained from the quantitative analysis (see the blue and red boxes in the top block of Figure 2).

3.3 | Quantitative analysis

3.3.1 | Stakeholder identification

Following the first phase, the information obtained through the focus group and the interviews was used to build the network of stakeholders, starting from a snowball sampling (Conde et al., 2005) centered on the respondents (see the blue box in the bottom block of Figure 2), which is similar to the methodology described in Cottafava and Corazza (2020). In other words, each node of the network refers to a relevant actor identified by the respondents, while the links, namely the relations among respondents and stakeholders, were

TABLE 1 Example of questions during the interviews and their coding.

Background	Reference to literature	Questions
Recognition of a self-determined definition	Freeman (1984); Aaltonen et al. (2008)	(1) What is a stakeholder for you? (2) How would you define a stakeholder?
Identification to apply a prioritization	Byrson (2004); Wood et al. (2021); Rowley (1997); Rowley and Moldoveanu (2003); Rowley (2017); Kujala and Korhonen (2017); Kujala et al. (2012); Heikkinen et al. (2013); Kujala et al. (2016)	(1) What criteria do you apply for assessing relationships with certain categories/sets of stakeholders? (2) For instance, do you adopt a more relational or transactional approach? (3) What role do stakeholders play in your specific function? (4) Which stakeholders do you most often relate to?
Prioritization and contextualization	Mitchell et al. (1997); Park et al. (2017)	(1) In evaluating stakeholders' relationships, does a prioritization occur? To better explain it, the academic literature on stakeholders lists some potential, non-exhaustive prioritization criteria, such as (a) strategic importance in the short and long term; (b) frequency of contact; (c) importance of demands; (d) urgency of demands, in terms of pressure and influence; (e) specificity for the function/activity of the respondent.
Stakeholder-oriented organizational culture	Cots (2011)	(1) In your current job or, more generally, in your career, have you ever participated in a stakeholder mapping/prioritization exercise? (2) If so, what criteria were used for this?
Binationality	There is little work that has directly addressed the implications of binational projects for addressing stakeholder concerns	(1) Do you think that homogeneous categories of stakeholders can be identified between Italy and France? (2) If so, what are they? (3) What relationships does the Italian section of TELT have with French stakeholders and vice versa? (4) Is there a direct participation with stakeholders of the other country? (5) What are the relationships among working sites of the same country (ITA-ITA and FRA-FRA) and among the two countries (ITA-FRA)?

attributed when any type of relation was described between two nodes during the interviews. Thus, the individual snowball networks obtained by each interview were merged into a unique network by homogenizing stakeholder names and categories. We define this participatory network-building method as a bottom-up mapping process. The term bottom-up explicitly refers to the engagement of primary or secondary internal or external stakeholders during the stakeholder identification and mapping process. Finally, two representative labels were assigned to each node to differentiate its function and role, according to Table 2. It should be noted that the data depict the system of actors as described by the interviewees; consequently, it is not to be considered an exhaustive and bias-free reconstruction of the ecosystem of stakeholders related to the megaproject. Rather, it reflects the natural dimension for managers and directors to represent their privileged interlocutors.

3.3.2 | Stakeholder prioritization

Once obtained, the full network of stakeholders was analyzed using the software Gephi (version 0.9.2), elaborating four centrality degree

TABLE 2 Labels assigned to each node of the network.

Type	Label
Function	Associations (ASSO), communication (COM), local community (CIT), business (SOC), politician (SIND, NO/SI TAV), public institutions (IST), trade unions (SIND), megaproject constructor (TELT)
Role	Institutions, civil society, business partners

indicators (see the red box in the bottom block of Figure 2): (1) the authority (Kleinberg, 1999); (2) the PageRank (Brin & Page, 1998); (3) the eigenvector (Segarra & Ribeiro, 2014); and (4) the betweenness (Brandes, 2001; Freeman, 1977). The first three—authority, PageRank, and eigenvector—assess, albeit with different methodologies, the importance of the actors/nodes with respect to their neighbors. In particular, these centralities are affected by the importance/centrality of the node neighbors (Segarra & Ribeiro, 2014), and they are useful to recognize community structures (Newman, 2006). The other indicator, authority, refers to the Hyperlink-Induced Topic Search (HITS) algorithm, where nodes are classified as hubs (nodes with many outbound links) or authorities (nodes with many inbound links), and their

centrality is calculated recursively; in other words, an authority node is more central if it has many inbound links from very central hubs and vice versa (Kleinberg, 1999). Similarly, the PageRank algorithm (developed by Larry Page, founder of Google) assigns a centrality to every node depending on the number of inbound links and the centrality of the nodes from where such links start (Brin & Page, 1998). Finally, the eigenvector centrality also scores nodes connected to many nodes with high scores, but it starts from the solution of the eigenvector equation (Segarra & Ribeiro, 2014). Since SNA results are typically highly dependent on initial conditions, assumptions, and algorithm parameters, we adopted multiple algorithms to cross-validate the prioritization from the SNA. The betweenness, on the other hand, calculates the probability that, given any two actors/nodes in the network, the shortest path connecting them passes exactly through the node being considered. In other words, it represents the capacity of a node/actor, in a certain sense, to serve as a bridge to connect different actors.

Additionally, bottom-up clusters have been highlighted thanks to the modularity algorithm (Blondel et al., 2008), with a resolution of 1.0 (Lambiotte et al., 2014), in order to point out the densest groups of collaborations and to better classify the stakeholders, thereby avoiding researchers' interpretation bias. With bottom-up clusters, here we refer to the groups obtained through the use of a cauterization algorithm over a network. Indeed, modularity represents a measure of the structure of the network used to classify nodes according to their density of connections. In other words, modularity splits an entire network into small subsets and clusters made of highly interconnected nodes (the nodes belonging to the same cluster) and a low link density with nodes outside the same cluster.

Finally, the results from both the qualitative and the quantitative analysis were compared to identify potential discrepancies between the managers' perspectives (as declared from the theoretical definitions given during the interviews) and what emerged from the centrality degrees and the SNA (see the gray box in Figure 2). Such a comparison aims to highlight differences between the theoretical definition and the real practices and actions of managers (e.g., what are the most central and relevant stakeholders with whom they are collaborating?).

3.4 | The Turin–Lyon high speed rail case study

3.4.1 | Historical roots

Talks around the construction of a new HSR line to connect Italy and France, from Turin to Lyon, started at the beginning of the '90s in Italy. As Manfredi et al. (2015) report, some of the most prominent entrepreneurial and political figures of the Italian region of Piedmont got together, forming the Comitato Promotore per l'Alta Velocità (Highspeed Rail Promotion Committee), to act as promoters of the megaproject. Soon, the committee acquired the interest of the Italian government and, consequently, of the state-owned company that manages the infrastructure and services of the Italian rail network, Ferrovie dello Stato Italiane (Italian State Railways). The rationale for the new HSR line was based on the purported benefits of lower

carbon dioxide emissions (as opposed to, for instance, the use of air travel), the creation of new jobs and economic growth, the reduction of traffic congestion, and time-saving (Marincioni & Appiotti, 2009). The proposed line would be a key element in the Trans-European Transport Network, sitting at the center of the Mediterranean corridor, with a 270 km-long railway line featuring a 65-km cross-section that includes the longest tunnel in the world at 57.5 km (of which 12.5 km was in Italy and 45 km in France).

