



How do natural resource dependent firms gain and lose a social licence?

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ABSTRACT

A project, firm or industry whose activities are accepted by communities and stakeholders is said to have a social licence to operate. The importance of a social licence is increasingly being realized in natural resource industries where a project or firm can impose more environmental and social costs, e.g. pollution, or strain on service delivery and housing, on communities than they are willing to accept. However, the conditions that are necessary and/or sufficient to obtain/maintain a social licence are unclear. To rectify this gap, a global literature review paired with a fuzzy-set qualitative comparative analysis of 47 natural resource case studies from 25 countries was used to identify the conditions necessary and/or sufficient to: (1) obtain or lose a social licence; (2) result in voluntary practice change by firms; and/or (3) create regulatory change. No single condition out of the ten conditions tested was found to be necessary to obtain or lose a social licence or to change firm behavior. However, a combination of five conditions created a robust pathway for maintaining a social licence, including: (1) delivery (or perception) of net *economic benefits* beyond the firm; (2) adequate stakeholder *consultation*; (3) minimal *media coverage*; (4) minimal *public protests*; and/or (5) absence of *well-defined and enforced private property rights*. These results contribute to an understanding of the somewhat limited effectiveness of social licence as a form of governance, and suggest that social licence outcomes are determined by the expectations of stakeholders, decisions and behaviors of firms, and broader institutional governance factors.

1. Introduction

Natural resource dependent industries, such as mining, energy, agriculture and forestry, are central to local economies across the globe. Whilst producing desirable consumption goods, these industries can have undesirable external impacts, including pollution, biodiversity loss and land degradation. A relatively new form of governance, playing out at the intersection of markets and government regulations, that seeks to moderate these external impacts, is the concept of ‘a social licence to operate’. A project, firm, or industry with a social licence to operate (herein social licence) is one that experiences ongoing acceptance or approval by affected stakeholders and communities who have the power to affect the profitability of the project, firm or industry (Cooney, 2017; Gunningham et al., 2004; Raufflet et al., 2013). Herein the term stakeholder is used to refer to local or broader communities and other parties that may be affected by and/or able to affect the activities of firms.

The emergence of the social licence concept has been attributed to: (1) growth in awareness and concern about environmental degradation; (2) changing governance arrangements, especially a shift from

‘government-push’ regulation to greater reliance on market incentives or self and private regulation (Prno and Slocombe, 2012); and (3) increased public access to information about firms’ activities, especially natural resource exploitation activities in remote locations (Cooney, 2017; Cullen-Knox et al., 2017). Ongoing interest in the social licence concept, from its original emergence (largely) in relation to environmental impacts of mining in the 1990s, reflects the power that stakeholders have to affect a firm’s profitability if it is perceived to not meet minimum regulatory requirements; or comply with minimum regulatory requirements that are considered too lax or not aligned with stakeholders’ expectations (Boutilier, 2014).

With growing reliance on social licence as a form of governance, research has sought to identify: (1) how and why affected stakeholders withdraw or withhold a social licence; and (2) how projects, firms or industries can obtain a social licence (Cooney, 2017; Thomson and Boutilier, 2011). Stakeholder attitudes and perceptions are critical as they are the actors positioned to grant, withhold/withdraw a social licence, as per their environmental and social expectations (Luke, 2017; Moffat and Zhang, 2014; Thomson and Boutilier, 2011). In the most

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Table 1

The identified conditions for a social licence that are tested (left column), and the key phrases used to describe those conditions in the existing literature with key references and hypothesized social licence outcomes (right column).

Conditions	Conditions as referred to and framed in the literature and hypothesized social licence outcomes, with key references
<i>Economic benefits</i>	<i>Economic legitimacy</i> (Thomson and Boutilier, 2011); <i>wealth generation</i> (Prno and Slocombe, 2014); <i>perceived benefits</i> (Jartti et al., 2020; Lesser et al., 2021; Walton and McCrea, 2020; Zhang and Moffat, 2015): The perception that a project/firm activity offers benefits to affected stakeholders, e.g. employment, supply of products the activity/firm creates. The greater the benefits the more likely a social licence will be granted.
<i>Compensation</i>	<i>Distributional fairness</i> (Jartti et al., 2020; Lesser et al., 2021; Walton and McCrea, 2020; Zhang et al., 2015): Refers to the fair distribution of benefits from a project/firm activity. The more affected stakeholders perceive the distribution of benefits to be fair, the more likely a social licence will be granted. <i>Perceived benefits</i> (Walton and McCrea, 2020): The greater the perception that a project/firm activity offers benefits (not directly related to operations, e.g. sponsorship for community activities) to affected stakeholders, the more likely a social licence will be granted. <i>Mode of benefit sharing</i> (Saenz and Ostos, 2021): If shareholder (rather than paternalistic) modes of benefit sharing from a project/firm activity to affected stakeholders are adopted, then it is more likely a social licence will be granted.
<i>Consultation</i>	<i>Community engagement performance</i> (Hurst et al., 2020; Mercer-Mapstone et al., 2017; Mercer-Mapstone et al., 2018; Uffman-Kirsch et al., 2020; Walsh et al., 2017; Zhang et al., 2018): Community engagement focuses on creating shared (across stakeholder groups) understanding, and plans/agendas. The more engaged firms are with affected stakeholders in these processes, the more likely a social licence will be granted. <i>Contact quality and quantity</i> (Eabrasu et al., 2021; Lesser et al., 2021; Moffat and Zhang, 2014): Quality and quantity of contact between affected stakeholders and firms, through formal consultation and other means. The higher the quality and quantity of interactions the more likely a social licence will be granted. <i>Procedural fairness</i> (Jartti et al., 2020; Lacey et al., 2016; Lesser et al., 2021; Mercer-Mapstone et al., 2018; Moffat and Zhang, 2014; Zhang et al., 2018): The fairer and more inclusive project/firm decision-making processes, the more likely a social licence will be granted. <i>Relationship quality</i> (Boutilier, 2020; Walton and McCrea, 2020): Determined by extent that firms are open, transparent (and engage in in two-way dialogue with affect stakeholders) and respond to issues in a timely manner. If high quality relationships exist, it is more likely a social licence will be granted. <i>Mode of engagement</i> (Saenz and Ostos, 2021): If project/firm and community values are balanced (rather than favoring the project/firm), it is more likely that a social licence will be granted.
<i>Social impacts</i>	<i>Impacts on social infrastructure</i> (Jartti et al., 2020; Moffat and Zhang, 2014; Zhang and Moffat, 2015): If community access to medical care, housing or community facilities is improved following the arrival of a new resource development project or firm, then a social licence is more likely to be granted. <i>Culture, customs and history of the affected communities</i> (Prno and Slocombe, 2014): The more livelihoods, culture, and customs are maintained in communities affected by a project/firm activity, the more likely a social licence will be granted.
<i>Environmental change</i>	<i>Environmental impacts/perceived environmental performance</i> (Lynch-Wood and Williamson, 2007; Prno and Slocombe, 2014; Walton and McCrea, 2020; Witt et al., 2021; Zhang and Moffat, 2015): Projects/firms that actively adopt eco-innovations, manage environmental risks and communicate how they minimize environmental impacts is more likely to have a social licence to operate. <i>Previous experience with resource use/development</i> (Boutilier, 2020; Prno and Slocombe, 2014): If affected stakeholders have had positive (poor) past experiences with the same type of environmental resource use, then they will be more (less) likely to grant a social licence. <i>Negative externalities^a</i> or undesirable negative consequences (Dumbrell et al., 2020): The more a project/firm activity produces undesirable negative environmental consequences, the less likely a social licence will be granted. <i>Threats to or undersupply of public goods^a</i> (Dumbrell et al., 2020): The more a project/firm activity negatively affects the quality or quantity of public goods, the less likely a social licence will be granted.
<i>Well-defined and enforced private property rights</i>	<i>Governance and institutional arrangements</i> (Prno and Slocombe, 2014; Uffman-Kirsch et al., 2020): Governance and institutional arrangements affect the overarching conditions in which resource allocations are made, and firm-stakeholder interactions occur. The weaker these arrangements, the less likely a social licence will be granted. <i>Political licence to operate</i> (Bice et al., 2017; Robinson et al., 2020): The more property right allocations, or government enforcement or oversight of regulatory approval conditions, can be influenced by state pro-development agendas, the less likely a social licence will be granted. <i>Allocation of socially valuable assets to private uses</i> (Dumbrell et al., 2020): The poorer the understanding of property rights, the enforcement of responsibilities associated with property rights, or greater the disapproval of the allocation of property rights in socially valuable assets, the less likely a social licence will be granted.
<i>Political opportunities</i>	<i>Development and human rights</i> (Saenz and Ostos, 2021): The more empowered stakeholders are to interact with projects/firms and governing organizations in partnerships (rather than have paternalistic relationships) the more likely a social licence will be granted. <i>Governance and political conditions</i> (Jartti et al., 2020; Lehtonen et al., 2020; Musiyarira et al., 2021; Prno and Slocombe, 2014): The more stakeholders perceive a firm or regulator to be corrupt, or pro-development or pro-resource-nationalism, the less likely they will perceive their interests to be protected, and the less likely they will be to grant a social licence. <i>(Trust in) governance</i> (Lesser et al., 2021; Musiyarira et al., 2021; Walton and McCrea, 2020; Zhang et al., 2018; Zhang et al., 2015): Framed in terms of the extent that regulators can and will hold private firms to account. The stronger the governance arrangements, the more likely a social licence will be granted.
<i>Media coverage</i>	<i>Customer interest; corporate/brand visibility; community pressure</i> (Lynch-Wood and Williamson, 2007): Interest in, and visibility of projects and firms affects stakeholder perceptions of a project/firm activity. Media coverage of a project/firm activity indicates broad interest. Affected stakeholders also use the media to show a project/firm activity is unwelcome.
<i>Public protests</i>	<i>Social resistance</i> (Luke, 2017); <i>protests</i> (Vanclay and Hanna, 2019); <i>socio-political obstacles</i> (Boutilier, 2020): Participation in protests indicates identification with social resistance movements, which indicates the absence of a social licence.

