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Social License to Operate in the Aquaculture Industry: A Community-Focused Framework

**US DEPARTMENT OF COMMERCE
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Social License to Operate in the Aquaculture Industry: A Community-Focused Framework

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ABSTRACT

With aquaculture development becoming increasingly important in meeting global food needs, understanding social barriers to development is essential. Social license to operate (SLO), a concept that describes community acceptance and approval of incoming industry, offers a lens for better understanding these barriers and an opportunity to identify strategies for successful development. While this concept has recently gained traction within the aquaculture industry, it remains poorly understood. Efforts to measure and predict social license have begun, but these efforts primarily focus on company actions and impacts. This study seeks to expand the utility of social license within the aquaculture sector by developing a preliminary quantitative framework that can predict a community's willingness to issue SLO prior to siting. Using social acceptability research, I identify 7 themes that have been empirically shown to predict public approval: environmental values, economic values, use-conflict, knowledge of aquaculture, experience with aquaculture, confidence in government, and perceptions of safety. Situating these themes within a tested path model of social license, it is clear that they operate through trust—a central component of SLO. Specifically, the framework presented positions community characteristics as moderators between company actions and SLO. Based on these indicators, certain communities are found to be more or less likely to be willing to trust incoming companies, and thus SLO-generating actions will be more or less effective depending on community receptivity.

1. INTRODUCTION

As climate change and overharvesting threaten natural fish stocks and the world's population approaches 9 billion, marine aquaculture is becoming critically important in world food production (FAO 2018). Capture fishery production has remained stagnant since the 1980's even while demand for seafood rises. Thus, aquaculture has been the primary driver of growth in the supply of fish for human consumption (FAO 2018). Currently, over 50% of all seafood consumed is farmed, and that percentage is predicted to increase (Aquaculture 2020). The United States is the second largest market for fish and fish products but only produces about \$1 billion worth of aquaculture products annually, ranking 16th globally in production (FAO 2018; WHOI 2007; NMFS 2018). However, with its long coastline, large Marine Exclusive Economic Zone, and skilled labor force, the U.S. has vast potential for expansion (FAO 2013). With clear opportunities for growth, the Department of Commerce has called for the development of an aquaculture industry worth \$5 billion by 2025.

To foster this growth, research institutions have been putting considerable effort into developing ways to improve and increase production, streamline regulatory processes, and identify potential sites (e.g., the National Aquamapper). However, one major barrier to growth that has been neglected involves public perception, a problem situated squarely within the social sciences (Leith et al. 2014; Cullen-Knox et al. 2017; Krause et al. 2020). Local resistance to aquaculture has been well documented and can present insurmountable barriers to development (Young and Matthew 2010; Bacher 2015; Anderson 2013; Hargreaves 2017; Alexander et al. 2018; Flaherty et al. 2018). A community may be situated on a section of coastline ideal for aquaculture production biologically, but without community approval and support, companies may never progress beyond the planning stage.

Social license to operate (SLO), a concept used in resource extraction industries, has recently emerged within the aquaculture literature to address the importance of the social relationship between industry and community (Mather and Fanning 2019). Although scholars have presented varying definitions, SLO has broadly been described as the informal, ongoing approval or acceptance of a project granted by communities (Joyce and Thomson 2000; Thomson and Boutilier 2011; Lacey et al. 2012). Communities can be powerful actors in the development of shared resources. They have the ability to create delays in operation, pressure governing bodies into tightening regulations, and even influence consumer purchasing preferences—all of which produce real economic costs to companies (Lacey et al. 2012; Prno and Slocombe 2012; Franks et al. 2014; Moffat et al. 2014; Moffat et al. 2016). By securing and maintaining community approval, companies are less likely to encounter resistance (Moffat et al. 2016). Thus, securing SLO is essential to the development of the aquaculture industry.

However, the meaning of SLO varies by industry and remains vaguely defined (Hall et al. 2014, Dowd & James 2014; Moffat et al. 2016). Scholars have only scratched the surface of SLO as it applies to aquaculture, and researchers point out the need for a conceptual model specific to aquaculture so SLO can be quantitatively measured (Mathers and Fanning 2019). While efforts to create such a model have begun (Sinner et al. 2020), gaps remain. A key element missing to both widely accepted models of SLO in mining and preliminary models of SLO within aquaculture is community context. This paper seeks to address this gap.

Consistent and clearly defined measures can help researchers, industry, communities, and regulatory agencies better understand the conditions that encourage or hinder the development of

SLO, which is key to fostering growth within the wider industry. As pointed out by Mather and Fanning (2019), while the research on social license within aquaculture is limited, there is vast literature on the social acceptability of aquaculture. Researchers have studied public perception on varying scales in places across the globe. This research, in addition to the literature addressing SLO across several industries, will inform the construction of a quantitative model that assesses the likelihood of the development of SLO. However, rather than focusing solely on company actions and impacts, as is the case with existing models, this paper identifies potential indicators related to community context that influence the likelihood of SLO issuance. While further research is needed for empirical validation, this model offers a starting point for the development of a consistent measurement that includes a community context perspective, thus advancing our understanding of what constitutes SLO as it applies to the aquaculture sector.

2. METHODS AND APPROACH

2.1 Literature Selection Process

This paper and the resulting framework is based on a compilation of 3 comprehensive literature reviews. The first review (Review 1) included key works on SLO as applied to several resource industries. Beginning with highly cited, canonical texts on SLO within the mining industry—where the concept has been most thoroughly investigated—I then broadened the scope to include the literature applying SLO to forestry, agriculture, and the marine sector (see Kelly et al. 2017). This breadth allowed for a more comprehensive understanding of SLO and illuminated key conceptual consistencies across industries.

The second review (Review 2) focused on SLO as it applies to aquaculture. In a manner similar to that of Kelly et al.'s (2017) review of SLO in the marine sector, I performed a systematic search of the literature using 3 online search engines: Academic Search Complete, Web of Science, and ProQuest (see Figure 1). I performed 2 queries within each database, one using the search terms “social license” and “aquaculture,” and a second using the alternative spelling “licence.”

Following the initial search, I then reviewed the list of results for relevance using article abstracts. In cases where relevance remained unclear after reviewing the abstract, I reviewed the full text. The final list included articles where social license was a central analytical theme or frame as applied to the aquaculture industry. Discarded articles included texts where authors would reference a company or industry’s “social license” without expansion or analysis. The use of SLO in this regard affirms a major critique of the concept—mainly that it is frequently deployed but lacks analytical substance (Owen and Kemp 2013). See Figure 1 for a visual representation of the review process. Table 1 provides a summary of papers included in the final review.

The third review (Review 3) in this report investigated the extant literature on public perception and social acceptability of aquaculture. Utilizing the same systematic process used to compile articles for the SLO in aquaculture review, I performed 2 queries within the 3 online databases. The first query included the search terms “public perception” and “aquaculture” and resulted in a list of 108 items. In the second query, I used “social acceptability” and “aquaculture” resulting in 82 items. After reviewing the article abstracts for relevance and removing duplicates, the final list for review included 44 items. Figure 2 provides a visualization of this process.

While all 44 documents were reviewed in their entirety, for the purposes of this review, I focused on articles that included empirical public perception surveys (n=26) as identified in Table 2. By focusing on survey results, I was better able to systematically search for patterns that would

illuminate community characteristics that are consistently associated with support of or opposition to the aquaculture industry. The themes identified are explored in detail in Section 4.

2.2 Analytical Approach

Using the texts compiled as a result of Review 1, I was able to first establish a basic foundation of SLO conceptually and distinguish key components of SLO that appear to be universal across industries. Additionally, I was able to review any existing quantitative models pertaining to SLO in mining in order to assess their applicability to the aquaculture industry and determine whether they could inform a community-suitability framework. Review 2 was narrower in focus and provided valuable insight into how SLO has been applied to the aquaculture industry to date. However, considering this pocket of research remains in its infancy, significant gaps remain. While researchers have highlighted the importance of company actions in securing social license, they have yet to define concrete measures that can predict whether a community is more or less likely to issue social license, independent of company actions.

Review 3 was conducted in an attempt to fill this gap. Though I reviewed both qualitative and quantitative studies, by focusing on survey research, I was able to identify several commonly addressed themes and systematically compare results. I created a table containing survey scale, methods, and results. Results were then grouped by theme. This process allowed me to identify patterns within each theme, which are described in detail in Section 4. Collating results from the 3 reviews, I created a list of indicators that are key to community willingness to issue SLO. A visualization of the review process is shown in Figure 3.

3. SOCIAL LICENSE TO OPERATE: AN OVERVIEW

The term “social license to operate” emerged in the mining industry in the 1990s in an effort to highlight the importance of community-industry relationships in mitigating risk (Gunningham et al. 2004; Thomson and Boutilier 2011; Lacey, Parsons and Moffat 2012; Dowd and James 2014; Moffat et al. 2016; Baines and Edwards 2018). Although scholars have presented varying definitions, SLO has broadly been described as the informal, ongoing approval or acceptance of a project granted by communities (Joyce and Thomson 2000; Thomson and Boutilier 2011; Lacey et al. 2012). Within the mining sector, regulatory compliance alone had become increasingly insufficient as companies began seeking social approval from host communities to reduce the risk of costly social conflicts that frequently occur with resource development projects (Gunningham et al. 2004; Parsons and Moffat 2012; Prno and Slocombe 2012; Prno 2013; Moffat and Zhang 2014; Cullen-Knox et al. 2017). Researchers have documented wide-ranging negative effects resulting from unmet community expectations and demands. Through a variety of mechanisms, communities have the ability to create delays in operation, pressure governing bodies into tightening regulations, and even influence consumer purchasing preferences—all of which produce real economic costs to corporations (Gunningham et al. 2004; Lacey et al. 2012; Thomson and Boutilier 2011; Prno and Slocombe 2012; Franks et al. 2014; Moffat et al. 2015; Moffat et al. 2016). By securing and maintaining community approval, companies are able to proceed with operations with fewer encumbrances (Moffat et al. 2016).

However, companies are not the only party benefiting from the establishment of SLO—when granted, often both companies and communities gain (Hall et al. 2014; Dowd and James 2014; Moffat et al. 2016). Companies are required to go above and beyond regulatory requirements in order to build the trust necessary for the establishment of SLO (Lacey, Parsons & Moffat 2012;

Hall et al. 2014; Moffat & Zhang 2014; Falck & Spangenberg 2014). Thus, companies are incentivized to involve the local community in planning and operations, actively address concerns, communicate openly, and be culturally sensitive in their decision-making (Thomson & Boutilier 2011; Prno and Slocombe 2012). While this is especially important in the planning and permitting stages, companies must work to maintain SLO over time, as it can be easily withdrawn if trust is violated (Thomson & Boutilier 2011; Lacey, Parsons & Moffat 2012; Prno 2013; Vince & Haward 2017; Hall et al. 2014).

