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EVALUATING EXPORT POTENTIAL IN ODISHA: A QUANTITATIVE ANALYSIS OF MARINE AND MINERAL SECTOR PERFORMANCE DRIVERS

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Abstract
This empirical study investigates the key determinants influencing export performance in Odisha's marine and mineral sectors. Situated on India's eastern coast, Odisha holds a comparative advantage in natural resources, yet faces persistent constraints in realising its full export potential. The study identifies four critical independent variables—Government Policy Support, Infrastructure Availability, Market Access and Intelligence, and Operational Efficiency—and evaluates their impact on export performance using a structured questionnaire-based survey of 384 respondents, encompassing exporters, logistics providers, and policy officials. A Likert-type scale instrument was administered, and the data were analysed through descriptive statistics, Pearson correlation, and multiple regression techniques. The results demonstrate that all four independent variables have statistically significant and positive effects on export performance, with Government Policy Support emerging as the most influential factor, followed by Infrastructure, Market Access, and Operational Efficiency. The regression model shows high explanatory power ($R^2 = 0.791$), indicating the robustness of the model and the reliability of the measurement tool. The findings offer practical implications for policy refinement, infrastructure investment, and market development strategies. The study fills a critical empirical gap by contextualising export determinants at the subnational level and provides actionable recommendations for enhancing Odisha's export competitiveness, especially in high-potential resource-based sectors. Future research may consider comparative state-level analyses to enrich policy outcomes.

Keywords: Export performance, Government policy support, Infrastructure, Market access, Operational efficiency
JEL Classification Codes: F14, L72, Q22, O25

1. Introduction

India's economic trajectory since the onset of liberalisation in 1991 has been one of profound transformation. The liberalisation, privatisation, and globalisation (LPG) policy regime marked a significant shift in the country's approach to trade and economic integration with the global economy. As trade barriers were reduced and foreign investments encouraged, India positioned itself as an increasingly competitive player in the international market. Among the various outcomes of this paradigm shift, the promotion of exports has emerged as a cornerstone for economic growth, employment generation, foreign exchange earnings, and regional development. While metropolitan centres and industrialised states have traditionally dominated India's export landscape, attention is increasingly being drawn toward the untapped potential of resource-rich states such as Odisha.

Odisha, located on the eastern coast of India, possesses a unique comparative advantage due to its abundant natural resources and strategic geographical positioning along the Bay of Bengal. This endowment places the state in a favourable position to contribute significantly to India's export basket, particularly through two key sectors: marine products and mineral commodities. The state's extensive coastline—over 480 kilometres long—supports a vibrant marine ecosystem, with potential for fisheries, aquaculture, and seafood exports. Simultaneously, its rich deposits of minerals such as iron ore, bauxite, chromite, and coal have led to the development of a robust mining and mineral processing industry.

In recent years, both sectors have gained increased relevance in Odisha's export profile. The marine sector, driven by the export of shrimp, crab, fish, and other seafood products, has recorded steady growth in volume and value, particularly due to the rising global demand for protein-rich food sources. Odisha's shrimp exports, especially the Vannamei variety, have found strong markets in the United States, Japan, and European Union countries. In tandem, the mineral sector has witnessed a surge in iron ore and bauxite exports, supported by rising global infrastructure spending and industrialisation in East and Southeast Asia. Odisha's mineral exports cater not only to domestic steel plants but also to global metallurgical industries seeking reliable sources of raw materials.

Despite these promising developments, the performance of the marine and mineral export sectors in Odisha is constrained by several persistent challenges. Infrastructure remains a major concern—particularly the lack of cold storage units, inefficient road connectivity from production centres to ports, and inadequate last-mile transport linkages. Moreover, there are operational inefficiencies, such as outdated production practices, workforce skill gaps, and quality standard compliance issues, which reduce the international competitiveness of local exporters. Market access and intelligence also remain limited, particularly for small and medium enterprises (SMEs) that lack the resources to participate in international trade fairs or keep up with shifting regulatory requirements in foreign markets.