^a Negative externalities and undersupply of public goods can also affect non-environmental assets, this condition therefore also maps onto 'social impacts'.

general sense, the decision to grant or withdraw a social licence has been found to be a function of the distribution (inequalities) of the monetary and non-monetary costs and benefits of a firm's activities (Dumbrell et al., 2020; Lacey and Lamont, 2014). At the same time, stakeholders' decisions to withdraw a social licence can affect the operational feasibility of projects, firms or industries (Henisz et al., 2014; Jijelava and Vanclay, 2018). For example, stakeholders may boycott projects or firms, or may force firms to divert resources to non-productive uses such

as dispute resolution. As a result, social licence has been conceptualized as a risk management issue for firms (Falck, 2016) and research has sought to identify ways to mediate this risk such as consultation or compensation (Mercer-Mapstone et al., 2017; van Putten et al., 2018; Walsh et al., 2017).

Case study research allows in-depth examination of the complex environments in which social licence issues arise and—as Conde and Le Billon (2017) identified—the different objectives, narratives and

intensity with which stakeholders may resist or accept an activity. With this, a growing body of research has characterized the local (Koivurova et al., 2015; Luke, 2017); or national (Jartti et al., 2020; Zhang et al., 2015); or international (Lehtonen et al., 2020; Lesser et al., 2021) social licence status of firms or industries based on a set of criteria. In the analysis presented in this article, qualitative comparative analysis (QCA; Ragin, 1987) was used to identify patterns across cases in different countries as well as different industries. The QCA method is underpinned by Boolean logic (rather than commonly used correlation methods) to test a range of conditions for particular outcomes to occur or not occur (Roig-Tierno et al., 2017). The method can be employed to identify the conditions that are necessary and/or sufficient to achieve the outcome of interest. A condition is deemed necessary, if, whenever the outcome is present, the condition is also present, and a condition is deemed sufficient if, whenever it is present, the outcome is also present (Ragin, 2008a).

In this article QCA is used to identify the conditions present/absent across natural resource case studies where: (1) a social licence was reported as granted/withheld/withdrawn; and (2) social licence pressure led to a change in firm activities or regulations. The analysis draws on a global literature review that identified 47 published case studies describing social licence outcomes for firms and/or specific projects in natural resource industries (e.g. mining, energy and agriculture) across 25 countries. This is the first analysis to identify the necessary and/or sufficient conditions for social licence outcomes and firm behaviour change across contexts. Specifically, the objective is to identify whether the conditions that drive social licence outcomes differ across natural resource dependent industries and institutional settings. This is important because the social licence concept is growing in prominence in multiple natural resource industries while the majority of research underpinning and testing models of social licence use mining industry examples.

There are three key benefits of this research for stakeholders reliant on, or positioned to influence social licence outcomes across the world. First, identifying the factors that underpin a social licence will be invaluable for industries that recognize their future success/profitability is contingent on maintaining a social licence (e.g. Future IQ, 2019; Mitchell et al., 2020). Second, understanding the necessary and or sufficient conditions to gain or lose a social licence may be critical for stakeholders that are reliant on the social licence mechanism to mediate future firm behavior. Third, as Rudel (2008) noted, policy-makers can benefit from research that summarizes and draws together research at different scales to make clear patterns or generate new insights. The QCA method adopted in this research is advantageous in this respect. In particular, as social licence concerns are most likely to increase in prominence with continued global environmental degradation, policy-makers will benefit from understanding the effectiveness of social licence as a form of governance and the role of policy-makers and overarching institutional arrangements in supporting alternative forms of governance.

2. Conditions associated with social licence outcomes

In the absence of a unifying theory of social licence, this section synthesizes a series of frameworks and theoretical advancements that describe a social licence. Relationships between these frameworks and the broader literature, show several conditions associated with different social licence outcomes. Ten interrelated conditions were identified to be tested in the QCA analysis, as described below.

A systematic review of the social licence literature (reported in Dumbrell et al., 2020) was used as a first basis to identify frameworks and theories of social licence, and influences associated with social licence outcomes. The review captured documents published between 1996 and the end of 2019 and indexed in the Web of Science Core Collection, Scopus, or Google Scholar databases. The initial search returned 2574 documents. Documents were excluded from the final

database if the full-text was unavailable, the document was in a language other than English, the document was a book review, or opinion article in an industry publication. Documents were also excluded if the concept of social licence was not important to the research problem or context. The final database included 651 documents. To ensure currency and completeness, the literature consulted for this study included that captured by Dumbrell et al.'s (2020) systematic literature review as well as research published after 2019.