3.4.2 | The birth of the No TAV movement

If, on the one hand, the proposal sparked enthusiasm among some parties, on the other hand, it was met with suspicion, dissent, and doubt, especially on the part of local institutions and communities of the Susa Valley, which debated against the actual need and utility of the proposed line. Marincioni and Appiotti (2009) argue that behind such dissent there were concerns of a different nature, especially environmental, social, economic, and political. From an environmental point of view, critics warned that the excavation of the mountains surrounding the Susa Valley would release asbestos and uranium (Fornero et al., 2005) and complained that construction works would increase noise and pollution in the valley. On top of these matters, several actors emphasized the impacts on the everyday life of the valley as a result of having construction sites in the area for over a decade. The project was also severely criticized for its cost and lack of real benefits in terms of traffic flows between Turin and Lyon (Armano et al., 2013; Tartaglia, 2012), which were deemed as already declining. Finally, from a political point of view, local communities and institutions felt excluded by the Italian government in the consultations and planning phases, exacerbating their impotency and marginality as stakeholders (Marincioni & Appiotti, 2009). As Leonardi (2013) argues, the matter very soon became as much an environmental battle as a cultural symbol of opposition to globalization. By mobilizing Agamben's (2007) notion of profanation, Leonardi (2013) maintains that the duly coined No TAV movement not only aims at subverting the status quo but also prefigures new (albeit embryonic) alternative spaces for self-governance (Fournier, 2013). The No TAV movement was born as a very heterogeneous body, including people from very different backgrounds such as local institutions, ordinary citizens, intellectuals, and technical experts, but it also included more radical and violent groups.

3.4.3 | Development and resistance

In 1994, Italy and France came together to set up Alpetunnel, a company responsible for conducting feasibility studies, but it was only at the beginning of the new millennium that the project really gained traction and momentum. In 2001, the first agreement between the Italian and French governments was signed, which led to the establishment of Lyon-Turin Ferroviaria (LTF), a binational company born out of an equal partnership between Rete Ferroviaria Italiana and Réseau Ferré de France. In 2002, the first excavations were carried

out in France, while at the same time, LTF was conducting compulsory expropriations in Italy. Resistance in Italy heightened considerably after LTF published its projects illustrating the plans for an exploratory tunnel in the town of Venaus, which caused concern about the high concentration of asbestos in the surrounding rocky sediments. Several acts of resistance were conducted by the No TAV movement in the winter of 2005, in a conflict that quickly escalated and led to the militarization of the valley in defense of the construction sites. Particularly relevant was the march of December 8th, when 30,000 people occupied and reconquered the sites, transforming them not only into garrisons to organize resistance, but also as spaces for social solidarity and community (Fournier, 2013; Leonardi, 2013). The protest convinced the Italian government to abandon its plans for Venaus and rethink its strategy.

One of the first responses to this crisis was the establishment of the Italian Technical Observatory in 2006 by the Italian Government, a body that includes different stakeholders, with the goal of facilitating inter-stakeholder dialogue on environmental, social, and economic issues. At the head of the Observatory was nominated Mario Virano, who would eventually become the general director of Tunnel Europin Lyon Turin (TELT). According to Foietta and Costantino (2020), the current special commissioner of the Observatory admitted that mistakes by the project's proponents were made in the past, especially in terms of communication and openness to those parties that felt underrepresented or neglected (Bauman, 2000). In its first year of activity, the Observatory conducted over 300 audits. However, proposals were still met with resistance, and time was running out as the proponents only had until June 2007 to come up with a final project before the EU funding would have been lost (Manfredi et al., 2015). Relationships with local municipalities and the Observatory got tense once again when it became known that the funding requests to the EU contained a new proposed route that had not been jointly examined and evaluated (Debernardi & Grimaldi, 2012). However, the green light from the EU came at the end of 2007 with the funding approval, effectively making way for a new phase of the project.

3.4.4 | Between stalemate and progress

Ariemma and Burnside-Lawry (2016) argue that the Observatory, as evidenced by a multi-stakeholder discussion forum on the project's feasibility, became focused instead on megaproject governance, causing dissent among opposition mayors. Protests toward the new project continued, and drilling only began at the end of 2009, while it was announced that a new construction site would be set up in Chiomonte by the end of the following year. As a consequence of strong pressure from the EU and threats of funding withdrawal, the definitive project for the exploratory tunnel, La Maddalena (in the town of Chiomonte), was approved. The opening of the construction site in 2011 caused another vehement protest in which the opposition occupied the area, setting up the "Free Republic of the Maddalena" (Ariemma & Burnside-Lawry, 2016). After prolonged fights with the military and the police, the protesters were forced to vacate. The site was

then militarized and put under 24/7 surveillance (Burnside-Lawry & Ariemma, 2015) and remains so to this day.

3.4.5 | The current situation

In 2012, the Italian and French governments signed a new agreement, defining the new functions and structure of the public promoter, procurement arrangements, cost distribution, and compensating measures. TELT was instituted in 2015 as a replacement for LTF, with the main goal of realizing the tunnel. By 2017, the project on the Italian side was finally defined: the construction site for the excavation tunnel would remain in Chiomonte. However, in 2018, the new leadership in the Italian government paused the project again to allow for a new cost-benefit analysis, this time held by external parties. Despite negative financial evaluations (even with an increase in EU funding for the project), the government gave the green light. At the end of 2019, TELT approved the delivery of the specifications to the companies for the work on the French side and for the creation of interchange niches in the geognostic and exploratory tunnel of Chiomonte (Wijck, 2020). Despite a period of relative peace, the valley was once more the nexus of turmoil when representatives of the No TAV movement and the police clashed in April 2021, in the little town of San Didero, following the occupation of the area of the new interport, which was to substitute the one located 20 km away, in Susa.

4 | FINDINGS

4.1 | Qualitative analysis

4.1.1 | Self-determined definition of stakeholder

Some fundamental elements emerged from the interviews in terms of the definition of stakeholder. In Table 3, a few noteworthy examples are reported by highlighting the relevant corresponding aspects. For instance, DIR1 considered the firm and megaproject stakeholders to be overlapping. Similarly, LOT3 identified the company and project stakeholders as the same:

For me, the company and the project are the same thing. In the sense that TELT is a company, a purpose company, it is not a development company, which has its own business, so TELT exists because the project exists, and the project goes on because TELT exists, so they are absolutely the same at this stage.

