



Strategic dynamics in the fishing field: An egocentric network analysis of small-scale fishing communities in Chile

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ABSTRACT

Artisanal/small-scale fishers employ diverse strategies to navigate the fishing field, balancing access to resources with their institutional relationships. Within the framework of field theory, this study applies an egocentric network analysis to examine these strategies in fishing communities in central and south-central Chile. In doing so, we explore how the fishers mobilize different forms of capital and adjust their strategies within a field structured by power relations, competition, and disputes over resource access and the legitimacy of regulations. The results reveal that the fishers maintain stronger ties with associations and market actors, while their connections with control and financing agencies are comparatively weaker. Heterogeneity in the networks varies, reflecting a tension between diversity in institutions and efficiency in mobilizing resources. A cluster analysis identified three field action strategies, understood as the ways in which the fishers either stabilize their position or reconfigure their location within the fishing field: (1) leveraging fishers associations to strengthen social and cultural capital, (2) diversifying connections with governance and market actors to access symbolic and economic capital, and (3) engaging with research and financing organizations to secure technological and informational capital. These findings underscore the key role of network structure, relational proximity, and strategic variety in the fishing field, providing significant insights on the governance problem of artisanal fishing.

1. Introduction

The management of marine fisheries resources, identified decades ago as a wicked problem (Jentoft and Chuenpagdee, 2009), requires approaches that address cross-cutting interactions among multiple stakeholders and governance levels, considering different spatial and temporal dimensions (Ostrom, 2010; Refulio-Coronado, 2021). Marine fisheries operate within complex socio-ecological systems, where fishery resources interact with a variety of users and managers (McClanahan et al., 2009; Restrepo-Gómez et al., 2022). Among these, national and local government agencies, private companies, and artisanal fishers play key roles in shaping governance dynamics (Ostrom, 2007).

In this context, various governance approaches emphasize the creation of governance networks that respond to local socio-ecological needs, without losing sight of broader policy objectives (Carlisle and Gruby, 2019; Pelage et al., 2023). Among these approaches are rights-based management (Allison et al., 2012; Willmann et al., 2017),

polycentric systems (Gelcich, 2014; Tuda et al., 2021), adaptive co-management (Armitage et al., 2008; Sandström and Rova, 2010), interactive governance (Jentoft and Bavinck, 2014; Jentoft and Chuenpagdee, 2015, 2022), and Elinor Ostrom's Institutional Analysis and Development Framework (Ostrom, 2011), among others. A common element among these approaches is the inclusion of artisanal fishers in decision-making processes and the promotion of long-term sustainability in marine-coastal governance (Defeo et al., 2016; Gelcich et al., 2010). These contributions, which advocate shifting from top-down management to co-management, emphasize the construction of social capital and the development of governance networks that allow for more adaptive and resilient management structures (Carlisle and Gruby, 2019; Ostrom, 2007).

Social network analysis (SNA) has been widely used to examine socio-ecological interactions in marine and coastal governance. This methodology provides valuable insights into how artisanal fishers engage with multiple governance centers and interact with diverse

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resource users (Alexander et al., 2015; Crona et al., 2017; Grace–McCaskey et al., 2023; Grafton, 2005; Marín and Berkes, 2010; Mueller et al., 2008). By capturing the complexity of multi-level governance interactions, network analysis reveals how fishers mobilize resources and sustain their livelihoods through horizontal ties (collaborations with peers) and vertical ties (connections with regulatory institutions) (Crona and Bodin, 2010). This relational perspective highlights that the ability of fishers to access and utilize resources depends on their strategic relations with governance units and other actors, highlighting the central role of network structures in addressing the governance issues of fisheries (Sekhar, 2007).

Nevertheless, while network analysis provides a view of relational structures, it often falls short in capturing the broader institutional and power dynamics that shape these interactions (Vaisey and Lizardo, 2010). To address this gap, we integrate field theory (Bourdieu and Wacquant, 1992; Fligstein and McAdam, 2012) as a complementary framework. Field theory conceptualizes governance as a structured yet dynamic space where actors compete for influence by mobilizing different forms of capital—economic, social, cultural, and symbolic (Scoville and Fligstein, 2020). This perspective allows us to move beyond network structures: how fishers position themselves within governance institutions, how they leverage resources, and how power asymmetries shape their opportunities and constraints.

In fisheries governance, capital is not only distributed unequally among actors, but it also defines their strategies and capacity to influence decision-making processes. Artisanal fishers do not only interact through networks; they also compete over access to economic, social, and symbolic capital, which directly affects their capacity to secure rights, negotiate regulations, and maintain their daily activities. In this sense, governance processes are shaped by power asymmetries, where some actors—such as state agencies or industrial fishers—hold more institutional and economic capital, while others—such as small-scale artisanal fishers—must rely on social capital, collective action, and adaptive strategies to maintain access to resources (Bourdieu, 1990; Fligstein, 2001).

Field theory conceptualizes the capacity of an actor to construct shared meanings, create identities and form strategic alliances through the concept of “social skill” (Fligstein, 2001). These skills are critical for navigating governance structures, as they enable actors to mobilize resources and coordinate collective actions that can reinforce or transform governance arrangements. Artisanal fishers, for example, leverage their connections with associations, markets, and government actors to strengthen their field position, secure financial and regulatory support, and respond to socio-environmental challenges (Marín et al., 2012; Gelcich, 2014).

In the Chilean context, fisheries governance has gradually taken shape through co-management frameworks involving government agencies, fishers’ associations, and other key stakeholders. Examples include the Areas of Management and Exploitation of Benthic Resources (AMERB, its acronym in Spanish), the administration plans for artisanal fishing coves (pursuant to Law 21.027, 2017/2024), management committees, and scientific-technical committees (established under Law 20.657, 2013), among others. Artisanal fishers have leveraged these networks to access governance and market resources, enhancing their adaptive capacity and resilience in the face of regulatory and environmental changes (Gelcich, 2014; Marín et al., 2023; Marín and Berkes, 2010). This has also led to the development of co-management regulations and the strengthening of cohesion within local artisanal fishing associations (Schumann, 2007).