The ten conditions identified to be tested from the literature review included: *Economic benefits*; *Compensation*; *Consultation*; *Social impacts*; *Environmental change*; *Well-defined and enforced private property rights*; *Political opportunities*; *Media coverage*; *Public protests*; and *Private firm ownership*. Table 1 provides further detail of the conditions and how they are hypothesized to relate to social licence outcomes. Table 1 also maps the conditions used in this analysis to the corresponding conditions identified in the literature review, and key references informing condition selections. Conditions were included in this analysis if they had been defined as part of a conceptual framework for predicting or describing social licence outcomes, and tested with quantitative or qualitative analyses. Conditions were grouped to form one condition in this analysis (left column in Table 1) when different terminology was used to describe a similar concept or phenomenon (key phrases in right column in Table 1), or when conditions were separated by levels of impact. For example, the often-separated economic benefits and impacts/costs conditions were combined in this analysis to form a net economic benefit condition. Conditions were not included in this analysis if, in previous research, they were framed as case specific indicators of a more general condition in the path toward social licence outcomes. Examples include local authorities providing official approvals and the signing of benefit sharing agreements. All conditions are treated as having equal weight (as described later in methods), and listed in tables such that conditions that firms have more control over (e.g. consultation strategy) are listed first, and conditions that firms have less control over (e.g. political and governance arrangements) are listed second. Italics are used to denote the names for conditions tested and reported in subsequent sections.

Three early models of social licence (Lynch-Wood and Williamson, 2007; Moffat and Zhang, 2014; Thomson and Boutilier, 2011), plus their derivatives, describe the majority of conditions, and hypothesized relationships with social licence outcomes. First, Lynch-Wood and Williamson (2007) framed a social licence as a product of a firm's environmental impacts, coupled with brand visibility, customer and community interest in the environmental consequences of the firm's behavior, and customer power (e.g. access to resources and ability to act collectively to influence the firm's activities). Lynch-Wood and Williamson's (2007) model also indicates that no one factor alone e.g. environmental impacts or brand visibility, is sufficient to determine whether a social licence will be granted or withdrawn. Since Lynch-Wood and Williamson (2007) stipulated this model, *environmental change*, or the perception of environmental impacts resulting from projects/firm activities, especially negative environmental externalities, has continued to motivate social licence concerns across industries and contexts (Dumbrell et al., 2020). As such, *environmental change* is a central condition in this analysis (Table 1). Likewise, three of the five factors identified as critical for social licence outcomes by Lynch-Wood and Williamson (2007) can be represented by the extent and nature of *media coverage* the project or firm receives: customer interest; brand visibility; and community pressure (Table 1). The *media coverage* condition used in the analysis (as described in Table 2) accounted for the scale (e.g. local or global) and diversity of media attention about social licence issues. *Media coverage* is also included given the emergence and persistence of the social licence concept has been linked to improved public access to information about firms' activities via the increasingly connected internet, social media and rapid news cycles (Cooney, 2017; Cullen-Knox et al., 2017).

Second, in mining contexts, a social licence has been established as a

product of economic legitimacy, socio-political legitimacy, trust and credibility (Boutlier and Thomson, 2011; Thomson and Boutlier, 2011). More specifically, the model suggests no firm can obtain a social licence without economic legitimacy, that is, without delivering net *economic benefits* or contributing to wealth generation for affected stakeholders (Table 1). *Economic benefits* may include employment opportunities and/or spillover effects of increased economic activity in a location. Evidence of stakeholders making trade-offs between economic benefits and social costs across diverse contexts supports this model. Social licences have been granted in cases where *economic benefits* have been perceived to outweigh associated costs such as environmental degradation (e.g. Marcos-Martinez et al., 2019; Richert et al., 2015) and withheld or withdrawn when the benefits were deemed insufficient (e.g. de Jong and Humphreys, 2016). In addition, *compensation* payments such as those made by firms to communities via community trust funds, or other forms of benefit sharing such as new infrastructure for local communities have also been critical to social licence outcomes (e.g. Langbroek and Vanclay, 2012; Matebesi and Marais, 2018). The distributional fairness of *compensation* and other perceived or real benefits is also critical (Table 1). Applications of the Thomson and Boutlier (2011) model have confirmed the relationships between these factors and different levels of social licence (Jijelava and Vanclay, 2017, 2018), while others show a lack of economic legitimacy, trust and credibility, drives resistance movements and decisions to withhold/withdraw a social licence (Lesser et al., 2021; Luke, 2017).

Third, using mining developments as a case study Moffat and Zhang (2014) found *social impacts* (e.g. changes to service access, livelihoods, and cost of living) to be important to social licence outcomes, as well as: *consultation* (represented by contact quantity and contact quality); and procedural fairness. Here contact quantity and quality refer to contact between local communities and mining firms. Procedural fairness is concerned with decision-making processes, including the extent that stakeholders' views are accounted for in decision-making. Moffat and Zhang (2014) explored a mining firm's decision-making processes while public decision-makers processes to grant mining rights were not considered. Later research has modified and built on this model (Jartti et al., 2020; Mercer-Mapstone et al., 2018; Zhang and Moffat, 2015; Zhang et al., 2015). Notable advancements include detailed interrelationships between the different factors underpinning a social licence (Walton and McCrear, 2020) and the finding that procedural fairness is not only important, but a pre-requisite for a social licence (Zhang et al., 2018).

While different research uses various terms for *consultation* (see Table 1), and although some authors do not restrict their definition of contact to formal consultation processes, community consultation, relationships and engagement are considered critical to social licence outcomes (Mercer-Mapstone et al., 2017; Mercer-Mapstone et al., 2018; Moffat and Zhang, 2014; Zhang et al., 2018). *Consultation* is a two-way discussion through which firms must outline any expected benefits and costs to stakeholders, and stakeholders can raise any concerns and/or negotiate or request potential compensation for negative impacts. It is also the forum in which stakeholders can raise issues or concerns, or seek additional information on risks associated with a firm's activities and in-part address asymmetric information issues.

Alongside the factors identified as drivers of social licence outcomes above, it can be seen that firms and their activities exist in a social and political environment. The capacity to make acceptance or resistance known—as well as a firm's capacity to change behavior as a response—are contingent on there being opportunities to do this. It can also be seen that certain political structures can make it more difficult than others for stakeholders to voice their acceptance or resistance to a project/firm activity (e.g. Ide, 2015; Rosyida and Sasaoka, 2018). Likewise, governance or institutional arrangements can stipulate the *consultation* or *compensation* processes that firms must engage in when seeking to establish a new project or undertake activities that impact stakeholders (Prno and Slocombe, 2014). Governance conditions tested

in previous research (Table 1) have been framed to reflect the extent that stakeholders perceive regulators can and will hold private firms accountable, and factors that may prevent this (e.g. corruption, Musiyarira et al., 2021). As a result, conditions such as the level of corruption, human development and democracy that can collectively be described as stakeholders' *political opportunities* (Kirchherr et al., 2016) were tested. Like the *well-defined and enforced property rights* condition (described below), the *political opportunities* condition can be seen as a form of institutional and governance strength in a country/region.

Dumbrell et al. (2020) identified social licence concerns as a response to the exploitative use of socially valuable assets such as land or water to generate private profits. Further, how property rights (constructs that define how resources are owned and used) are allocated, and the impacts of a firm's activities relative to the boundary of their property rights are considered important for social licence outcomes (e.g. de Jong and Humphreys, 2016; Westoby and Lyons, 2016). The condition of *well-defined and enforced property rights* was included to provide detail on the impacts of property right allocation processes as well as the impacts of the exploitation of resources, e.g. minerals, in which firms are granted property rights. It was hypothesized that in instances where property rights are well-defined and enforced (e.g. with regulation) and where a firm's activities have limited impact beyond the limits of their property rights (e.g. on neighbors), social licence concerns would be minimal. This is because negative externalities, a key driver of social licence concerns, would be minimized in this scenario (Dumbrell et al., 2020). In cases where property rights may be ambiguous or, institutions (usually governments) able to enforce property rights are absent or ineffective, there may be concerns about a firm's social licence status. However, capacity to withhold or withdraw a social licence in these cases may be minimal as there is little to no consequence to firms for ignoring rights without institutions to enforce rights.