This constant negotiation and maintenance work can result in tangible benefits for the community. Some are simply transactional—companies will offer financial compensation to host communities in the form of rent, local taxes, royalties, or donations. Some are economically based, such as when companies ensure that a percentage of jobs go to local community members (Prno 2013). Other benefits are less tangible. For example, in many cases, corporations will modify operations to lessen environmental impacts when a community expresses disapproval. Thus, the establishment of SLO can provide a degree of certainty about the future health of the environment for residents (Baines and Edwards 2018). Communities are able to hold companies accountable for their environmental impacts by requiring operational modifications. Communities can also benefit from SLO through their ability to withhold it altogether. In cases where the development of an industry has the potential to seriously disrupt a community or a community's public resources, members have been able to prevent development entirely (Lacey et al. 2012; Moffat et al. 2015; Moffat et al. 2016). Thus, SLO is empowering as it provides a mechanism for communities to play an active role in determining what happens to shared resources (Lacey et al. 2012; Lacey and Lamont 2014).

3.1 Who Issues SLO?

The question of who issues SLO is complex and has raised multiple critiques. Thomson and Boutilier (2011) assert that the “community” issues the SLO but specify that they use “community” as a generic term that describes the networks of stakeholders who have a shared interest in the company. These stakeholders are those who affect and are affected by the company (Thomson and Boutilier 2011). The “community” as issuer is most commonly used in the literature, although some have argued that the term is unclear. Owen and Kemp (2013) argue that use of the term “community” homogenizes a diverse group of stakeholders. They explain that while SLO is typically understood as an “inclusive” concept, often certain stakeholder group's perceptions are privileged which can potentially exclude disempowered or marginalized groups. Billing (2018) echoes this, arguing that key stakeholders with financial resources are the “community” driving SLO outcomes as they have the resources necessary to gather oppositional support through local campaigning. Researchers document that stakeholders hold this perception, as well. In a study examining the role of SLO in marine governance, stakeholders believed that the loudest and most resourced group controls SLO (Cullen-Knox et al. 2017).

Researchers note that SLO operates on multiple scales, complicating “community” as it is typically conceptualized (Hall et al. 2014; Dowd and James 2014; Moffat et al. 2016; Mather and Fanning 2019). While the local host community typically does have the most influence (Lacey et al. 2012), stakeholders across the globe can have a significant impact on operations, as well (Moffat et al. 2016). Non-governmental organizations (NGO), a frequent source of well-resourced and organized resistance to mining operations, are rarely locally based and often have a hand in the issuance of SLO (Cullen-Knox et al. 2017). As a way to conceptualize the varying scales of SLO, Voyer and van Leeuwen (2019) identify 2 main categories of stakeholders: communities of

place—commonly the host community—and communities of practice—or stakeholders who are geographically dispersed but have an interest in the project. This conceptualization clarifies that “community,” as it pertains to SLO, should be understood broadly, rather than as a homogenous, local group.

3.2 What Does SLO Require?

Gunningham et al. (2004) argue that on a basic level, most stakeholders expect that corporate behavior should not negatively impact human health, the environment, or enjoyment of property. Thus, resource development industries are often subject to public resistance because of their potential impacts. Not only can their operations create use conflict by operating in shared public spaces, but their practices can be damaging to the environment and, subsequently, to human health. To remedy public opposition, these sectors have to be particularly mindful of their SLO, requiring them to go beyond regulatory requirements to meet the demands of the public (Gunningham et al. 2004). While specific demands vary, scholars agree that developing SLO requires ongoing relational work to build trust—a central component of SLO (Gunningham et al. 2004; Thomson and Boutilier 2011; Prno 2013; Moffat and Zhang 2014; Ford and Williams 2016; Moffat et al. 2016; Baines and Edwards 2018). It is this relational aspect, according to Lacey et al. (2012), that is the key differentiating feature separating SLO from other concepts like corporate social responsibility, sustainable development, and free, prior, and informed consent.

From an industry perspective, researchers argue that companies must first identify key stakeholders and initiate engagement (Prno 2013). Thomson and Boutilier (2011) point out that companies must engage all parts of the stakeholder network, as failure to connect with certain segments could result in perceptions of illegitimacy. Particularly in the planning stages, stakeholders need to be informed of operational plans and potential impacts to avoid perceptions of secrecy. Transparency and openness are essential to gaining legitimacy and building the trust required for SLO (Thomson and Boutilier 2011; Leith et al. 2014; Rooney et al. 2014). Beyond initiating contact and informing stakeholders of development plans, companies also need to provide ample opportunities for stakeholder feedback (Thomson and Boutilier 2011; Hall 2014; Voyer and van Leeuwen 2019), as studies have shown that active participation can build trust and promote compromise (De Cremer et al. 2005; Gouldson et al. 2007; Diez et al. 2015). This participation, according to Zhang et al. (2015) is what generates perceptions of “procedural fairness,” or whether people believe that they have a voice in the process. Though important early on, this active dialogue must exist throughout the duration of the project (Gunningham et al. 2004; Baines and Edwards 2018).

Beyond providing opportunities for stakeholder feedback, companies must also actively respond to that feedback. According to Moffat and Zhang (2014), contact must be perceived as “positive” and “pleasant” by stakeholders. They find that contact quality, rather than quantity, aids in trust building. A 2020 study by Sinner et al. echoed this, with contact quality as the strongest predictor of SLO. It is clear that stakeholders need to feel respected and understood (Boutilier and Thompson 2011). Further, companies need to provide “demonstrable evidence of efforts to address stakeholders’ concerns” (Voyer and van Leeuwen 2019). It is the accumulation of this evidence over time that builds credibility and relational trust, both of which are essential for the development of SLO (Thomson and Boutilier 2011; Moffat and Zhang 2014; Voyer and van Leeuwen 2019). This evidence can come in many forms. Thomson and Boutilier (2011) argue that a primary form of evidence is making and keeping promises. Hall (2014) points out that companies can build evidence by effectively managing concerns—specifically concerns she terms “game-

changers.” While some concerns are unavoidable problems and simply require transparency, “game-changers” are issues that have the potential to enhance or diminish SLO depending on how the concern is managed. While each case is unique, if a company facilitates robust, 2-way consultation when dealing with game-changers, this process can contribute toward developing an effective SLO. In essence, it is the cycle of listening to stakeholders, responding to concerns with potential resolutions, coming to agreement, and following through with action that builds the reputation of credibility that is necessary for SLO (Thomson and Boutilier 2011; Voyer and van Leeuwen 2019).

Along with engagement, stakeholders also need to experience tangible benefits that help to offset the risks associated with operation (Mason et al. 2010; Hall 2014; Zhang and Moffat 2015; Zhang et al. 2015; Moffat et al. 2016). Often, stakeholders are willing to accept negative social impacts because they are outweighed by positive socioeconomic impacts. Vince and Haward (2017), among others, conceptualize this form of agreement as “contingent consent,” where stakeholders can rescind their consent at any point if the company fails to follow through with benefits (Levi 1997; Owen and Kemp 2013). These tangible benefits include increases in general wealth, infrastructure, and employment; however, expectations vary with the presumed impact of the operation (Zhang and Moffat 2015). Ultimately, stakeholders are more likely to approve of an operation if they believe that the distribution of outcomes is fair (distributional fairness) and that they had a voice in the process (procedural fairness) (Zhang et al. 2015). These perceptions generate trust which Moffat and Zhang (2014), among others, argue leads to SLO (Thomson and Boutilier 2011; Zhang et al. 2015; Moffat et al. 2016).

3.3 Withheld or Withdrawn SLO

Scholars have also noted that while it takes time to generate the foundation of trust necessary for SLO, SLO is dynamic and can quickly be withdrawn (Thomson & Boutilier 2011, Lacey et al. 2012; Lacey, Parsons & Moffat 2012; Prno 2013; Hall et al. 2014; Vince & Haward 2017). Further, SLO may be withheld from the start, which can lead to the cessation of a project altogether (Prno 2013). Withholding or withdrawal of SLO can occur for a multitude of reasons. In a study of SLO as it applies to 4 energy industries in Australia, Hall et al. (2014) found that the most common reasons for withdrawn or withheld SLO were mishandled engagement approaches, not following through with commitments, and failing to identify where stakeholder input could be most influential in the life of a project (Hall et al. 2014). Similarly, Thomson and Boutilier (2011) cite that providing incomplete or false information, failing to respect and listen to stakeholders, failing to facilitate continued engagement with all stakeholders, and failing to deliver on promises made can lead to withheld or withdrawn SLO.

Considering much of the SLO literature is from a management perspective, researchers have typically focused on the company’s actions or non-actions. However, several scholars have asserted that context specific place-effects of the host community can prevent the establishment of SLO before a project even reaches the formal planning stages. For example, there is growing evidence that collectively held community values are important in determining whether an incoming industry might be successful. Researchers argue that value alignment between the host community and company is key to developing SLO (Prno 2013; Leith et al. 2014; Ford and Williams 2016; Cullen-Knox et al. 2017; Billing 2018). Two studies in particular describe this in terms of public perceptions of “acceptable use” or whether they value the coast for “lifestyle/landscape vs. livelihoods” (Billing 2018; Leith et al. 2014). In essence, they argue that how community members and stakeholders value the area of interest (for example, recreational

use, peace and quiet, industrial activity, etc.) plays a key role in their acceptance of incoming aquaculture development. Different communities may place higher value on different activities depending on community characteristics. Prno (2013) also lends support to this in his study of SLO in the mining industry. He contends that while sustainability is an important factor in all cases, communities often have differing conceptions of sustainability. What is most important to SLO is whether the development of a particular industry matches the community's vision of sustainable development. In short, when values are not aligned, communities are more likely to withhold SLO (Voyer and van Leeuwen 2019). Further, there is evidence that trust in government increases the likelihood of SLO issuance (Zhang et al. 2015; Moffat et al. 2016; Runge et al. 2021). Communities with more confidence in regulating agencies will be more trusting of incoming industries. Again, this emphasizes the importance of community context in SLO.

3.4 Measuring SLO

As an intangible agreement, SLO has proven difficult to measure. Lacey et al. (2012) point out that it is often easier to define when an operation does not have SLO than when it does. It is clear that companies lack SLO when they face public protests, incur delays in operation due to public complaints, or in extreme cases have to move their operation to an entirely new site because of the host community's resistance. However, in most cases, SLO is less observable. Turning to the mining literature where the concept of SLO has been more thoroughly investigated, researchers use several methods to measure SLO. Some simply ask if participants "approve" or "accept" a company's practices (Prno 2013; Moffat and Zhang 2014). For example, in a highly cited 2014 study, Moffat and Zhang measure SLO with 2 items asking participants whether they approve/accept of the company of interest (1=*not at all*, 5=*very much so*). In a subsequent study, they use 4 items in the measure: tolerate, accept, approve, or embrace (Zhang and Moffat 2015).