This research builds on these frameworks by examining how artisanal fishers in Chile mobilize their networks and capitals to maneuver through the complexities of a fisheries governance system characterized by high uncertainty and a diverse array of stakeholders with conflicting interests (Dahlet et al., 2021; O’Riordan, 2015; Pinkerton and Davis, 2015). Combining egocentric network analysis (Lin, 2001; Van der Gaag et al., 2008) with field theory (Bourdieu and Wacquant, 1992; Fligstein

and McAdam, 2012), we investigate the variety of strategies that fishers employ to engage with governance units, market actors, fishers’ associations, and other institutions (cf. Klutetz and Fligstein, 2016). While network analysis provides a view of fishers’ relational structures and access to resources, field theory complements this by situating these strategies within a broader institutional and relational arena shaped by historical trajectories and power asymmetries. Together, these approaches show how fishers’ field positions, capitals, and social skills influence their capacity to adapt and change the fishing governance (Kungl and Hess, 2021; Olsson and Jerneck, 2018). Although there are previous combinations in networks and field theory (de Nooy, 2003), this has not been seen in research into small-scale fishing and this research aims to be a first approximation.

2. Materials and methods

2.1. Study area

This study focuses on the artisanal fishing areas in the central and central-southern Chile, specifically the Biobío and Valparaíso regions, where the egocentric networks of fishers and their interactions with various actors in the coastal fishing sector are examined (Fig. 1). In our case, we selected two coves in the Valparaíso region and three in the Biobío region. These regions have been the subject of previous social network studies due to their contrasting socio-economic and environmental contexts. The differences between the two regions—such as the varied presence of industrial fishing actors alongside administration, control, and commercial sectors—offer a rich landscape for analyzing the roles and influences of these diverse stakeholders on small-scale fisheries. The distinct fishing strategies developed in each region, shaped by local conditions, make these areas crucial for understanding the dynamics of artisanal fisheries in Chile.

The Biobío and Valparaíso regions offer complementary yet contrasting perspectives on small-scale fisheries. Both are historically significant areas for artisanal and industrial fishing (Pulgar and Villarreal, 2025), not only in terms of landings and the presence of fishers but also in the development of social organizations for artisanal fishers (unions) (Basulto del Campo, 2014). In terms of contrasts, while the Biobío region is characterized by its productive fishing grounds and diverse stakeholder engagement, the Valparaíso region is distinguished as a hub for administrative institutions responsible for overseeing national fisheries policy and management (Marín et al., 2012). These institutional dimensions, combined with the diverse presence of actors, make both regions essential for understanding the governance and development of small-scale fisheries in Chile. Previous research with a network approach confirms their relevance and contrast in this sense (Marín and Berkes, 2010). Both are valuable contributions to understanding how fishers elaborate strategies with a range of actors and their implications for resource management.

2.2. Data collection and analysis

The research was conducted through several field visits between March 2023 and August 2024, using social network analysis based on a two-mode incidence matrix, also known as an affiliation matrix, in an $n \times m$ rectangular format (Borgatti et al., 2013). During this period, we collected both attribute and relational data from artisanal small-scale fishing communities (caletas) in the Valparaíso region (central zone), specifically from caletas located in the bays of Valparaíso and San Antonio, and the Biobío region (south-central zone), focusing on one caleta in the Gulf of Arauco.

We designed a social network analysis questionnaire (Appendix A) based on existing literature to identify and characterize key institutional and organizational counterparts, or “alters,” involved in the governance of fisheries in Chile ($n = 28$, following Marín and Berkes (2010) and Marín et al. (2012)). These alters were categorized into 11 institutional