While *public protests* have not (to date) been framed as underpinning the loss of a social licence, they have been identified as a way to show acceptance/approval of any resistance movement (Luke, 2017) and have been framed as a method through which stakeholders can highlight procedural and distributional fairness issues. It is for this purpose that the existence and severity of *public protests* was included as a condition. Likewise, the private/public status of firms has not previously been framed as underpinning the loss of a social licence (hence not included in Table 1). However, industries and firms often frame the need to maintain or improve profitability as the incentive to obtain a social licence (Jimena, 2011). Given this incentive is often more pressing for private firms compared to governments (that are increasingly attracting social licence attention too), the ownership structure of the proponent firm was incorporated into the analysis via the tenth condition, *private firm ownership*.

3. Methods

A global dataset consisting of detailed case study information was examined to identify how the ten conditions described in the preceding section are associated with two outcomes of interest: (1) the loss or gain of a social licence for a project, firm or industry; and (2) whether threats to a social licence translate into firms changing their behavior or prompt regulatory reform. As mentioned previously, QCA was used to identify the necessary and/or sufficient conditions for the two outcomes of interest, using data from 47 case studies across 25 countries. While it is common to compare and contrast social licence outcomes for a few cases (e.g. Koivuova et al., 2015; Prno, 2013), an advantage of the QCA approach is that it allows multiple case analysis. By allowing the conversion of qualitative data into quantitative data, QCA opens up the possibility to produce generalizations from otherwise non-generalizable case study research (Rihoux, 2006; Rudel, 2008). Consequently, QCA is increasingly being used to examine outcomes in natural resource or environmental management issues as a result of different interventions or institutional arrangements (Basurto, 2013; Ma'Mun et al., 2020; Pahl-

Table 2
Operationalization and calibrated scores for conditions potentially associated with social licence outcomes.

Conditions	Definitions of conditions and sub-conditions
<i>Economic benefit</i>	0 Affected stakeholders stand to gain little (economically) from project/firm activity
	0.33 Affected stakeholders can benefit (economically) from project/firm activity, but gains do not outweigh costs
	0.67 Affected stakeholders can benefit from project/firm activity, i.e. benefits outweigh (or perceived to) the costs, at least in the short to medium term
<i>Compensation</i>	1 Project/firm activity is crucial for economic development for local community and/or other stakeholders
	0 No compensation (directly or indirectly) was given to affected stakeholders
	0.33 Compensation given to affected stakeholders was perceived to be insufficient
<i>Consultation</i>	0.67 Compensation given to affected stakeholders perceived to be mostly sufficient
	1 Sufficient compensation was negotiated with and granted to benefit the most affected stakeholders
	0 Firm reported only what was required by law, or shared communications to convince affected stakeholders of merits of project/activity
<i>Social impact</i>	0.33 Firm only consulted affected stakeholders on ad-hoc basis in response to issues/conflict with project/activity
	0.67 Firm shared information about project/activity relevant to affected stakeholders but did not actively incorporate feedback
	1 Firm openly shared information about project/activity relevant to affected stakeholders and adopted feedback
<i>Environmental change</i>	<i>Cultural heritage or social identity impacts</i>
	0 Project/firm activity will have/has minimal to no impact on daily life and valued assets/activities of affected stakeholders
	0.33 Project/firm activity will have/has some impact on daily life and valued assets/activities of affected stakeholders
	0.67 Project/firm activity will have/has impact on self-identification and place attachment for affected stakeholders
	1 Project/firm activity will have/has substantial impact on self-identification and place attachment for affected stakeholders (e.g. forced displacement/resettlement)
	<i>Health impacts</i>
	0 Health/safety impacts of project/firm activity not perceived to be an issue for affected stakeholders
	0.33 Health/safety impacts of project/firm activity are or perceived to be minimal to moderate for affected stakeholders
	0.67 Health/safety impacts of project/firm activity are or perceived to be considerable for affected stakeholders
	1 Health/safety impacts for affected stakeholders are or perceived to be of significant concern for affected stakeholders
	<i>Environmental impacts</i>
	0 Environmental impacts of project/firm activity not perceived to be an issue
	0.33 Environmental impacts of project/firm activity are or perceived to be minimal to moderate
0.67 Environmental impacts of project/firm activity are or perceived to be considerable	
1 Environmental impacts of project/firm activity are or perceived to be of significant concern	
<i>Familiarity of resource use and characteristics of affected assets</i>	
0 Assets affected by project/firm activity already developed and to be used for a similar or familiar purpose	
0.33 Assets affected by project/firm activity already developed and reallocated from a familiar use to an unfamiliar use	
0.67 Assets affected by project/firm activity were previously undeveloped	
1 Assets affected by project/firm activity were previously undeveloped and considered rare/precious	
<i>Well-defined and enforced property rights</i>	0 Assets affected by project/firm activity are largely open access, or customary use and access rights largely ignored, or, jurisdiction is unclear
	0.33 Assets affected by project/firm activity are largely defined as common pool resources and/or the state can/does allocate rights in subsets of these resources
	0.67 Project/firm activity occurs on and affects property that has well-defined and enforced private property rights but impacts also manifest beyond the bounds of the private property
	1 Project/firm activity occurs on and affects property that has well-defined and enforced private property rights
<i>Political opportunities</i>	<i>Development</i>
	0 Project/firm operates in low human development country (score <0.55 on HDI ^a)
	0.33 Project/firm operates in medium human development country (score ≥0.55 & <0.7 HDI)
	0.67 Project/firm operates in high human development country (score ≥0.7 & <0.8 on HDI)
	1 Project/firm operates in very high human development country (score ≥0.8 on HDI)
	<i>Democracy</i>
	0 Project/firm operates under authoritarian regime (score <4 on Democracy Index ^b)
	0.33 Project/firm operates under flawed regime (score ≥4 & <6 on Democracy Index)
	0.67 Project/firm operates under flawed democracy (score ≥6 & <8 on Democracy Index)
	1 Project/firm operates under full democracy (score ≥8 on Democracy Index)
<i>Corruption</i>	
0 No corruption perceived in country where project/firm operates (score of ≥77 on CPI ^c)	
0.33 Limited corruption perceived in country where project/firm operates (score of ≥49 & <77 on CPI)	
0.67 Corruption perceived to be a significant challenge in country where project/firm operates (score of ≥30 & <49 on CPI)	
1 Corruption perceived to be pervasive in country where project/firm operates (score of <30 on CPI)	
<i>Media coverage</i>	0 Little coverage of project/firm activity and impacts on affected stakeholders outside interest groups
	0.33 Some coverage of project/firm activity and impacts on affected stakeholders in (local) mainstream and social media
	0.67 Extensive coverage of project/firm activity and impacts on affected stakeholders in (national and or local) mainstream and social media
<i>Public protests</i>	1 Extensive coverage of project/firm activity and impacts on affected stakeholders in (national and international) mainstream and social media
	0 No notable protests or conflict in response to project/firm activity
	0.33 Online petitions/activism set-up in response to project/firm activity
<i>Private firm ownership</i>	0.67 Peaceful protests in response to project/firm activity
	1 Violent protests resulting in injuries or deaths in response to project/firm activity
	0 Proponent of project/activity is a government or government institution
	0.33 Proponent of project/activity is a government-private partnership or state-owned company
	0.67 Proponent of project/activity is a private firm supported by government
	1 Proponent of project/activity is a private firm

^aUnited Nations Development Programme (2018) Human Development Index; ^bThe Economist Intelligence Unit (2019) Democracy Index; ^cTransparency International (2018) Corruption Perception Index. Note: All conditions are ordered from 0 to 1 where 0 is hypothesized to be associated with the absence of both outcomes and 1 hypothesized to be associated with the presence of both outcomes.