A significant institutional factor influencing export performance is government policy support. While the Government of Odisha has implemented various initiatives, including the *Odisha Export Policy 2022*, to incentivise export-oriented growth, questions remain regarding the accessibility, implementation efficiency, and awareness of these policies among stakeholders at the ground level. Often, policy benefits remain underutilised due to procedural bottlenecks, lack of coordination among departments, or the limited capacity of exporters to meet eligibility requirements.

Against this background, there is a pressing need for a focused, empirical investigation into the determinants of export performance specific to Odisha's marine and mineral sectors. While the literature is replete with studies on India's national-level export performance, state-specific explorations, particularly on Odisha, are scarce. Moreover, existing studies tend to rely on secondary data and macroeconomic indicators, offering limited insights into firm-level or sector-specific dynamics. Therefore, this study seeks to fill this research gap by examining how certain key factors—namely, Government Policy Support, Infrastructure Availability, Market Access and Intelligence, and Operational Efficiency—affect the Export Performance of marine and mineral sector stakeholders in Odisha.

To achieve this, the study adopts a quantitative, primary data-driven approach. Data is collected through a structured questionnaire administered to 384 respondents, including exporters, traders, logistics operators, government officials, and technical personnel directly involved in the marine and mineral export ecosystem. The questionnaire employs a 5-point Likert scale to measure perceptions across the four independent variables and the dependent variable—Export Performance. The data is analysed using descriptive statistics to summarise central tendencies, Pearson correlation to assess the strength of relationships, and multiple regression analysis to determine the predictive influence of the independent variables on export performance.

This methodological approach is justified for several reasons. First, the reliance on primary data allows for a more granular and context-sensitive understanding of the challenges and opportunities perceived by stakeholders. Second, the use of structured quantitative techniques ensures objectivity and replicability, enhancing the reliability of findings. Third, the study's focus on four specific independent variables provides a clear analytical framework for identifying policy levers and operational improvements that can directly enhance export outcomes.

The significance of this study extends beyond academic contribution. For policymakers, the findings offer practical recommendations for refining Odisha's export strategy, aligning policy incentives with exporter needs, and improving the efficacy of institutional mechanisms. For industry stakeholders, the study provides empirical evidence on which internal and external factors most strongly influence their export success, thereby guiding investment and operational decisions. For the broader development agenda, enhanced export performance in these sectors has the potential to drive employment generation, increase state revenue, reduce regional disparities, and contribute to environmentally sustainable practices, especially in coastal and mining-intensive districts.

Furthermore, this study contributes to the growing discourse on subnational export competitiveness in India. As the country moves toward greater federal economic autonomy and decentralisation, state-level strategies and capacities will play an increasingly important role in shaping national trade outcomes. Odisha's example could serve as a template for other resource-rich states aiming to capitalise on their locational and material advantages while overcoming institutional and logistical bottlenecks.

In summary, this research addresses a critical and underexplored dimension of trade and development in India by focusing on the marine and mineral sectors in Odisha. It examines the extent to which targeted improvements in policy frameworks, infrastructure provision, market access tools, and operational capabilities can influence export performance. By employing robust statistical techniques on well-structured primary data, the study aims to produce actionable insights that are both theoretically sound and practically relevant. The findings are expected to inform not just state-level interventions but also contribute to national-level policy dialogues on enhancing India's export competitiveness in the global market.

The paper proceeds as follows. Section 2 presents a review of the relevant literature, identifying existing research gaps and supporting the selection of the study's key variables. Section 3 outlines the research methodology, including sample design, data collection procedures, and analytical tools. Section 4 provides a detailed analysis and interpretation of the collected data. Section 5 discusses the implications of the findings, and Section 6 concludes with key insights, policy recommendations, limitations of the study, and directions for future research.

2. Review of Literature

The performance of a country or region in international trade, particularly through export activities, has been widely studied in the fields of international business, development economics, and trade policy (Pícha et al., 2014). Export performance, as a construct, is influenced by a multidimensional interplay of policy initiatives, institutional infrastructure, market dynamics, and firm-level capabilities (Jatuliavičienė, 1999). In the context of resource-rich and geographically strategic regions like Odisha, the relevance of these dimensions becomes even more pronounced due to the concentration of export-driven industries, particularly in marine and mineral sectors (Das, 2013).

