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Analyzing the Development of the Vannamei Shrimp Industry in Bengkalis Regency Using Porter's Five Forces Approach

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Abstrak. *Penelitian ini bertujuan untuk menganalisis perkembangan industri udang vannamei di Kabupaten Bengkalis menggunakan pendekatan Porter's Five Forces. Penelitian dilakukan dengan metode deskriptif kualitatif melalui wawancara, observasi lapangan, dan studi dokumentasi yang melibatkan pembudidaya udang, instansi pemerintah terkait, serta pelaku usaha perikanan. Hasil penelitian menunjukkan bahwa perkembangan industri udang vannamei di Kabupaten Bengkalis dipengaruhi oleh struktur persaingan industri yang relatif kuat. Kekuatan tawar pemasok dan pembeli tergolong tinggi, sementara tingkat persaingan antar pelaku usaha juga cukup intens. Di sisi lain, ancaman pendatang baru dan produk substitusi berada pada tingkat menengah. Temuan ini menunjukkan bahwa meskipun industri udang vannamei di Kabupaten Bengkalis memiliki potensi ekonomi yang besar, penguatan daya saing melalui strategi yang terintegrasi dan berkelanjutan sangat diperlukan agar industri ini dapat berkembang secara optimal.*

Kata kunci: *Daya Saing; Kabupaten Bengkalis; Perkembangan Industri; Porter's Five Forces; Udang Vannamei.*

Abstract. *This study aims to analyze the development of the vannamei shrimp industry in Bengkalis Regency using Porter's Five Forces approach. The research employed a qualitative descriptive method through interviews, field observations, and document analysis involving shrimp farmers, government agencies, and fisheries-related business actors. The results indicate that the development of the vannamei shrimp industry in Bengkalis Regency is influenced by a relatively strong competitive industry structure. The bargaining power of suppliers and buyers is high, while the intensity of competition among industry players is also considerable. Meanwhile, the threat of new entrants and substitute products is at a moderate level. These findings suggest that although the vannamei shrimp industry in Bengkalis Regency has significant economic potential, strengthening competitiveness through integrated and sustainable strategies is essential to ensure optimal industry development.*

Keywords: *Bengkalis Regency; Competitiveness; Industry Development; Porter's Five Forces; Vannamei Shrimp.*

Introduction

Indonesia is the world's largest archipelagic state, consisting of more than 17,000 islands and an extensive coastline. Data from the Ministry of Marine Affairs and Fisheries indicate that national marine territory covers approximately 6.4 million square kilometers. Such geographic conditions place marine and fisheries activities among the most important economic sectors, particularly aquaculture, which increasingly supports coastal livelihoods and regional income generation. Bengkalis Regency represents a coastal archipelagic area in Riau Province located on the eastern side of Sumatra and directly adjacent to the Malacca Strait, one of the most intensively used international shipping routes. The regency includes mainland territory and several islands, notably Bengkalis Island and Rupat Island, with coastal and marine zones dominating its spatial structure.