However, DIR2 and LOT1 focused instead on the positive and negative influence stakeholders may have on the firm and the megaproject (e.g., "There are stakeholders and disinterested stakeholders.")

A more institutional and traditional definition was reported by DIR3, DIR4, COO1, and LOT1, who stated, for instance, "Stakeholders are all those figures and institutions that have an interest in the

TABLE 3 Relevant aspects related to the self-determined stakeholder definition as emerged from the interviews.

Stakeholder criteria	Interviewees	Example
Project and company overlapping	DIR1, LOT3	Let us say that our company is a company that has only one activity, which is to build the Turin-Lyon line, so in reality the concept of project and company are quite similar
Positive/negative stakeholder	DIR2, LOT1	(1) There are stakeholders and disinterested stakeholders. (2) The power/influence of stakeholders could also be negative or positive.
Traditional definition	DIR3, DIR4, COO1, LOT1,	(1) Stakeholders are all those figures and institutions that have an interest in the project. (2) For me, stakeholder has a very broad sense, so in general all those who have any interest in society and in the project. (3) We can have stakeholders who have high interest and high power; vice versa, stakeholders who have low interest and low power
Broader definition	LOT5	... So clearly, the stakeholders are really everyone: All the citizens, in my opinion, Europeans and perhaps also, broadening out, those who could potentially one day use the line ...
Narrow definition	LOT6, LOT7	(1) Here we, in my opinion, in TELT, maybe we are the real stakeholders, because if the interest is to realize the tunnel, the works, we are the ones who are called to do this thing here. I have the support of the other directorates. For me the stakeholder, in this context is the one who works to ensure the realization of the works (2) Perhaps in French we speak more of <i>décisionnaire</i> , which is the one who makes the decisions, but perhaps it is different from the word stakeholder, which seems to me less hierarchical.

project” and, “For me, stakeholder has a very broad sense, so, in general, all those who have any interest in society and in the project.” An interesting definition was given by COO1, who emphasized the local community: “We have a lot of people interested in the project: we have the communities; we obviously have all the territories involved in a much wider way.”

LOT5, instead, had a very broad concept of stakeholders, including all of Italian society and European society as a whole since the megaproject relies on public funding. Indeed, he stated, “They have

the right to know how money is used; they have the right to know if it is useful or not. So clearly the stakeholders are really all: all the citizens, in my opinion, European citizens.” He also added future stakeholders, including

those who could potentially use the line in the future. So there are potential stakeholders, such as all those who pay taxes in Europe, for example, and then there are all those who will travel, because it has to satisfy a need, because if something does not satisfy any need, then there is naturally a problem.

On the contrary, LOT6 and LOT7 gave very narrow definitions, recognizing as stakeholders only the internal components in charge of the project. For instance, LOT6 stated,

Here we, in my opinion, in TELT, maybe we are the real stakeholders because if the interest is to make the tunnel, the works, we are the figures who are called to do this thing here. I have the support of the other directorates. For me, the stakeholder, in this context is the one who works to ensure the realization of the works.

Three main aspects and classifications emerged from the qualitative analysis: (1) an overlapping of (mega)project and firm stakeholders, (2) an emphasis on the role of stakeholders (i.e., positive and negative influence), and (3) differing visions in terms of the scope of stakeholders (i.e., traditional, broader, and narrower definitions). In particular, the broader and narrower definitions refer to respondents who recognized ordinary citizens as well as future generations as stakeholders (broad) versus the internal stakeholders (narrow).

In sum, some common features took shape. The first element is represented by the recognition of the distinction between the stakeholders of the company in charge of the construction and the stakeholders of the megaproject itself. This distinction is mainly noticeable among the interviewees who exercise institutional power as they consequently adopted a stakeholder management vision more connected to the megaproject as a whole, rather than to their role within the construction process only. A second consideration can be made in light of the clear distinction between those construction site managers who were already managing a site and who consequently had the stakeholders they interact with firmly in mind (thus making use of Freeman's names-and-faces approach) and those who had not yet managed a site, who instead made an almost entirely theoretical rationalization of current and future stakeholders. A third consideration, almost entirely cultural and ontological, refers to the interviewees' understanding and use of the term “stakeholder.” We observed that Italian interviewees were familiar with the term and used it widely, attributing to it a quasi-homogeneous meaning, while almost all French interviewees used the term *partie prenante* instead, with some even completely unaware of the word “stakeholder” and only familiar with the French equivalent. At first, the lack of foreign words in the French language required some extra input on the researchers' side for a mutual understanding, but, in subsequent

interviews, the word stakeholder was directly substituted by its French equivalent for the sake of clarity.

4.1.2 | Prioritization

The traditional distinction between primary and secondary stakeholders was not appreciated by all respondents (see Table B1 for the detailed raw results from the interviews). Table 4 summarizes the main findings of this phase. In fact, many interviewees stated that all stakeholders are to be considered primary, particularly if the time frame is considered: stakeholders in different temporal moments may have different importance and priorities in relation to the work. Hence, not all interviewees saw prioritization as static, but rather as a dynamic concept. In this regard, some interviewees struggled to implement their own mapping due to poor envisioning skills and difficulties in prioritizing stakeholders on different time and geographical scales. For example, one interviewee stated that it is not possible to prioritize stakeholders as that power falls totally within the quality of relationships, and “therefore, there are only well-managed and poorly managed relationships.”

Furthermore, it emerged from the interviews that the prioritization criteria were not the same for all interviewees. In particular, some interviewees recognized the distinction adopted in the literature between primary and secondary stakeholders as correct; for others, there was no precise prioritization criterion while the rest used other criteria (e.g., short vs. long-term, internal vs. external, and well vs. poorly managed). Those who declared to privilege a perspective that focuses more on the quality of relationships than on prioritization or the frequency of the engagement were the apical directors of the organization and the ones involved in active construction sites, who, consequently, had a clear idea of the names and faces of their interlocutors (McVea & Freeman, 2005).

4.2 | Quantitative analysis

4.2.1 | Stakeholder identification

More than 95 groups of stakeholders and 360 relations were identified, representing very different categories from one another and

TABLE 4 Stakeholder prioritization self-declared classification.

Prioritization criteria	Interviewees
Primary/secondary	DIR1, DIR2, DIR4, DIR5, DIR9, COOR1, LOT1, LOT2, LOT3, LOT5, LOT6, LOT7
No prioritization	DIR3, DIR7, COOR2, LOT4
Other prioritization: Short/long-term	DIR8, DIR9
Other prioritization: Internal/external	LOT8
Well/bad-managed	DIR6

several levels: public actors (e.g., ministries, regional governments, and local mayors), third sector (e.g., associations and committees, and research centers), private companies (e.g., suppliers, contractors, and subcontractors), and other offices and management units within the company in charge of the megaproject. This mapping was performed by extrapolating the mentioned presence of an actor from the interview transcripts. No trace of a previous list was provided to the interviewees, so the knowledge and mapping took place in a completely inductive manner, similar to Cottafava and Corazza (2020). The full list of the identified stakeholders is provided in Table C1, while the raw results from the interviews (not yet homogenized) can be consulted in Table B1.