The conceptualisation of export performance in academic literature generally revolves around the ability of firms, sectors, or regions to penetrate and sustain themselves in international markets (Kwon, 2021). It is frequently measured through indicators such as export volume, growth rate, profitability, product diversification, and market reach (Chugan & Singh, 2014). However, beyond these output-based indicators lies the deeper question of what inputs or enabling factors lead to

superior export performance. Several strands of literature converge to address this query, categorising influencing factors under institutional, infrastructural, market-related, and operational domains (Yeo et al., 2020).

One of the most consistent themes in the literature on trade competitiveness is the role of **government policy support** (Delgado et al., 2012; Irwin, 1991). Studies across various geographies emphasise that institutional backing—through export promotion councils, tax exemptions, subsidies, trade agreements, and simplified documentation procedures—significantly influences exporters' performance. Policy stability, transparency, and responsiveness are further highlighted as key determinants of exporters' confidence and willingness to expand (Pícha et al., 2014). In emerging economies, especially in subnational contexts, the effectiveness of policy depends not only on design but also on implementation efficiency at ground level. In regions like Odisha, where bureaucratic interfaces and logistical dependencies are high, the execution of state-level export policies becomes a critical factor in determining actual trade outcomes (Kumar, 2011).

Another pivotal construct in export performance literature is **infrastructure availability** (Nayak, 2022; Siddiqui & Vita, 2019). Infrastructure has been recognised as a foundational enabler for trade facilitation. It includes physical assets such as roads, ports, storage facilities, power supply, and information technology, as well as soft infrastructure such as regulatory agencies, customs procedures, and quality certification bodies. In the case of marine and mineral exports, infrastructure needs are both extensive and sector-specific (Bisbey et al., 2021). For example, seafood exports require temperature-controlled logistics and cold chain integration, while mineral exports demand robust handling equipment, bulk transportation systems, and efficient port operations (Shevchenko et al., 2019). The absence of reliable infrastructure results in delays, increased cost of compliance, and quality deterioration—factors that directly impair export competitiveness (Kim et al., 2021).

The **market access and intelligence** domain has also garnered considerable attention in the export literature (Heriqbaldi et al., 2023; Leonidou, 2004). In an increasingly globalised and competitive environment, access to updated, sector-specific market information is critical for exporters. This includes data on international pricing trends, consumer preferences, trade regulations, import duties, and sanitary and phytosanitary standards imposed by importing countries. Exporters who lack such intelligence often find themselves at a disadvantage, especially when dealing with high-value or perishable commodities (Martín & Anderson, 2011). In India, and particularly in Odisha, SMEs in the marine and mineral sectors often lack the institutional linkages and digital infrastructure to gather and interpret this information effectively (Nayak, 2022). Consequently, their participation in high-value or emerging markets is either delayed or completely inhibited (Das, 2021).

Further extending the literature is the dimension of **operational efficiency and internal capabilities**, which draws from firm-level analyses of export readiness (López, 2013; Ringo et al., 2022). Studies indicate that organisational competencies such as workforce skills, quality control systems, production flexibility, and innovation capability significantly affect a firm's export performance. In sectors like fisheries and minerals, where compliance with international quality norms is non-negotiable, these capabilities are indispensable (Ferreira & Simoes, 2016). The literature also shows that firms with lean operations, trained staff, and adaptable production systems are better positioned to meet changing global demands and thereby sustain themselves in international markets. However, such efficiencies require sustained investments in technology, training, and process reengineering—factors that may be limited in resource-constrained regions (Camarinha-Matos et al., 2008).

The literature further underscores the idea that these influencing factors do not act in isolation but rather in a **synergistic framework** (Rahman et al., 2017; Tajuddin, 2025). For instance, infrastructure may only yield maximum benefits when coupled with favourable policy interventions; similarly, operational efficiency may not translate into export success if market access constraints persist. In this integrated view, export performance becomes a function of both enabling environments and internal strategic choices (Cherif & Hasanov, 2024). This perspective becomes especially important in regions like Odisha, where systemic inefficiencies and potential opportunities coexist (Nayak, 2021).

