

The Persistence of Extractive Sector Dominance and Development Policies in the Border Islands: A Circular and Cumulative Causation Approach in Natuna Regency

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ABSTRACT

Natuna Regency is a resource-rich island border region, but its economy is concentrated in the weakening extractive sector. This study explains the persistence of this sector's dominance by integrating sectoral structure analysis and policy analysis into the Circular and Cumulative Causation (CCC) framework. The study uses an explanatory case study approach based on secondary data, with Location Quotient, Shift-Share, and Klassen Typology analysis for the 2015–2024 GRDP structure; content analysis of Presidential Regulation 41/2022 and Natuna Regent Regulation 16/2024; and analysis of fiscal data (Oil and Gas Revenue Sharing Funds and expenditure allocations) for the 2020–2024 period as an empirical bridge. The results show that the Mining and Quarrying sector contributed an average of 71.90% of GRDP but grew negatively (CAGR -1.02%), while the Agriculture, Forestry, and Fisheries sector was the only diversification candidate that consistently strengthened. Formal policy commitments to fisheries are categorized as symbolic because they are not accompanied by fiscal reallocation: the proportion of Fisheries Service spending is only 0.81–1.34% and its gap with the weight of GRDP actually widened after the policy was enacted. Fiscal dependence on Oil and Gas DBH, which consistently exceeds PAD (a ratio of 171–352%), indicates a vicious cycle mechanism with dominant backwash effects. The study recommends earmarking Oil and Gas DBH for diversification, operational translation of national mandates, and optimization of PAD as an integrated intervention package.

INTRODUCTION

Natuna Regency is a strategic archipelago and border region for national sovereignty and holds significant maritime economic potential. Its geostrategic position makes Natuna a crucial point in Indonesia's maritime defense and sovereignty strategy, particularly in responding to the dynamics in the North Natuna Sea (Sochfan et al., 2025). Its marine territory covers approximately 264,198 km², or nearly 99% of the regency's total area, with an estimated annual fisheries potential of over 500,000 tons (KKP, 2015 in Fiah & Burhanuddin, 2023). At the same time, Natuna holds significant oil and gas reserves, with oil/condensate of 244.55 million tonnes per year and gas of 1,700.3 billion cubic feet per day (BSCF) in the first half of 2024 (Directorate General of Oil and Gas, 2025). Amidst these two great potentials, an interesting phenomenon has emerged to be studied: the structure of Natuna's Gross Regional Domestic Product (GRDP) over the past decade has been dominated by the extractive sector (Mining and Quarrying), while the non-extractive sector (Agriculture, Forestry, and Fisheries) has grown consistently but its contribution remains relatively small.

This dominance did not occur because the extractive sector grew rapidly, but rather because it weakened. The Mining sector's contribution declined from 75.57% in 2015 to 68.23% in 2024, with a negative compound annual growth rate (CAGR) of -1.02%. In contrast, the Agriculture, Forestry, and Fisheries sector recorded a positive CAGR of 3.10%. This pattern indicates a change in proportion (marginal diversification), not a fundamental sectoral transformation: growth in the non-extractive sector has not been sufficient to shift the dominant position of the extractive sector. The question then is why this dominance persists, and whether regional development policies are strengthening or hindering the diversification trajectory.

During the same period, two relevant formal policies were enacted. Presidential Regulation 41/2022 establishes the spatial planning and zoning framework for the utilization of Natuna–North Natuna marine space, including capture fisheries and aquaculture zones, and establishes Natuna as a national Integrated Fisheries Center. Natuna Regent Regulation 16/2024 contains a Master Plan and Roadmap for the Advancement of Science and Technology, emphasizing strengthening research and innovation to support the blue economy. Both policies are at different levels but equally relevant for assessing whether regional policy is moving toward diversification or maintaining existing patterns.

One relevant framework for understanding the relationship between economic structure and policy is Myrdal's (1957) Circular and Cumulative Causation (CCC). In CCC, economic change does not push the system toward equilibrium, but rather triggers a feedback loop that reinforces the initial direction of change: economic structure influences policy, and policy in turn reinforces economic structure through resource allocation and incentive formation (Berger, 2008; O'Hara, 2008). This framework allows analysis not only to describe sectoral structure and policy substance separately, but also to explore the feedback mechanisms that link the two.

Several studies have examined the dynamics of regional economic structures through sectoral approaches such as Location Quotient and Shift-Share (Nabilla et al., 2024; Nasution & Benardin, 2025; Reniati et al., 2024; Wijaya et al., 2020), but most focus on structural diagnosis without addressing regional policies as analytical variables explaining observed patterns. In the context of border and island regions, studies tend to emphasize reliance on the primary sector and strategies for developing leading sectors in underdeveloped regions (Abadi et al., 2024; Nurlina et al., 2023; Satrianto et al., 2023), but have not yet evaluated how development policies concretely shape economic structures. Meanwhile, regional development policy literature generally focuses on legal-formal aspects or alignment with global frameworks such as the SDGs (Gasali, 2019; Hasanah et al., 2019), without linking them to the structural dynamics of the regional economy. Thus, there has been no study that systematically links changes in sectoral structures with the implementation of specific policies in island border areas using the CCC framework.

This study fills this gap with three interrelated objectives: (1) describing the conditions and dynamics of Natuna's economic sectoral structure for the 2015–2024 period; (2) analyzing the direction and substance of development policies as reflected in Presidential Regulation 41/2022 and Regent Regulation 16/2024; and (3) analyzing the feedback mechanisms between sectoral structures and policies within the CCC framework. The 2020–2021 period is treated as the pre-policy baseline and 2022–2024 as the policy adoption period, with methodological caution given that 2020–2021 coincided with the COVID-19 pandemic shock.