4.2.2 | Stakeholder prioritization

Finally, as described in the methodology section, an SNA and an evaluation of the different degrees of centrality were performed on the stakeholder network reconstructed from the interviews (Brandes, 2001; Brin & Page, 1998; Freeman, 1977; Kleinberg, 1999; Segarra & Ribeiro, 2014). In all the figures in this section, the links correspond to the mention of a specific stakeholder by one of the interviewees: each node represents a different stakeholder while the size of the labels (and of the node itself) shows the corresponding degree of centrality. The colors, on the other hand, represent a “bottom-up” cauterization (i.e. obtained through the modularity algorithm; Blondel et al., 2008) and are consequently attributable to the structure of the network as a whole and not to an a priori classification. Table 5 shows the top 10 nodes for each centrality degree that emerged from the SNA while Table D1 shows the exact composition of each cluster.

Five clusters were identified: (1) civil society (light blue + light green), (2) internal and external project stakeholders (light green), (3) general public institutions such as the Italian and French governments and the European Union (dark green), (4) national public institutions and bodies such as the Italian and French transport or infrastructure ministries (purple), and (5) local institutions such as local mayors and valley communities (orange).

Figure 3 shows the authority (Figure 3a) and the PageRank degree (Figure 3b). Authority is mainly attributed to national and international public institutions (IST category) while PageRank is mainly focused on national and international public institutions (IST category) and some civil society components (SOC category) representing generic construction and engineering companies (SOC1 and SOC2). In addition, public institutions related to the environment, such as Arpa Piemonte (responsible for validating the environmental quality assessment on all construction sites; IST 31) and the Ministry of Environment (IST 37), are more central with respect to their authority.

The betweenness centrality (Figure 3c) is completely centered on internal structures and business units (LOT and DIR categories). This result is due to the fact that the network was constructed entirely from interviews with directors and internal components, and, consequently, it is of little significance in terms of the stakeholder ecosystem due to the organization-centered data. However, the literature on

TABLE 5 Prioritization results (top 10 nodes) from the centrality degrees.

Rank	1	2	3	4	5	6	7	8	9	10
Betweenness	DIRE7	DIRE1	LOT5	LOT1	LOT2	LOT3	DIRE2	LOT8	LOT7	LOT6
PageRank	IST14	IST15	IST1	SOC2	IST10	TELT1	SOC1	IST8	IST9	IST7
Eigenvector	IST1	IST14	IST15	SOC2	IST37	IST31	IST32	IST10	IST7	IST16
Authority	IST14	IST15	IST10	IST1	IST7	IST8	IST9	SOC2	IST16	IST17

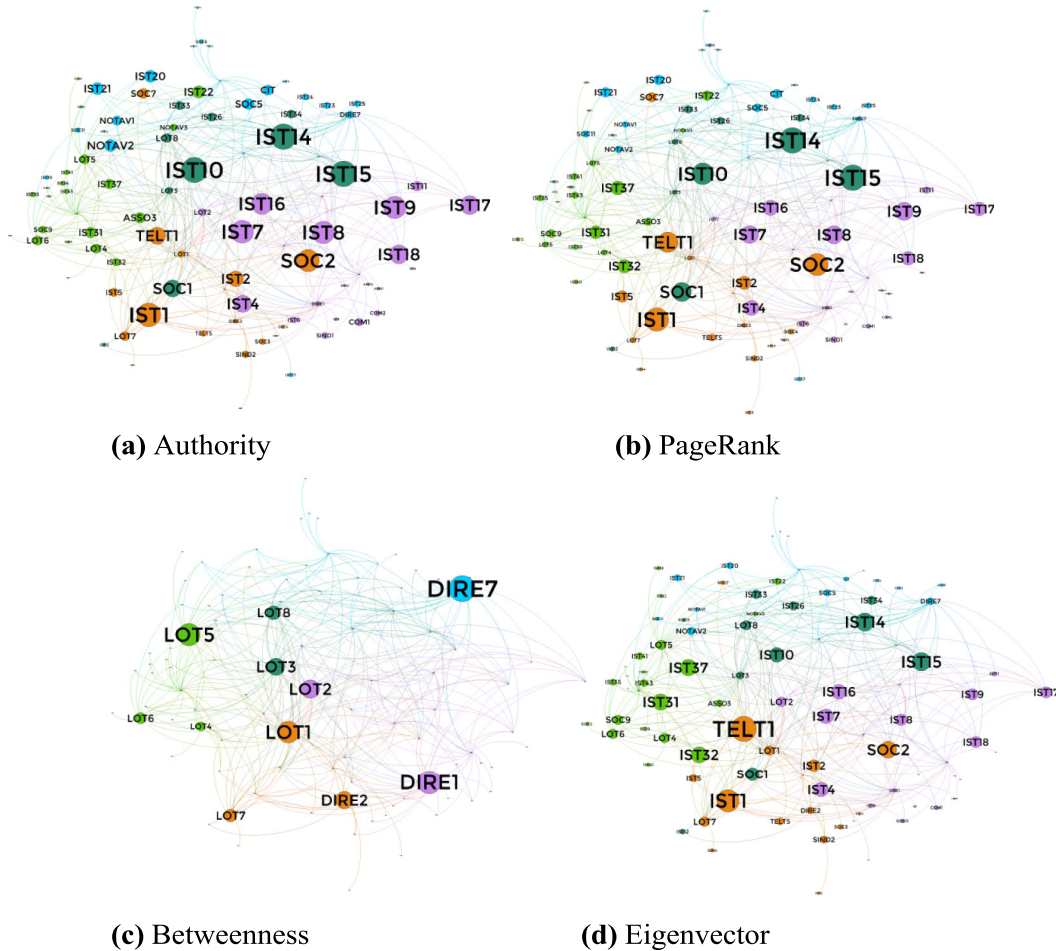


FIGURE 3 Degree of centrality of the stakeholder network.

MSR confirms that internal project managers, such as the directors of the construction sites, are among the most central stakeholders in megaprojects (Aaltonen, 2011; Mahmoudi et al., 2021). Finally, the eigenvector degree of centrality (Figure 3d) is again focused on the institutional components (IST category) and the internal components (TELT category). In this case, national and international institutional components (purple and dark green clusters) and environmental agencies (light green cluster) appear as the more central, while the internal components (LOT and TELT categories) are not particularly important or relevant, having low eigenvector centrality scores. Among all the degrees of centrality, the social component (NO TAV and SOC categories) turns out to be secondary as it emerges from the network built by the interviewees.