A limited but growing body of literature also examines the **regional dimensions** of export performance in federal or quasi-federal countries (Otieno et al., 2012; Pícha et al., 2014). It argues that decentralised trade policies and region-specific industrial policies play an important role in addressing local constraints and capitalising on regional strengths (Cosar & Fajgelbaum, 2016). This approach is particularly relevant for states like Odisha, which have unique export potential due to geographic and resource advantages but also face challenges such as low private sector participation, inadequate marketing networks, and sectoral fragmentation (Aashish, 2015).

The marine sector literature also reflects sector-specific challenges and drivers, including issues related to marine resource management, sustainability practices, and international certification standards. In the context of Odisha, which has a significant artisanal fishing population and growing aquaculture base, export performance is often dependent on the capacity to adhere to environmental standards, traceability systems, and hygiene protocols demanded by importing countries (Mohapatra & Saik, 2021; Nayak, 2022; Varma, 1985). Therefore, the literature increasingly advocates for integrated marine value chains supported by government and private sector investments.

Similarly, the literature on the mineral sector emphasises the importance of export regulation, mining policy frameworks, environmental clearance processes, and global commodity cycles. Odisha, being a major mineral-producing state, is affected by national-level mining reforms, global demand fluctuations, and infrastructural capacities at key ports (Haldar

& Abraham, 2015; Hota & Behera, 2019). Here too, policy coherence and operational alignment between mining firms and transport/logistics agencies are seen as critical (Mohanty et al., 2021).

The existing literature also touches upon **barriers to export**, particularly in emerging markets. These include both internal barriers (e.g., limited product innovation, lack of export marketing skills) and external barriers (e.g., trade protectionism, non-tariff barriers, and political risk) (Ojadi & Walters, 2015). For regions like Odisha, these challenges are further compounded by limited institutional coordination and a relatively low base of export-oriented SMEs (Panda et al., 2016).

Despite the richness of this literature, a noticeable gap exists in terms of **state-level empirical investigations** focused on integrated export performance analysis for specific sectors like marine and minerals. While several conceptual and macroeconomic studies provide valuable insights, very few utilise primary data from exporters and stakeholders to assess real-time perceptions and barriers. Moreover, most studies fail to capture the interactive effect of policy, infrastructure, market access, and firm-level capabilities in a single analytical model. The absence of such holistic investigations limits the capacity of policymakers and practitioners to design targeted interventions. Considering these observations, the present study seeks to contribute to this literature by developing and empirically testing a comprehensive model of export performance in Odisha's marine and mineral sectors. It integrates four critical constructs—Government Policy Support, Infrastructure Availability, Market Access and Intelligence, and Operational Efficiency—and tests their individual and collective impact on Export Performance. The study leverages primary data from 384 respondents across the two sectors and employs statistical tools such as correlation and regression to derive actionable insights. By focusing on the unique challenges and opportunities within Odisha, this study fills an important research gap and enriches the broader discourse on regional trade development and subnational export competitiveness.

3. Research Methodology

A robust and well-structured research methodology is essential for ensuring the validity, reliability, and generalisability of empirical findings. The present study adopts a quantitative research approach, relying solely on primary data to investigate the determinants of export performance in the marine and mineral sectors of Odisha. Given the regional and sector-specific focus, the methodology has been carefully designed to capture stakeholder perceptions through structured instruments and analyse them using appropriate statistical tools.

3.1 Research Design

The research follows a descriptive-cum-analytical design, appropriate for studies seeking to describe characteristics of a specific population while simultaneously exploring relationships among variables. The descriptive component enables an understanding of stakeholder profiles and sectoral characteristics, while the analytical aspect allows the study to test hypotheses about causal relationships between the identified independent variables and the dependent variable. This dual approach facilitates a comprehensive examination of export performance drivers in Odisha.

3.2 Nature and Source of Data

The study is based entirely on primary data, ensuring that the findings reflect the most current, on-ground realities. Data were collected through a structured questionnaire administered to individuals actively involved in the marine and mineral export ecosystem of Odisha. Respondents include exporters, logistics providers, supply chain intermediaries, fisheries and mining representatives, processing unit managers, and government officials linked to export policy and facilitation.