However, other scholars have developed more complex measures. In a 2017 paper by Boutilier, one of the authors of the most widely cited works on SLO within the mining industry (Thomson and Boutilier 2011), he suggests a 12-item measure (see Table 3). He argues that the declarative statements included address key theoretical elements of SLO as outlined in previous works: legitimacy, credibility, and trust (Thomson and Boutilier 2011; Moffat and Zhang 2014). Between 2012 and 2015, this set was used in 23 studies in 11 countries for a total of 2,152 interviews. Using this data, Boutilier (2017) performed factor analysis and found that the measures were internally consistent. Thus, the set is reliable. In a subsequent analysis, he addressed validity by analyzing stakeholder comments and seeing if their sentiments correlated with the survey results. The qualitative measures were significantly correlated with the quantitative measure of approval ($p < .02$), suggesting that the measure is also valid. However, he points out that further research is needed to confirm validity (Boutilier 2017).

While both Boutilier's (2017) metric and Moffat and Zhang's (2014) 4-item measure have been utilized in several studies, 2 questions remain. First, to what extent are the 2 metrics measuring the same thing? Can the level of SLO be captured by simply asking if a participant "approves" of an activity, or does Boutilier's measure capture more nuanced aspects of SLO that are key to measurement? Future studies that utilize the 4-item metric should include a second independent measure in order to confirm whether the scores correlate and the measure is valid. Further, a comparative study using both measures should be conducted to see if the measures are both getting at the same thing. If results are the same regardless of the measurement used, this could inform future studies and enable consistency in research.

Second, are these metrics universal? Considering they are both rooted in research on SLO within the mining industry, can these metrics be used as effectively in other industries? While studies have shown that understanding and application of SLO varies by industry (Dowd and James 2014), the underlying components of SLO are relatively consistent. Scholars have examined SLO as it applies to forestry (Moffat et al. 2016), various energy sectors (Hall et al. 2014), Marine Protected Areas (Voyer et al. 2015a, Voyer et al. 2015b), aquaculture (Baines and Edwards 2018; Sinner et al. 2020), and more. In all cases, SLO is similar in definition. As researchers continue to investigate SLO, the effectiveness of these measures will come to light.

3.4.1. SLO Conceptualized

Whatever the measure used to assess SLO, most scholars agree that SLO exists on a continuum (Thomson and Boutilier 2011; Prno 2013; Parsons and Moffat 2014; Moffat and Zhang 2014). A binary understanding of SLO as either “issued” or “withheld” fails to capture the varying levels of SLO. This is especially problematic when SLO is considered “issued” simply when a company faces little to no opposition. As Owen and Kemp (2013) argue, “minimal community resistance” is a poor measure of SLO because it conflates the tangible evidence available—no resistance—with support. Absence of opposition, interpreted as latent support, is an inaccurate gauge of SLO. A binary understanding of SLO masks the complexities and varying levels of support and company/community benefits.

Thomson and Boutilier (2011) provide a detailed conceptualization of SLO as a continuum in their foundational study of SLO. They present a cumulative pyramid model that progresses from withholding/withdrawal, to acceptance, approval, and finally co-ownership. They saw this step-wise progression as a result of a company first gaining legitimacy, then credibility, then finally garnering full trust from the community (Thomson and Boutilier 2011). While a company may be able to proceed with little resistance after reaching ‘acceptance,’ Thomson and Boutilier (2011) argue that the highest level (full-trust and co-ownership) is most beneficial to all parties. Once co-ownership status is reached, communities incorporate the operation into their collective identity and can become advocates and defenders of the industry (Thomson and Boutilier 2011). Though this cumulative model has failed to be empirically validated, subsequent research has maintained that SLO exists on a continuum, and scholars have continued to draw on this conceptualization.

Recognizing that Thomson and Boutilier’s (2011) conceptualization has not been validated—even by the authors themselves—Moffat and Zhang (2014) offer another model that situates community trust at its center. Specifically, Moffat and Zhang (2014) find that trust is the mediating variable between 3 exogenous variables—contact quality, impacts on social infrastructure, and procedural fairness—and social license. The path model included in their 2014 paper is included as Figure 4 (Moffat and Zhang). Results revealed that contact quantity was not a significant factor in the development of SLO and that impacts on social infrastructure had only an indirect effect on acceptance and approval through trust.

Drawing from this model, Sinner et al. (2020) sought to develop a model for SLO within the aquaculture industry that outlined the factors likely to influence the granting of social license. To do this, they identified the aquaculture industry’s potential economic, social, cultural, and environmental impacts and performed a survey to assess which impacts were significant predictors of SLO. Following Moffat and Zhang (2014), they also included questions about contact quality and the equitable distribution of benefits (economic fairness). Findings revealed that 3 variables—cultural impacts, contact quality and economic fairness—were significant predictors of SLO in the overall sample; however, contact quality was the one variable that was highly significant across all demographic subsamples (Sinner et al. 2020). These findings further validate Moffat and

Zhang's (2014) model and reiterate the importance of company actions in securing social license. The quality of contact between a company and community is key to the development of SLO.

3.5 Contribution

Answering Mather and Fanning's (2019) call for research contributing to a model or measure for SLO within aquaculture, this paper builds upon existing models that focus on company actions to create a model that considers community context. Sinner et al. (2020) offers an important contribution by verifying that company actions like quality of contact and distribution of economic benefits (economic fairness) are relevant beyond the bounds of the mining industry. Nonetheless, neither Sinner et al. (2020) or Moffat and Zhang (2014) address community context which has been cited as key to SLO (Thomson and Boutilier 2011; Prno 2013). As Prno (2013) argues, a community's needs, expectations, values, and previous experience with mining all affect the likelihood of the development of SLO. It is reasonable to assume that this is also true with aquaculture development. This paper addresses this gap by incorporating important contributions from the Social Acceptability (SA) of aquaculture literature. Research from this area identifies key topics of importance from a public perspective. These themes serve as the foundation for a model that predicts a community's willingness to trust incoming aquaculture operations (detailed in Section 5). Section 4 offers results from a systematic review of the survey research on the social acceptability of aquaculture. I then discuss the results from this review within a SLO perspective in Section 5. The merging of these 2 bodies of literature informs the resulting framework.

4. SOCIAL ACCEPTABILITY OF AQUACULTURE

4.1 Introduction

The social acceptability of aquaculture research offers key insights into a public perspective of issues of importance surrounding aquaculture development. In seeking to develop a model based on community characteristics, this body of work is particularly relevant because it addresses public concerns and impacts of aquaculture broadly, rather than focusing on specific relational elements. Instead of looking at what companies can do to improve their likelihood of gaining approval, this research provides clues as to what pre-established community characteristics make it more or less likely for incoming aquaculture operations to acquire SLO. Questions addressed by this body of literature are wide ranging. For example, what values are associated with approval or opposition to aquaculture development? Do higher levels of knowledge or awareness of aquaculture contribute to increased support? Do perceptions of regulatory effectiveness influence public approval? While both qualitative and quantitative studies investigating social acceptability of aquaculture were assessed and used in this analysis, Section 4.2 outlines the results of a systematic review of survey research addressing public perceptions of aquaculture. By focusing on survey research, I was able to identify clear themes and patterns after collating survey results into a detailed table. Table 4 is an abbreviated version of this table.

4.2 Results

After initial review, I identified 7 major themes addressed in the surveys: environment, economy, use conflict, knowledge, experience, government and regulation, and health and safety. Table 4 identifies which themes were addressed in each of the 26 articles examined. The following

sections outline the findings within each theme and identify any patterns. These patterns will inform the conceptual model presented in Section 5.

4.2.1. Environment

Environmental concerns were included in all but 4 of the 26 surveys reviewed. Both concerns and benefits were addressed. Concerns typically included were aquaculture's effects on the marine floor and seascape, pollution, the interaction of escaped non-native species with wild stocks, sea lice, and disease. Benefits included decreased pressure on wild stocks due to overfishing and improved water quality (in the case of shellfish aquaculture). Overall, survey results indicate that respondents are greatly concerned with the environmental impacts of aquaculture (Whitmarsh and Wattage 2006; Mazur and Curtis 2008; Murray and D'Anna 2015; Alexander et al. 2016; Murray et al. 2017). In fact, in 3 studies that allowed participants to rank a series of concerns based on perceived importance, researchers found that participants consistently ranked environmental impacts as the most important aquaculture issue (Whitmarsh and Wattage 2006; Mazur and Curtis 2008; Freeman et al. 2012).

Further, surveys reveal that social acceptability of aquaculture is strongly linked to its perceived environmental impacts (Hynes et al. 2018; Krovel et al. 2019). In a comparative study of Norwegian and American perceptions of aquaculture, Chu et al. (2010) found that those who believed aquaculture was harmful to the environment were significantly less likely to support development. In a 2009 study investigating perceptions of salmon aquaculture in coastal regions of Scotland, Whitmarsh and Palmieri found that respondents who ranked minimizing environmental damage as most important in a series of aquaculture related concerns were least likely to favor aquaculture expansion. In a subsequent study, the same authors (2011) found that environmental beliefs surrounding aquaculture impacts also translate to purchasing behavior. Respondents who attached a higher priority to minimizing environmental impacts of salmon aquaculture were less likely to purchase farmed salmon. Murray and D'Anna (2015) linked support for aquaculture to environmental values more broadly by including a widely used attitudinal measure known as the New Ecological Paradigm (NEP). The NEP assesses the degree to which participants see humans as being part of nature rather than separate from nature (Murray and D'Anna 2015). In their study measuring perceptions of shellfish aquaculture in Baynes Sound, Canada, they found a significant negative relationship between NEP score and support for the aquaculture industry—those with more pro-environmental views were less likely to support shellfish aquaculture (Murray and D'Anna 2015). Other specific predictors of opposition to aquaculture development include the belief that aquaculture spoils the beauty of the coastal environment (Dalton and Jin 2017) and the belief that aquaculture displaces wild fisheries (Chu et al. 2010).

While studies show significant concern for aquaculture's environmental impacts, several studies also show that participants recognize that aquaculture does have environmental benefits—mainly, the relief of pressure on wild fish populations (Freeman et al. 2012; Alexander et al. 2016; Murray et al. 2017; Flaherty et al. 2018). Further, one study investigating public perception of Integrated Multi-Trophic Aquaculture (IMTA), a type of synergistic cultivation where multiple species are grown together to reduce waste, found that the majority of respondents believed that IMTA would improve waste management and the sustainability of aquaculture overall, in addition to helping to replenish wild stocks (Alexander et al. 2018). Shellfish and plant aquaculture were also recognized as having fewer negative impacts on water quality (Thomas et al. 2018) and as more sustainable than finfish aquaculture (Flaherty et al. 2018).