These physical characteristics provide favorable conditions for fisheries development while also exposing the region to ecological pressures, including coastal erosion, seawater intrusion, and mangrove degradation. Official statistics report that Bengkalis Regency covers more than 7,700 km², with a substantial share consisting of coastal and marine areas. The Regional Long-Term Development Plan (RPJPD 2024) classifies the regency as a coastal archipelagic region with specific geographic constraints and economic orientation. Bengkalis Island, comprising Bengkalis and Bantan Districts, covers approximately 938 km², while Rupat Island, which includes Rupat and North Rupat Districts, extends over about 1,514.99 km². Its position along the Malacca Strait and proximity to Malaysia and Singapore create direct access to regional and international markets. At the same time, such exposure intensifies competition with other shrimp-producing regions, requiring local producers to operate under increasingly demanding market conditions. Shrimp aquaculture has emerged as one of the leading fisheries activities in Bengkalis Regency, particularly the cultivation of vannamei shrimp. The species is widely adopted due to its short production cycle, biological adaptability, and steady market demand. Provincial data estimate approximately 1,300 hectares of land suitable for cultivation, although only a limited share is currently utilized, involving around 61 active farmers. Production exceeded two million kilograms in 2021, placing shrimp farming among the main contributors to regional aquaculture output. Before the COVID-19 pandemic, exports to Malaysia and Singapore reached 200–250 tons per month. Despite this performance, industry development remains constrained by structural conditions. Most producers operate at small and medium scales, face restricted access to capital and modern technology, and depend heavily on external suppliers and intermediaries. Competitive pressure from other domestic and international shrimp-producing regions further reduces the room for local farmers to improve margins and expand operations. Existing studies on vannamei shrimp in Indonesia largely concentrate on cultivation techniques and financial viability, while the competitive environment shaping industry behavior has received limited attention, particularly in coastal archipelagic settings. This study addresses that gap by examining the development of the vannamei shrimp industry in Bengkalis Regency through the analytical lens of Porter's Five Forces, with the aim of identifying the main competitive pressures that influence industry performance and prospects.

Figure 1. Porter's Five Forces Analysis

Literature Review

Porter's Five Forces was introduced in 1979 and later elaborated in *Competitive Strategy* (1980). The framework argues that industry

competition cannot be reduced to rivalry among established firms alone; it is also shaped by buyers, suppliers, substitute offerings, and the possibility of new entrants. In Porter's formulation, industry structure is determined by five pressures: (1) buyers' bargaining power, (2) suppliers' bargaining power, (3) threat of substitutes, (4) threat of entry, and (5) rivalry among existing competitors (Porter, 1980). The interaction among these forces determines the degree of competitive pressure and influences firm behavior, strategic choices, and performance outcomes. Later interpretations emphasize that the model is useful for diagnosing how profit potential is distributed across actors within an industry and where structural constraints are most likely to arise (Lestari, 2007, as cited in Muohimin & Rambe, 2025). In applied research, the framework is frequently used to assess market power dynamics, identify dominant pressures, and explain why certain sectors face persistent profitability challenges even when demand appears favorable.

Research Methodology

This research used a qualitative descriptive design to examine the development of the vannamei shrimp industry in Bengkalis Regency, with particular attention to competitive pressures and stakeholder relations. The design was selected because it allows the study to capture how industry actors interpret constraints, negotiate market relationships, and respond to competitive conditions in practice. Data were obtained through semi-structured interviews with vannamei shrimp farmers, officials from fisheries-related government agencies, and relevant business actors (e.g., input suppliers, traders, and processors where applicable). Field observations were carried out at shrimp pond sites to document production practices and operational conditions. In addition, document analysis was conducted using official reports and statistical publications to support and cross-check interview findings. Informants were recruited through purposive sampling, based on their direct involvement in shrimp aquaculture and their experience within the local industry network. Data analysis proceeded through systematic coding and thematic organization, followed by synthesis across sources to ensure consistency between interview, observation, and documentary evidence. The resulting themes were then interpreted using Porter's Five Forces framework to describe buyer power, supplier power, rivalry, threat of entry, and threat of substitutes, thereby clarifying the competitive structure that shapes industry development in Bengkalis Regency.

Results and Discussion

Results

The development of shrimp pond aquaculture in Bengkalis Regency is closely linked to conditions in regional and international shrimp markets. Production activities are shaped not only by local resource availability but also by price fluctuations, input supply chains, and market access beyond the regency. Shrimp aquaculture has become an important source of income for coastal households and contributes to employment generation, particularly in pond management, harvesting, processing, and distribution activities. The expansion of shrimp farming has gradually shifted the local economic structure from dependence on capture fisheries and small-scale trading toward aquaculture-based production. This shift reflects changes in labor allocation, investment patterns, and income sources within coastal communities. As a result, shrimp farming has become one of the drivers of regional economic activity, although its benefits are distributed unevenly across actors depending on scale of operation and market access. To examine these dynamics, this study applies Porter's Diamond framework, which links industry performance to four core conditions: factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry, together with the roles of government and external opportunities. The framework allows the analysis to move beyond production volume and focus on structural factors shaping competitiveness.