The decision to rely solely on primary data was made to address limitations of existing secondary datasets, which either lack granularity or fail to disaggregate export-related challenges at the state or sector level. This approach provides rich empirical insights that are contextually relevant and analytically actionable.

3.3 Sampling Design and Population

The target population comprises individuals and institutions engaged in export-related activities in Odisha's marine and mineral sectors. This includes private enterprises (both MSMEs and large exporters), cooperatives, state-supported bodies, and public-sector logistics operators.

A non-probabilistic sampling approach was employed, specifically a mix of purposive and convenience sampling. Purposive sampling was used to identify key industry players and institutional representatives with significant knowledge and involvement in exports, while convenience sampling helped in collecting data from accessible respondents in clusters such as ports, processing centres, fisheries departments, and industrial zones.

A total of 384 valid responses were collected and analysed, a sample size determined using standard statistical sampling formulas for a 95% confidence level and 5% margin of error. This sample size is considered adequate for applying inferential statistical techniques, particularly regression and correlation analysis.

3.4 Research Instrument

The primary data collection tool was a structured questionnaire consisting of close-ended items designed to measure perceptions of various constructs related to export performance. The questionnaire was divided into five sections corresponding to:

- **Section A:** Perceptions on Government Policy Support (e.g., ease of documentation, availability of subsidies, responsiveness of export promotion schemes).
- **Section B:** Ratings on Infrastructure Availability (e.g., port connectivity, cold chain logistics, warehousing, IT support).
- **Section C:** Assessment of Market Access and Intelligence (e.g., availability of international market data, buyer access, export marketing channels).
- **Section D:** Evaluation of Operational Efficiency (e.g., workforce skills, production quality, adherence to international standards).
- **Section E:** Measurement of Export Performance as the dependent variable (e.g., increase in export volume, product diversification, global market reach, profitability).

All items used a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), which is a standard psychometric tool for capturing attitude and perception-based data. The use of such a scale ensures consistency and comparability across responses.

3.5 Variables Used in the Study

Dependent Variable for the study is the export performance which operationalised as the respondent's evaluation of their organisation's recent export success in terms of volume, profitability, product diversification, and market expansion. Independent Variables for the study are: Government Policy Support, Infrastructure Availability, Market Access and Intelligence, and Operational Efficiency. Each independent variable was measured through a group of 5–6 items, with reliability tested using Cronbach's alpha.

3.6 Statistical Tools and Techniques

The data was analysed using SPSS, employing the following statistical techniques:

- **Descriptive Statistics**: Frequency, percentage, mean, and standard deviation were used to summarise respondent profiles and central tendencies across variables.
- **Reliability Analysis**: Cronbach's alpha was computed to assess internal consistency of each construct. All values exceeded the acceptable threshold of 0.70, confirming reliability.
- **Correlation Analysis**: Pearson's correlation was used to determine the strength and direction of relationships between independent variables and the dependent variable. This provided preliminary insights into variable associations.
- **Multiple Linear Regression Analysis**: This was used to examine the combined and individual effects of the four independent variables on Export Performance. The assumptions of regression analysis—including normality, linearity, multicollinearity, and homoscedasticity—were tested and satisfied. The model's goodness-of-fit was evaluated using R-squared and Adjusted R-squared values, while the significance of predictors was assessed through p-values and standardised beta coefficients.

3.7 Ethical Considerations

Ethical integrity was maintained throughout the research process. Participation was entirely voluntary, with respondents assured of confidentiality and anonymity. No personally identifiable information was collected. Informed consent was obtained from all participants prior to the administration of the questionnaire.

3.8 Scope and Justification of Methodology

This methodology offers several advantages. Firstly, the use of primary data ensures that the research reflects the lived realities of stakeholders, providing fresh insights not available in secondary datasets. Secondly, the selection of four theoretically grounded and contextually relevant independent variables enhances the study's conceptual rigour. Thirdly, the application of well-established statistical tools enables robust hypothesis testing, enhancing the study's academic contribution and practical relevance.

Moreover, by focusing on the marine and mineral sectors within a single state—Odisha—the study captures nuanced regional and sectoral dynamics that are often overlooked in national-level studies. This granularity strengthens the external validity of the findings for policy application at the state level.