While overall it appears that people who are concerned about aquaculture's environmental impacts are less likely to support development, 3 studies show that this relationship may be more complicated. A 2020 U.S. study found a positive relationship between environmental values and support for aquaculture, complicating the narrative that positions environmentalists as aquaculture opponents (Rickard et al. 2020). Further, a 2018 study of Vancouver Island and Canada's Maritime Provinces found that the same environmental concerns were cited by aquaculture supporters and aquaculture opposition alike, raising questions about whether environmental concerns are always at odds with development (Flaherty et al.). Concerns cited included harm to wild fish stocks, use of chemicals and antibiotics in farming, waste accumulation on the sea floor, and detrimental effects on sea life. Safford and Hamilton (2012) found a similar pattern among highly educated respondents. While highly educated respondents were more critical of aquaculture's impacts than less educated respondents, they were simultaneously more supportive of development. The authors argue that these views are not necessarily contradictory, as highly educated respondents who are not fundamentally opposed to aquaculture may also have serious questions about best practices. Freeman et al. (2012) identified a similar trend. While environmental concerns were ranked high in importance in both German and Israeli samples in their cross-national study, these concerns were only linked to lower levels of support in the Israeli sample.

Lastly, it is clear that perceptions of environmental impacts and the way these perceptions affect support for aquaculture vary greatly by place. For example, Hynes et al. (2018) found that only 20% of their Norwegian sample felt that aquaculture posed a threat to the marine environment, compared to 40% of their Irish sample. Another cross-national study conducted in 2016 showed that environmental concern and level of support varied by region (Alexander et al. 2016). In Sweden, similar amounts of respondents agreed and disagreed that they are concerned about the environmental impacts of the aquaculture industry, though they were significantly more concerned about fish aquaculture than shellfish or seaweed aquaculture (Thomas et al. 2018). In the U.S., participants were very concerned about environmental impacts, with 80.9% of respondents agreeing that aquaculture has the same problems as land-based agriculture like the use of processed feeds and antibiotics being a source of pollution.

In sum, while the relationship between environmental views and approval for aquaculture is complex, concern over the environmental impacts of aquaculture generally translates into increased skepticism and lower approval. Level of concern, however, appears to vary by place. It is likely that local experience (or lack thereof) with aquaculture operations influences how people perceive potential impacts.

4.2.2. *Economy*

The economic benefits of aquaculture are widely considered a positive outcome of development (Murray and D'Anna 2015). Benefits addressed include economic growth, generation of tax revenue, and the most widely cited benefit—job creation. Research shows that participants agree that aquaculture is an important economic activity (Flaherty et al. 2018) and that those who believe aquaculture is good for the economy are more likely to be supportive of future development (Dalton and Jin 2017; Krovel et al. 2019). Regarding job creation, Murray et al. (2017) found that nearly 90% of participants in their study of U.S. attitudes toward aquaculture believed that the aquaculture industry provides local employment. Similar findings were cited in a 2018 comparative study of Norwegian and Irish perceptions of aquaculture, with 85% and 95% of respondents agreeing that aquaculture generates local jobs (Hynes et al.). Coastal Canadians also appear to agree, with 85% believing that aquaculture creates good jobs in coastal communities (Flaherty et al. 2018). However, within this same study, only 36% of Pacific coast respondents and

55% of Atlantic coast respondents said these employment benefits lead to favorable impressions of the industry, indicating that economic benefits, while important, may not be enough to offset other factors that may have stronger influence on public perceptions of aquaculture (Flaherty et al. 2018). Though questions remain about the relative importance of economic impacts, it is clear that the economic effects are considered a positive impact of aquaculture development and that this perspective is linked to support for the industry (Murray and D'Anna 2015; Dalton and Jin 2017; Krovel et al. 2019).

4.2.3. Environment vs. Economy

While it is clear that both environmental and economic values condition people's perceptions of aquaculture, several studies have attempted to sort out the relative importance of these ostensibly conflicting values. In a 2009 study, Whitmarsh and Palmieri attempted to develop a hierarchy of concerns by determining specific weights attached to a variety of socioeconomic and environmental concerns. Using the Analytic Hierarchy Process, a statistical technique used to determine preferences and choices at the community level, they found that those who favored the expansion of salmon aquaculture attached the highest priority to maximizing economic benefits and the lowest priority to minimizing environmental damage. Further, the authors found evidence that the social and economic profiles of the area influenced the priority participants attached to socioeconomic benefits and environmental impacts. They argued that people in poorer areas prioritized economic effects of aquaculture while those in more affluent areas prioritized minimizing environmental impacts (Whitmarsh and Palmieri 2009). Similarly, a 2018 study of ecotourists in Southern Chile found that wealthier tourists were more willing to pay to avoid further environmental impacts due to aquaculture development compared to less affluent tourists (Outeiro et al. 2018).

Freeman et al. (2012) also found support for the connection between the need for employment and support for industry development within the Israeli sample of their comparative study. Israeli respondents who were more concerned with job security were more supportive of aquaculture development. While this pattern was not apparent in their German sample, the authors argued that this was due to minimal awareness of aquaculture in general. The Israeli sample had significantly more exposure. Safford and Hamilton (2012) also found economically rooted predictors. In a comparative study between 2 coastal Maine counties, respondents who were from Hancock County, the more prosperous and economically diversified of the 2, were more likely to be concerned with aquaculture's environmental impacts while Washington County respondents were more likely to think that aquaculture development was important. Further, Washington County respondents favored jobs over preserving local character more frequently than Hancock County respondents (Safford and Hamilton 2012). Clearly, economic place effects are important determinants of both environmental concern and aquaculture perceptions.

4.2.4. Knowledge

Public knowledge of aquaculture was assessed in 15 out of the 26 surveys reviewed. In general, surveys found low levels of knowledge of aquaculture within their geographic areas of study (Robertson et al. 2002; Mazur and Curtis 2006; Mazur and Curtis 2008; Freeman et al. 2012; Alexander et al. 2016; Murray et al. 2017). Mazur and Curtis (2006) found that 72% of survey participants considered themselves "not well informed" about aquaculture. In a 2018 study, Thomas et al. found that only 1/9 of participants self-selected "high awareness" when asked about their knowledge of aquaculture, while 1/3 of participants selected "low awareness." This trend was

even more pronounced when asking participants about specific aquaculture practices like offshore aquaculture or IMTA (Robertson et al. 2002; Alexander et al. 2016).

However, 2 surveys did find higher levels of knowledge among participants. The first was a regional study in Spain that investigated consumption preferences of farmed versus wild fish (Claret et al. 2014). They measured both subjective (self-assessed) and objective knowledge with 2 sets of questions and found that 85% had moderate to high levels of subjective knowledge and 70% had moderate to high levels of objective knowledge (Claret et al. 2014). The second study was conducted in coastal communities on Vancouver Island and Canada's Maritime Provinces, where 66% of participants considered themselves very or somewhat familiar with the aquaculture industry (Flaherty et al. 2018). The authors assessed objective knowledge, as well, by asking participants about what species were farmed in their area. Responses revealed that Canadians had an "impressive awareness" of what species were and were not being farmed locally (Flaherty et al. 2018). However, awareness levels differed by region and by species. They attributed this regional variation to differences in media coverage (Flaherty et al. 2018).

In several cases, researchers investigated the link between knowledge level and support for aquaculture. Overall, results suggest that higher levels of knowledge and awareness are associated with support. For example, Thomas et al. (2018) found that while low and medium awareness groups had more neutral responses to questions assessing support, the high awareness group had more positive opinions of aquaculture and was more likely to support blue growth initiatives. Robertson et al. (2002) similarly found that participants who were more familiar with offshore practices held significantly more positive attitudes of aquaculture. In a more recent study, Bouchard et al. (2021) also found that participants who were more aware of aquaculture operations had more positive attitudes about aquaculture. However, other studies offer more mixed results. Rickard et al. (2020) found a positive relationship between subjective knowledge and support but a negative relationship between objectively measured knowledge and support. Murray and D'Anna (2015) found no support for the link between knowledge and positive attitudes. While more research is needed for consensus, evidence does suggest that knowledge level could be an effective predictor of positive attitudes, with higher levels of knowledge and awareness leading to increased support (Robertson et al. 2002; Thomas et al. 2018; Bouchard 2021).

4.2.5. Use Conflict

Considering that aquaculture is an activity that primarily occupies space in common pool resources, opposition can arise due to competing uses. For example, aquaculture development along the coast of Maine has faced damaging opposition from the lobster industry, wild-catch fishermen, recreational ocean users, and summer shorefront property owners vying for continued use of prospective aquaculture areas (Conkling 2000). While use conflict is addressed in 35% of the survey articles assessed, findings vary by place. In the U.S., Murray et al. (2017) found that nearly 70% of respondents agreed that aquaculture can interfere with recreation. In comparison, Hynes et al. (2018) found that only 2.5% of Norwegians and 11% of Irish respondents believed that aquaculture hindered their use of the coast. Connecting perceptions of use-conflict to support for aquaculture, Dalton et al. (2017) found that Rhode Islanders who believed that aquaculture interferes with other uses were less supportive of future development. Krovel et al. (2019) investigated perceived use-conflicts in both national and local samples in Norway. Their results echoed Dalton et al. (2017), showing that within both samples, those who agreed that fish farms create conflict with other activities had more negative views of the industry. Shafer et al. (2010) similarly found that water-users in 2 New Zealand towns disliked the idea of more aquaculture farms more than land-users. However, Thomas et al. (2018) presented conflicting results, finding

that those who “go out to sea by boat” were actually more supportive of development. Further, Sinner et al. (2020) found that impacts on recreational fishing or other marine recreation did not significantly predict support at all in their New Zealand sample.

Though more research is needed to gauge how the public’s understanding of use conflict shapes their likelihood of supporting aquaculture development, the inclusion of use conflict in community assessment is important. The wider public may have varying views on the effects of use conflict, but it has been documented that stakeholders directly engaged in shared-resource activities can present serious challenges for aquaculture development (Conkling 2000). Alexander et al. (2018) suggests that there is a “stakeholder hierarchy” that determines which voices influence aquaculture decision-making. They point out that those voices at the top of the hierarchy are often other resource-use applicants. Thus, use conflict is an important place-based indicator to consider when thinking about community suitability for aquaculture.

4.2.6. Experience

Participants’ experience with aquaculture appears to influence public perceptions of aquaculture, yet the findings vary. Experience includes questions about proximity to farms or the ocean, engagement with farms, consumption of farmed seafood, and social connections to the industry. The relationship between proximity to aquaculture operations and support for the industry was addressed in 4 of the surveys reviewed with mixed results. Thomas et al. (2018) found that participants with farms near their home were more likely to support aquaculture. Yet Hynes et al. (2018) and Shafer et al. (2010) found the opposite—those with farms in their locality were more sensitive to marine development. Murray and D’Anna (2015) found no significant relationship between proximity to aquaculture and support. Proximity to the sea was also addressed with equally mixed findings. Norwegian and Irish participants with a sea view were more likely to see aquaculture as a threat to the environment (Hynes et al. 2018), while Rhode Islanders with coastal views were marginally more supportive (Dalton and Jin 2017). No relationship existed between support and sea views in Thomas et al.’s (2018) survey of Swedes.