5 | FINDINGS

5.1 | Quantitative and qualitative comparison

The analysis conducted through the two phases—qualitative and quantitative—revealed a few insights.

In terms of a self-declared definition of stakeholder, the majority of respondents recognized how the business and project stakeholders should be considered the same; hence, the distinction presented by Aaltonen et al. (2008) seems to not apply to the present case study. This is reflected in the answers provided by respondents who pointed out that TELT is a purposely created legal entity with the singular aim of building the HSR. In other words, they adopted a very wide and

general definition rather than a short-sighted vision. Similarly, in the second phase of the qualitative analysis, the prioritization phase, the majority of managers gave a very broad definition of prioritization. Indeed, several directors did not agree with the common internal/external stakeholder classification (Beringer et al., 2013), highlighting a holistic view of stakeholder management that includes stakeholders such as tax-payers, future users of the infrastructure, or Italian/European citizens in general. On the contrary, what emerged from the SNA and the evaluation of the centrality degree did not reflect such a broad vision, hence the need to perform an SNA on the stakeholders' network. Indeed, the functional purpose of the comparison between the definition given by the managers and the prioritization that emerges from the SNA is to highlight and identify potential discrepancies. The SNA, in particular, allows the analysis of the real actions of managers, in other words, the real network of stakeholders they are engaged with. In our case, although the majority of managers had a broad and theoretical understanding of stakeholders by including secondary stakeholders such as citizens and NGOs, this vision was not reflected in their actions and network of collaborations. This finding, therefore, confirms the necessity of applying an SNA to improve directors' and managers' awareness regarding external stakeholders and their influence on the project, as pointed out by Mok et al. (2015).

In terms of the ecosystem view and the emergent prioritization of stakeholders, this study highlighted how the strategies and actions followed by the interviewed managers are still focused on primary stakeholders (suppliers, contractors, and public institutions) rather than on secondary ones (environmental NGOs and civil society). Although the managers' strategic vision (emerging from the self-declared definitions) follows a sustainable development strategy in the long term and is in line with a normative and conceptual stakeholder perspective, the environment and its preservation are still absent from real practice. This may be explained in terms of the time horizon of individual visions. If, on one side, a megaproject may benefit the environment in the long-term (e.g., by reducing transportation carbon emissions), on the other side, this is not true in the short-term (through the impact of the construction phase). Thus, the perspective of secondary stakeholders such as environmental NGOs that advocate for both short- and long-term preservation is not reflected in the actions of the managers, revealing a firm-centric perspective rather than a stakeholder or conceptual one (see Steurer, 2006). This approach, in the case of the Turin–Lyon HSR, has generated large—and sometimes violent—conflicts with civil society. According to Atkins et al. (2021), this issue may be overcome through an active conversation with environmental NGOs and civil society.

At a more general level, drawing on the second-order classification (descriptive, instrumental, and normative) of Donaldson and Preston (1995), the emergent network, indeed, can be considered as a descriptive level, answering to the question “What does happen?” while the self-determined definition can be considered at a normative level. In other words, although respondents were aware of the different stakeholders' interests (stressing several times the need for taking care of and listening to citizens and civil society), their actions were not aligned with this vision. Hence, the developed and adopted

methodology for this study may represent the missing link between the normative and descriptive levels, namely the instrumental level. According to Donaldson and Preston (1995), stakeholder theory is also instrumental in the sense that it establishes a framework for examining the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals.

In conclusion, by recalling the two initial research questions (i.e., if managers are aware of stakeholder networks-of-networks and how a prioritization occurs), our study revealed a clear distinction between the theoretical and practical point of view of middle and top managers (i.e., the self-determined definition of stakeholders) and their real actions and network of collaborations (i.e., the emergent prioritization from the SNA). On the one side, the majority of managers included as relevant and crucial many secondary stakeholders, such as citizens, NGOs, or taxpayers; however, on the other side, the analysis of their network of collaborations did not produce such a broad vision of stakeholders. On the contrary, what emerged from the SNA was a prioritization completely centered on institutional and/or primary stakeholders. These discrepancies between qualitative and quantitative prioritization can be simply derived and explained by answering the second question about how a prioritization occurs. Indeed, what our SNA explained is that prioritization is an emergent behavior of the system and cannot be determined with a top-down approach. In other words, as system theory affirms, a (complex) system is not simply the sum of its parts; rather, it is more than the sum of its parts because the system as a whole generates emergent dynamics. More specifically, these differences in prioritization can also be partly (but not completely) explained from a methodological point of view by looking at the structure of the network itself. Indeed, at this stage, the SNA does not consider intrinsic differences between middle and top managers: each respondent (and the corresponding node) and his/her opinion (and the mapped stakeholders) were weighted equally. Thus, the holistic and broad vision of the senior managers did not precisely reflect their power in taking decisions; in other words, their views are weighted equally to those of middle or site managers. Thus, analyzing the priority thanks to the centrality degree and without considering such differences in power led to a democratization of relationships and their influence on the ecosystem. This aspect, on one side, led to a less accurate or realistic reading of the relationships, but on the other side, it highlighted discrepancies between the perception that the managers have about the stakeholders' ecosystem and the reality of the ecosystem.

5.2 | Limitations and further developments

This work represents the first step toward the full development of an ecosystem approach (Cottafava & Corazza, 2020), and its main limitations provide useful insights for future studies related to the Turin–Lyon HSR or to other similar megaprojects.

First, the primary limitation is that stakeholders have been analyzed taking the megaproject managers' point of view. Our interviews

have been conducted with several key figures of the construction site—middle and top management of the company. This company-centric, top-down perspective has allowed us to start teasing out the intricate network of relationships, but it lacks the richness and complexity that only a complementary exploration of external stakeholders could provide, which would further benefit from the adoption of a bottom-up perspective. Therefore, adding this layer will be seminal to shedding light on the complexities of organizational life and its relationships (O'Doherty, 2016). However, the megaproject managers' point of view is particularly interesting because, as highlighted by Eden and Ackermann (1998), megaproject managers act as intermediate actors between stakeholders and the project itself.

The lack of a bottom-up process (i.e., a stakeholder mapping process that involves the external stakeholders) is mainly highlighted in the betweenness centrality results, which pointed out completely biased central nodes. Indeed, only the interviewed managers act as a bridge within the analyzed network. With respect to the other centrality degree, instead, interesting findings emerged, although they cannot be considered fully representative of the whole megaproject ecosystem of actors. In light of this, further studies need to expand the boundaries of the stakeholder mapping process, both qualitatively and quantitatively, in order to fully develop a conceptual and normative stakeholder approach (Steurer, 2006). This aspect is crucial to identify, as defined by Byrson (2004) and by Wood et al. (2021), the indirect and involuntary stakeholders, thus enhancing an ecosystem view of megaproject stakeholders (Kujala & Korhonen, 2017). In this sense, Atkins et al. (2021) highlighted how active conversations between environmental NGOs and firms may lead to common visions, avoiding conflicts and disputes. To do so, in megaprojects, it is absolutely necessary to adopt a stakeholder engagement strategy from the early planning and design phases.