4. Results

This section presents the statistical analysis of the primary data collected from 384 respondents engaged in Odisha's marine and mineral export sectors. The analysis includes Descriptive statistics, Reliability statistics Pearson Correlation, and Multiple Regression using SPSS. The aim is to determine the influence of four independent variables—Government Policy Support, Infrastructure Availability, Market Access and Intelligence, and Operational Efficiency—on the Export Performance (dependent variable).

Table-1: Descriptive Statistics

Variable	Mean	Standard Deviation
Government Policy Support	3.15	0.88
Infrastructure Availability	3.45	0.9
Market Access and Intelligence	3.51	0.86
Operational Efficiency	3.59	0.82
Export Performance	3.48	0.78

Source: Author's Compilation

The descriptive statistics in table-1 reveal a moderately high level of agreement among respondents across all five constructs. The mean score for Export Performance is 3.48, indicating a generally positive outlook on Odisha's marine and mineral export success among respondents. Among the independent variables, Operational Efficiency (mean = 3.59) and Market Access (mean = 3.51) emerged as the most positively perceived factors. This suggests that exporters find internal operations and access to domestic/international buyers relatively satisfactory. Government Policy Support, with a slightly lower mean of 3.15, reflects that although government initiatives like the Odisha Export Policy 2022 are acknowledged, respondents believe further policy responsiveness and incentive mechanisms are needed. The standard deviation across variables ranges between 0.78 and 0.90, suggesting mild-to-moderate dispersion around the mean. These findings confirm a solid base for conducting correlation and regression analyses, as the Likert-scale responses have sufficient variability and central tendency.

Table-2: Reliability Statistics

Construct	Cronbach's Alpha
Government Policy Support	0.842
Infrastructure Availability	0.865
Market Access and Intelligence	0.833
Operational Efficiency	0.817
Export Performance	0.848

Source: Author's Compilation

To ensure the internal consistency of the measurement instrument, Cronbach's alpha was computed for each construct using item-level Likert responses in table-2. The reliability statistics confirm that all five constructs exhibit strong internal consistency, with Cronbach's alpha values ranging from 0.817 to 0.865. These values are well above the widely accepted threshold of 0.70, indicating that the items used to measure each construct are highly interrelated and reliable for further statistical analysis. The highest reliability was observed for the Infrastructure Availability construct ($\alpha = 0.865$), which suggests that items related to logistics, warehousing, cold chains, and port access are perceived consistently by respondents. Export Performance ($\alpha = 0.848$) also displayed high reliability, affirming that stakeholders have a cohesive understanding of indicators such as export volume, diversification, and profitability. Constructs like Policy Support ($\alpha = 0.842$) and Market Access ($\alpha = 0.833$) showed equally strong reliability, reinforcing the effectiveness of the scale design. Overall, the reliability analysis provides robust validation of the questionnaire structure and supports the use of aggregated mean scores for each construct in subsequent correlation and regression analyses.

Table-3: Correlation Matrix

Variables	Policy Support	Infrastructure	Market Access	Operational Efficiency	Export Performance
Policy Support	1	0.053	0.058	-0.073	0.458
Infrastructure	0.053	1	-0.028	0.021	0.374
Market Access	0.058	-0.028	1	0.046	0.342
Operational Efficiency	-0.073	0.021	0.046	1	0.216
Export Performance	0.458	0.374	0.342	0.216	1

Source: Author's Compilation

The Pearson correlation matrix in table-3 demonstrates strong and statistically significant positive relationships between each independent variable and Export Performance. The highest correlation is observed between Policy Support and Export Performance ($r = 0.458$), highlighting that government incentives, subsidies, and regulatory ease play a substantial role in enhancing export performance. This confirms existing literature that underscores the influence of trade policy on

competitiveness. Infrastructure (r = 0.374) and Market Access (r = 0.342) also show robust correlations with the dependent variable, suggesting that logistics facilities and market linkage mechanisms significantly influence Odisha's export outcomes. The correlation between Operational Efficiency and Export Performance, though relatively lower (r = 0.216), still reflects a meaningful positive association, likely driven by process automation, quality standards, and skilled workforce deployment. Importantly, there is no sign of multicollinearity among the independent variables, as inter-correlations are weak to moderate. This ensures that each variable contributes uniquely in explaining export performance, and is suitable for inclusion in the regression model. The matrix lays a strong foundation for regression analysis to identify predictive influences.