Factor Conditions

Natural Conditions

Bengkalis Regency has extensive coastal areas suitable for shrimp pond development, supported by tropical climate patterns and salinity levels compatible with vannamei shrimp cultivation. Land availability for pond construction remains relatively high, particularly in coastal and island districts. However, environmental pressures such as coastal erosion, seawater intrusion, and degradation of mangrove ecosystems impose constraints on long-term production stability. These ecological risks require careful management to prevent declining productivity and environmental conflict.

Human Resources

Coastal populations in Bengkalis possess long-standing experience in fisheries and aquaculture, providing a basic labor base for shrimp farming. Nevertheless, most farmers rely on inherited practices rather than formal technical training. Skills related to water quality management, disease control, and feed efficiency remain uneven. Moreover, declining interest among younger residents reduces the pool of future operators, raising concerns about labor continuity and skill renewal.

Science and Technology Resources

Shrimp farming practices in Bengkalis remain largely traditional or semi-intensive. Technologies such as aeration systems, probiotics, and biofloc methods have begun to appear but are not widely adopted. Extension programs and technical guidance exist, yet their reach and effectiveness vary across locations. Weak coordination between farmers, government agencies, and academic institutions limits the diffusion of innovation and restricts the integration of research into practical farming decisions.

Demand Conditions

Domestic Demand

Local demand for vannamei shrimp arises from household consumption, restaurants, hospitality services, and food businesses within Bengkalis and surrounding regions. Shrimp represents an important protein source and remains a preferred seafood product. Rising incomes and dietary shifts toward animal protein have further expanded consumption levels. In addition to local markets, Bengkalis shrimp is distributed to other areas in Riau and neighboring provinces, extending market reach beyond the regency.

Export Demand

Export markets play a central role in shaping the development of the vannamei shrimp industry in Bengkalis Regency. Geographic proximity to Malaysia and Singapore, combined with the availability of port facilities, facilitates cross-border trade and reduces logistical barriers. Before the COVID-19 pandemic, exports to these neighboring countries reached approximately 200–250 tons per month, indicating the importance of external demand for sustaining production levels. Access to international markets also exposes local producers to price volatility, quality standards, and competition from other exporting regions. While export orientation creates income opportunities, it simultaneously increases dependency on external buyers and market fluctuations. As a result, export demand acts both as a growth driver and as a source of vulnerability within the industry structure.

Related and Supporting Industries

Related Industries

Key related industries include hatcheries supplying shrimp seed, feed producers, and trading intermediaries. Local hatchery capacity remains limited, particularly in terms of technology and disease control, leading many farmers to rely on seed from outside the region. This reliance increases production costs and raises biosecurity risks. Feed supply also presents constraints. While feed producers play a decisive role in determining growth rates and survival, farmers often face difficulties accessing feed with consistent nutritional quality, especially during peak production periods. Trading intermediaries connect producers with local, regional, and export markets, yet distribution channels remain fragmented and price transmission is uneven. Weak integration among hatcheries, feed producers, traders, and farmers reduces coordination across the value chain and increases exposure to supply disruptions and market shocks. Strengthening

linkages among these actors is therefore essential for improving production reliability and economic resilience.

Supporting Industries

Supporting sectors such as transportation, logistics, storage, and trade infrastructure influence the efficiency of shrimp distribution. In Bengkalis, access roads to pond sites, cold storage facilities, and refrigerated transport remain insufficient. As a result, farmers depend heavily on local middlemen who control market access and pricing. This structure limits producers' bargaining capacity and contributes to unstable farm-gate prices. Inadequate infrastructure also affects product quality preservation during transport, which restricts access to higher-value markets. Improving logistics, storage capacity, and transport connectivity would therefore enhance supply chain efficiency and support competitiveness in both domestic and export markets.