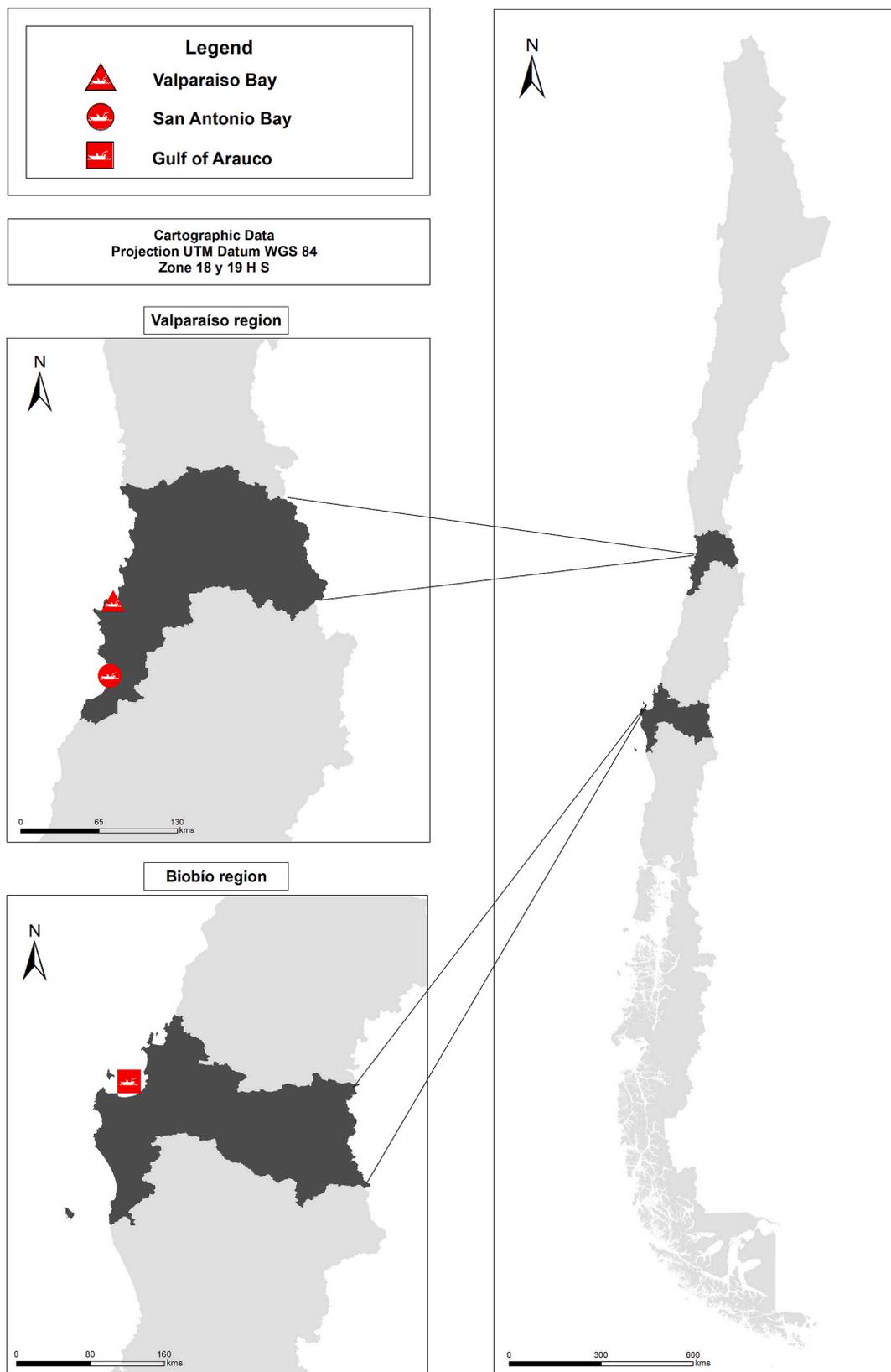


Fig. 1. Study areas: Central and south-central coves of Chile.

sectors or positions to provide a clearer understanding of the broader fishing field, including sectors such as management, control, and market. This classification draws not only from scientific literature and a documentary review of the institutional objectives of governance units

within the fishing field but also from ethnographic work conducted in artisanal fishing communities. In fact, data collection is framed within ethnographic research on the strategies of artisanal fishing communities, which consisted of interviews, documentary review, and direct

observation of fishing communities. By combining these approaches, we streamline the diversity of the 28 actors while ensuring that their roles and functions in fisheries governance are accurately represented (see Appendix B).

Additionally, we assigned each alter specific capital attributes—such as informational, social, economic, cultural, and symbolic capital—using binary values (1 or 0). To classify the actors in the different capitals, the assignment considers the main resources of each sector and what impacts artisanal fishers. All actors have various capitals, but only the fundamental ones are considered. The classification was based on interviews with key informants and ethnographic work during 2021–2022 with key actors in the artisanal sector. Originally, the instrument is designed to measure social capital as accessibility to the available resource among its contacts, but fails to identify which type of actor allows—within their own sector—to build “social skills” for the fishing field. We have identified this type of actors close to artisanal fishers to define them as “social capital” in the latter sense, i.e. as a way to mobilize resources from their own sector to demand interests, including those of other sectors. This categorization allowed us to construct a cumulative capital index, which serves as a composite measure of the number of different types of capital that fishers could access through their institutional connections in the fishing field. In addition, the cumulative scale is subsequently used to calculate the total capital that is used by each fishers’ strategy.

The “egos” represented both leaders and non-leaders from the small-scale fishing communities (Valparaíso region, n = 24; Biobío region, n = 36). Only fishers formally affiliated with the respective unions of each artisanal fishing community (Caleta) were included in the study. Including non-leader fishers allowed us to delve deeper into earlier studies that primarily focused on formal leaders, such as union presidents, as representatives of community social capital. This study thus provides a broader view of fishers’ networks beyond formal leadership roles, highlighting differences in access to resources and information among other members. Of our sample, 25 % are women, while the remaining 75 % are men. This is in line with the national proportion registered in the artisanal fishing sector (SUBPESCA, 2022): 25.67 % women and 74.33 % men. Regarding their work experience, 40.38 % have 10 or fewer years of work experience, 38.46 % have between 11 and 20 years of experience, and 21.15 % have more than 20 years of work experience.

Before administering the questionnaire, participants were informed about the voluntary, confidential, and anonymous nature of their participation, as well as their right to withdraw at any time. Informed consent was obtained and recorded at the beginning of the instrument. The questionnaire was divided into two parts: the first collected attributes of the “egos” (e.g., locality, age, gender, years of work, education level), while the second part focused on the relationships between “egos” and their institutional counterparts, using categories such as roles and gender. A Likert scale was also used to measure the closeness of these relationships (1 = not close to 5 = very close). The closeness on this scale allows us to assess the potential channel of resources between ego and alter (that is, the capital flows).

Different metrics were used to analyze the structure of fishers’ egocentric networks in the central and southern regions (see Table 1). The main metrics included network size, access to different institutional sectors within the network, diversity of actors in egocentric networks, the total amount of capital that each fisher can mobilize through their connections, the distribution of accessible capital, and the efficiency with which each fisher utilizes that capital relative to the diversity of institutional sectors they access. We also included capital composition, which reflects the weighted distribution of various types of capital (e.g., economic, physical) based on the closeness of relationships with alters (in this case, we use the Likert scale to weight the different metrics). These metrics provide insight into the material and relational strategies fishers employ, as well as how efficiently they leverage their available resources.

Our goal is to adopt an egocentric network approach to understand the relational structures of the fishing field. The resources fishers access are embedded within this field and thus form the basis for their strategies. By first examining the structures of their egocentric networks (ego-alter), we gain insight into the scope of their potential resources within the fishing field. Next, we analyze their relationships to these resources to identify relational patterns and classify strategies. These metrics—such as network access, E-I index, capital efficiency, alter closeness, and the composition of capital weighted by the closeness of relationships—enable us to explore the structural and relational foundations of these strategies. This relational perspective on the fishing field highlights not only the resources available within fishers’ networks but also their capacity to adapt, influence, and transform the institutional domain in which they act.

Table 1
Principal measures applied in research.