To address these three objectives, this research relies on the integration of several theoretical pillars. Regional economics explains why economic activity is spatially concentrated and why interregional inequality can persist in the long run (Armstrong & Taylor, 2000; Arsyad, 2010). In the Indonesian context, interregional inequality has long been a structural characteristic of development (Sjafrizal, 1997). The concept of growth poles (Perroux, 1950) and the distinction between polarization effects and trickling-down effects (Hirschman, 1958) explain that resource-rich regions often experience concentration in the extractive sector while other sectors are less developed because capital, labor, and infrastructure are absorbed by the dominant sector.

To empirically identify sectoral patterns, the study used three leading sector analysis instruments. The Location Quotient (LQ) measures the relative specialization of a sector relative to a reference region (Isserman, 1977); in this study, the LQ is treated as evidence of structural persistence, rather than a normative indicator of comparative advantage (Crawley et al., 2013). Shift-Share Analysis decomposes growth into the national growth effect, industry mix effect, and competitive share effect, thus distinguishing rent-driven from productivity-driven growth (Lahr & Ferreira, 2020). The Klassen typology classifies sectors into four quadrants based on share and growth, thus diagnosing structural transformation versus structural lock-in.

Institutional economics provides a framework for understanding how rules and incentives shape resource allocation. This thinking stems from the idea that the arrangement of rights and transaction costs influence allocative efficiency (Coase, 1960), which later developed into the new institutional economics tradition (North, 1990; Richter, 2005). North (1990) emphasized that institutions do not always evolve toward efficiency, and institutional change can be formal without being substantive. This distinction is key to the analysis: formal change is reflected in regulatory texts, while substantive change is reflected in resource reallocations and real economic behavior. Formal change without substantive change indicates a symbolic policy. Acemoglu and Robinson (2012) add that groups controlling resource rents may have an interest in maintaining extractive institutions despite formal commitments to diversification. Furthermore, the quality of institutions—more than just resource endowments—determines a territory's development trajectory (Rodríguez-Pose, 2020) and helps explain the persistence of interregional inequality in the region (Suryaman et al., 2025).

The CCC framework integrates these elements into three dimensions. The causal dimension explains how sectoral dominance shapes fiscal structures; the circular dimension explains how fiscal dependency shapes policy incentives; and the cumulative dimension explains how these patterns strengthen over time through self-reinforcing feedback loops (Berger, 2008; O'Hara, 2008). This logic aligns with the concepts of path dependence and increasing returns, which explain that initial institutional choices tend to lock in subsequent trajectories and make it difficult to change direction (Pierson, 2000). The mechanisms that result in amplifying inequality are called backwash effects, while those that spread growth are called spread effects. This combination of dimensions forms the basis for assessing whether Natuna's dynamics are more consistent with a virtuous or vicious cycle.

RESEARCH METHODS

This research uses an explanatory case study approach (Yin, 2014; Maxwell & Mittapalli, 2008) which aims to explain the mechanisms behind the observed phenomena, rather than simply describe them. The scope is Natuna Regency, with a sectoral structural analysis period of 2015–2024 and a fiscal analysis period of 2020–2024. The data used are entirely secondary, including sectoral GRDP data at constant 2010 prices from the Natuna Regency Central Statistics Agency (2025); the text of Presidential Regulation 41/2022 and Natuna Regent Regulation 16/2024; and fiscal data from the Budget Realization Report, Budget Implementation Document, and Notes to the Natuna Regency Financial Report (BPKPD Natuna, 2026).

Sectoral Structure Analysis

Three techniques are used in a complementary manner; all three are commonly applied in regional development planning in Indonesia (Widodo, 2006). The LQ is calculated by comparing the sector share in Natuna to the Riau Islands Province as a reference region; an LQ value > 1 indicates a base sector. Shift-Share decomposes sectoral growth from 2015–2024 into

three components, with the competitive share effect (CSE) as an indicator of local competitive advantage or limitation. The Klassen typology classifies sectors into four quadrants based on their growth rate and contribution to GRDP. Given the extreme dominance of the Mining sector, Klassen's interpretation is contextualized, emphasizing the relative position of each sector.

Policy Analysis

Content analysis was conducted on articles, verses, and appendices governing marine spatial zoning, economic sector priorities, or research and innovation programs. Deductive coding was used to identify priority sectors, types of support, and the level of specificity of directives (general, moderate, or operational). To test whether formal commitments translate into actual allocations, the study compared textual commitments with implementation indicators, such as the proportion of Fisheries Service spending to total regional spending. Policies were categorized as substantive, partial, or symbolic based on the presence or absence of convergence between formal priorities and actual allocations.

As additional verification, the study introduced the Relative Allocation Ratio (RAR), which is the ratio between the proportion of relevant SKPD spending to total regional spending and the proportion of sector contributions to GRDP. A $RAR < 1$ indicates relative deprioritization, while a $RAR > 1$ indicates active prioritization. The RAR is used to test whether the low allocation to fisheries is unique or simply reflects fiscal constraints across all sectors.

CCC Mechanism Analysis

Fiscal data serves as an empirical bridge connecting economic structure to policy. Fiscal dependence on the extractive sector is proxied by the ratio of Oil and Gas Revenue Sharing Funds (DBH) to total regional revenue and to Regional Original Income (PAD), as in Indonesia's fiscal system, DBH is the only channel directly linking oil and gas production to regional finances. Findings from the three data sources are integrated into a matrix that maps the causal, circular, and cumulative dimensions of CCC.

To ensure testability, the study declared falsifiable conditions from the outset: the fiscal dependency proposition is refuted if the ratio of Oil and Gas Revenue Sharing to Regional Original Revenue (PAD) is consistently below 100%; the symbolic policy proposition is refuted if fisheries spending increases significantly and the gap narrows post-policy; and the vicious cycle proposition is refuted if low fisheries allocations are universal across sectors. Two forms of robustness tests were conducted: analysis of the pre-pandemic sub-period 2015–2019 and verification of year-on-year consistency. All fiscal analyses used proxies with explicit institutional justification and transparently acknowledged limitations.