Similarly, there is no consensus regarding the relationship between participants’ engagement with farms and support for aquaculture. While Murray and D’Anna (2015) found no significant association, Mazur and Curtis (2008) found that those who had visited aquaculture sites were more likely to be concerned about aquaculture’s environmental impact, though the causal direction of this relationship is unclear. Mazur and Curtis (2008) also investigated whether social ties to the industry led to increased levels of support, finding that participants who had social connections to people working in aquaculture were more likely to support the industry. Lastly, consumption of aquaculture products has been linked with public sentiment. Participants who consumed farmed seafood more frequently or who were aware that they had consumed aquaculture products in the past also held more positive attitudes toward aquaculture (Murray and D’Anna 2015; Rickard et al. 2020). While more research is needed to draw conclusions surrounding the connection of proximity and engagement, what is clear is that these discrepancies highlight significant regional variation. It is likely that participants’ responses are colored by place effects, including previous experience with aquaculture and place-based values.

4.2.7. Government and Regulation

Another topic often addressed in aquaculture survey research is public perception of government regulating agencies. The surveys reviewed investigated public opinions on the importance of participation, regulatory strictness, and credibility of government agencies. Regarding participation, Mazur and Curtis (2008) found that the vast majority of participants in

both surveyed regions in Australia believed that the benefits of public participation outweighed any costs incurred by the government to facilitate input. Participants highly valued the principle of “having a say” in planning. Though they stopped short of analyzing whether increased participation was linked to support, Dalton and Jin (2017) did investigate this link, finding that those who had attended planning meetings were in fact more supportive of future aquaculture development.

One 2010 study investigated whether perceptions of regulatory strictness influenced public support for aquaculture development among aquaculture experts in Norway and the U.S. (Chu et al. 2010). To do this, they clustered respondents based on whether they thought that governing bodies were lenient, balanced, or strict in regard to aquaculture. They found that U.S. respondents in the “strict-cluster” and the “balanced-cluster” were more supportive of aquaculture than respondents in the “lenient-cluster.” In fact, the predicted probability for opposition to aquaculture within the “strict-cluster” was 0.00 (Chu et al. 2010). The authors point out that the groups represented in the “lenient-cluster” were primarily fishermen, environmental NGOs, and some researchers. Thus, the causal direction of this relationship is uncertain. Opposition to the industry may fuel perceptions of regulatory strictness, rather than perceptions of strictness fueling opposition. More research is needed to determine if these same patterns arise among the wider public.

Several avenues were used to evaluate trust in government and regulating agencies. Mazur and Curtis (2008) asked directly about the public’s level of trust in national, state, and local government regulating procedures in terms of aquaculture. Though they found varied amounts of trust within each level of government, between 1/4 and 1/2 of participants cited low levels of trust across the board. In an earlier paper, Mazur and Curtis (2006) found that participants who felt “heard” awarded higher levels of trust to regulating agencies, reemphasizing the importance of participation. Further, they found evidence that confidence in government acts as a moderator for aquaculture support. Participants who believed that the current regulatory system would ensure the best environmental outcomes had higher levels of trust in the aquaculture industry. Trust in government as a source of aquaculture information was another avenue investigated, though with mixed findings. While Murray et al. (2017) found that in the U.S., most respondents felt that government officials were a biased, untrustworthy, unfair, and inaccurate source of aquaculture information, Rickard et al. (2020) found no links between these perceptions and aquaculture support using the same dataset. Flaherty et al. (2018) found that in Canada, 60% of Pacific respondents and 69% of Atlantic respondents rated Canada's Department of Fisheries and Oceans (DFO) as a very or somewhat reliable aquaculture information source, though they did not investigate links with support.

In sum, it is clear that participation in the planning process is valued (Mazur and Curtis 2006; Mazur and Curtis 2008; Dalton and Jin 2017). Participation increases trust in regulating agencies and increases the likelihood of industry approval (Mazur and Curtis 2006; Dalton and Jin 2017). Further, there is evidence that confidence in governing bodies and perceived regulatory strictness may be important indicators of support for aquaculture development.

4.2.8. Health and Safety

The final theme addressed in 27% of the surveys reviewed is health and safety. Surveys showed that the public has mixed perceptions on the safety of farmed seafood (Murray et al. 2017; Flaherty et al. 2018). In Canada, 50% of participants overall felt that aquaculture provides safe, high-quality seafood, yet Pacific coast residents felt that wild salmon is safer and healthier than farmed salmon (Flaherty et al. 2018). Within the U.S., the vast majority (85.3%) believe that

aquaculture yields a healthy product. Yet respondents were split on whether they believed that farmed or wild-caught seafood was safer (Murray et al. 2017). In Spain, Claret et al. (2014) found no significant differences in perceptions of safety between wild and farmed fish.

In addition to measuring perceptions, 2 studies investigated whether these perceptions are predictive of support (Chu et al. 2010; Dalton and Jin 2017). Chu et al. (2010) found that participants who believed that farmed fish are more likely to contain pollutants are less likely to approve of aquaculture (Chu et al. 2010). Similarly, Dalton and Jin (2017) found that participants who believed that farmed salmon is unhealthy were less likely to support development.

4.3 Summary

Survey research within the SA of aquaculture literature reveals the importance of context—particularly how values, beliefs, and experience can color individual opinions of the aquaculture industry. Considering aquaculture companies are entering and operating primarily in common pool resources within established communities, it is reasonable to assume that both collective experience and collectively held values can create an environment that is more or less conducive to development. Patterns within the themes identified above will serve to inform a series of indicators that are predictive of community suitability for aquaculture development. These patterns are discussed within an SLO perspective below.

5. DISCUSSION

5.1 Trust

Trust is one area where the social license literature and the social acceptability literature largely overlap. Within the social license research, trust is featured centrally, and its role in developing SLO has been empirically validated (Thomson and Boutilier 2011; Moffat and Zhang 2014). Moffat and Zhang (2014), among others, show that trust acts as a mediator between several quantitative indicators and acceptance (Zhang et al. 2015; Moffat et al. 2016). They argue that 2 types of trust, as highlighted by Poppo and Schepker (2010), are key to building relationships between the industry and the community. The first is integrity-based trust, which in this case is the community's perception that the industry is adhering to a certain set of agreed upon principles. The second, competence-based trust, is whether the community believes that the industry has the knowledge and skills needed to appropriately manage their concerns (Poppo and Schepker 2010; Moffat and Zhang 2014). Company behaviors that increase trust include being transparent and open with the community from early in the planning stages, being well informed when faced with questions, having quality communication with stakeholders, and following through with promises (Thomson and Boutilier 2011; Hall 2014; Moffat and Zhang 2014; Voyer and van Leeuwen 2019). Actions that generate trust increase the likelihood of earning social license.

While the SLO literature tends to focus on strategies companies can use to build trust, the social acceptability of aquaculture literature highlights the importance of considering place-based experiences and local values by demonstrating their effect on trust and, subsequently, on public approval. Just as certain company actions can generate trust, community context can enhance or hinder trust formation. This consideration is an important contribution to what is currently known about SLO. A community's willingness to trust, determined by key community-based indicators outlined in the SA research, moderates the ability of incoming companies to build trust through

their behavior, and thus affects their ability to cultivate SLO. The following section discusses how the SA and SLO literature together inform this contribution.

5.1.1. Experience

Social acceptability research concerning aquaculture demonstrates how local experiences can alter trust in the industry and affect public approval (Freeman et al. 2012; Schlag and Ystgaard 2013; Froehlich et al. 2017). While the relationship between approval and individual experiences like proximity to an aquaculture facility or engagement with fish farms is mixed, several studies look at collective community experiences in relation to approval and find interesting results (Freeman et al. 2012; Schlag and Ystgaard 2013; Froehlich et al. 2017). For example, in a comparative study of Germany and Israel, Freeman et al. (2012) found that areas with a history of negative experiences with aquaculture companies were less likely to support new companies. In 2008, a high-profile court case led to the removal of all aquaculture farms from the Gulf of Eilat in Israel. Resulting media coverage focused on damage to coral reefs and marine pollution. Survey results showed that Israeli participants who were concerned about the environment were significantly less likely to support aquaculture development. This same pattern was not found in the German sample. They deduced that these inconsistencies were due to their differing historical experience with the aquaculture industry. In Israel, trust in the industry as a whole had already been damaged, and thus, participants were less likely to support future development (Freeman et al. 2012).

Examples such as this highlight the importance of examining community-level data. Collective experiences are difficult for survey data to capture when looking at individual level predictors. In fact, the inconclusiveness surrounding experience-related survey results speaks to this. An individual's proximity to an aquaculture operation may yield positive or negative attitudes towards the industry depending on their local experience (Hamilton and Safford 2015). An illustrative example of this comes from comparative survey research conducted by Hamilton and Safford (2015). They found that coastal Alaskan residents were significantly more concerned with aquaculture's environmental impacts compared to residents of other coastal areas. Alaska has a well-established salmon aquaculture industry, and residents have dealt with negative environmental impacts. Their concerns are reflective of their local environment. Thus, it is clear that trust, and subsequently industry approval, are affected by local experience.

The social license literature also emphasizes the importance of local experiences. Specific examples include a prominent paper by Prno (2013) that detailed the case of a proposed mine in Peru where social license was withheld and the project was unable to proceed. The authors found that residents had had several negative experiences with mining development in their area which led to an erosion of local trust that made residents doubt that the incoming mine could be run responsibly. The negative legacy left by other mining operations contributed to anti-mining sentiment and greatly reduced the odds of SLO being established (Prno 2013). This example fits more broadly within the theme of context—which is often cited as important in the SLO literature. Companies are encouraged to operate strategically in response to local contexts (Thomson and Boutilier 2011). Yet it is important analytically to account for context independently. Local experiences, specifically local experiences with aquaculture, are important determinants of a community's willingness to trust, which moderates the effects of a company's actions.

5.1.2. Health and Safety

While the link between public perceptions of the healthfulness and safety of farmed fish is clear—those who think farmed fish are nutritionally inferior to wild-caught fish are less likely to

approve of aquaculture (Chu et al. 2010; Dalton and Jin 2017), the SA of aquaculture review reveals one additional key finding: uncertainty. Mixed opinions on the safety and nutritional value of farmed fish demonstrate that the public has not reached a clear consensus (Claret et al. 2014; Murray et al. 2017; Flaherty et al. 2018). This uncertainty is not related to a lack of education; rather, it is in part due to conflicting reports coming from the scientific community (Kaiser and Stead 2013; Schlag and Ystgaard 2013). For example, a 2004 study by Hites et al. found significantly higher levels of contaminants and insecticides in farmed salmon as compared to wild-caught, suggesting that wild-caught salmon is safer to eat than farmed salmon. Jiang et al. (2017) also found nutritional differences between wild-caught and farmed salmon, with farmed salmon being nutritionally inferior in terms of fatty acid content. However, there are other studies that show insignificant differences or differences in favor of wild salmon (EFSA 2005). Lundebye et al. (2017), for example, found lower levels of contaminants like PCBs, dioxins, and mercury in farmed salmon as opposed to wild-caught salmon. Uncertainty stemming from lack of consensus within the scientific community has likely eroded public trust (Schlag and Ystgaard 2013).