Measure	Description	Interpretation
Access	The number of distinct actors (alters) an ego (the focal fisher) is connected to in their network (Borgatti et al., 2013).	A high Access value indicates more relationships and broader reach, providing greater opportunities for diverse resources. Low Access may restrict the ego’s ability to gather support.
Position Access	The diversity of institutions that the ego can reach through their network (Borgatti et al., 2013). These include management, research, association, and others.	A high Position Access value allows the ego to engage with multiple institutional sectors, gathering diverse resources. Low Position Access limits the ability to access varied institutional support.
E-I Index	Compare the proportion of ego ties to “external” actors (from other institutional categories) versus “internal” actors (from the same category) (Krackhardt and Stern, 1988).	A positive value indicates greater connectivity with external actors, promoting heterogeneity and access to new sources of capital. A negative value or one close to zero suggests a predominance of internal relationships, potentially more cohesive but less diverse.
Capital Accumulation	The amount of capital that fishers or strategies can access through their relations, aggregating all capital types. Based on the idea of Bourdieu (1990). It is calculated as the sum of the capital contributed by each actor (alter) with which the ego has a link.	A higher Accumulated Capital value reflects greater access to overall resources. Low values suggest limited resource access, which may restrict opportunities for influence or support.
Capital Composition	Distribution of various types of capital among fishers, weighted by the closeness of their relationships (as measured on a Likert scale). Based on the idea of Bourdieu (1986, 1990). The amount of each type of capital is weighted according to the closeness of the relationship with each alter, and then the proportion with respect to the total is calculated.	Higher values in a particular capital type indicate greater access to that specific resource through close relationships. A low value suggests limited access to certain resource types.
Capital Efficiency	The uses of available capital in relation to the diversity of positions accessed. Combines capital distribution with institutional access. Inspired on the ideas of Ronald Burt (1992) and Bourdieu (1986, 1990). It is the total capital of each ego, divided by the number of connections. Then that average is divided by the different positions to which it has access.	High Capital Efficiency suggests optimal use of available capital across multiple positions, indicating strategic use of the network. Low efficiency means available resources are underutilized.

Statistical tests, specifically the Wilcoxon rank sum test (a non-parametric method), were applied to assess significant differences between regions across these metrics (as Shapiro-Wilk tests indicated non-normality in key variables; $p < 0.05$ for at least one region). This analysis is robust to small discrepancies in sample sizes. To further validate our findings, we employed bootstrap resampling (10,000 replicates) using the BCa method to compute confidence intervals for the differences in median values across regions. In the variables with significant differences, the BCa intervals consistently exclude zero. Additionally, hierarchical clustering analysis (using complete linkage and Euclidean distance) was performed to classify fishers' strategies based on their connections with institutional sectors (i.e., a 60x11 matrix). Hierarchical clustering is an unsupervised method that iteratively groups similar observations, producing a dendrogram that reveals the nested structure of the data (Husson et al., 2017). In this way, we can obtain emerging patterns from relational configurations, which we interpret as groups of relational strategies that fishers have in the fishing field. As these configurations are based on ego-alter and not exclusively on ego, an ego can participate in the different clusters that emerge. An optimal dendrogram cut can be established to classify or reduce data information and a deeper classification of hierarchical patterns. To choose the optimal cut, we employed an empirical inertial gain criterion—selecting the number of clusters beyond which further partitioning yields only marginal increases in between-group inertia. All analyses were conducted in R.

3. Results

3.1. General

The network approach, guided by field theory, shows the interdependence and relationship between actors and their capital in artisanal fishing. The results reveal differences and similarities between the networks and the capital of fishers in both regions. Their relational strategies fall into three categories: those seeking to build social skills in the field, those with direct and regular relationships, and those seeking long-term expansion through institutional relationships.

Fishers ($N = 60$) maintain connections with a diverse range of actors (N ties = 677), occupying various strategic positions across the network, with significant variation in the resources or capitals they can access. On average, fishers were connected to 16.4 different actors ($SD = 8.39$) across 7.42 institutional categories ($SD = 8.39$). The average closeness to their alters was 2.68 ($SD = 1.12$), with 25.8 % of alters being female and 74.2 % male.

The accumulated capital, representing the total potential resources accessible to fishers, averaged 21.1 (median = 19, $SD = 9.67$). The distribution of these resources across networks reflected moderate evenness, with a capital distribution score of 1.88 (median = 1.85, $SD = 0.17$), meaning each connection contributed nearly two units of capital. Capital efficiency, which measures how effectively fishers utilize these resources relative to the diversity of positions accessed, averaged 0.28 (median = 0.28, $SD = 0.1$), suggesting strategic use of their connections.