Second, according to the relational perspective of stakeholder theory (Cots, 2011; Rowley, 1997, 2017), the adoption of an ecosystem approach is also crucial to understanding the pivotal role that nature and the natural environment play (Laine, 2010), especially when dealing with megaprojects. The view of nature as a stakeholder (Heikkinen et al., 2013; Kortetmäki et al., 2022; Kujala et al., 2012, 2018; Kujala, Heikkinen, et al., 2019) does not emerge from the interviews; however, eventually, the ecological issues are pointed out as a concern for specific stakeholders, as in the case of the NO TAV movement. It must also be noted that, over the years, much of the resistance to the Turin–Lyon HSR was sparked by environmental concerns related to the impacts that the megaproject would have on the natural landscape and resources of the Susa Valley, which then led to an irreconcilable ideological fight. With the purpose of contributing to the development of stakeholder theory, what has emerged is an evident lack of reasoning regarding the normative distinction of stakeholder theory in real-world settings. For example, the instances of nature as a stakeholder are addressed simultaneously by project opponents (e.g., environmental activists and NGOs) as well as by regional and local environmental agencies, environmental regulators, and environmental engineers (with a more pragmatic intent). In future studies, it would be worth

acknowledging the presence of coherent counter-arguments in addressing stakeholders' concerns, which could be further expressed by visualizing collaborations and contestations among different stakeholders within a network. Having this in mind, traditional stakeholder mapping exercises or the classification of stakeholders according to the salience model may not be enough for investigations into the role of the environment and culture as stakeholders, and they need further improvements as novel methodologies, such as participatory processes (de Moor, 2018) or, more in general, citizen science (Bonney et al., 2014; Guerrini et al., 2018) have recently highlighted. In this sense, participatory processes are crucial in creating the sense of a community (de Moor, 2015) as a thematic network of actors collaborating for a mutual benefit or goal (Andrews, 2002; Wenger et al., 2011).

In this sense, our methodology may support the practice of confronting eventual discrepancies—such as the ones emerging from our study—and designing effective strategies to align corporate goals with the real actions of internal managers (as schematically represented in Figure 1) by answering the question “What should happen if?” For instance, such strategies could take advantage of the digital urban acupuncture approach described by Iaonesi and Persico (2016) where, after a precise and detailed analysis of the network of actors, micro-interventions can be planned and designed to deal with issues such as the lack of engagement of a specific stakeholder.

Third, with the concept of MSR in mind (Lin et al., 2017; Ma et al., 2017; Zeng et al., 2015), these findings signal the importance of conducting stakeholder mapping activities *ex ante* during the megaproject design phase and even prior to public debate (Revel et al., 2007), as the literature has widely emphasized (Olander, 2007). Such activities should then be replicated in other phases of the project, including during construction. Thus, a dynamic mapping process (i.e., one that is repeated over time) is necessary to evaluate the impact of the different phases of a megaproject, and it should be fully incorporated into the planning and management of the megaproject itself (Park et al., 2017).

6 | CONCLUDING REMARKS

This paper attempted to tackle the wicked problem of stakeholder management for the sustainable development of megaprojects, which has been well documented in the MSR literature (Lin et al., 2017; Ma et al., 2017). Given their complexity, megaprojects (especially infrastructural ones) have a very dense network of stakeholders, many of whom are often not given the voice and representation they deserve. In light of the UN's SDGs, nature and the natural environment should also be included in the discussion, as highlighted by the Business2Nature literature (Heikkinen et al., 2013; Kujala & Korhonen, 2017). In setting the tone by analyzing the modern principles behind the concept of MSR and then bringing the discussion back to more classic versions of stakeholder theory (Freeman, 1984; Mitchell et al., 1997), we have identified important categories of stakeholders and defined

criteria for their identification. Then, we have conducted an empirical analysis of the company responsible for bringing to fruition the Turin–Lyon HSR, a binational rail megaproject that, especially on the Italian side, carries the burden of 30 years of environmental, political, and ideological contestation and resistance (Manfredi et al., 2015). After conducting semi-structured interviews and focus groups with the top and middle management of the company and some participant observations, we analyzed the similarities and differences in defining stakeholders for our interviewees and then assessed whether it was possible to achieve a stakeholder prioritization. This process was not deemed as useful by several respondents, at least in terms of strictly defining stakeholders as primary or secondary (Karlsen, 2002). The qualitative analysis highlighted how different actors had, at times, very different conceptions of stakeholders, both in defining what they are and in weighing their importance by using radically different criteria. The quantitative SNA, instead, allowed us to identify stakeholder groups and their dynamic relations (Rowley, 2017). Following this, the SNA served to evaluate different degrees of centrality in terms of authority (Kleinberg, 1999), PageRank (Brin & Page, 1998), eigenvector (Segarra & Ribeiro, 2014), and betweenness (Brandes, 2001). The former three revealed how, from the point of view of the megaproject managers, the most relevant stakeholders are the national and European public institutions, which provide the legal framework for the project and are the source of public funding, and the construction companies (contractors, sub-contractors, and suppliers). In contrast, the social components of the local territory (e.g., social movements, local mayors, or NGOs) do not emerge as important actors. Due to the highly contested history of the Turin–Lyon HSR (Manfredi et al., 2015), this work has highlighted how the lack of a proper stakeholder engagement process and a holistic and ecosystem-oriented vision could be one of the reasons for the unpredictable reactions from civil society and other stakeholders with limited power. Although further research is necessary to unfold causalities and stakeholders' relationships, especially among external stakeholders, the present work sets the procedural foundation for further development toward the inclusion of secondary stakeholders with little power for a more ethical management of megaprojects.

CONFLICT OF INTEREST STATEMENT

This study was partially funded by TELT as part of a larger project aimed at creating more scientific knowledge on conflicts and other issues surrounding the megaproject. The results are aimed at helping national and European policymakers deal with issues of representation, inclusion, and impact. In accordance with the university regulations for integrity in scientific research of the Università degli Studi di Torino (2016), no information obtained in the study has been removed, and the researchers' reflexivity and neutrality have been maintained.

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APPENDIX A: LIST OF INTERVIEWEES

TABLE A1 List of interviewees.