Findings such as these are echoed in the social license literature. For example, Beckie et al. point out how conflicting reports surrounding the herbicide glyphosate have increased public alarm, threatening the social license of “unhindered” glyphosate use (2020). The use of glyphosate has already been banned in several countries, and companies all over the world are searching for alternatives in an effort to prepare for potential widespread restrictions (Beckie et al. 2020). Additionally, the social license literature demonstrates how public health events resulting from company malpractice can lead to the withdrawal of SLO for an entire industry. For example, Arnot (2018) discusses how a widespread salmonella outbreak in 2008 traced to Peanut Corp. of America led to a temporary collapse of social license for the peanut product industry. The actions of a single company led to a loss of \$225 million for the nation’s peanut growers due to plummeting demand. Similar effects are found within public perception of aquaculture research. Interestingly, Schlag and Ystgaard (2013) found that focus group participants from the U.K. referenced the recent Bovine Spongiform Encephalopathy and food-and-mouth crises that occurred in their cattle industry when discussing trust in the aquaculture industry. A public health event, even one isolated to a single industry, was able to influence public trust of unrelated food industries (Schlag and Ystgaard 2013). Clearly, a community’s willingness to trust aquaculture development does not rest solely on a company’s actions or non-actions. Perceptions on the healthfulness and safety of farmed seafood is likely a key determinant of a community’s willingness to trust.

5.1.3. Knowledge

The SA of aquaculture research presents 2 main findings surrounding knowledge. First, the public is generally unfamiliar with aquaculture products and procedures and is often uncertain and skeptical about new aquaculture technologies (Robertson et al. 2002; Kaiser and Stead 2002; Mazur and Curtis 2006; Mazur and Curtis 2008; Freeman et al. 2012; Schlag and Ystgaard 2013; Alexander et al. 2016; Murray et al. 2017). Second, there is some evidence that an individual’s level of knowledge of aquaculture may have an effect on their opinion of aquaculture development. Specifically, higher levels of knowledge are linked to increased support (Robertson et al. 2002; Thomas et al. 2018; Bouchard et al. 2021). Similarly, within the SLO literature, scholars highlight how confidence in and availability of scientific information plays a substantial role in the development of SLO. When information is provided by an incoming company, government agency, or other interest group just prior to development, it is often perceived as biased or untrustworthy (Cullen-Knox et al. 2017). This is confirmed in the SA of aquaculture literature, as well (Murray et al. 2017). Information disseminated by these groups is often perceived as “framed”

to support value-driven objectives (Cullen-Knox et al. 2017). We can hypothesize that areas with higher levels of independent knowledge may be more open to development because they are aware of the potential risks and benefits a priori (Owen and Kemp 2013; Falck and Spangenberg 2014; Cullen-Knox et al. 2017; Billing 2018). If the public is confident in their knowledge of aquaculture practices and technologies, they may be more willing to trust incoming development as they can independently assess whether it would benefit their community. Thus, areas with a well-informed public may be more suitable for incoming aquaculture development.

5.1.4. Government

In addition to safety concerns, the SA of aquaculture literature highlights that perceptions of government regulating bodies and participation in planning processes are important to public approval of the aquaculture industry. First, the literature highlights that the opportunity for participation in planning is an important determinant of trust in governing bodies and approval of development more generally (Mazur and Curtis 2006; Mazur and Curtis 2008; Dalton and Jin 2017). Second, it suggests that trust in governing bodies may moderate approval of development. Specifically, Mazur and Curtis (2006) found that interviewees who believed that the current regulatory system would ensure the best environmental outcomes had higher levels of trust in the aquaculture industry.

This research dovetails with the SLO literature, where several papers highlight the importance of participatory governance in generating trust in the industry (De Cremer et al. 2005; Gouldson et al. 2007; Diez et al. 2015), as well as the moderating effect of confidence in government (Zhang et al. 2015; Moffat et al. 2016). Confidence in governance increases public acceptance of mining both directly and indirectly through trust in the mining industry. If the public was confident that the legal and regulatory bodies could ensure that the mining companies would responsibly manage their environmental and social impacts, then they were more likely to support incoming mining operations. This confidence also increased their trust in the mining industry more generally (Zhang et al. 2015). Both bodies of literature support the assumption that confidence or trust in government regulating agencies is an important indicator of a community's willingness to trust.

5.1.5. Values: Environment, Economy and Acceptable Use

The importance of values is made clear in the SA literature. Survey results show that environmental and economic values are key predictors of aquaculture approval and that these views both vary by and are partially determined by place (Whitmarsh and Palmieri 2009; Chu et al. 2010; Freeman et al. 2012; Safford and Hamilton 2012; Murray and D'Anna 2015; Alexander et al. 2016; Dalton and Jin 2017; Flaherty et al. 2018; Hynes et al. 2018; Krovel et al. 2019). Specifically, individuals who were more concerned with the environmental impacts of aquaculture and those who held a pro-ecological world view were less likely to support aquaculture (Whitmarsh and Palmieri 2009; Chu et al. 2010; Murray and D'Anna 2015; Dalton and Jin 2017). Individuals who valued economic development and believed that aquaculture development is good for the economy were most likely to support development (Dalton and Jin 2017; Krovel et al. 2019). When investigated together, Whitmarsh and Palmieri (2009) show that in relation to aquaculture, these values are often oppositional. Those most likely to support aquaculture development were individuals who attached the highest priority to maximizing economic benefits and the lowest priority to minimizing damage (Whitmarsh and Palmieri 2009). It is clear that these values are important determinants of support.

Scholars argue that the role of values has been overwhelmingly neglected in the SLO literature, despite being incredibly important (Ford and Williams 2016). For example, Voyer and van Leeuwen (2019) argue that value alignment is an essential component in the successful establishment of SLO. In their comparative case study examining the role of social acceptability in SLO using Marine Protected Areas (MPAs), they found higher levels of acceptance in the areas that had a history of environmental activism. These communities clearly held strong, collective environmental views that aligned with conservation—a central goal in the creation of MPAs. The most successful MPA projects were those that took place in communities where collectively held environmental values aligned with the goals of the project (Voyer and van Leeuwen 2019).

Scholars have found similar patterns with economic values, particularly when discussing use-conflict. For example, in a 2018 study of SLO within a proposed aquaculture operation, Billing found opposing values when comparing non-locals who vacation in the area with local coastal residents. Non-locals who were resistant to development valued the area for “peace and quiet,” while locals valued their coastal region for “industrial activity.” Value-alignment between a community and industry is central to SLO, particularly with development that has the potential to conflict with a community’s vision of “acceptable use” of local resources, as is the case with aquaculture (Prno 2013; Leith et al. 2014; Ford and Williams 2016; Cullen-Knox et al. 2017; Billing 2018). Further, the type of economic development valued by the community has also been shown to propel or hinder aquaculture development. For example, Schlag and Ystgaard (2013) argue that communities with a history of traditional fishing are resistant to incoming aquaculture development because they see aquaculture as an economic threat—even while recognizing and desiring the economic benefits. Participants discussed this conflict in terms of trust. Where aquaculture is often associated with big industry, particularly in Spain, members of fishing communities felt that aquaculture development would ultimately lead to large conglomerates threatening traditional lifestyles. Participants trusted local, traditional fish production in comparison to the unfamiliar, industrial aquaculture (Schlag and Ystgaard 2013).

Considering the centrality of trust to SLO formation, it is reasonable to hypothesize that value-alignment works to improve the likelihood of SLO at least partially through trust. Communities may be more willing to trust incoming aquaculture development if it aligns with their collectively held values, as Schlag and Ystgaard (2013) have documented. Taking the SLO and SA of aquaculture together, it is clear that environmental and economic values are important determinants. Communities with strong environmental values may be less likely to trust aquaculture development because of potential or uncertain environmental impacts. In contrast, communities who value economic development may be more likely to trust incoming aquaculture development because of benefits such as job creation. However, this development must also align with the type of economic activity valued and desired by community members.

5.2 Indicators

The intention of this review was to develop a list of tangible indicators that predicts whether a local community is well suited for aquaculture development. While SLO is primarily generated through relationships built between stakeholders and a company, the literature also highlights the importance of context and how specific place-effects can influence issuance (Thomson and Boutilier 2011; Prno 2013; Leith et al. 2014; Ford and Williams 2016; Cullen-Knox et al. 2017; Billing 2018). However, the only empirically verified quantitative models for SLO thus far focus on company actions and impacts (Moffat and Zhang 2014; Sinner et al. 2020). This paper addresses a key gap in the literature by offering a preliminary quantitative model focusing on community

context and community characteristics. Themes and patterns found within social acceptability of aquaculture surveys, combined with what is known about SLO, informed the development of a series of indicators shown in Table 5. Though further research is certainly needed, including empirical confirmation of the indicators, this framework serves as a starting point, grounded in 2 well-established bodies of literature.

Table 5 offers a description of the indicators deemed influential. The first 3 themes—environment, economy and use conflict—are value-related indicators. Depending on a community’s collectively held values surrounding sustainability and conservation, economic development, and what type of economic development aligns with the community’s values, a community will likely be more or less willing to trust incoming aquaculture development. This willingness to trust moderates the ability for companies to pursue social license through trust generating company actions. The fourth indicator, community knowledge of aquaculture, works to influence a community’s willingness to trust by reducing or increasing uncertainty. It is likely that communities with higher levels of knowledge of aquaculture practices and products will be more likely to trust incoming development because they are not solely relying on information from the company or regulating agency in charge of development. Aware of the risks and benefits a priori, they can make informed decisions and are better able to issue SLO (Dowd and James 2014).

The fifth theme, experience, addresses previous experience with aquaculture. These experiences certainly influence a community’s willingness to trust incoming companies. Positive experiences likely lead to higher levels of willingness to trust, while negative experiences lead to lower levels. Government and regulation, the sixth theme, refers to a community’s level of confidence and trust in regulating agencies. Both the SA of aquaculture literature and the SLO literature show that this has a moderating effect on SLO generation. Communities that trust local regulating agencies to have their best interests in mind would have higher levels of willingness to trust. The final indicator is a result of findings within the theme of health and safety. It is likely that communities who perceive aquaculture products to be safe and healthful are also more likely to be willing to trust incoming aquaculture development. Communities that are uncertain, or that think that aquaculture products are inferior to wild-caught seafood, would likely have lower levels of willingness to trust. As shown in the preliminary path model (Section 5.3), these 7 indicators are all attributes of community context, which determines a community’s willingness to trust incoming aquaculture development.

5.3 Preliminary Path Flow Model

Figure 5 is a preliminary path flow model showing how community indicators identified through this literature review work to influence social license to operate within aquaculture. Independent of the community/company relationship, community context—including confidence in regulating agencies, perceptions of health and safety, knowledge of aquaculture, previous experience with aquaculture and environmental and economic values—influence a community’s willingness to trust incoming aquaculture development. Considering several of these factors are likely interrelated, they are positioned in a circle surrounding “community context” so that defined paths can be inserted as the model is tested. Following this model, a community’s willingness to trust will influence whether they are likely to issue SLO to incoming aquaculture operations.