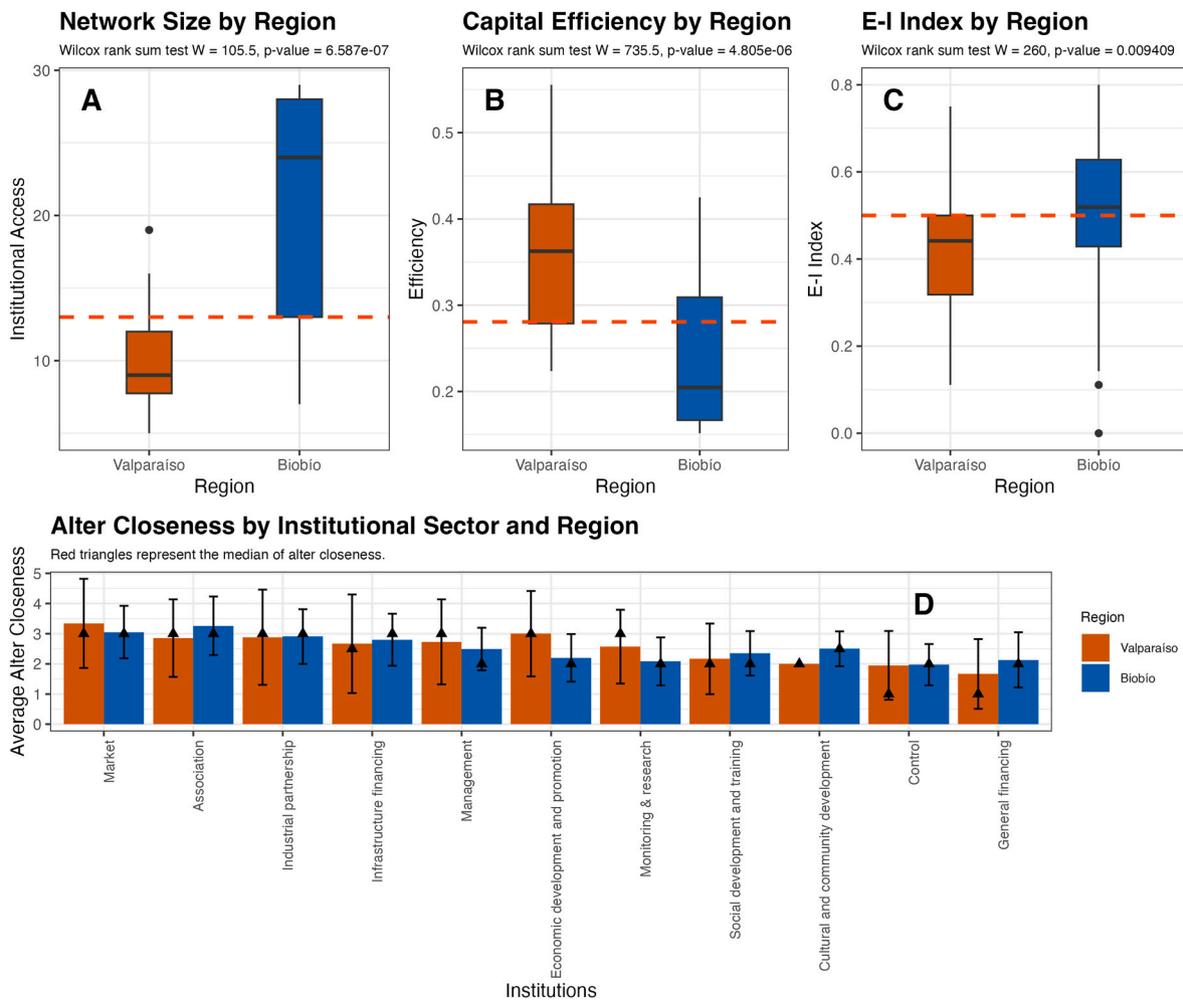


Fig. 2. Network size, capital efficiency, heterogeneity, and alter closeness.

3.2. Egocentric and capital structure in the fishing field

The egocentric network analysis reveals significant regional differences in how fishers from Biobío and Valparaíso access key positions within the fishing field. Fishers in Biobío demonstrated broader access to a larger array of key actors, with a median access of 24 compared to 9 in Valparaíso, indicating significantly broader connections ($W = 105.5$, $p\text{-value} = 6.587e-07$; 95 % BCa CI: [-20, -6]) (Fig. 2A). However, despite this broader network size, measures of capital accumulation and distribution did not differ significantly between the regions (capital accumulation medians: Biobío = 20.5, Valparaíso = 18.5, $W = 364.5$, $p\text{-value} = 0.3115$, 95 % BCa CI: [-8.0, 3.5]; capital distribution medians: Biobío = 1.833, Valparaíso = 1.917, $W = 526.5$, $p\text{-value} = 0.1557$, 95 % BCa CI: [-0.0833, 0.1818]).

Significant differences emerged in capital efficiency, with fishers in Valparaíso exhibiting higher efficiency (median = 0.3625) compared to their Biobío counterparts (median = 0.2045) (Fig. 2B). This suggests that fishers in Valparaíso optimize their available resources more effectively despite having smaller networks ($W = 735.5$, $p\text{-value} = 4.805e-06$; 95 % BCa CI: [0.0584, 0.2189]). Additionally, network heterogeneity based on institutional sectors was more pronounced in Biobío, as indicated by a higher E-I Index (mean = 0.46, median = 0.5, $SD = 0.16$), compared to Valparaíso ($W = 260$, $p\text{-value} = 0.009$; although marginal with 95 % BCa CI: [-0.219, 0.000]) (Fig. 2C). Heterogeneity and network efficiency were negatively correlated ($\rho = -0.497$, $p = 5.222e-05$), which suggests a balance between maximizing the use of resources and having diversified relationships. On the

contrary, the gender-based E-I index shows that both genders have homophilic relationships (mean = -0.69, median = -0.76, $SD = 0.32$), and this difference is accentuated by region (median Valparaíso = -0.92, median Biobío = -0.61; $W = 196$, $p\text{-value} = 0.0002$; 95 % BCa CI: [-0.4615, -0.1515]).

Fishers in both regions have different levels of proximity to institutional actors, which reflects their strategic priorities in the fishing field. Associations and market entities consistently emerge as the closest partners, with proximity averages over 3. In Biobío, strong ties to associations (mean = 3.26, $SD = 0.97$) emphasize the role of collective action and shared identity as key drivers of engagement. Meanwhile, Valparaíso fishers demonstrated slightly closer relationships with market actors (mean = 3.34, $SD = 1.48$), indicating a stronger orientation toward leveraging market opportunities. Industrial partnerships also played a significant role, with comparable proximity levels in both regions, highlighting fishers' capacity to operate within competitive and regulatory landscapes.

On the other hand, weaker ties with control agencies, financial institutions, and economic development agencies, with average proximity scores of less than 2, reflect a selective pattern of external engagement. For instance, ties to general financing bodies were distant in Valparaíso (mean = 1.67, $SD = 1.15$) and slightly closer in Biobío (mean = 2.13, $SD = 0.91$). Moderate proximity to management bodies and infrastructure financing institutions shows a preference for connections that directly support fishers' operational or strategic needs.