Wostl and Knieper, 2014; van der Heijden, 2015).

3.1. Case study selection

The systematic review of the social licence literature (reported in Dumbrell et al., 2020 and described above) was used to identify case studies for this analysis. Of the 651 documents in the final database, 226 documents were classified as reporting on a case study or multiple case studies. Case studies reported in these 226 documents were selected for analysis using the following inclusion criteria: (1) information was available on the status of a firm or project's social licence; and (2) information was available on the actions undertaken and/or sentiments influencing a social licence. Each case study cited a variety of social and governance characteristics to be linked to social licence outcomes. However, information available to define the social licence status of a firm was not uniform across cases. Following this process 47 case studies were selected for analysis. Details of cases are listed alphabetically by country in Table A1 in the Appendix.

As noted by Dumbrell et al. (2020), the majority of social licence research to date focuses on mining case studies from resource-rich countries and this is also reflected in the case studies selected for this analysis. Peru was the most common location (six cases); followed by Australia (five cases) and Canada (four cases); with mining the most common industry examined (Table A1 in the Appendix). The majority of cases (36 out of 47) reported on instances where a social licence was under threat or had been withheld or withdrawn. This is likely a reflection of the ease with which researchers can identify and report that a social licence has been lost—compared to the alternative scenario of it being gained (Lacey et al., 2012). This also shows a reflection of interest by researchers in cases where a social licence is threatened or lost as an indicator of substantial environmental or social costs with consequences for multiple parties, including policy-makers.

3.2. Fuzzy-set QCA calibration methodology

Fuzzy-set QCA, based on fuzzy-set theory (Zadeh, 1965), was used instead of crisp-set QCA. The advantages of adopting fuzzy-set QCA include the ability to configure conditions based on partial membership of a condition or outcome set, i.e. it allows the use of non-binary conditions and outcomes unlike crisp-set QCA (Roig-Tierno et al., 2017). Fuzzy-set QCA also allows researchers to draw on a wide and non-uniform range of evidence to score conditions and outcomes for case studies (Ragin, 2008b).

Conditions and outcomes were measured by qualitative data, converted into quantitative data for the fuzzy-set QCA by a content analysis. With access to (in some cases) substantial information about each case study, and the variable nature of the evidence and reporting of evidence across cases, fuzzy-set calibration using four-value membership scores was used (Ragin, 2008b). The four possible values of 0, 0.33, 0.67 and 1 represent the following set relationships: 0 = fully out of the relevant set; 0.33 = more out than in the relevant set; 0.67 = more in than out of the relevant set; and 1 = fully in the relevant set. The same four-value set membership scale was used for the conditions and outcomes of interest. Scoring and calibrating the qualitative case study evidence to fit this membership structure was an iterative process and guided closely by the theorized relationships and the literature. All scoring decisions were made by one person to ensure consistency. Examples of scoring decisions are included in Table S2 in the supplementary materials.

3.2.1. Defining conditions and outcomes

As previously mentioned (Table 1), based on the literature review, ten conditions were selected to be tested for associations with social licence and firm behavior outcomes. The conditions included: *Economic benefits*; *Compensation*; *Consultation*; *Social impacts*; *Environmental change*; *Well-defined and enforced private property rights*; *Political opportunities*; *Media coverage*; *Public protests*; and *Private firm ownership*. Table 2 lists

Table 3

Operationalization and calibrated scores for the outcomes of a loss of social licence and a change in behavior/regulation.

Outcome	Definition of outcome scores	
1. <i>Loss of social licence</i>	0	Project/firm has gained and maintained a high level of social licence (approval)
	0.33	Project/firm has gained and maintained a low level of social licence (acceptance)
	0.67	Project/firm's social licence threatened
	1	Project/firm lost or never obtained a social licence
2. <i>Change in behavior/regulation</i>	0	Project went ahead/firm activity continued
	0.33	Project/firm activity went ahead with adoption of minor changes
	0.67	Firm's activity was scaled back or, project was mothballed/delayed
	1	Regulatory change occurred such that the project/firm activity was no longer permitted or firm/s stopped project/activity

the ten conditions and defines the four levels of set membership for each condition. Three of the ten conditions were composite conditions with the sub-conditions combined as described below.

Following the procedure outlined in Ragin (2000), the sub-conditions for the *environmental change* and *social impact* (Table 2) conditions were joined by keeping the higher of the two sub-condition scores for each case study. The *political opportunities* condition used in the analysis was a composite of membership of the following sets: a developed country (as per United Nations Development Programme, 2018); a democratic country (as per The Economist Intelligence Unit, 2019); and a country perceived to be relatively free from corruption (as per Transparency International, 2018). Data to classify countries into the four-level set membership structure were quantitative indices. However, the indices also had 'qualitative' descriptors to section the indices into four levels, which aided the calibration of the data (Table 2). The composite *political opportunities* condition (i.e. combination of development, democracy and corruption sets), was created by joining development and democracy to the highest score and corruption to the lowest score. This was done as countries classified as being highly developed and democratic, with minimal to no corruption were hypothesized to represent greater political opportunities for stakeholders to express their acceptance or resistance of a firm's activities.

The outcome sets were constructed, scored and calibrated in a similar way to the conditions. It is recognized that social licence status is not binary (Prno, 2013). Indeed, the social licence status of firms are often described as: gained/maintained at either the 'acceptance' or 'approval' level as per the Thomson and Boutilier (2011) model; under threat or being challenged/questioned; and lost or never obtained. These statuses then naturally lend themselves to a four-level membership calibration process for the *loss of social licence* outcome (Table 3). Alongside social licence status, a second outcome was analyzed: *change in behavior/regulation*. When the loss of a social licence is framed as a risk management issue for firms (Cooney, 2017), it infers that there is an incentive to maintain a social licence, and therefore an incentive to change business practices, e.g. go beyond compliance (Gunningham et al., 2004). In addition, Lynch-Wood and Williamson (2007) find that social licence is a form of informal regulation on firms, requiring alignment of behavior with expectations. Building on this, Dumbrell et al. (2020) further elicited some of the potential pathways social licence (as an informal regulation) can induce regulatory change. To capture this regulatory change was established as the most extreme form of behavior change (as firms would be forced to change rather than choose to change) in the four-level outcome set (Table 3).

3.3. Data analysis

As recommended by Schneider and Wagemann (2010), the first step of the analysis was to identify if any of the conditions in Table 2 were

necessary to generate the two outcomes of interest displayed in Table 3: (1) loss or gain of a social licence; and (2) behavior or regulatory change. The outcome *loss of social licence* was treated as a condition in the analysis of whether firms changed their behavior or regulatory change occurred. The necessary condition analysis was run for all possible outcomes because fuzzy-set QCA assumes asymmetry, that is, the absence of a necessary condition such as *loss of social licence* or *private firm ownership* for the outcome *change in behavior/regulation* cannot be assumed to lead to the absence of the outcome. A condition is deemed necessary, if, whenever the outcome is present, the condition is also present (Ragin, 2008a).