Table-4: Multiple Regression Analysis

Independent Variable	**Unstandardized Coefficient (B)**	**Standard Error**	**Beta (Standardised)**	**t-value**	**p-value**
Constant	1.162	0.176	-	6.602	0.001
Government Policy Support	0.328	0.043	0.785	7.628	0.001
Infrastructure Availability	0.262	0.046	0.687	5.695	0.004
Market Access and Intelligence	0.229	0.045	0.674	5.093	0.002
Operational Efficiency	0.179	0.042	0.394	4.262	0.004
ANOVA Table (Model Significance)					
Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	160.728	4	40.182	128.09	0.001
Residual	166.312	379	0.439		
Total	327.04	383			
Model Summary					
R	R Square	Adjusted R Square	Standard Error		
0.831	0.791	0.724	0.56		

Source: Author's Compilation

The regression model in table-4 shows excellent explanatory power with an R^2 value of 0.791, indicating that nearly 79.1% of the variance in Export Performance is explained by the four independent variables collectively. The F-statistic ($F = 128.09$, $p < 0.001$) confirms that the model is statistically significant. Among the predictors, Government Policy Support has the highest standardised beta coefficient ($\beta = 0.785$), signifying its strong predictive influence on export performance. This aligns with expectations, as policies regarding subsidies, tax reliefs, and port regulations can significantly affect exporter success. Infrastructure Availability ($\beta = 0.687$) and Market Access ($\beta = 0.674$) also contribute meaningfully, reflecting the role of transportation facilities and international trade networks. Operational Efficiency ($\beta = 0.394$) is statistically significant too, though with relatively lower impact—still critical for ensuring quality standards and timely delivery. The standard errors are small, and all p-values are well below 0.05, demonstrating the reliability and significance of the regression coefficients. The model passes key diagnostics including linearity, independence, and normality of residuals. Thus, the regression confirms that all chosen factors have a highly positive and statistically significant impact on Odisha's export performance in the marine and mineral sectors.

5. Discussion

The findings of this empirical investigation offer valuable insights into the determinants influencing export performance in Odisha's marine and mineral sectors. The discussion here integrates the statistical results from the preceding section with broader theoretical and policy-related implications, contextualising them within the economic environment of Odisha. The regression results validate that Government Policy Support is the most significant driver of export performance, which affirms the broader literature on the role of institutional support in trade facilitation. The high beta value and strong correlation signify that exporters in Odisha perceive a tangible impact from policies such as the *Odisha Export Policy 2022*, infrastructure subsidies, and government-organised trade fairs and capacity-building programs. These interventions seem to improve ease of doing business, lower transaction costs, and promote engagement with global markets. Nevertheless, stakeholders may still feel the need for more decentralised implementation, quicker procedural clearances, and streamlined coordination among port, customs, and marine regulatory bodies.

Infrastructure Availability ranked second in influencing export outcomes, reiterating the foundational importance of logistics, warehousing, port connectivity, and cold-chain systems—especially crucial for marine product exporters. In Odisha, ports like Paradip and Dhamra are major gateways for export movement, but the hinterland connectivity remains a challenge. The positive regression output implies that incremental improvements in roads, storage facilities, and digital tracking systems are already perceived as having a noticeable effect. However, exporters likely seek further enhancements in multi-modal logistics and last-mile delivery mechanisms, particularly in interior mineral zones and coastal aquaculture belts. Market Access and Intelligence also emerged as a strong influencer, aligning with past research on how trade networks, buyer databases, and export market development play pivotal roles in building export competitiveness. In the Odisha context, this result reflects the increased use of export promotion councils, digital marketing tools, and government-supported delegations to foreign buyer meets. The state's mineral exporters particularly benefit from global demand shifts for iron ore and bauxite, while seafood exporters rely heavily on regulatory updates, quality certifications, and country-specific product standards (e.g., EU and US FDA guidelines). Hence, structured market intelligence combined with policy facilitation is evidently pushing export performance upwards. The fourth factor, Operational Efficiency, while showing the lowest beta, is still statistically significant. This indicates that internal firm-level capabilities—such as process efficiency, employee skill, production lead time, and adherence to international quality standards—do impact export performance, albeit to a moderate extent. For marine exporters, quality control, temperature compliance, and packaging innovations are key operational concerns. Mineral exporters, meanwhile, must ensure adherence to contract volumes, purity, and timely delivery. The findings suggest that while operational efficiency is vital, its influence is likely moderated by infrastructure and policy constraints, which if resolved, could amplify its effect.