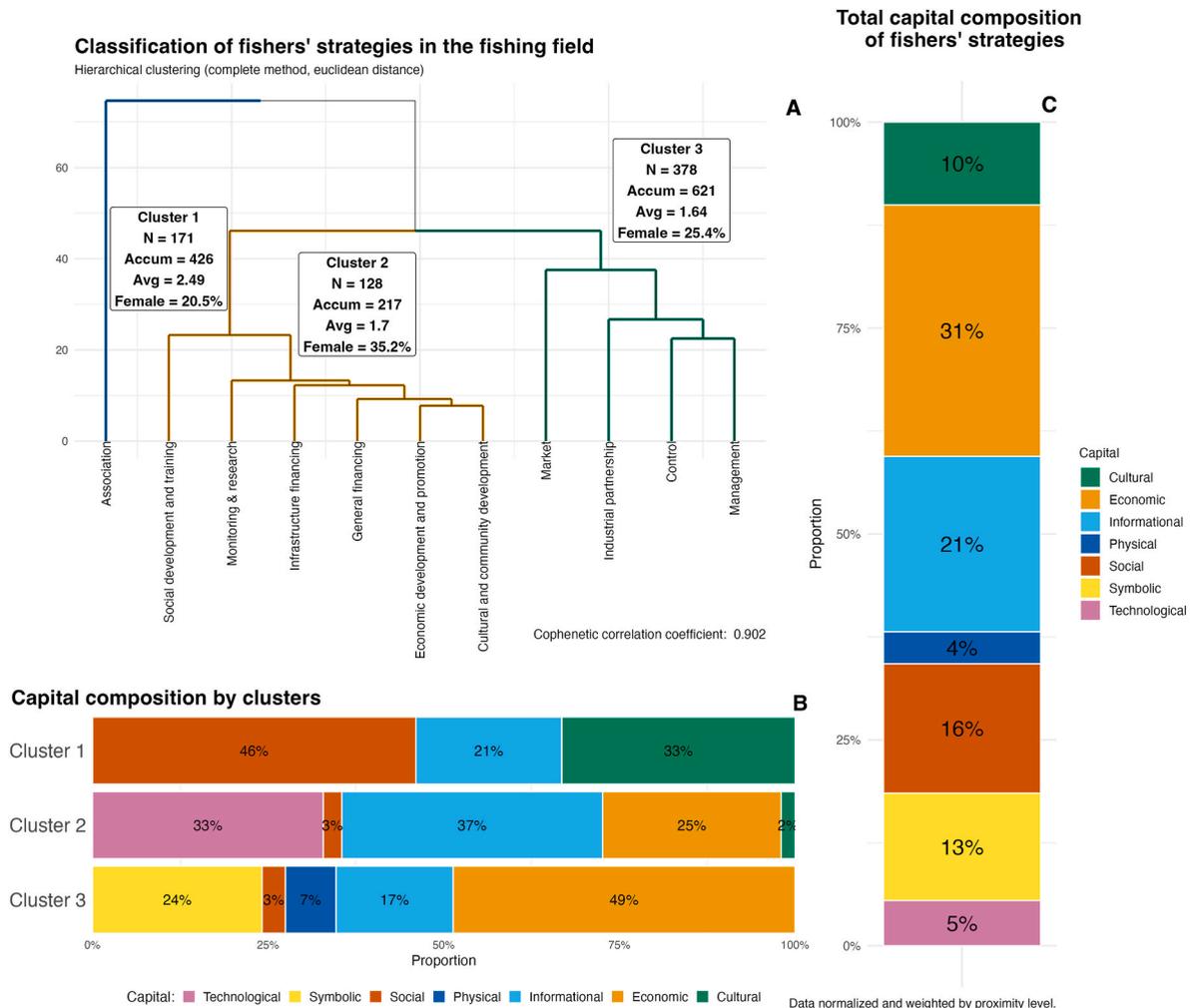


Fig. 3. Relational strategies of fishers and their capitals in the fishing field using hierarchical clustering (ego-alter level).

3.3. Relational strategies in the fishing field and their capital composition

The analysis of fishers' institutional ties and capital composition reveals distinct patterns of relational strategies. A hierarchical clustering of ties (Cophenetic correlation coefficient = 0.902) identified three relational clusters (that is, fishers' relational strategies), each representing a different approach to building and utilizing networks in the fishing field (Fig. 3, A).

- Cluster 1 (N ties = 171) comprises fishers who prioritized connections with fishers' associations at regional and national levels, as well as social organizations. Their strategy was firmly rooted in collective support, cooperation, and community-based problem-solving. Capital composition by clusters (Figura 3, B) showed a strong orientation towards social (46 %), cultural (33 %), and informational (21 %) capital, with no physical, economic, symbolic, or technological components. This cluster accumulated 426 gross units of capital in total. Such an emphasis on social and cultural resources aligns with community-based management and the maintenance of shared identities in coastal communities.
- Cluster 2 (N ties = 128) is centered on institutions offering social development, training, and infrastructure financing—such as universities, research institutions, and funding bodies. Although total capital accumulation was lower (217 gross units), the capital composition included substantial informational (37 %), technological (33 %), and economic (25 %) capital, with minimal cultural (2 %) and social (3 %) capital (Fig. 3, B). By engaging with development-oriented actors, fishers are positioning themselves to improve their long-term sustainability and productivity, improve fishing practices and adapt to environmental and regulatory changes.
- Cluster 3 (N ties = 378) features the most diversified strategies, with fishers engaging multiple governance and market arenas—management committees, control bodies like Sernapesca and Maritime Authorities, market entities (restaurants, merchants/traders), and the industrial sector. This cluster achieved the highest capital accumulation (621 gross units), dominated by economic (49 %) and symbolic (24 %) capital, along with informational (17 %) and some physical (7 %) and social (3 %) capital, but lacking cultural or technological forms (Fig. 3, B). Here, fishers leveraged more complex institutional landscapes, seeking legitimacy, reputation, and market positioning. These diversified links allowed them to engage with regulations, enforcement, and commercial opportunities, reflecting a proactive stance in a polycentric governance context.

When all fishers' capital was aggregated, normalized, and weighted by relational proximity (Fig. 3, C), economic (31 %) and informational (21.3 %) capital emerged as the most prominent overall, confirming the centrality of financial resources, market opportunities, and access to crucial knowledge and data in the fishing field. Social (15.7 %) and symbolic (13 %) capital also played substantial roles, reflecting the importance of reputation, trust, and collective norms. Physical (3.89 %) and technological (5.49 %) capital were less significant in the aggregate, but remained critical within specific clusters where modernization, compliance, and productivity enhancements were strategic goals.

The three clusters represent distinct configurations of relational strategies and capital use in small-scale fisheries. Some fishers rely primarily on strong intra-sectoral bonds and cultural heritage (Cluster 1), others develop ties with development-oriented institutions to improve infrastructure and capabilities (Cluster 2), and still others cultivate diversified relationships across management, control, market, and industrial spheres to enhance legitimacy, economic gains, and adaptiveness (Cluster 3).

4. Discussion

4.1. Egocentric networks as the basis for fishing field strategies

The integration of egocentric networks with field theory provides a robust framework for understanding the strategic actions of small-scale artisanal fishing communities. Unlike sociocentric or purely personal network approaches, egocentric analysis captures the specific resources and capital available to individual actors within their relational contexts. Field theory (Bourdieu and Wacquant, 1992; Fligstein and McAdam, 2012) extends this understanding by framing these relationships within structured and historically contingent domains. Then, this approach shows a network structure of the position of artisanal fishers in the fishing field, in which the different capital stocks are represented in the social space and in the positioning (strategies) of the fishers themselves. Also, this reveals that relationship contexts are not neutral or random (Silver, 2011) but are shaped by the distribution of capital and the strategic goals of actors operating within institutional constraints. Ultimately, it allows us to consider how fishers position themselves within governance and to bear in mind how they shape their relationship with the fishing industry and units of governance.