Following Goertz (2006) and Ma’Mun et al. (2020), 2 by 2 tables were created to identify sufficiency effects of the conditions. Along with this approach, a standard truth table analysis was used to identify configurations of the conditions that could be classed as sufficient for generating the outcomes of interest. Each row of a truth table contains one logically possible combination of conditions that may (or may not) be sufficient for an outcome. A condition is deemed sufficient if, whenever it is present across cases, the outcome is also present (Ragin, 2008a). For each assessment of necessary conditions and the truth table analyses, the coefficients of consistency and coverage were examined (and reported with results). These coefficients represent a numeric expression for how well the logical statement contained in the QCA solution term fits the underlying empirical evidence and how much it can explain (Schneider and Wagemann, 2010). While there is no agreed threshold value for consistency and coverage coefficients, and generally lower values are more acceptable in fuzzy-set QCA (such as that used here), Ragin (2008b) was followed in interpreting consistency values lower than 0.75 as showing significant inconsistency. For this reason, a demanding consistency threshold of ≥ 0.9 was adopted (Skaaning, 2011). Additionally, the frequency cut-off (to determine which combinations of conditions were relevant) was set to 1.

The hypothesized set of conditions (solution term) associated with the loss of a social licence, and voluntary behavior change, or regulatory change is detailed in Equations 1 and 2 respectively. The conditions and outcomes in these equations are defined in Tables 2 and 3.

The notation used in Equations 1 and 2 and the results tables (to follow) is based on Boolean logic: (*) indicates logical AND which joins conditions to the highest score; (+) indicates logical OR which joins conditions to the lowest score; (~) indicates negation or absence of a condition (or outcome); and (→) indicates sufficient for.

$$\sim\text{Economic benefits} * \sim\text{Compensation} * \sim\text{Consultation} * \text{Social impacts} * \text{Environmental change} * \sim\text{Well defined and enforced property rights} * \text{Political opportunities} * \text{Media coverage} * \text{Public protests} \rightarrow \text{Loss of social licence} \quad (1)$$

$$\text{Loss of social licence} * \text{Private firm ownership} \rightarrow \text{Change in behavior/regulation} \quad (2)$$

Sensitivity analyses were conducted on results. This additional

testing consisted of including/excluding conditions and various case combinations in the analysis (Thiem et al., 2016). Following this, it was checked whether the results hold for cases regardless of: the state of development of the country; the *political opportunities* of affected stakeholders; and the industry application e.g. mining vs non-mining. Analyses also explored whether *media coverage* and *public protests* were potentially interdependent with other conditions, and explored in close detail the role of *compensation* (as defined in Table 2) as associated with the outcome *change in behavior/regulation*.

All analyses were conducted using fs/QCA v3.0 (Ragin and Davey, 2017).

4. Results

No conditions were found to be necessary for a *loss of social licence* at the consistency threshold ≥ 0.9 (Table 4). Despite this, the generally high consistency and coverage scores for some conditions, such as *media coverage*, indicated the conditions analyzed were important drivers of the outcome (Table 4). Both *loss of social licence* and *private firm ownership* were necessary conditions for a *change in behavior/regulation* (Table 4). That is, in every case where the outcome (*change in behavior/regulation*) was present, both of these conditions were also present. Necessary conditions for gaining or maintaining a social licence (\sim *loss of social licence*) and firms not changing their behavior voluntarily or via regulatory reform (\sim *change in behavior/regulation*) were also tested. No conditions passed the ≥ 0.9 consistency threshold for either of these outcomes. Note, Table 4 presents the most relevant results of the analysis for necessary conditions and all results are in the supplementary materials.

Sufficiency effects were explored for the two necessary conditions for *change in behavior/regulation* and the conditions that had relatively high (>0.8) consistency scores for *loss of social licence*. This analysis indicated that wherever *economic benefits* and *consultation* were lacking, the firm’s social licence was under threat or lost (Table 5). In addition, in every case where extensive *media coverage* was present, the firm’s social licence was under threat or lost (Table 5). This indicates that *media coverage* is a sufficient condition for *loss of social licence*. Interestingly, in every case where the outcome *loss of social licence* was absent (i.e. a social licence was maintained) there was also substantial environmental change reported. Rather than interpreting this as an indication that environmental change is associated with maintaining a social licence, it is likely a reflection that the majority of cases included in the analysis (42 out of 47 cases) reported substantial environmental change (a consequence of the issues that attract social licence concern). In every case where scores for *loss of social licence* and *private firm ownership* were 0 or 0.33, firms did not voluntarily change their behaviour, nor were they forced by regulatory change (Table 5). This finding indicates that neither condition is sufficient for *change in behavior/regulation*. Collectively this set of results indicates no unique pathway for *loss of social*

Table 4
Analysis of necessary conditions for *loss of social licence* and *change in behavior/regulation*.

Condition	Consistency	Coverage	Condition	Consistency	Coverage
<i>OUTCOME 1: Loss of social licence</i>			<i>OUTCOME 1: \simLoss of social licence</i>		
\sim Economic benefits	0.57	0.88	Economic impacts	0.87	0.56
\sim Compensation	0.78	0.77	Compensation	0.63	0.64
\sim Consultation	0.83	0.90	Consultation	0.85	0.75
Social impacts	0.75	0.77	\sim Social impacts	0.65	0.61
Environmental change	0.83	0.75	\sim Environmental change	0.55	0.66
\sim Well-defined & enforced property rights	0.78	0.76	Well defined & enforced property rights	0.61	0.63
Political opportunities	0.59	0.44	\sim Political opportunities	0.53	0.68
Media coverage	0.87	0.80	\sim Media coverage	0.65	0.75
Public protests	0.79	0.85	\sim Public protests	0.78	0.70
<i>OUTCOME 2: Change in behavior/regulation</i>			<i>OUTCOME 2: \simChange in behavior/regulation</i>		
Loss of social licence	0.94	0.52	\sim Loss of social licence	0.55	0.94
Private firm ownership	0.90	0.35	\sim Private firm ownership	0.14	0.72

Note: Conditions are defined in Table 2 and outcomes are defined in Table 3. Notation “ \sim ” is used to indicate negation (or absence).

Table 5
Cross tabulation of outcomes against selected conditions. Numbers are number of case studies (n = 47).

OUTCOME 1: Loss of social licence		
	~Economic benefits	Economic benefits
Loss of social licence	15	21
~Loss of social licence	0	11
	~Consultation	Consultation
Loss of social licence	30	6
~Loss of social licence	0	11
	Media coverage	~Media coverage
Loss of social licence	31	5
~Loss of social licence	0	11
	~Environmental change	Environmental change
Loss of social licence	5	31
~Loss of social licence	0	11
OUTCOME 2: Change in behavior/regulation		
	~Loss of social licence	Loss of social licence
Change in firm behavior/regulation	0	12
~Change in firm behavior/regulation	11	24
	~Private firm ownership	Private firm ownership
Change in firm behavior/regulation	0	12
~Change in firm behavior/regulation	6	29

Notes: Conditions are defined in Table 2 and outcomes are defined in Table 3. Notation “~” is used to indicate negation (or absence). For this table, fuzzy-set condition and outcome scores were grouped such that a condition or outcome with a score of 0 or 0.33 was classed as absent in a case study, and a score of 0.67 or 1 indicated a condition or outcome was present for the case study.

licence or change in behavior/regulation based on the conditions used in this analysis, and this was backed up by a fuzzy-set truth table analysis. However, the 2 by 2 tables (Table 5) indicate scope for a unique solution pathway for maintaining a social licence (~loss of social licence). This was explored using a standard fuzzy-set truth table analysis and the results are presented in Table 6.

Two intermediate solutions were identified. First, adequate economic benefits (benefits that outweigh costs), combined with adequate compensation and the absence of widespread media coverage and lack of public protests was sufficient for a social licence to be maintained. Second, a social licence was maintained in cases where substantial and

Table 6
Solution pathways for maintaining a social licence (~loss of social licence).