Figure 6 situates this community-focused model within an empirically verified path model of SLO offered by Moffat and Zhang (2014). While Moffat and Zhang’s (2014) model is based on research within the mining industry, Sinner et al. (2020) confirmed that contact quality and perceptions of fairness were significant predictors when applied to aquaculture, as well. These

indicators address relational aspects of SLO, where perceptions of company actions determine the likelihood of SLO issuance. However, the literature also confirms that SLO is also influenced by community context. Themes identified in this review inform the set of indicators that make up aspects of community context that influence a community's willingness to trust incoming aquaculture development. The level of willingness to trust, determined by community context indicators, moderates the ability for companies to garner SLO through company action.

6. CONCLUSION

With aquaculture development seen as increasingly important in maintaining adequate food supply on a global scale, understanding social barriers to development is essential. The SLO concept offers a framework for understanding these social barriers and an opportunity to better understand the elements that lead to successful development. What is known so far is that SLO is relational and is gained through the generation of trust between a company and community. Aquaculture companies must be proactive in seeking SLO, as company-controlled impacts and company-community engagement are key predictors of SLO. If companies are able to earn a community's trust through their actions and impacts, they are more likely to receive SLO. However, from the literature, it is clear that community characteristics and collectively held values also influence the likelihood of SLO issuance, independent of company actions. The preliminary model presented in this paper addresses this and demonstrates how community indicators can influence a community's willingness to trust incoming operations.

Considering the call for efforts to increase aquaculture development, this research has additional practical applications. Most importantly, this model could inform efforts to identify areas particularly suitable for aquaculture development. While this is being done with biological indicators (for example, National Aquamapper), including social indicators when mapping out areas of interest would provide a more comprehensive and accurate prediction of potentially suitable areas. Aquaculture development could be more or less beneficial to communities depending on certain community characteristics and collective values. By considering these social factors in identifying areas of interest, efforts could be more strategic and effective.

While more research is needed for empirical validation, this model is an important starting point for future investigation. The weight of each indicator may vary, yet overall, it is clear that community context is an essential consideration when modeling SLO. This research fills an important gap in the literature, not only advancing the body of work dedicated to SLO within aquaculture, but to the SLO literature more broadly. Quantitative assessment has been limited to few, key studies focusing on company actions and impacts. Advancement of the academic analysis of SLO as a concept depends on the expansion of our understanding of what constitutes SLO, what indicators influence its development, and how it applies across industries. With continued research, SLO continues to grow into a useful tool for the systematic inclusion of social barriers and catalysts for both industry personnel and researchers. Research looking beyond what a company can do to garner SLO is key to broadening our understanding of SLO and expanding its utility.

TABLES

Table 1. Summary of papers (N=19) reviewed focusing on social license to operate (SLO) within aquaculture.

Author	Year
Baines and Edwards	2018
Billing	2018
Billing et al.	2021
Buck et al.	2008
Kelly and Fleming	2017
Leith et al.	2014
Kelly et al.	2017
Krause et al.	2020
Mather and Fanning	2019
McGhee et al.	2019
Murphy-Gregory	2018
Newton et al.	2020
Runge et al.	2021
Sinner et al.	2020
Stephen and Wade	2019
Tollefson and Scott	2006
Vince and Haward	2017
Voyer and van Leeuwen	2019

Table 2. Summary of papers (N=44) reviewed.

Author	Year	Survey?
Alexander et al.	2016	1
Alexander et al.	2018	1
Amberg and Hall	2008	

Bacher et al.	2014	
Bailey and Eggereide	2020	
Barrington et al.	2010	
Beckensteiner et al.	2020	
Bouchard et al.	2021	1
Chu et al.	2010	1
Claret et al.	2014	1
Dalton and Jin	2017	1
Fernandez-Polanco and Luna	2012	1
Feucht and Zander	2016	
Flaherty et al.	2018	1
Freeman et al.	2012	1
Froelich et al.	2017	
Hynes et al.	2018	1
Johnson et al.	2019	
Joyce and Satterfield	2010	
Katranidis et al.	2003	
Kluger et al.	2019	
Krovel et al.	2019	1
Krause et al.	2020	
Mazur and Curtis	2006	1
Mazur and Curtis	2008	1
Murray and D'Anna	2015	1
Murray et al.	2017	1
Outeiro et al.	2018	1
Reig et al.	2019	
Rickard et al.	2020	1
Ridler et al.	2007	

Robertson et al.	2002	1
Safford and Hamilton	2012	1
Schlag and Ystgaard	2013	
Shafer et al.	2010	1
Sinner et al.	2020	1
Thomas et al.	2018	1
Tiller et al.	2019	
Weitzman and Bailey	2019	1
Whitmarsh and Palmieri	2009	1
Whitmarsh and Palmieri	2011	1
Whitmarsh and Wattage	2006	1
Young and Liston	2010	
Young and Matthews	2010	
Total		26

Table 3. Set of 12 statements that measure social license to operate (SLO; Boutilier 2017).

Statement
[Company] shares information on matters that affect us.
[Company] contributes to regional well-being.
[Company] takes account of our interests.
[Company] respects our way of doing things.
We're satisfied with our relation with [Company].
We have similar vision for future as [Company].
[Company] treats everyone fairly.
We can gain from a relationship with [Company].
[Company] listen to us.
The presence of [Company] is a benefit.
[Company] gives more help to those who it affects more.
[Company] shares decision-making on matters that affect us.

Table 4. Summary of social acceptability of aquaculture survey results (N=26), including type of aquaculture investigated, geographic scope, and themes discussed.

Study	Aquaculture Type	Geographic Scope	Environment	Economy	Knowledge	Use Conflict	Experience	Govt. & Regulation	Health & Safety
Alexander et al. 2016	IMT	Multinational: Ireland, Israel, Italy, Norway, UK	■		■				
Alexander et al. 2018	IMT	Multinational: Ireland, Israel, Italy, Norway, UK	■		■				
Bouchard et al. 2021	Finfish, Shellfish, Sea Vegetables	Regional: Atlantic States, USA			■				
Chu et al. 2010	All	Cross-national: Norway, USA	■	■				■	■
Claret et al. 2014	Finfish	Regional: Spain			■				■
Dalton and Jin 2017	Shellfish	Regional: 3 coastal regions, RI, USA	■	■		■	■	■	■
Fernandez-Polanco and Luna 2012	All	National: Spain	■						■
Flaherty et al. 2018	Mariculture	Regional: coastal Vancouver Island & CA Maritime	■	■	■			■	
Freeman et al. 2012	Mariculture	Multinational: Israel, Germany	■	■	■				■
Hynes et al. 2018	All	Cross-national: Norway, Ireland	■	■	■	■	■	■	
Krovel et al. 2019	Finfish	National & local, Norway	■	■					

Mazur and Curtis 2006	Finfish, shellfish	Regional: Australia	■	■	■	□	□	■	□
Mazur and Curtis 2008	Finfish, shellfish	Regional: Australia	■	■	■	■	■	■	□
Murray and D'Anna 2015	Shellfish	Local: Baynes Sound (Vancouver & Denman Isl)	■	■	■	■	■	□	□
Murray et al. 2017	All	National: USA	■	■	■	■	■	■	■
Outeiro et al. 2018	Finfish	National: Chile (tourists)	■	■	□	□	□	□	□
Rickard et al. 2020	All	National: USA	■	□	■	□	■	■	□
Robertson et al. 2002	Offshore	Local: Hampden Beach, USA	□	□	■	□	□	□	□
Safford and Hamilton 2012	All	Regional: Hancock & Washington County, ME, USA	■	■	□	□	□	□	□
Shafer et al. 2010	All	Local: Banks Peninsula and Christianchurch, New Zealand	□	□	□	■	■	□	□
Sinner et al. 2020	All	National: New Zealand	■	■	■	■	■	□	□
Thomas et al. 2018	Seaweed, mussel, finfish	Regional: Sweden, west coast	■	■	■	■	■	□	□
Whitmarsh and Palmieri 2009	Salmon	Regional: Scotland	■	■	□	□	□	□	□
Whitmarsh and Palmieri 2011	Salmon	Regional: Scotland	■	□	□	■	■	□	□
Whitmarsh and Wattage 2006	Salmon	Regional: Scotland	■	■	□	□	□	□	■

Table 5. Community indicators that influence social license to operate (SLO) issuance.

Theme	Potential Indicator	Relationship
Environment	Concern over impact of aquaculture	High (-), Low (+)
Economy	Desire economic development	Low (-), High (+)
	Type of economic activity desired	Not aligned (-), Aligned (+)
Use Conflict	Acceptable use	Leisure (-), Livelihood (+)
	Competing, highly valued industries	Present (+), Absent (-)
Knowledge	Knowledge of aquaculture	Low (-), High (+)
Experience	Previous experience with AQ	Negative (-), Positive (+)
Government & Regulation	Trust in govt. regulating agencies	Low (-), High (+)
Health & Safety	Perceptions of health and safety of AQ products	Unsafe/uncertain (-), Safe (+)

FIGURES

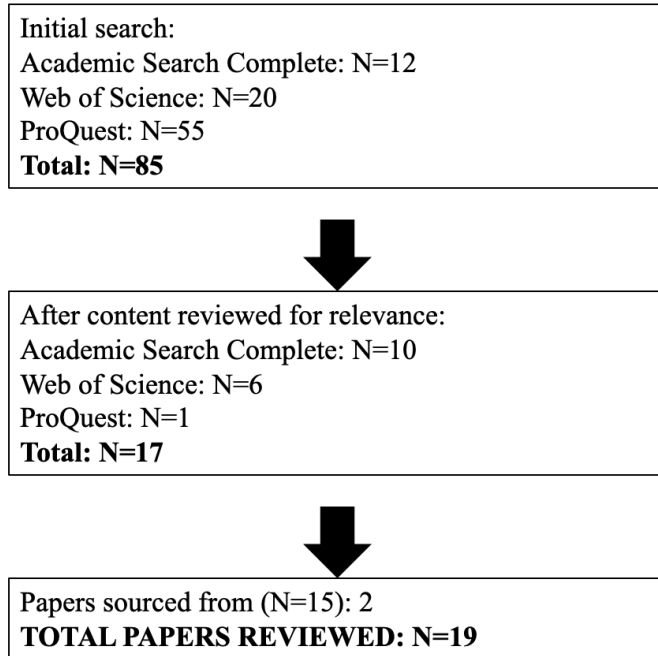


Figure 1. Visualization of the social license to operate (SLO) within aquaculture review process.