Strategy, Structure, and Rivalry

Shrimp farming in Bengkalis Regency is dominated by small and medium-scale producers operating independently with limited coordination. Most enterprises lack formal management systems, long-term planning, and collective marketing arrangements. This fragmentation reduces production efficiency and weakens bargaining capacity in input and output markets. Rivalry is shaped not only by competition among local producers but also by pressure from large-scale operators in other regions and from exporting countries such as Thailand and China. Market requirements related to quality, traceability, and supply continuity further intensify competition. Limited adoption of modern production technologies and weak marketing capabilities restrict farmers' ability to access higher-value markets directly. Institutional arrangements such as producer groups, cooperatives, and shared marketing platforms could improve coordination, strengthen negotiation power, and facilitate learning and technology adoption.

Government Role

Public policy influences the shrimp industry through regulation, extension services, environmental management, and access to finance. National initiatives such as the Indonesian Shrimp Commission serve as coordination mechanisms for industry development. Environmental monitoring and disease control programs seek to maintain ecological stability and reduce production risks. Financial support and credit facilitation aim to expand investment capacity among producers. However, policy effectiveness depends on coordination across agencies and consistency in implementation. Gaps in program alignment and limited local institutional capacity reduce the impact of public interventions on farm-level performance.

Opportunities

Several structural opportunities shape future prospects for shrimp farming in Bengkalis Regency. Natural conditions support aquaculture expansion, while rising global demand, particularly in Asian and European markets, creates export potential. Policy support for infrastructure development and market access further enhances growth prospects. Technological upgrading and improved production management offer pathways for productivity gains and cost reduction. Expansion of shrimp farming also generates employment across production, processing, and distribution activities, contributing to income diversification in coastal communities. Training programs, extension services, and entrepreneurship support can improve workforce skills and support small enterprise development. When aligned with infrastructure investment and market integration, these measures can strengthen local economic performance and improve labor absorption without increasing ecological pressure beyond carrying capacity.

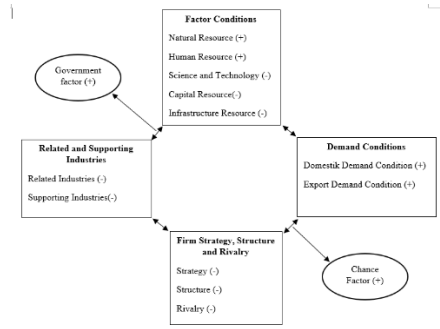

Figure 2. The results of analysis using Porter's theory

Porter's Five Forces analysis indicates that the vannamei shrimp industry in Bengkalis Regency operates under strong competitive pressure. High bargaining power on the input side (suppliers) and output side (buyers) constrains farmers' ability to control production costs and selling prices, while rivalry among producers intensifies pressure to meet quality requirements and supply continuity. In contrast, the threat of new entrants and substitute products remains moderate, although both still shape market expectations and long-term resilience. Taken together, these forces suggest that policy and managerial responses should prioritize structural improvement such as reducing dependency on external inputs, strengthening collective market access, and upgrading coordination across the value chain, rather than concentrating narrowly on increasing production volume.