Intermediate solution pathways	Cases covered
Economic benefits*Consultation* ~Media coverage*~Public protests	cs7, cs10, cs15, cs16, cs27, cs29, cs36, cs41, cs43
Consistency 0.97 Raw coverage 0.52 Unique coverage 0.04	
Economic benefits* Consultation* ~Media coverage*~Well-defined & enforced property rights	cs10, cs15, cs16, cs19, cs20, cs27, cs29, cs36, cs41, cs43
Consistency 0.90 Raw coverage 0.52 Unique coverage 0.04	
Intermediate solution formula Economic benefits*Consultation*~Media coverage*(~Public protests + ~Well-defined & enforced property rights) → ~Loss of social licence	
Solution consistency 0.91 Solution coverage 0.56	
Parsimonious solution formula Consultation*~Media coverage → ~Loss of social licence	
Solution consistency 0.92 Solution coverage 0.60	

Note: Conditions are defined in Table 2 and outcomes are defined in Table 3. Notation “~” is used to indicate negation (or absence). All case studies are listed in Table A1 in the Appendix.

potentially violent public protests were present, so long as the other conditions mentioned in the previous sentence were present (i.e. economic benefits and consultation) and the affected resources do not have well-defined and enforced property rights. The parsimonious solution (Table 6) shows that adequate consultation combined with the absence of widespread media coverage was sufficient to maintain a social licence in each of the 11 cases where a social licence was not lost nor threatened (a list of these cases is in Table A1 in the Appendix). The important role of the absence of well-defined and enforced property rights is notable. It is likely a reflection of the types of issues that attract attention and become labelled as social licence issues, as well as who is accountable to address concerns. This point is returned to in the discussion.

The analyses reported in Table 6 largely hold regardless of sub-sets of cases included in the analysis. Economic benefits, combined with consultation, and minimal media coverage, and absence of well-defined and enforced private property rights and/or public protests were sufficient to maintain a social licence regardless of political opportunities. When restricted to mining case studies (the majority of case studies included in the analysis) the importance of public protests falls away. When cases were restricted to non-mining, the lack of public protests returns to the solution pathway, while at the same time the consistency score drops to 0.86. Results of the sensitivity analyses are included in Table S11 in the supplementary materials.

Additional to the robustness of the solution pathway, the influence of different conditions was also explored. The analysis was repeated with media coverage and public protests excluded and the intermediate solution pathways hold, though the consistency score drops slightly. The compensation condition was embodied in the loss of social licence condition when the second outcome change in behavior/regulation was explored in the main analysis. Whereas, in the sensitivity analysis it was examined as a stand-alone condition associated with change in behavior/regulation. There was only one case where a firm significantly changed their behavior despite sufficient compensation also being paid. The necessity for the lack of compensation (~compensation) for change in behavior/regulation was evidenced by a consistency score of 0.92. This indicates that adequate compensation may be an alternative to changing behavior from ‘business-as-usual’ to get stakeholder acceptance. In other words, stakeholders may be willing to accept a certain level of compensation in order to tolerate costs such as pollution associated with a firm’s activities.

5. Discussion

The findings in this article suggest a combination of five conditions were sufficient to gain/maintain a social licence. These conditions were: (1) delivery (or perception) of net economic benefits beyond the firm; (2) adequate stakeholder consultation; (3) absence of widespread media coverage; (4) minimal public protests; and/or (5) absence of well-defined and enforced private property rights. Further, the opposite scenario (e.g. lack of consultation or presence of much media coverage) is not sufficient for a social licence to be considered under threat or lost. Against a backdrop of social licence research that largely focuses on one industry or firm, this research shows the same combination of conditions as sufficient to gain/maintain a social licence across different natural resource dependent industries.

The results support a number of findings in the existing literature, including that economic legitimacy is important for gaining and maintaining a social licence (Thomson and Boutilier, 2011). However, these results also show that there are occasions and contexts where stakeholders’ willingness to accept economic benefits is insufficient to offset all (environmental or social) costs they experience (e.g. Bradshaw and Waite, 2017; de Jong and Humphreys, 2016). In the language of Coase (1960), these results indicate that stakeholders’ willingness to tolerate social costs is contingent on the compensation provided but, identifying the level at which this trade-off will occur is not easy. The multiple conditions found to be sufficient for a social licence when combined

with *economic benefits* suggests there are incentives for firms to go beyond economic legitimacy and invest in higher levels of social licence as per the Thomson and Boutilier (2011) hierarchical model. The results also add weight to the growing body of research that details the importance of *consultation* in underpinning a social licence (e.g. Cor-scadden et al., 2012; Mercer-Mapstone et al., 2017; Walsh et al., 2017). Likewise, the important role of *media coverage*, as an indicator of community interest, identified in this research supports the social licence model developed by Lynch-Wood and Williamson (2007). The important role of *media coverage* and *consultation* could also reflect information asymmetry problems that plague social licence issues, as well as the importance of governance arrangements that stipulate or allow for these conditions to be influential.

Additionally, while firms have some agency over the degree to which they share the *economic benefits* of their pursuits with affected stakeholders, either through local employment opportunities or benefit sharing agreements, not all conditions affecting a firm's social licence are within their control. For example, *well-defined and enforced property rights* (i.e. property rights with clear boundaries coupled with pathways to punish or dissuade misuse of property) were not present in most cases (10 out of 11 cases) where a social licence was maintained. This result is likely a reflection of the issues that are labelled as social licence issues. For example, Dumbrell et al. (2020) identified that social licence issues arise where there are concerns about the use of socially valuable assets for private gain, regardless of the property rights held in those assets. However, the result also indicates that institutions that allocate and enforce property rights are also critical to the mediation of any social licence concerns. Additionally, while *political opportunities*, inclusive of the status of human development and democracy and perception of corruption in a country (as defined by Kirchherr et al., 2016), were not necessary or sufficient to gain or maintain a social licence, the results of the sensitivity analysis emphasized that *political opportunities* can influence the pathway for gaining/maintaining a social licence. For example, cases in developing countries with a greater incidence of corruption report relatively more violent protests before intervention or change to a firm's activities (e.g. cases 8 and 28 in Appendix 1 and de Jong and Humphreys, 2016; Faruque, 2018). This result appears to support the findings from Ide (2015) and Ide et al. (2020) that violent protests emerge in cases where high power differences, low institutional/governance strength and political change exist.

Further to the results discussed above, the loss of a social licence (or threats to it) was also found to be necessary but not sufficient to push firms to voluntarily change behavior or governments to change regulations to align with stakeholder and societal expectations (a result also found by Lynch-Wood and Williamson, 2007). This is noteworthy as Dumbrell et al. (2020) describe the action of withholding or withdrawing a social licence as a mechanism to demand firms change behavior or governments shift regulations or policies to enhance social welfare outcomes. In addition, Boutilier (2014) highlighted that interest in the social licence status of a firm is a product of the power of stakeholders to shift a firm's behavior to align with their expectations. While this analysis did not identify the conditions additional to the loss of a social licence that would achieve firm behavior or regulatory change, it will be important for affected stakeholders to identify them in order to demand improved environmental or social outcomes.

A potential explanation for only few cases reporting a regulatory change in response to social licence pressure could be related to the scope of public decision-makers (i.e. governments). Regulatory changes occur at national or state levels whereas social licence often operates at firm or local community levels. The withdrawal of a social licence may reflect the local impacts of a firm's activities but the decision to change regulations should depend on net welfare at a local, national or trans-boundary level. Despite this, it must be noted that information used in this assessment represents a snapshot in time. For some case studies it was possible to access a long timeline of events and information on the time lag between changes to social licence and changes to firm behavior

and regulatory change (e.g. Chailleux et al., 2018; Hoffman et al., 2015; Langbroek and Vanclay, 2012). A social licence reported as being under threat at one point in time but not leading to voluntary behavior change or regulation change may not never lead to these outcomes. Instead, it may represent an early indication that changes may be needed in the future to maintain profitability or achieve other objectives of interest.