Interview No.	Interviewee	Year
1	HR Director (M)	2020
2	Development Manager (F)	2020
3	Deputy Director Italy (M)	2020
4	Construction Director (M)	2020
5	Engineering Director (M)	2020
6	Financial Director (M)	2020
7	Deputy Communication Director (M)	2020
8	Construction Coordinator Italy (M)	2020
9	Construction Site Project Manager 1 (M)	2020
10	Construction Site Project Manager 2 (M)	2020
11	Construction Site Project Manager 3 (M)	2020
12	Construction Site Project Manager 4 (F)	2020
13	Construction Site Project Manager 5 (M)	2020
14	Construction Site Project Manager 6 (M)	2020
15	Construction Site Project Manager 7 (M)	2020
16	Construction Site Project Manager 8 (M)	2020
17	Construction Coordinator France (M)	2020
18	Legal Director (F)	2020
19	General Director (M)	2020
20	Head of Environment Department Italy (F)	2020
21	Sustainable Development and Safety Director (F)	2020
22	Environment Manager (F)	2020

APPENDIX B: STAKEHOLDERS IDENTIFIED DURING THE INTERVIEWS

TABLE B1 List of identified stakeholders (for each interviewee) from the semi-structured interviews.

Working Position	Primary Stakeholders	Secondary Stakeholders
DIRECTOR 01	Engineering company Construction company Local communities Prefecture/Police Headquarters Central Ministries European Union INEA Agency Media/information representatives	Head office services Unions/employers' associations Trade associations No TAV movement (both technical and violent) Lawyers who file complaints and appeals on the project
DIRECTOR 02	Construction companies Engineering firms Small local businesses Prefecture/Police Headquarters	Law bodies Politicians Labor unions
DIRECTOR 03	ANCE Building Builders Central Ministries Piemonte region Italian State French State European Union Common Construction company Work team in TELT Category cultural associations	<u>Explicitly defined all as primary</u>
DIRECTOR 04	Italian State French State European Union INEA Agency State Railways Ministries	Providers Engineering company Construction company
DIRECTOR 05	Italian State French State Ministries Region Prefecture/Police Headquarters Board of Directors TELT TELT top management Journalists Assessors Mayors	Citizens Labor unions Non-profit organizations SCHOOLS
DIRECTOR 06	Mayors Local territorial organizations Batch managers Prefecture	<u>For the interviewee, there are only well managed and badly managed stakeholders, rather than primary and secondary</u>

TABLE B1 (Continued)

Working Position	Primary Stakeholders	Secondary Stakeholders
	Environment and safety control bodies European society Taxpayers University Future clients	
DIRECTOR 07	Italian State French State European Union 1 European Parliament 2 European Commissions Transport, Environment, Economy + DG Move 3 Inea agency Territory, in all its meanings	<u>Interviewee explicitly indicates that stakeholders are all equally important as even micro-scale stakeholders or events can have a very important impact on the work</u>
DIRECTOR 08	SHORT TERM: Italian State Lawyers of the NO TAV French State 1 Ministries-Infrastructure and Transport and Economy and Finance 2 Local Authorities (e.g., alpine tourism) European Union 1 European Commission 2 Inea Agency 3 European Court of Auditors LONG TERM: Taxpayers European Commission	<u>Independently indicates that its distinction, rather than in hierarchical terms, is temporal in the short term (until the work is completed) and in the long term (from when it will be made operational onwards)</u>
DIRECTOR 09	SHORT TERM: Italian State French State European Union State Railways TELT Human Resources Human resources seconded from Ferrovie dello Stato Citizens and the sense of identity of the valley PRO-TAV NO TAV LONG TERM: Italian railway network European citizens European trading companies	Technicians Builders Railway engineers SITAF The families of TELT workers

(Continues)

TABLE B1 (Continued)

Working Position	Primary Stakeholders	Secondary Stakeholders
COORDINATOR 01	Board of Directors TELT Ministries - Infrastructure and Transport and Economy and Finance European Union Industrial world In the field of security: 1- TELT; 2- Companies in the pipeline; 3- Municipalities	Industrial world Mayors Region Civil protection
COORDINATOR 02	Italian State French State European Union Ministries Prefecture Resident population around construction sites Construction companies Engineering firms Project Stakeholder Panel All those who will benefit from the work and all those who suffer from it	<u>It is not possible to make a division in terms of primary and secondary stakeholders, either explicitly or implicitly.</u>
MANAGER OF LOT 01	TELT General manager Directions Construction Director CONSTRUCTION SUPERVISION Batch manager CSE SECURITY COORDINATOR PM CONTRACTOR Site manager Environmental manager Security Manager INSTITUTIONS Ministries Common Harp Piedmont OTHER No TAV activists	SECURITY COORDINATOR • Safety Inspector INSTITUTIONS Region OTHER Orders Associations
MANAGER OF LOT 02	TELT President TELT Director President of the CIG ITA and FRA Assistant Directors Commission des Contracts European Union	Local politicians

TABLE B1 (Continued)

Working Position	Primary Stakeholders	Secondary Stakeholders
	ITA and FRA transport ministries Batch managers	
MANAGER OF LOT 03	Italian State French State European Union Political parties State Railways (with criticism present) Movement No TAV Construction companies Engineering firms TELT Works Management Commission des Contracts Courts of Auditors (ITA, FRA, EU)	Ministry of Cultural Heritage Superintendency of Turin Ministry of the Environment Harp Piemonte region Courts of Auditors Media/information representatives
MANAGER OF LOT 04	Harp ISPRA SPreSAL TELT tender office Other environmental control bodies(police, authorization bodies) Mayors and municipalities Prefecture Every landowner Commission des Contracts	<i><u>It indicates that there is no hierarchy, compared to other works; in this specification all assume great importance</u></i>
MANAGER OF LOT 05	CIPESS and other control bodies European society Taxpayers Italian State French State European Union Industrial world Purchasing Department (currently) Territorial Activities Directorate Ministry of Transport Piemonte region Common State Railways	Finance Police of Susa, for building renovation State Property Agency
MANAGER OF LOT 06	Sitaf CIPESS Ministries - Environment and Cultural Heritage Piemonte region TELT TELT Departments - Environment, Territory, Works Harp Environmental Impact Assessment Technical Commission	Smat Telecom Italgas TELT Departments - Engineering, Law

(Continues)

TABLE B1 (Continued)

Working Position	Primary Stakeholders	Secondary Stakeholders
	Superintendence Commission des Contracts	
MANAGER OF LOT 07	Construction supervision Construction companies Engineering firms Construction Director Commission des Contracts	Security Coordinator Fire fighters State services TELT Departments - Territory, Environment, Safety, Finance Local association of inhabitants Mayor
MANAGER OF LOT 08	Italian State French State European Union INTERIORS Construction companies Engineering firms SNCF TELT Departments -Environment, Safety, Territory, Finance Construction supervision OUTDOORS Court of Auditors Common Local territorial organizations Inhabitants Auditors	<u>It is not possible to make a division in terms of primary and secondary stakeholders, as the interviewee divides them between internal and external, with the exception of Italy, France, and the European Union, which have been identified as the three main stakeholders</u>

APPENDIX C: LIST OF IDENTIFIED STAKEHOLDERS

TABLE C1 Full list of identified stakeholders.