Our findings highlight the utility of this framework for analyzing the diverse strategies employed by artisanal fishers. In governance models that promote top-down approaches, such as interactive (Jentoft and Bavinck, 2014), inclusive (Bennett, 2018; Cohen et al., 2019), polycentric (Gelcich, 2014) or transformative governance (Lombard et al., 2023), it is essential to consider access and diversity to institutional sectors, as well as the efficient use of the types of capital available to fishers. This perspective broadens existing approaches by examining how fishers interact with institutional actors, revealing both constraints and opportunities in their efforts to secure resources.

In Biobío, the fishers possess larger and more diverse networks that reflect the institutional diversity of the south-central region. Fishers in Valparaíso, in contrast, demonstrate higher capital efficiency, employing smaller networks strategically in order to gain access to capitals of strategic importance. In both cases we find a high heterogeneity of actors (although slightly greater in Biobío), which shows the openness of their networks to the capital of the field. This echoes but also expands on prior research, such as Marín's (2012) focus on formal leaders, by incorporating non-leader fishers into the analysis. In doing so, we find significant regional variation in network types and strategic use of resources, which provides support for the applicability of field theory to interactive governance studies.

Moreover, the relational strategies identified in this study align with social resource theory (Lin, 2001), which emphasizes the importance of relationships in accessing potential resources. Field theory reconstructs this access as a function of an actor's position in a structured field, where social capital is framed in terms of the interplay between power, norms, and material conditions. In this way, it is the fishers themselves who manage their positions in a space disputed for resources, and this alerts us to areas of interest for collaborative management. The clustering of relationships into associations (Cluster 1), research and development bodies (Cluster 2), and governance or market actors (Cluster 3) illustrates the multi-layered dynamics of insider and external interactions. These findings are consistent with Fligstein's (2001) concept of "social skill," which emphasizes the ability of actors to stabilize (or balance) internal relations while strategically engaging with other actors.

In addition to these regional differences in network size and efficiency, we observed notable variations in the closeness of fishers' relationships. Fishers generally report stronger ties with market actors and members of their own sector, while connections to control and financing agencies tend to be weaker or more distant. From the fishers' perspective, such "distant" ties can be perceived as hindering or obstructing their activities, reflecting underlying power asymmetries. In line with Granovetter's (1973) distinction between strong and weak ties, further research could examine whether these weaker connections still provide

bridging social capital and alternate channels for resource access, or if they instead heighten the tensions fishers experience when navigating complex governance structures.

4.2. Types of strategies in the fishing field

By grouping fishers according to their patterns of ties with institutional sectors—and the mix of social, cultural, economic, informational, technological, symbolic, and physical capital those ties convey—we uncover how artisanal fishers strategically build resource access and influence within the fishing field. These relational clusters capture connections to management bodies, research institutions, market intermediaries, and other governance actors, revealing the field's inherently multidimensional governance dynamics (Marín and Berkes, 2010; Jentoft, 2020). This lens shows how the activation and distribution of different capitals across institutional linkages shape fishers' adaptive capacity and collaborative potential in small-scale fisheries (Basurto et al., 2025; Crona and Bodin, 2010).

Artisanal/small-scale fishers employ diverse strategies within the fishing field in three senses, distinguished by variations in capital composition and institutional connections:

- A. *Collective action within associations.* This strategy focuses on relationships within the artisanal sector, emphasizing cooperation, collective problem-solving, and the preservation of shared identity. Fishers in this group primarily rely on social and cultural capital. In this context, community cohesion plays a crucial role in shaping governance structures and strengthening adaptive capacity. Such strategies are deeply rooted in localized knowledge (Berkes et al., 2000), which fishers leverage to address common challenges, such as adapting to climate changes (Frawley et al., 2024), managing access to resources or marketing (Pulgar et al., 2024), provisioning cultural ecosystem services (Vázquez Pinillos and Barragán Muñoz, 2024). The collective action in the artisanal fishing sector can also be understood as a historical response to external pressures and internal organizational needs with a major impact on resource management, such as the development of TURFs (Pulgar and Villarroel, 2025). Similarly, the strengthening of collective action by fisherwomen in management is reflected in this type of strategy and resources (Chambon et al., 2024; Franco-Meléndez et al., 2021; Gallardo-Fernández and Saunders, 2018). These networks facilitate the mobilization of social capital to enact change, particularly in scenarios requiring collective responses to environmental, social, or economic crises. These findings align with research emphasizing the role of social capital in small-scale fisheries as a fundamental building block for collaborative management and self-management (Crona and Bodin, 2010).
- B. *Development-oriented strategies.* Fishers in this cluster engage with institutions outside the traditional fisheries domain, including universities, research bodies, and funding organizations. These relationships provide access to technological and economic resources critical for innovation and long-term sustainability. For instance, technological advancements introduced through partnerships with research institutions have been shown to improve fishers' efficiency and reduce environmental impacts (Cárcamo et al., 2014; Marín and Berkes, 2010). Although fishers in this cluster accumulate less overall capital compared to other groups, their emphasis on infrastructure development and technology transfer helps them better adapt to regulatory and environmental challenges. The capital composition of this cluster also reflects an orientation toward modernization, with greater reliance on external funding and knowledge systems. However, studies often overlook this strategic orientation, leaving gaps in understanding how such initiatives influence broader governance structures and interact with other strategies—for example, in the context of natural disasters (Marín et al., 2023). Future research could explore the impact of these

development-oriented connections on the resilience and adaptability of fishing communities over time.

- C. *Engagement with governance and market actors.* This cluster represents the most diversified strategy, with fishers interacting with governance bodies, market intermediaries, and industrial actors (González-Mon et al., 2023). These relationships enable fishers to access economic, symbolic, and informational capital, facilitating their engagement with the regulatory frameworks and market opportunities. For example, partnerships with industrial actors, historically seen as adversarial (Pulgar and Villarroel, 2025), have occasionally shifted toward collaboration (as in the management committees), particularly when aligning on shared goals like sustainable resource management. Fishers in this cluster often engage in governance processes through collaborative governance units (Jentoft and Chuenpagdee, 2015), such as management committees, where their symbolic and informational capital can influence decision-making processes (Jentoft, 2000; Pinkerton and John, 2008). Furthermore, their connections with market actors allow them to culturally valorize their resources, integrating elements of heritage and sustainability into their commercial strategies (Villarroel et al., 2023). This aligns with studies emphasizing the role of market positioning in contributing to fisher agency and sustainability in governance systems (e.g., Penca et al., 2021).