RESULTS AND DISCUSSION

Sectoral Structure Dynamics 2015–2024

Natuna's economic structure during 2015–2024 is characterized by paradoxical aggregate stagnation: the majority of sectors grow consistently, yet total GRDP barely moves. GRDP at

constant prices only grows from IDR 14,115.28 billion in 2015 to IDR 14,258.65 billion in 2024, with a CAGR of only 0.11% per year. This paradox stems from the Mining and Quarrying sector, which contributed 75.57% of GRDP in 2015. This sector peaked in 2019 (IDR 11,019.31 billion) and then declined continuously to IDR 9,728.94 billion in 2024, recording a CAGR of -1.02%. This decline reflects the depletion of oil and gas reserves, as confirmed by the contrast with the growth of the national mining sector over the same period. In contrast, the non-extractive sector experienced dynamic growth, led by Information and Communications (CAGR 5.72%), Real Estate (5.26%), and Trade (4.28%), but its share was too small to offset the contraction in Mining. Figure 1 shows the divergence in the trajectories of these two basic sectors.

Table 1. Summary of Natuna Regency's GRDP in Selected Sectors 2015–2024 (ADHK 2010, billion rupiah)

Sector	2015 GRDP	2024 GRDP	CAGR (%)	Contribution 2015→2024 (%)
Mining & Quarrying	10,667.29	9,728.94	-1.02	75.57 → 68.23
Agriculture, Forestry & Fisheries	1,413.52	1,860.38	3.10	10.01 → 13.05
Construction	932.87	1,122.33	2.08	6.61 → 7.87
Wholesale & Retail Trade	360.75	525.96	4.28	2.56 → 3.69
Information & Communication	88.76	146.46	5.72	0.63 → 1.03
Real Estate	79.57	126.17	5.26	0.56 → 0.88
Total GRDP	14,115.28	14,258.65	0.11	100.00

Source: Natuna Regency Central Statistics Agency (2025), processed by the author. Note: Total GRDP includes all 17 sectors.

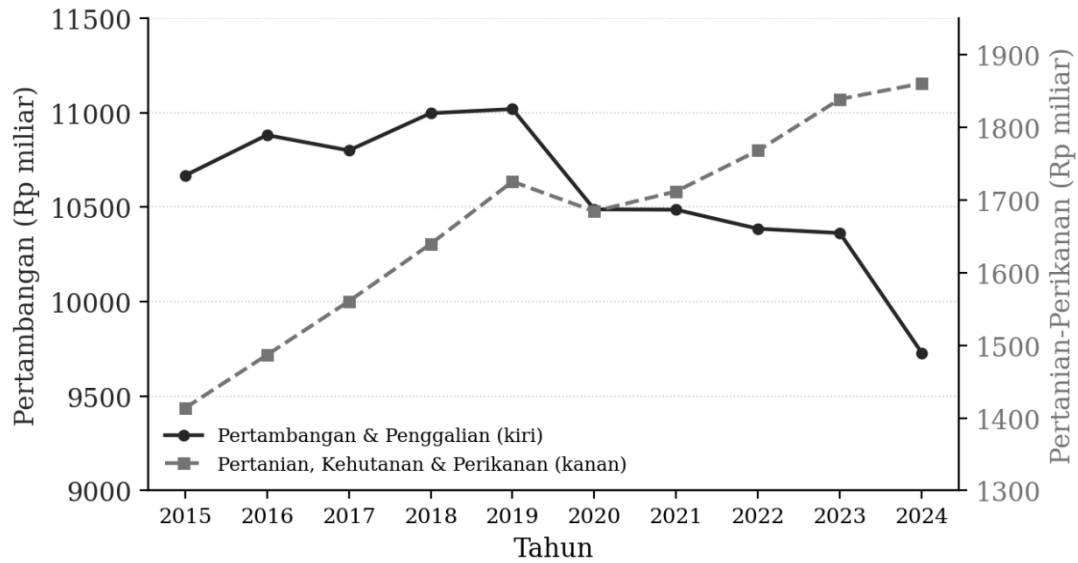


Figure 1. Trends in GRDP of the Mining Sector and the Agriculture-Fisheries Sector of Natuna Regency 2015–2024 (ADHK 2010)

Source: Central Statistics Agency of Natuna Regency (2025), processed by the author.

The LQ analysis confirms this concentration. Of the 17 sectors, only two consistently maintained base status throughout the period: Mining (LQ rising from 4.61 to 6.94) and Agriculture, Forestry, and Fisheries (LQ rising from 2.73 to 4.79). Interestingly, Mining's LQ increased even as its production declined, as the sector's contraction in the Riau Islands Province was proportionally faster. This finding is more accurately interpreted as strengthening relative specialization, rather than simply increasing dependency. The strengthening LQ of the Agriculture-Fisheries sector is relevant because fisheries, as the dominant subsector, is increasingly consolidating as a base sector, although it has not yet matched the dominance of Mining.

The Shift-Share results reveal a consistent and worrying finding: all 17 sectors recorded a negative competitive share effect (CSE) without exception (Table 2). The Mining sector recorded the largest negative CSE (−14,790.01 billion rupiah), while the Agriculture-Fisheries sector remained negative (−676.95 billion rupiah) despite absolute growth. This pattern indicates that no single sector in Natuna is able to outperform similar sectors at the national level, thus regional economic growth is highly dependent on national momentum, rather than on the region's endogenous capacity.