Label	Description	Type	Type 2
ASSO1	cultural associations of tunnel engineers	Scientific and Cultural Associations	Civil Society
ASSO2	Italian Tunnel Company	Scientific and Cultural Associations	Civil Society
ASSO3	Non-profit Associations And Organizations	Scientific and Cultural Associations	Civil Society
CIT	Citizens Of The Susa Valley	Local Community	Civil Society
COM1	Media	Communication	Civil Society
COM2	Opinion Leaders	Communication	Civil Society
COO1	Construction Sites Coordinator 1	TELT	
COO2	Construction Sites Coordinator 2	TELT	
DIRE1	Director 1	TELT	
DIRE2	Director 2	TELT	
DIRE3	Director 3	TELT	
DIRE4	Director 4	TELT	
DIRE5	Director 5	TELT	
DIRE6	Director 6	TELT	
DIRE7	Director 7	TELT	

TABLE C1 (Continued)

Label	Description	Type	Type 2
DIRE8	Director 8	TELT	
DIRE9	Director 9	TELT	
IST1	Mayors/Councilors Of Municipalities Of Valley	Local Community	Institutional
IST10	European Union	Public	Institutional
IST11	Inea Agency	Public	Institutional
IST12	Italian Politicians	Political	Institutional
IST13	French Politicians	Political	Institutional
IST14	Italian State	Public	Institutional
IST15	French State	Public	Institutional
IST16	Ministry Of Transport Fr	Public	Institutional
IST17	Ministry Of Infrastructures Fr	Public	Institutional
IST18	Ministry Of Economy Fr	Public	Institutional
IST19	Schools Of The Valley	Public	Institutional
IST2	Mountain Communities	Local Community	Institutional
IST20	Italian Citizens	Local Community	Civil Society
IST21	French Citizens	Local Community	Civil Society
IST22	European Citizens	Local Community	Civil Society
IST23	European Parliament	Political	Institutional
IST24	European Commissions (Transport, Environment, Economy)	Political	Institutional
IST25	Dg Move	Political	Institutional
IST26	European Court Of Auditors	Political	Institutional
IST27	Civil Protection	Local Community	Civil Society
IST28	French Stakeholder Panel	Local Community	Civil Society
IST29	Observatory Tav	Local Community	Civil Society
IST3	Metropolitan City	Public	Institutional
IST30	Universities And Research Centers	Public	Institutional
IST31	Piedmont Harp	Public	Institutional
IST32	Commission Des Contracts	Public	Institutional
IST33	Italian Court Of Auditors	Public	Institutional
IST34	French Court Of Auditors	Public	Institutional
IST35	Ministry Of Cultural Heritage	Public	Institutional
IST36	Superintendence Of Turin	Public	Institutional
IST37	Ministry Of The Environment	Public	Institutional
IST38	Armed Forces	Public	Institutional
IST39	Spresal	Public	Institutional
IST4	Piemonte Region	Public	Institutional
IST40	Landowners	Local Community	Civil Society
IST41	Cipess (Interministerial Committee For Economic Planning And Sustainable Development)	Public	Institutional
IST42	Property Agency	Public	Institutional
IST43	Technical Commission Go	Public	Institutional
IST44	Fire Fighters	Public	Institutional
IST5	Prefecture Of Turin	Public	Institutional
IST6	Turin Police Questure	Public	Institutional
IST7	Transport Ministry	Public	Institutional
IST8	Infrastructure Ministry	Public	Institutional

(Continues)

TABLE C1 (Continued)

Label	Description	Type	Type 2
IST9	Ministry Of Economy	Public	Institutional
LOT1	Building Site Manager 1	TELT	
LOT2	Building Site Manager 2	TELT	
LOT3	Building Site Manager 3	TELT	
LOT4	Building Site Manager 4	TELT	
LOT5	Building Site Manager 5	TELT	
LOT6	Building Site Manager 6	TELT	
LOT7	Building Site Manager 7	TELT	
LOT8	Building Site Manager 8	TELT	
NOTAV1	Technical/intellectual No Tav Movement	Local Community	Civil Society
NOTAV2	Violent No Tav Movement	Local Community	Civil Society
NOTAV3	Lawyers	Local Community	Civil Society
SEN1	SEN1	TELT	
SIND1	Labor Unions	Labor Unions	Institutional
SIND2	Employers' Associations	Labor Unions	Institutional
SITAV	Pro-tav Movement	Local Community	Civil Society
SOC1	Engineering company (without distinction)	Enterprises	Business Partners
SOC10	French Control Bodies	Enterprises	Business Partners
SOC11	Sitaf	Enterprises	Business Partners
SOC12	Utilities (Smat, Telecom, Italgas)	Enterprises	Business Partners
SOC13	SNCF extension	Enterprises	Business Partners
SOC2	Construction company (without distinction)	Enterprises	Business Partners
SOC3	Trade Associations	Enterprises	Civil Society
SOC4	Small Enterprises In The Valley	Enterprises	Civil Society
SOC5	Ance Builders	Enterprises	Institutional
SOC5	State Railways	Enterprises	Business Partners
SOC6	Italian Railway Network	Enterprises	Business Partners
SOC7	Other Companies And The Entrepreneurial World	Enterprises	Business Partners
SOC9	ISPRA	Enterprises	Business Partners
TELT1	Telt Internal Departments/teams Including Work Management (Although Not Telt, But Of Companies Grouping)	TELT	
TELT2	Board Of Directors Telt	TELT	
TELT3	Human Resources TELT	TELT	
TELT4	Families Of TELT Employees	TELT	
TELT5	Safety Coordinators And Managers	TELT	

APPENDIX D: IDENTIFIED CLUSTERS

TABLE D1 Identified clusters.

Cluster	Nodes
0	IST7, IST16, IST4, IST8, IST9, IST17, IST18, LOT2, IST11, COM1, IST6, SIND1, DIRE1, COM2, IST3, SOC5, ASSO1, ASSO2, IST19, DIRE3, DIRE4, DIRE5
1	IST37, IST31, IST32, SOC9, LOT5, LOT6, LOT4, ASSO3, IST41, IST43, IST22, IST35, NOTAV3, IST39, IST40, SOC12, IST38, IST42, IST36, SOC10, IST30, DIRE6
2	IST1, SOC2, IST2, LOT7, LOT1, IST5, SIND2, TELT5, DIRE2, SOC3, SOC7, IST44, SOC4, IST13, TELT2, TELT1
3	COO1, IST14, IST15, IST10, SOC1, LOT8, IST26, IST33, IST34, LOT3, IST12, SOC13, DIRE8
4	SEN1
5	NOTAV2, DIRE7, IST20, IST21, SOC5, NOTAV1, CIT, SOC11, IST23, IST24, IST25, IST27, SOC6, IST29, IST28, SITAV, TELT3, TELT4, DIRE9, COO2