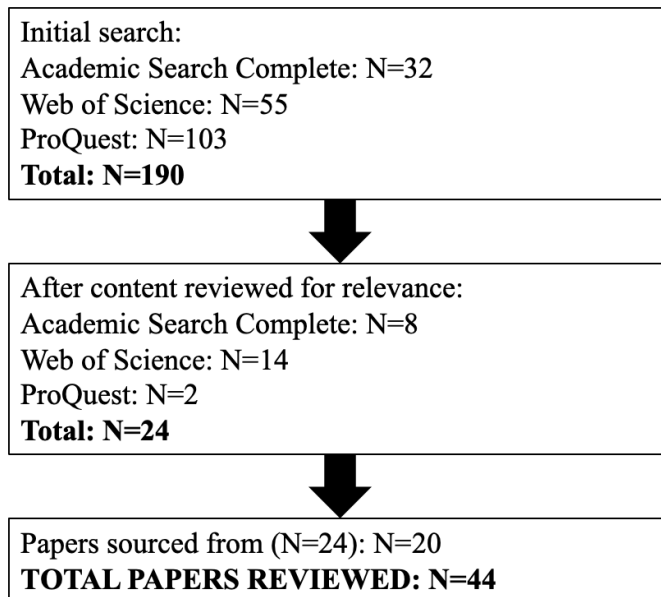


Figure 2. Visualization of the social acceptability of aquaculture review process.

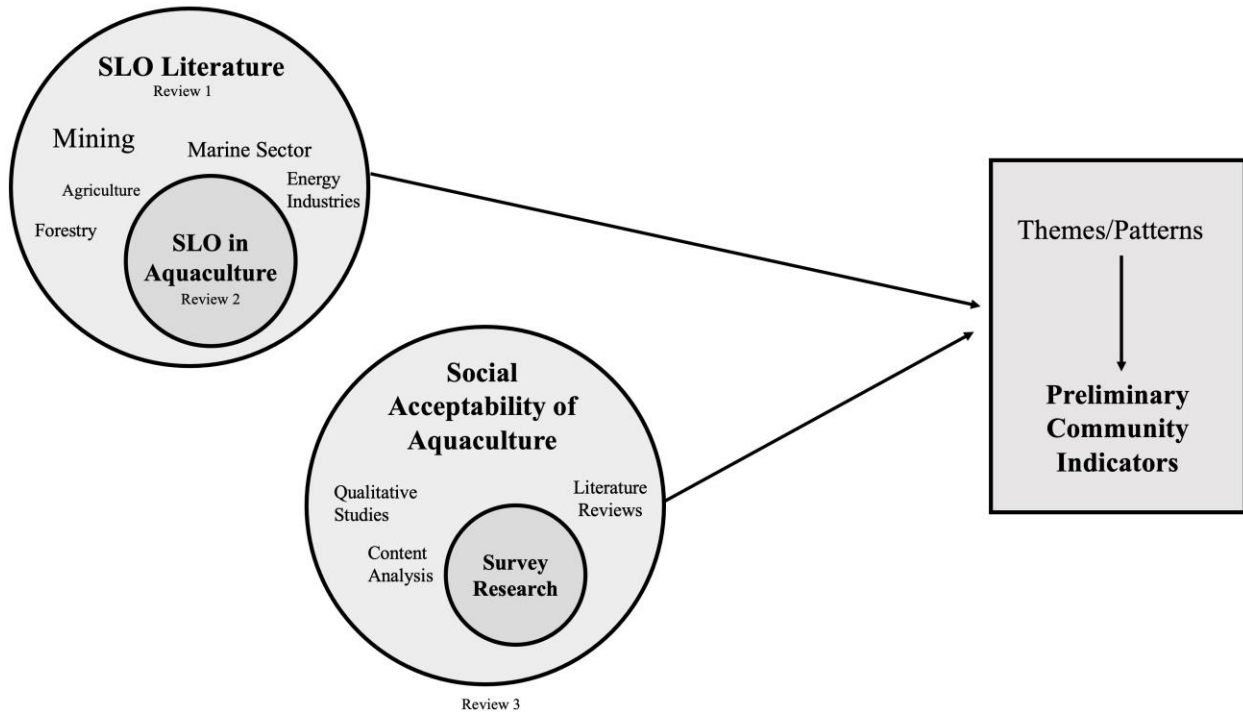


Figure 3. Overview of the review process. Themes from each review were collated to inform a set of preliminary indicators that intend to predict community suitability for aquaculture.

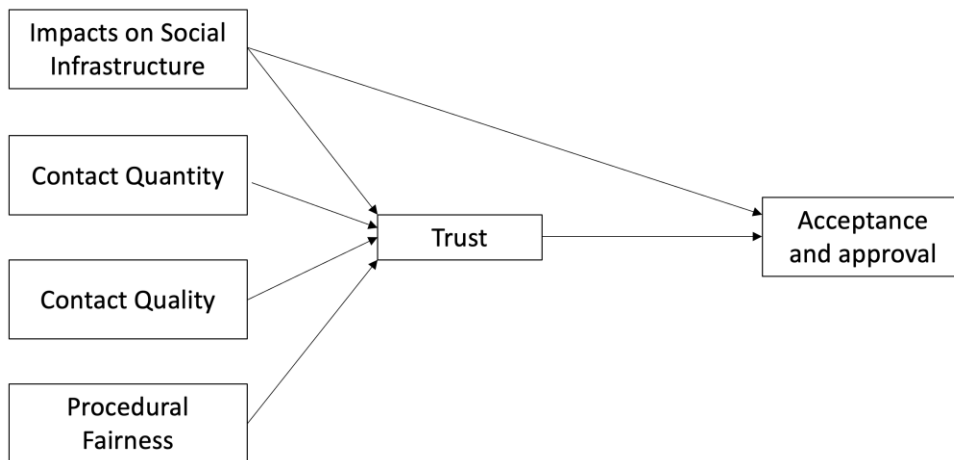


Figure 4. Path model for social license to operate (SLO) within the mining industry developed by Moffat and Zhang (2014).

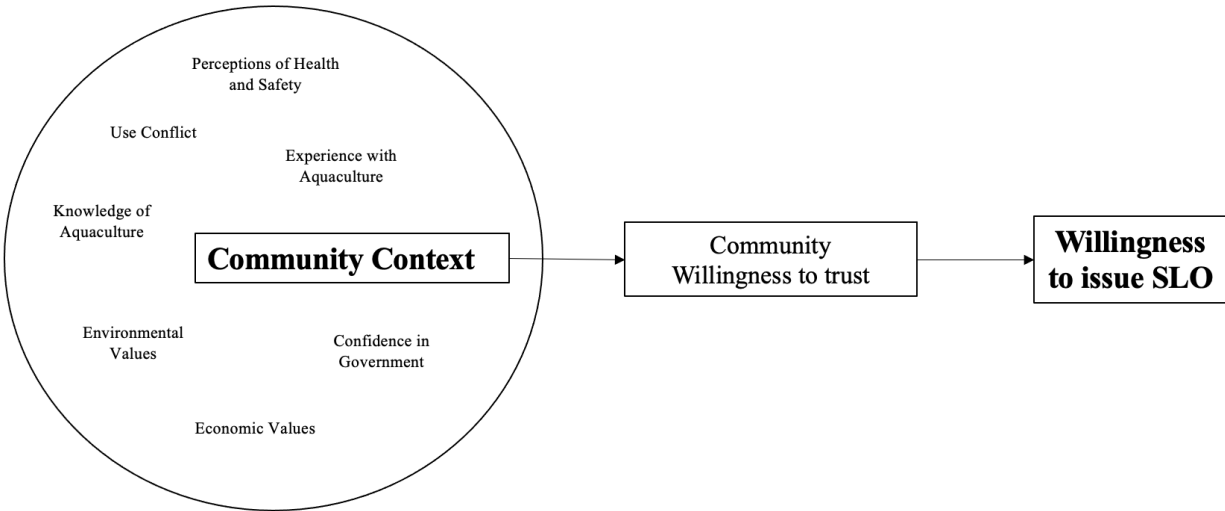


Figure 5. Preliminary path flow model showing how community context influences the likelihood of social license to operate (SLO) issuance independent of company actions.

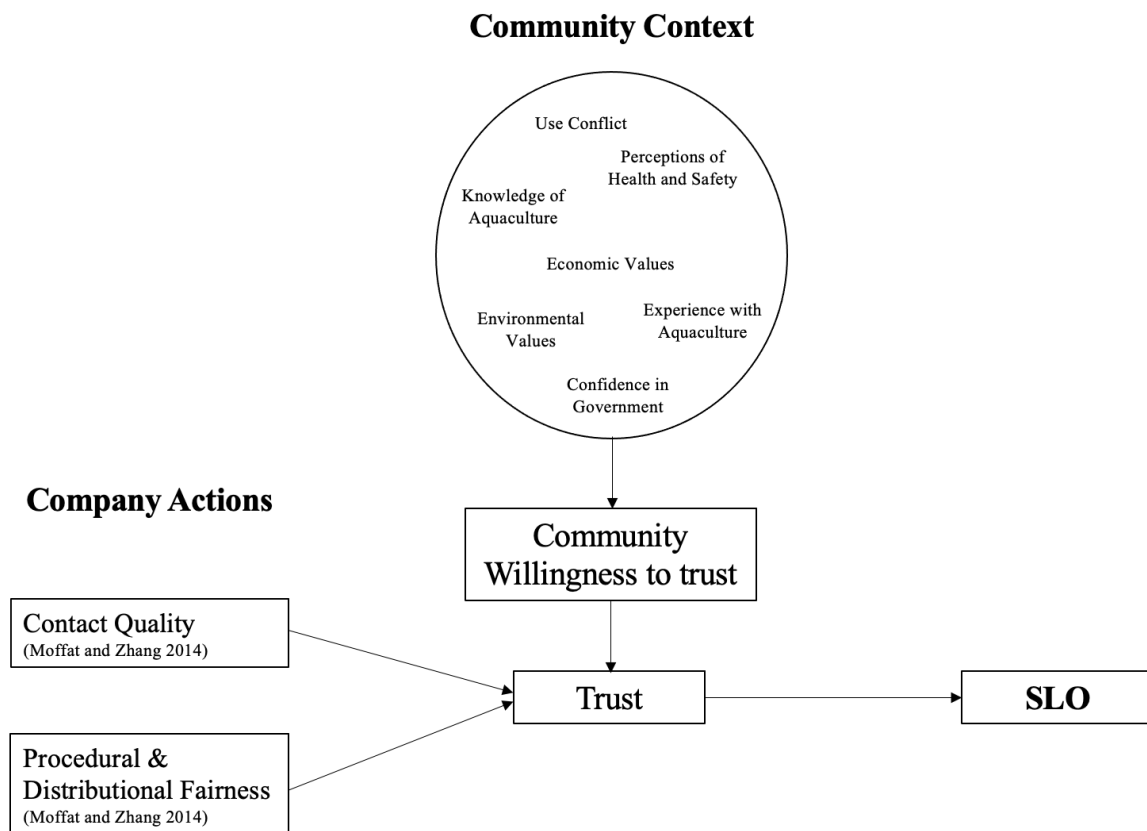


Figure 6. Preliminary path flow model showing the effects of community context and company actions on social license to operate (SLO). Community willingness to trust, influenced by the attributes of community context, moderates the ability for a company to generate trust, and subsequently SLO, through company actions.

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