Table 2. Shift-Share Decomposition of 17 sectors in Natuna Regency 2015–2024 (billion rupiah)

Sector	NGE	IME	CSE
A. Agriculture, Forestry & Fisheries	1,301.47	-177.66	-676.95
B. Mining & Excavation	9,821.71	4,029.95	-14,790.01

Sector	NGE	IME	CSE
C. Processing Industry	92.90	-18.49	-54.36
D. Electricity & Gas Procurement	9.25	-1.69	-4.16
E. Water Supply & Waste Management	0.78	-0.21	-0.29
F. Construction	858.92	-21.71	-647.75
G. Wholesale & Retail Trade	332.15	-11.99	-154.96
H. Transportation & Warehousing	72.56	33.66	-94.25
I. Accommodation & Food & Drink	52.55	-12.05	-17.87
J. Information & Communication	81.72	39.39	-63.41
K. Financial Services & Insurance	15.62	1.13	-11.15
L. Real Estate	73.26	-26.35	-0.31
M,N. Corporate Services	0.03	0.01	-0.04
O. Government Administration	219.81	-100.76	-30.71
P. Educational Services	19.30	-6.66	-5.53
Q. Health Services & Social Activities	36.38	13.34	-35.58
R,S,T,U. Other Services	7.96	4.01	-9.58

Source: BPS Natuna Regency and BPS RI (2025), processed by the author. NGE = national growth effect; IME = industry mix effect; CSE = competitive share effect.

The Klassen typology places the Mining sector in Quadrant II (“Advanced But Depressed”): dominant in composition (averaging 71.90% of GRDP) but experiencing negative growth. The Agriculture, Forestry, and Fisheries sector is the sole occupant of Quadrant I (“Advanced and Rapid”), with an average contribution of 11.53% and a CAGR of 3.10%, and the only sector assessed positively by all three methods simultaneously. Ten sectors occupy Quadrant III (potential but marginal), and four sectors in Quadrant IV. The absence of the Manufacturing Industry from the better quadrant (CAGR 2.04%, contribution 0.78%) indicates that forward linkages from the extractive and fisheries sectors to local industry are almost non-existent. A synthesis of the three methods is presented in Table 3.

Table 3. Synthesis of the results of the analysis of Natuna Regency's leading sectors

Sector	LQ (2015→2024)	CSE (Shift-Share)	Class Typology	Conclusion
B. Mining	Base (4.61→6.94)	The largest negative (-14,790)	II – Progressing But Under Pressure	Dominant but depleted
A. Agriculture/Fisheries	Base (2.73→4.79)	Negative (-676.95)	I – Progress and Progress	Potential, not yet optimal
F. Construction	Non-base (0.38→0.42)	Big negative (-647.75)	II – Progressing But Under Pressure	Depends on local government spending

Sector	LQ (2015→2024)	CSE (Shift-Share)	Class Typology	Conclusion
J. Information & Communication	Non-base (0.28–0.32)	Negative (–63.41)	III – Potential/Developing	Fast growing, marginal
Other sectors (13)	Non-base, low	All negative	III and IV	Fragmented, marginal

Source: author's analysis results based on BPS Natuna Regency data (2025).

Overall, Natuna's economic structure is fragmented into three layers: one dominant sector that is weakening, one potential sector that is strengthening but not yet large enough, and many small sectors that are growing dynamically but are too marginal to change the structure.

Policy Substance: Rhetorical Alignment, Substantive Divergence

A content analysis of Presidential Regulation 41/2022 and Regent Regulation 16/2024 reveals rhetorical alignment but substantive divergence. The following discussion examines the substance of each policy, assesses their alignment, and then tests their translation into actual fiscal allocations.

Sectoral Priorities in Presidential Decree 41/2022

Presidential Regulation 41/2022 concerning the Inter-Regional Zoning Plan for the Natuna–North Natuna Sea establishes a marine spatial utilization pattern with relatively clear sectoral priorities. Article 48 divides waters into six Public Utilization Areas (KPU): tourism (U1), oil and gas mining (U5), mineral and coal mining (U6), capture fisheries (U8), aquaculture (U9), and defense and security (U18). The fisheries and mining sectors each receive two zone allocations, thus appearing quantitatively equal. However, this equality does not reflect equal policy direction: the fisheries sector receives active development guidance (Articles 66, 74, and 75), while the mining sector receives environmental control and harmonization guidance (Articles 11, 72, and 73). The coding results are presented in Table 4.

Table 4. Results of coding analysis of the contents of Presidential Decree 41/2022

Sector	Article/Section	Types of support	Specificity
Fisheries (capture & cultivation)	Article 7c,g; 8; 10; 48 (U8,U9); 65; 66; 74; 75; Appendix IV	Allocation of 2 zones, directions for the development of marine growth centers, operational arrangements, establishment of integrated fisheries centers	Operational (10 units)
Mining/Oil and Gas	Article 7d; 11; 48 (U5,U6); 72; 73	Allocation of 2 zones (U5 oil and gas, U6 minerals), environmental harmonization, supervision of work areas	Moderate–Operational (5 units)
Marine tourism	Article 7e; 9; 12; 48 (U1); 71	Allocation of 1 zone, non-destructive tourism direction, port and shipping lane arrangement	General–Moderate (5 units)

Sector	Article/Section	Types of support	Specificity
Marine conservation	Article 7g; 14; 15; 17; 47	Allocation of conservation areas, protection of biota migration, ecosystem rehabilitation	Operational (5 units)
Defense	Article 7f; 13; 48 (U18); 80	Allocation of 1 military zone, development of defense infrastructure	Operational (4 units)

Source: Presidential Decree 41/2022, processed by the author (2026).