In practice, fishers in Cluster 1 leverage solidarity within their own sector to address immediate challenges—such as unfair market practices or conservation conflicts—by harnessing cultural and social capital (internal cohesion and shared identity) to strengthen their bargaining power. Meanwhile, the mixed strategies seen in Clusters 2 and 3 illustrate how some fishers adapt by tapping into broader institutional landscapes (e.g., state agencies, industrial partnerships, funding bodies) to secure economic, technological, or symbolic capital. Recognizing these different modes of strategic engagement allows governance actors to design more nuanced support structures—ones that bolster intra-sector cohesion where it already exists, yet also foster cross-sector collaboration to meet external demands. This underscores the importance of flexibility must accommodate the varied ways fishers operate within institutional fields.

4.3. Implications of relational strategies (clusters) for management

The three relational or strategic clusters provide a focus or starting point for management. Indeed, considering how fishers are organized and managed is essential to recognizing their position in the field.

The relationships in cluster 1 consist of social and cultural capital and sustain horizontal knowledge flows—local ecological observations and customary practices—within associations that operate as moral economies (Miranda and Stotz, 2021). Management can reinforce these foundations by funding community-led ecological monitoring grounded in fishers' own observations, facilitating inter-cove exchange workshops, and formally recognizing associations within co-management plans (such as Management Areas, see Gelcich et al., 2010).

In Cluster 2, the relationships are based on scientific, technical, and technological capital via partnerships with universities, state research bodies, and development agencies (García-Lorenzo et al., 2024; McPherson and Ropicki, 2021). Building on existing innovation hubs, managers should co-produce applied research with fishers—co-designing small-scale gear trials, data-collection protocols, and adaptive practices—and back these efforts with social-solidarity finance mechanisms (e.g., community credit lines) to ensure fair access to expertise and equipment. Crucially, these initiatives must integrate the social-cultural foundations of Cluster 1—fishers' trust networks and local practices—to secure lasting uptake of technological solutions (Miranda and Stotz, 2021).

Cluster 3's strengths lie in economic capital and regulatory information accessed via market intermediaries and governance bodies.

Although Chile's Management Committees provide a polycentric platform, they often underachieve on economic and equity goals (Estévez et al., 2020, 2021; Gelcich, 2014). Therefore, managers could set up co-managed market spaces where fishers and buyers would jointly define and respect local pricing customs before agreeing on transparent guidelines (Pulgar et al., 2024; Villarroel et al., 2023). Similarly, for example, this would allow for the identification of problems in price formation and the effects of illegal fishing (Oyanedel et al., 2020). Finally, the low share of physical capital (~4 % overall; ~7 % in Cluster 3) underscores the need for strengthened partnerships with enforcement agencies—through joint patrols, community enforcement committees, and inspection training—to bolster compliance and affirm fishers as co-stewards of the resource (Crona and Bodin, 2010; Tuda et al., 2021).

4.4. Considerations and limitations

From a governance perspective, recognizing diversity in fishers' strategies and underlying capitals can inform more adaptive and inclusive policy (Gelcich et al., 2010). Understanding that fishers draw on various institutional connections—associations, market intermediaries, research bodies, control agencies—can help tailor governance mechanisms that support different forms of engagement (Marín and Berkes, 2010). Encouraging collaboration and acknowledging fishers' agency can enhance the adaptive capacity of fisheries management systems (Jentoft and Chuenpagdee, 2015).

However, this study is based on cross-sectional data and focuses on two regions in Chile. Future research could adopt a longitudinal lens to observe how strategies change, as regulations, markets, and environmental conditions change. Comparative studies in other settings would allow for the broader applicability of these findings. Additionally, while various forms of capital were considered, qualitative aspects in the use of these capitals or resources were not explored. In this sense, mixed research, such as ethnographic research, could provide a complementary and in-depth view of the strategies of the fishers and the dynamics in the fishing field.

Although our results are statistically significant, the unequal sample sizes may affect the statistical power and precision of our estimates. Future research should consider larger and more balanced samples to further contrast these findings.

Finally, the classification and allocation of capital to the alters is based on document review and interviews with key informants, which may influence the analysis. Further research and triangulation with other approaches and mixed methods are needed to refine this line of inquiry.

5. Conclusion

The fishing field in Chile—at an artisanal fishing level—is characterized by different strategies and resources. This study identified significant regional variations: fishers in Biobío have larger and more diverse networks, aligning with the institutional complexity of the region, while those in Valparaíso exhibit greater capital efficiency, achieving high output from a smaller yet strategically concentrated network. These variations show the relationship between network structures, the mobilization of resources and, and fishers' positions within the fishing field.

The research emphasizes the importance of integrating relational and field-based approaches to fisheries governance. A network perspective allows us to identify the social and material bases that underpin fishers' strategies, while field theory situates these strategies within a broader institutional and historical context of power dynamics and resource competition. Together, these approaches show that fishers appropriate capital in various ways through their relationships and that their appropriation fits into the governance system for various purposes. These governance systems must recognize the strategies of fishers—agency—and their ability to navigate and transform the governance

institutions influencing their activities.

The clustering analysis revealed three distinct strategic orientations in the field: collective action rooted in associations, diversification through engagement with market and industrial actors, and long-term collaboration with institutional bodies. All three illustrate the form in which fishers utilize economic, informational, social, and symbolic capital in a quest to consolidate and respond to changing requirements of governance. Ultimately, fishers' proactive dealing with institutionality and informality tells a lot about their adaptability and capacity to shape contentious politics in fisheries governance.

CRedit authorship contribution statement

Miroslav Pulgar: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Daniela Refsow:** Writing – review & editing, Investigation, Data curation. **Constantino Villarroel:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization.

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Declaration of competing interest

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

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ocecoaman.2025.107816>.

Data availability

The authors do not have permission to share data.

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