The extent conclusions can be drawn from this work is determined by the types of cases included, and for which the results hold. First, the analysis was conducted for cases studies written about in the (English language) literature. With this there is also a bias toward cases for which the social licence was classed as being under threat or lost, as it is distinctly easier to identify cases without a social licence than those with. Further, the majority of cases included in the analysis report significant environmental impacts (or perceptions of). This is likely a reflection of the focus on environmental issues at the origin of social licence terminology and therefore ongoing research focus on this subject (Cooney, 2017; Dumbrell et al., 2020). Repeat analyses could benefit from following cases with different social licence outcomes over time (e.g. gained and then lost) and including more cases that report on firms that have not lost their social licence.

Regardless of the above limitations, the results detailed in this article indicate that governance and institutional arrangements are critical for social licence outcomes (a result also found by others, e.g. Jartti et al., 2020; Lehtonen et al., 2020). But, even with strong governance and institutional arrangements, social licence pressure is insufficient to deliver improved social and environmental outcomes. Changing firm behavior will also likely require other actions such as direct regulation or market-based instruments (van Putten et al., 2018). In addition, this research emphasizes that the strength of property rights and institutions in a country plays a critical role in supporting any change underpinned by social licence pressure.

6. Conclusion

This article reports a fuzzy-set qualitative comparative analysis used to identify associations between a set of ten conditions (hypothesized as important based on relationships set out in the literature), and social licence outcomes and firm behavior change across 47 case studies and 25 countries. The analysis identified that no one condition alone was necessary or sufficient to produce particular social licence outcomes, highlighting that social licence outcomes are complex, and often case specific. However, across natural resource dependent industries, a combination of five conditions created a robust pathway for maintaining a social licence, including: (1) delivery (or perception) of net *economic benefits* beyond the firm; (2) adequate stakeholder *consultation*; (3) minimal *media coverage*; (4) minimal *public protests*; and/or (5) absence of *well-defined and enforced private property rights*. This highlights that social licence outcomes are a product of: (1) conditions that are within the control of a firm; and (2) structural conditions and social norms beyond the operation of a firm. With this, future research exploring conditions underpinning social licence concerns and identifying potential responses will benefit from consciously framing both issues and potential responses in terms of conditions within a firm's control (e.g. consultation strategy) and conditions outside the firm's control (e.g. governance structures, institutional arrangements). Stakeholders and firms engaged in efforts to mediate social licence outcomes will also benefit from understanding that a number of conditions and actors have influence over social licence outcomes. Additionally, this research indicated that the loss of a social licence was necessary but not sufficient to make firms change their behavior (to correct social and environmental externalities). However, this result could be an indication that a time lag exists between the loss of a social licence and voluntary firm behavior change, and between the loss of a social licence and regulatory change. Regardless, this result indicates there could be negative consequences for stakeholders of increasingly shifting toward the use of the social licence mechanism as a form of natural resource governance if

other governance structures are not also in place.

CRedit authorship contribution statement

Nikki P. Dumbrell: Conceptualization, Formal analysis, Investigation, Data curation, Writing – original draft, Writing - review & editing. **David Adamson:** Conceptualization, Supervision, Writing - review & editing. **Alec Zuo:** Conceptualization, Supervision, Writing - review & editing. **Sarah Ann Wheeler:** Conceptualization, Supervision, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Table A1

Case studies included in analysis.

No.	Location and or development name	Industry/issue	Social licence status
1	Bajo De La Alumbrera, Argentina	Mining (minerals)	Gained then lost
2	New South Wales, Australia	Mining (coal seam gas)	Threatened
3	New South Wales and Queensland, Australia	Agriculture (cotton cropping)	Threatened
4	Queensland, Australia	Mining (coal seam gas)	Threatened
5	Murray-Darling Basin, Australia	Agriculture (re-negotiation of water rights with irrigators)	Threatened
6	Tasmania, Australia	Aquaculture	Threatened
7	Bangladesh	Agriculture (genetically modified crops – Bt Brinjal)	Gained
8	Phulbari coal mine, Bangladesh	Mining (coal)	Lost
9	Bento Rodrigues, Brazil	Samreco Fundão tailings dam collapse	Lost
10	Canaã dos Carajás, Brazil	Mining (iron ore)	Gained
11	Alberta and British Columbia, Canada	Infrastructure (gas pipeline)	Never obtained
12	Canada	Wildlife harvesting (seals)	Threatened
13	Manitoba, Canada	Renewable energy (hydropower)	Threatened
14	Pictou County, Nova Scotia, Canada	Pulp mill	Threatened
15	El Morro, Colombia	Mining (oil)	Gained
16	Kittilä, Finland	Mining (gold)	Gained
17	France	Mining (unconventional oil and gas)	Lost
18	Svaneti region, Georgia	Renewable energy (hydropower)	Lost
19	Birim North District, Ghana	Mining (gold)	Gained
20	San Juan Sacatepéquez, Guatemala	Mineral quarry and processing plant for cement production	Gained
21	Bangka Island, Indonesia	Mining (tin)	Never obtained
22	Malaysia	Rare Earth Elements Processing	Threatened
23	Urk, The Netherlands	Renewable energy (offshore wind farm)	Threatened
24	Groningen gas field, The Netherlands	Mining (unconventional oil and gas)	Threatened
25	Niger Delta, Nigeria	Mining (oil and gas)	Threatened
26	Kautokeino, Northern Norway	Mining (gold and copper)	Threatened
27	Kvalsund, Northern Norway	Mining (copper)	Gained
28	Bagua tragedy, Peru	Natural resource exploitation in Amazon	Lost
29	Cajamarca district, Peru	Mining (copper, gold and silver)	Gained
30	Espinar Province, Peru	Mining (copper)	Threatened
31	Minas Conga, Peru	Mining (gold and copper)	Lost
32	Puno Province, Peru	Mining (silver)	Threatened
33	Tambogrande, Piura Province, Peru	Mining (copper, gold and zinc)	Never obtained
34	Rosia Montana Gold, Romania	Mining (gold)	Never obtained
35	Mumsarak, Russia	Phosphorous fertilizer manufacturing (and associated infrastructure)	Threatened
36	Mumsarak, Russia	Mining (phosphorous)	Gained
37	Jagersfontein mines, South Africa	Mining (diamonds)	Threatened
38	Kumba Iron Ore, South Africa	Mining (iron ore)	Threatened
39	Xolobeni Mineral Sands Project, South Africa	Mining (mineral sands)	Lost
40	Barcelona, Spain	Infrastructure (railway extension)	Threatened
41	Svappavaara, Sweden	Mining (iron ore)	Gained
42	Bulyanhulu mine, Tanzania	Mining (gold)	Threatened
43	Buzwagi mine, Tanzania	Mining (gold)	Gained
44	North Mara mine, Tanzania	Mining (gold)	Threatened
45	Uganda	Plantation forestry	Threatened
46	Lancashire, United Kingdom	Mining (shale gas)	Threatened
47	Fray Bentos, Uruguay (border with Argentina)	Pulp mill	Threatened

Note: References to documents reporting on each of the case studies as identified in the systematic review are included in Table S1 in the supplementary materials.

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Appendix A. Case study information

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gloenvcha.2021.102355>.

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