The active development character of fisheries is most clearly evident in Article 66 (a), which stipulates the development of Marine Growth Centers through five activities, all oriented towards fisheries and the marine economy—from the use of space in fishing ports, capture fisheries and aquaculture centers, to biotechnology and maritime industry centers—none of which accommodate the extractive sector. Article 74 regulates capture fisheries zones by permitting “fishing that does not exceed sustainable potential or the allowable catch,” while Article 75 regulates aquaculture zones by emphasizing technological compatibility; both position fisheries zones as spaces for managed utilization, not free extraction. Finally, Appendix IV designates Natuna as the only “Integrated Marine Fisheries Center” on the national list, with “Development of a Fishing Port in the Lampa Strait” as the only infrastructure project located directly in Natuna.

In contrast, the mining sector is regulated by a controlling vocabulary. Articles 72 and 73 permit oil and gas and mineral activities “carried out in accordance with statutory provisions,” but without a development clause equivalent to Article 66, without the designation of extractive industry centers, and with a strategy that consistently uses the words “harmonization” and “control” instead of “development.” Article 73 even establishes a buffer zone by prohibiting activities within a distance of less than 250 meters of the Mining Work Area boundary—a provision that has no equivalent in the fisheries zone. Three findings stand out: first, fisheries receive the highest formal priority, both in terms of the number of units of analysis, the depth of guidance, and the designation of national centers; second, mining remains accommodated, but with a controlling framing that indicates the absence of an expansionary drive; and third, there is a gap between the claims of fisheries priority in the text and the realization of concrete infrastructure, as most of the strategic projects in Appendix IV are located outside Natuna, leaving physical support for fisheries centers prospective.

Substance of Natuna Regent Regulation 16/2024

Natuna Regent Regulation 16/2024 concerning the Master Plan and Roadmap for the Advancement of Science and Technology is characterized by strategic research and innovation planning for the 2024–2026 period. While explicitly claiming a blue economy orientation, this claim is not supported by a specific and measurable research program for the fisheries or maritime sectors, as seen in the coding results in Table 5.

Table 5. Results of coding analysis of the contents of Natuna Regent Regulation 16/2024

Unit of analysis	Article/Section	Priority sectors	Types of support	Specificity
Basis for policy formulation	Article 2	General (regional development)	—	General
Local economic overview	Appendix Chapter II	Fisheries, agriculture, plantations, maritime	Descriptive (background)	General (descriptive)
Technology sector opportunities	Appendix Chapter III	IT, renewable energy, creative industries	R&D and innovation support	General (strategic)
Blue economy & tourism	Appendix Chapter III	Marine economy, marine tourism	Sector development policy	General (conceptual)
Research & innovation strategy	Appendix Chapter V	General (all sectors of science and technology)	Development of research capacity, human resources, institutions	General (framework)
Regional research activity program	Appendix Chapter VI (Table 6.3)	Social economics, public health	Research program with annual targets (PPP, pre-prosperous families)	Operational (there is a target)
Evidence-based research program	Article 4 paragraph (3) letter a	General (multi-sector)	Annual research program	Operational (mechanism)
Featured product program	Article 4 paragraph (3) letter b	Superior product innovation (multi-sector)	Research-based product development	Operational (mechanism)

Source: Natuna Regent Regulation 16/2024, processed by the author (2026).

The structural irony is evident in Appendix Chapter II, which clearly presents the dominance of extractive industries—Mining's contribution reached 72.44% of the 2022 GRDP versus Agriculture and Fisheries' 11.49%—while also recording the agriculture and fisheries sector as absorbing 10,589 workers, the second largest after services. This recognition of the dualism between sectors that dominate added value and sectors that support the population's livelihoods is not reflected proportionally in the program. Chapter III instead opens up opportunities for diversification into "more advanced and competitive sectors, such as information technology, renewable energy, or the creative industry"—all three without a strong empirical basis in Natuna's economic structure, as they do not appear as LQ-based sectors or residents of Quadrant I. Conversely, fisheries, the basic sector and the only resident of Quadrant I, is only present as a descriptive context. The most operational programs in this document—the Roadmap in Appendix Chapter VI (Table 6.3) and the action plan in Article 4 paragraph (3)—are actually targeted at general social welfare (HDI/PPP, eradication of pre-prosperous families) and are formulated across sectors in a generic manner, without mentioning fisheries as a separate research priority. From an institutional perspective, Appendix Chapter V also does not specifically mention fisheries research institutions, fishing technology, or innovations in marine product processing.

Harmony and Divergence of the Two Policies

An examination of the alignment of the two policies (Table 6) shows a partial and asymmetrical pattern: they converge at the rhetorical level but diverge at the operational level.

Table 6. Alignment matrix of Presidential Regulation 41/2022 and Natuna Regent Regulation 16/2024

Dimensions	Presidential Decree 41/2022	Regent Regulation 16/2024	Level of alignment
Recognition of fisheries as a key sector	Explicit & operational (2 zones; Articles 66, 74, 75; integrated center)	Explicit yet descriptive (Chapter II, background)	Formal, not substantive
Blue economy orientation	Operational (marine growth zones & centers)	Conceptual (principles & opportunities, no program)	Partial alignment
Marine tourism	Zone U1, non-destructive direction (Article 71)	Referred to as research opportunities (Chapter III)	Aligned direction, different depth
Mining/Oil and Gas	Accommodated with control framing (U5, U6; Articles 72–73)	Not mentioned in the research program	Not relevant in the Regent's Regulation
Technology & innovation	Marine biotechnology (Article 66)	Broad priorities: IT, renewable energy, creative industries	Partial alignment; broader Regent Regulation
Measurable targets & indicators	There is for zones & infrastructure	There for social welfare; there for fisheries	Out of sync
Natuna as a maritime center	Explicit (Appendix IV: Integrated Fisheries Center)	Not referred or followed up	Out of sync

Source: processed by the author (2026) based on the coding results of Presidential Decree 41/2022 and Natuna Regent Regulation 16/2024.