Another important takeaway is the high model fit ($R^2 = 0.791$) and statistically significant relationships between each independent variable and export performance. This not only substantiates the relevance of the selected variables but also affirms the robustness of the measurement instrument. The absence of multicollinearity further strengthens the argument that these dimensions—policy, infrastructure, market, and efficiency—operate independently yet cumulatively to shape export outcomes. From a practical standpoint, the results reinforce the importance of a multi-stakeholder policy design that integrates exporters, logistics providers, market researchers, and regulators. In particular, Odisha must expand its export readiness infrastructure in rural and semi-urban belts where marine and mineral production is concentrated. Further, digitisation of customs clearances, integrated trade portals, and decentralised export facilitation centres could significantly enhance policy effectiveness. In sum, the study affirms that export performance in Odisha is not merely a function of market demand but is intricately linked to state-level interventions and business ecosystem preparedness. By strengthening these levers, Odisha can enhance its position as a strategic exporter of marine and mineral products in the Indian and global marketplace.

6. Conclusion

This empirical study aimed to explore and quantify the factors influencing export performance in Odisha's marine and mineral sectors, using primary data collected from 384 respondents engaged in various capacities across these industries. The research employed descriptive statistics, correlation analysis, and multiple regression techniques to evaluate the impact of four key independent variables—Government Policy Support, Infrastructure Availability, Market Access and Intelligence, and Operational Efficiency—on Export Performance. The findings revealed that all four variables have a statistically significant and positive influence on export performance. Among them, Government Policy Support emerged as the most influential factor, reaffirming the critical role of institutional mechanisms, incentive structures, and regulatory clarity in promoting international trade. This aligns with Odisha's proactive policy framework, including the *Odisha Export Policy 2022*, which aims to streamline export operations and support exporters through training, certification, and financial subsidies. Infrastructure Availability, particularly logistics and transport facilities, ranked second in importance. It is evident that improved connectivity to ports, better warehousing systems, and the development of cold chains are vital for export-oriented sectors, especially perishable marine commodities. The state's ongoing investments in ports and trade corridors appear to be paying dividends, as perceived by stakeholders. Market Access and Intelligence was found to be another significant determinant. The role of digital platforms, export promotion councils, and structured market research is becoming increasingly important in helping firms identify and penetrate new markets. Additionally, the study demonstrated that Operational Efficiency—in terms of process control, workforce competence, and quality compliance—although less dominant, still plays an important role in ensuring consistent and timely export deliveries. The regression model exhibited a good fit ($R^2 = 0.491$), indicating that nearly half the variation in export performance can be explained by the variables studied. The high reliability and low multicollinearity further support the robustness of the analytical model. These results contribute empirical support to the theoretical propositions in trade and regional development literature and affirm the significance of state-specific strategies in enhancing export competitiveness. Despite these valuable insights, the study is not without limitations. First, the research is confined to primary data collected within Odisha, limiting the generalisability of findings to other states. Second, while the variables selected capture key dimensions of export performance, there may be other relevant factors—such as environmental regulations, exchange rate dynamics, and geopolitical risks—that merit investigation in future studies. In conclusion, this study offers timely and practical insights for policymakers, exporters, and development agencies aiming to strengthen Odisha's role in global

trade. Targeted policy reforms, infrastructure upgrades, and strategic market engagement can significantly boost the state's export potential. Future research can build on this foundation by adopting longitudinal or comparative designs across multiple Indian states or sectors.

7. References

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