Discussion

The development of the vannamei shrimp industry in Bengkalis Regency is strongly influenced by its competitive structure, particularly the high bargaining power of suppliers and buyers and the intensity of rivalry among industry players. The findings of this study indicate that shrimp farmers in Bengkalis are positioned relatively weakly within the value chain due to their dependence on external suppliers of seed and feed, as well as on intermediaries for market access. This condition is consistent with the findings of Eryogia *et al.* (2024), who argue that in primary commodity-based industries, upstream and downstream actors often exert stronger control over prices and market access than producers, thereby reducing producers' margins and limiting their strategic autonomy. The moderate level of threat from new entrants and substitute products suggests that while the industry remains accessible, it still requires specific capital, technical knowledge, and market networks to operate competitively. This result aligns with the study by Muohimin and Rambe (2025), which found that industries with medium entry barriers tend to experience persistent competitive pressure from both existing and potential entrants. In Bengkalis, although natural resource availability and market demand create opportunities for expansion, limited access to finance, modern production technology, and certification systems restrict both the entry of new firms and the growth of existing ones. From the perspective of factor conditions, Bengkalis Regency possesses favorable natural endowments for shrimp farming, including suitable coastal areas, water quality, and climatic conditions. This finding supports the statistical and institutional reports of the Bengkalis Statistics Office (BPS Bengkalis, 2021) and the Riau Provincial Marine and Fisheries Agency (2021), which identify Bengkalis as a region with significant aquaculture potential. However, these natural advantages have not yet been fully transformed into sustainable competitive advantages due to weaknesses in human resources, infrastructure, and technological capacity.

The limited technical capacity of shrimp farmers remains a major constraint on productivity and efficiency. Most farmers continue to apply traditional and semi-intensive methods, with insufficient mastery of water quality management, disease control, and feed optimization. This observation is consistent with Mediacenter Riau (2021), which highlights the low level of technological adoption in coastal aquaculture systems as a structural barrier to industry upgrading. Furthermore, the declining interest of younger generations in aquaculture threatens the long-term regeneration of skilled labor in the sector. In terms of demand conditions, the vannamei shrimp industry in Bengkalis benefits from both growing domestic consumption and export opportunities, particularly to Malaysia and Singapore. This finding corresponds with Bengkaliskab.go.id (2021) and Riaureview.com (2021), which report that shrimp exports from Bengkalis reached 200–250 tons per month prior to the COVID-19 pandemic. Despite this strong demand, farmers' limited direct access to export markets means that a substantial portion of value added is captured by intermediaries rather than producers. The weak integration of related and supporting industries further constrains the competitiveness of the sector. The limited availability of local hatcheries, feed producers, cold storage facilities, and efficient

logistics increases production costs and operational risks. This condition reflects Porter's cluster theory, which emphasizes that the absence of strong linkages among related industries reduces overall sectoral competitiveness. Similar concerns are raised by Goriau.com (2021), which notes the dependence of Bengkalis farmers on external hatchery supplies and the associated risks of disease transmission and cost volatility. Government intervention has played a supportive role through policy initiatives, institutional development, and technical assistance programs. However, this study finds that coordination among government agencies and the effectiveness of implementation remain uneven. This finding reinforces the argument of Eryogia *et al.* (2024) that policy frameworks alone are insufficient to enhance competitiveness unless they are accompanied by consistent execution and strong inter-institutional collaboration. Overall, the results of this study indicate that while the vannamei shrimp industry in Bengkalis Regency possesses strong natural and market-based potential, its development is constrained by structural weaknesses in the value chain, limited technological capacity, and weak institutional integration. These findings are consistent with prior research emphasizing that sustainable industrial development requires not only resource endowments and market demand but also coordinated efforts to strengthen human capital, technological adoption, and institutional arrangements across the entire industry system.

Conclusion

This study concludes that the vannamei shrimp industry in Bengkalis Regency has substantial economic potential and plays an important role in supporting coastal economic development. However, the industry faces significant competitiveness challenges rooted in its structural conditions. High supplier and buyer bargaining power, combined with intense rivalry among industry players, represents the main constraints limiting local farmers' ability to improve productivity and profitability. Dependence on external input suppliers, limited market access, and weak institutional arrangements further reduce the bargaining position of small- and medium-scale producers. Therefore, improving industry competitiveness requires comprehensive and integrated efforts, including strengthening farmers' technical and managerial capacity, developing local input supply chains for seed and feed, and reinforcing producer institutions to enhance market access and collective bargaining power. In addition, the adoption of sustainable aquaculture practices is essential to maintain environmental resilience and support long-term industry viability. These measures are expected to promote the sustainable development of the vannamei shrimp industry in Bengkalis Regency and increase its contribution to regional economic growth.

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