The common ground lies in the formal recognition of fisheries and the blue economy; both also identify marine tourism as an opportunity. More substantial divergences emerge in three aspects. First, the operationalization of fisheries differs significantly: the Presidential Regulation translates priorities into special zones, marine growth center programs, and the establishment of binding national centers, while the Regent's Regulation does not translate these mandates into specific fisheries research or innovation programs. Second, the "Integrated Fisheries Center" mandate in Appendix IV of the Presidential Regulation is not referenced or followed up in the Regent's Regulation. Third, the measurable targets and indicators in the Regent's Regulation are directed toward general social welfare, not toward strengthening fisheries. Thus, regional policies, which should serve as a bridge to operationalizing the national mandate, are instead shifting toward strengthening general capacity and technology that lacks a link to the local economic base.

Formal-Substantive Comparison

Formal-substantive comparisons examine the extent to which textual commitments are translated into actual resource allocations. Translatability is not measured by a 1:1 equivalence between GRDP contributions and expenditures, but rather by the direction of convergence between the sector's economic weight and fiscal priorities. The proportion of Fisheries Service expenditure to total regional expenditures ranged only from 0.81–1.34% during 2020–2024, with an average increase only slightly from 0.94% at the baseline to 1.04% during the policy adoption period. The gap between the Agriculture-Fisheries sector's GRDP contribution and

the proportion of Fisheries Service expenditure actually widened, from an average of 10.66 percentage points to 11.47 percentage points (Table 7).

Table 7. Gap in contribution of GRDP and proportion of fisheries expenditure in Natuna Regency 2020–2024

Year	Sector A Contribution (%)	Estimated Pure Fisheries (%)	Fisheries Service Expenditure (Rp billion)	Proportion of Spending (%)	Sector A Gap (pp)	Pure Fisheries Gap (pp)
2020	11.50	8.86	10.26	0.96	10.54	7.90
2021	11.69	9.09	8.65	0.91	10.78	8.18
2022	12.06	9.43	10.01	0.98	11.08	8.45
2023	12.44	9.68	9.51	0.81	11.63	8.87
2024	13.05	10.06	15.20	1.34	11.71	8.72
Average 2020–2021	11.60	8.98	9.46	0.94	10.66	8.04
Average 2022–2024	12.52	9.72	11.57	1.04	11.47	8.68

Source: Natuna Regency Statistics Agency (2025) and Natuna Regency LRA 2020–2024, processed by the author. The pure fisheries estimate separates the fisheries sub-sector (averaging 77.6% of Sector A) from the Agriculture, Forestry, and Fisheries sector; pp = percentage points.

Presenting the two gap measures side by side allows for a more precise reading. With the pure fisheries estimate, the gap is in the range of 7.90–8.87 percentage points; with Sector A in aggregate, the gap is in the range of 10.54–11.71 percentage points. This difference in magnitude reflects the share of agriculture and forestry not covered by the Fisheries Agency, but both yield identical conclusions in direction: the average pure fisheries gap widens from 8.04 percentage points in the baseline to 8.68 percentage points in the policy adoption period—the exact same pattern as the Sector A measure. This means that the conclusion about underallocation is independent of how the fisheries sector is defined. The significant increase in spending in 2024 (1.34%, the highest in the period) coincides with the first full year of implementation of Perbup 16/2024, but its proportion remains about ten times smaller than the sector's contribution to GRDP.

The RAR analysis confirms this pattern is specific, not universal (Table 8). The Tourism and Transportation sectors consistently received spending exceeding their GRDP weight (average RAR of 1.66 and 2.22, respectively), and Information-Communication exceeded the proportional value in three out of five years. In contrast, the Agriculture-Fisheries sector recorded the lowest RAR (average 0.18) in every year without exception—meaning, for every 100 points of economic contribution it generates, local governments only reallocate approximately 18 points in spending. Thus, the low allocation to fisheries represents a consistent allocation choice, not simply a matter of limited fiscal capacity.

Table 8. Relative Allocation Ratio (RAR) by sector/SKPD of Natuna Regency 2020–2024

Sector /SKPD	2020	2021	2022	2023	2024	Track-track
A. Agriculture-Fisheries	0.16	0.22	0.20	0.15	0.19	0.18
G. Trade & Industry	0.22	0.47	0.38	0.77	0.25	0.42
J. Information & Communication	0.71	0.75	1.30	1.08	1.42	1.05
I. Tourism & Culture	1.55	2.01	1.29	1.64	1.83	1.66
H. Transportation & Communication	2.02	1.99	1.59	3.20	2.30	2.22

Source: BPKPD and BPS Natuna Regency, processed by the author. RAR < 1 indicates relative deprioritization, RAR > 1 indicates active priority. Sector A combines the Fisheries and Agriculture Services; the Fisheries Service will be renamed the Food Security and Agriculture Service in 2021–2024. The Mining Sector does not have a regional technical SKPD because oil and gas management falls under the central government's authority.

Based on the categorization criteria, Natuna's regional economic development policy regarding fisheries is categorized as symbolic: explicit formal commitments were not followed by adequate spending allocations, either before or after Presidential Regulation 41/2022 and Regent Regulation 16/2024 were enacted. One methodological consideration must be acknowledged: the 2020–2021 baseline coincided with the COVID-19 pandemic shock. However, three arguments counter this objection. First, if the widening gap were merely an artifact of the post-pandemic transition, the pattern should have narrowed or stabilized in 2023–2024 as the economy recovered, but in fact, the gap continued to widen (11.63 and 11.71 percentage points). Second, Sector A's low RAR (averaging 0.18) consistently emerged during both the pandemic and recovery periods, while Tourism and Transportation maintained RARs above 1.0 in both periods—this consistency across two different fiscal regimes reinforces the interpretation of a path-dependent structural pattern. Third, the baseline is set as a reference point before the policy is implemented, not as a claim of normal conditions, so that the period separation remains valid even if it contains exogenous distortions.

CCC Mechanism: Fiscal Dependence as an Empirical Bridge

Fiscal data connects the two portraits above. Table 9 presents indicators of fiscal dependence on oil and gas revenue sharing (DBH). The ratio of oil and gas revenue sharing to local revenue (PAD) is most diagnostic: throughout all periods without exception, oil and gas revenue sharing exceeded local revenue sharing, with ratios ranging from 171.45% to 352.22%. In the 2020–2021 baseline, every rupiah of local revenue was offset by nearly three rupiah of oil and gas revenue sharing (averaging 283.86%); this pattern continued in 2022–2024 (averaging 236.91%), with marginal improvements reflecting more local revenue growth than a decrease in structural dependence. Natuna Regency never achieved fiscal independence during the analysis period. Figure 2 visualizes the divergence between high fiscal dependence and low fisheries spending allocations.

Table 9. Fiscal Dependence Indicators for Oil and Gas DBH in Natuna Regency 2020–2024

Year	Oil and Gas DBH (Rp billion)	Total Revenue (Rp billion)	PAD (Rp billion)	DBH/Total (%)	DBH/PAD (%)
2020	138.07	926.42	51.53	14.90	267.94
2021	127.74	968.64	42.61	13.19	299.77
2022	234.85	989.28	66.68	23.74	352.22
2023	183.30	1,333.51	97.98	13.75	187.08
2024	116.12	972.91	67.73	11.93	171.45
2020–2021 Average	132.91	947.53	47.07	14.05	283.86
Average 2022–2024	178.09	1,098.56	77.46	16.47	236.91

Source: Natuna Regency Regional Revenue and Financial Management Agency (2026), processed. The total realization of Natural Resources Revenue Sharing Fund (DBH SDA) in 2024 was only 33.31% of the ceiling (Rp124.04 billion out of Rp372.37 billion) due to underpayments from the central government that have not been distributed; Oil and Gas Revenue Sharing Fund (oil + gas) alone was realized at Rp116.12 billion (CaLK Natuna Regency, 2024).

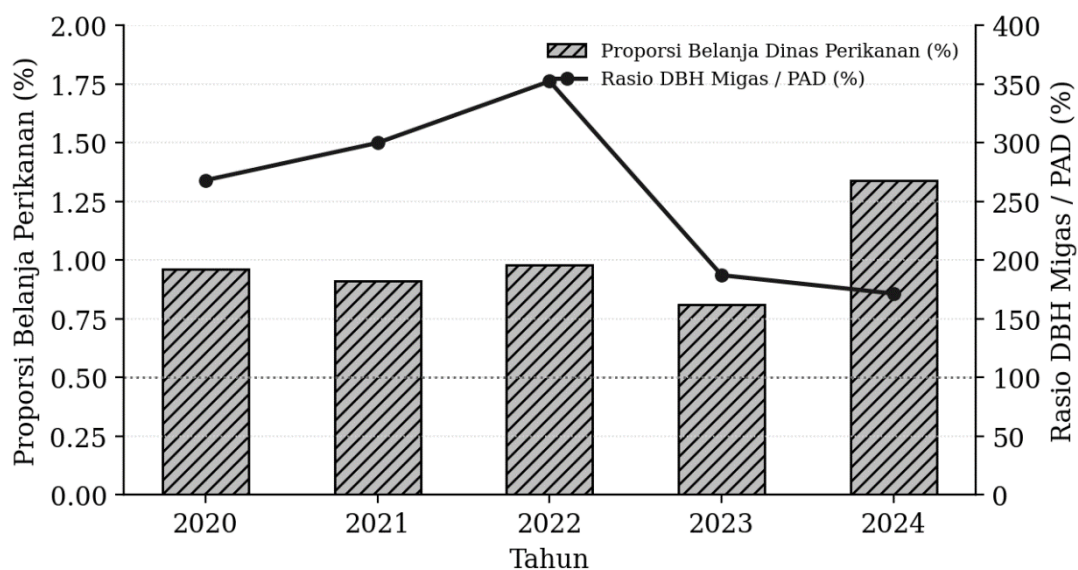


Figure 2. Fiscal dependence (oil and gas DBH/PAD ratio) and proportion of expenditure of the Natuna Regency Fisheries Service 2020–2024

Source: Natuna Regency BPKPD (2026), processed by the author. The dotted line marks the fiscal independence threshold (100%).

All three CCC dimensions were consistently identified. In the causal dimension, the dominance of the mining sector (averaging 71.90% of GRDP) creates a fiscal structure

dependent on the Oil and Gas DBH (Regional Revenue Sharing Fund). When oil and gas production declines, pressure on revenue increases, manifested in the realization of the 2024 Natural Resources DBH, which is only 33.31% of the ceiling (Rp124.04 billion out of Rp372.37 billion) due to underpayment by the central government. In the circular dimension, fiscal dependence creates institutional incentives to avoid disrupting the dominant sector, which is manifested not as explicit support but as the absence of a real commitment to alternatives. In the cumulative dimension, this pattern persists and even worsens: the gap between the weight of fisheries GRDP and its spending allocation widens after two policies committed to diversification are enacted.

The integration of the findings reveals two interlocking paradoxes, as illustrated in Figure 3. The Mining sector suffers from a dependency paradox: despite declining production, its dominant position remains because fiscal dependence on this sector hinders the development of alternatives. The Fisheries sector suffers from a priority paradox: despite receiving the most policy promises, it is the furthest from formal commitments and actual allocations. These two paradoxes are interlocked in a feedback loop: dependence on Mining hinders reallocation to Fisheries, while marginal allocations to Fisheries ensure that the sector cannot grow fast enough to reduce its dependence on Mining.

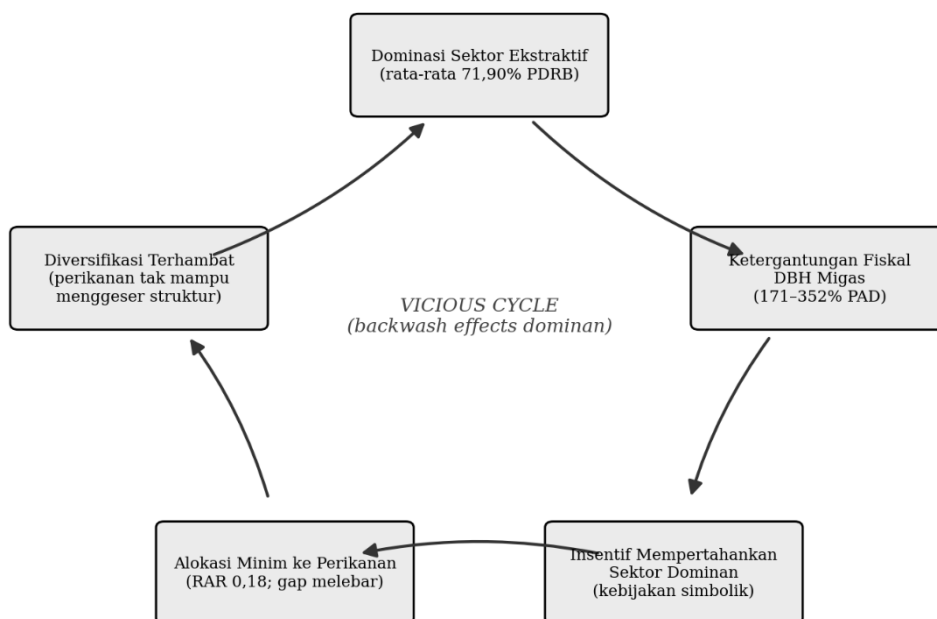


Figure 3. Schematic of the vicious cycle mechanism of Circular and Cumulative Causation in Natuna Regency

Source: author's construction based on the framework of Myrdal (1957), Berger (2008), and O'Hara (2008).

Based on the consistency of the three dimensions, the mechanisms operating in Natuna between 2020 and 2024 are more consistent with a vicious cycle with dominant backwash effects. This categorization persists after testing four alternative explanations (limited absorptive capacity, a universal gap between sectors, too short a period, and an unrealistic gap standard), and is robust to a sensitivity analysis that excludes the anomalous year of 2024. Year-over-year consistency reinforces this interpretation: the ratio of Oil and Gas DBH to PAD is always above 170%, the RAR for the Agriculture-Fisheries sector is always below 0.25, and the expenditure gap is always above 10.5 percentage points. It should be emphasized that this categorization is heuristic-interpretive: it demonstrates pattern consistency with the CCC framework, not statistically verified causality, as per the explanatory case study tradition (Yin, 2014).

This section describes and discusses the findings of the study, drawing similarities and differences between previous studies in terms of methods, data, and results. It also explains whether the problem has been successfully investigated according to its objectives using the proposed method. This should include a description of the analysis performed, the reasons and benchmarks for success/failure, and a section on the steps to be taken as a follow-up process.

This section also outlines the results of the qualitative and/or quantitative analysis, with an emphasis on answering the research questions. This section covers everything related to the activities carried out in the paper, including the concept, design, hypothesis (if any), experiments, observational data, and the results of the observations.

The content is supported by figures, tables, and equations referred to in the manuscript.

CONCLUSION AND SUGGESTIONS

This study explains the persistent dominance of the extractive sector in Natuna Regency through the Circular and Cumulative Causation framework. First, Natuna's economic structure is experiencing paradoxical stagnation: concentrated in the Mining sector (averaging 71.90% of GRDP) which is actually growing negatively (CAGR -1.02%) and is in the "Advanced But Depressed" Quadrant, while the Agriculture, Forestry, and Fisheries sector is the only diversification candidate that has consistently strengthened but has not yet developed to a scale that can change the structure. Second, development policies show rhetorical alignment but substantive divergence, and are categorized as symbolic in relation to fisheries: explicit formal commitments are not followed by proportional fiscal allocations, and the gap even widens post-policy. Third, the mechanism connecting the two is consistent with a vicious cycle based on backwash effects, where fiscal dependence on Oil and Gas Revenue Sharing Funds (DBH Migas) creates incentives that hinder reallocation to potential sectors.

These findings yield three policy implications that should be viewed as an integrated package. First, the fiscal incentive structure needs to be reformed, including through mandatory earmarking of a portion of the Oil and Gas Revenue Sharing Fund (e.g., 20–30%) across fiscal years for fisheries infrastructure, marine human resource development, and marine product

processing, following the practice of subnational Sovereign Wealth Funds. Second, the operationalization gap between national and regional policies needs to be closed by translating the mandate of the Integrated Fisheries Center into concrete, targeted, measurable programs outlined in the Science and Technology Roadmap. Third, structural fiscal space needs to be expanded through more aggressive optimization of Regional Original Revenue (PAD), given that the 2020–2024 PAD is only around IDR 42–98 billion. Reforming DBH allocation without operational translation results in a budget without a program; developing a program without fiscal space results in a plan without funding; therefore, all three must be implemented simultaneously.

This study has limitations that open up avenues for further research. The analysis did not utilize interviews to confirm the mechanisms behind the figures, did not employ inferential analysis to test causality, and limited the fiscal scope to the Fisheries Service. Future research could develop qualitative studies based on stakeholder interviews, more granular sectoral spending analysis across regional government agencies (SKPD), sectoral private investment analysis to explore market channels, expand the temporal horizon since the decentralization era, and conduct comparative studies across other island border regions such as Anambas, North Maluku, or Halmahera to test whether this vicious cycle mechanism is unique or recurring.

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