Journal of International Accounting, Taxation and Information Systems, 2025, 2(4), 467-479

JIATIS

Journal of International Accounting, Taxation and Information Systems

https://jiatis.com/index.php/journal

Online ISSN 3048-085X

Sustainability Strategy of PT XYZ in Entering the Blue Ammonia Industry in Indonesia

Muhammad Indra Zulmi[1], Nimmi Zulbainarni[2], Bagus Sartono[3]*

[1-3]*School of Business IPB University, Bogor, Indonesia*

E-mail: [1)] *indrazulmi@apps.ipb.ac.id*, [2)] *nimmizu@apps.ipb.ac.id*, [3)] *bagusco@apps.ipb.ac.id*

ARTICLE INFO

Article History
Received : 02.12.2025
Revised : 25.12.2025
Accepted : 07.01.2026
Article Type: Research Article

*Coresponding author:
Muhammad Indra Zulmi
indrazulmi@apps.ipb.ac.id

ABSTRACT

Blue ammonia is emerging as a critical transitional solution in the global energy transition, with market volumes projected to grow from 1.1 million tons in 2023 to 9.2 million tons by 2028, and Indonesia has positioned it as a key pillar of its net-zero strategy by 2060. This article analyses the sustainability strategy of PT XYZ, an Indonesian integrated energy and chemical company, in entering the blue ammonia industry. Produced from natural gas with carbon capture and storage (CCS), blue ammonia offers a decarbonisation pathway for hard-to-abate sectors. PT XYZ is converting an existing ammonia plant but faces challenges including CCS costs, gas-price volatility, financing needs, and stringent international standards. The study aims to (1) map external opportunities and threats, (2) assess PT XYZ's internal resources and capabilities, and (3) formulate sustainability-oriented strategic alternatives. A mixed-method approach combines PESTLE and Porter's Five Forces analyses with Resource-Based View and VRIO assessment, followed by SWOT and TOWS synthesis using document review, interviews, focus groups, and expert questionnaires. Findings shed light that PT XYZ operates in a supportive yet demanding environment, possessing strengths in HSE culture, gas procurement, CCS design, MRV readiness, and contract management, alongside gaps in equity gas, CCS agreements, blended finance, and anchor contracts. The resulting SO, WO, ST, and WT strategies provide a roadmap for de-risking investment, securing premium markets, and aligning with long-term decarbonisation goals.

Keywords: Blue Ammonia, Carbon Capture and Storage, Energy Transition, Resource-Based View, Strategic Management, Sustainability Strategy, SWOT–TOWS

1. Introduction

In recent years, blue ammonia has emerged as a central theme in the global energy transition agenda. This development is driven by the urgent need to reduce greenhouse gas emissions in the industrial and energy sectors while preserving economic competitiveness (Boero et al., 2021; Tjahjono et al., 2023). Produced from natural-gas-based hydrogen through the application of carbon capture and storage (CCS) technologies, blue ammonia is increasingly recognised as a promising clean energy transition solution, both as a hydrogen carrier and as a low-carbon fuel for industrial and transport applications (Pozo & Cloete, 2022; Tanzeem & Al-Thubaiti, 2023). Market projections indicate that global blue ammonia volumes will rise from about 1.1 million tons in 2023 to approximately 9.2 million tons in 2028, while market value is expected to increase from USD 13.95 billion in 2024 to roughly USD 18.55 billion by 2029 (BCC Publishing, 2024; The Business Research Company, 2024, 2025). Against this backdrop, Indonesia, having ratified the Paris Agreement and committed to a Net Zero Emission target by 2060, regards blue ammonia as one of the key pillars of its national decarbonisation strategy (Ministry of Environment and Forestry (MoEF) of Indonesia, 2021).

Ammonia is generally classified into grey, blue, and green ammonia, with the main differences lying in the energy source and carbon emission management across the production process. Grey ammonia produced via steam methane reforming without emission control has a high carbon footprint, whereas green ammonia derived from renewable-based electrolysis offers the lowest emissions but remains constrained by high costs and the need for large-scale green energy infrastructure (Boero et al., 2021; Tjahjono et al., 2023). Positioned between the two, blue ammonia is considered a realistic medium-term transition option because it leverages existing industrial infrastructure while integrating CCS to reduce emissions by roughly 60 to 90 percent compared with grey ammonia (Pozo & Cloete, 2022; Tanzeem & Al-Thubaiti, 2023). This makes blue ammonia development in Indonesia highly strategic, both as a bridge toward green ammonia and as an opportunity to enhance the competitiveness of domestic industries in responding to growing global demand for low-carbon products, particularly from importing countries such as Japan and South Korea that are accelerating their decarbonisation agendas (Palandri et al., 2025; Tjahjono et al., 2023).

In response to these market opportunities and regulatory signals, PT XYZ, a leading player in Indonesia's chemical and energy sector, is accelerating its blue ammonia business development through the conversion of an existing ammonia plant in Central Sulawesi. The initiative capitalises on a production capacity of more than 700 thousand tons per year and focuses on deploying CCS technologies to reduce process emissions while strengthening the company's position in low-carbon energy markets (PT XYZ., 2024). Nevertheless, PT XYZ faces substantial challenges, including the high cost of CCS implementation, natural gas price volatility, the need for sizeable transition financing, and increasingly stringent international sustainability standards (Asgharian et al., 2025; Palandri et al., 2025; Pozo & Cloete, 2022; Shin et al., 2023). Internally, the company's financial performance over the last three years reveals a significant decline in revenue, from approximately USD 731.5 million in 2022 to about USD 301.4 million in 2024 due to global price pressures, even though profitability has been maintained through efficiency gains and innovation as reflected in higher net profit margins (PT XYZ, 2024). This situation underscores the urgency of designing a more coherent strategy to ensure that blue ammonia investments effectively support PT XYZ's long-term business sustainability, as illustrated in Figure 1.

A review of prior studies on PT XYZ indicates that existing research has largely concentrated on retrospective financial analyses, including capital structure, financial performance, financial distress, and optimal stock portfolio construction (Aryanti et al., 2020; Endri et al., 2021; Febriani & Iswoyo, 2021; Ocfrin et al., 2022; Putra & Purnamawati, 2023; Sin & Fong, 2022). While these studies provide valuable insights into PT XYZ's historical financial condition, they offer limited guidance for strategic decision-making in the context of new, sustainability-oriented business development. In particular, they do not address the specific opportunities, challenges, risks, and capability requirements associated with PT XYZ's potential entry into the blue ammonia business, which is characterised by high technological complexity, regulatory uncertainty, and strong decarbonisation pressures.

At the same time, the strategy and sustainability literature emphasises that incumbent firms in the energy sector must adopt integrated, adaptive, and collaborative strategy formulation processes to remain competitive during the energy transition (Burritt et al., 2020; Kaipainen & Aarikka-Stenroos, 2022). However, empirical studies that translate these strategic principles into a structured analysis of external industry conditions and internal organisational readiness, particularly in the context of Indonesia's emerging blue ammonia industry, remain scarce. Addressing this gap, the present article aims to: (1) analyse the external factors of Indonesia's blue ammonia industry relevant to PT XYZ; (2) assess internal factors that reflect PT XYZ's readiness to develop a blue ammonia business; and (3) formulate measurable strategic alternatives for PT XYZ to develop a sustainable blue ammonia business. In doing so, this article provides a forward-looking and strategy-oriented analytical foundation for PT XYZ's management, while extending the literature on sustainability strategies of Indonesian energy companies entering the blue ammonia industry.

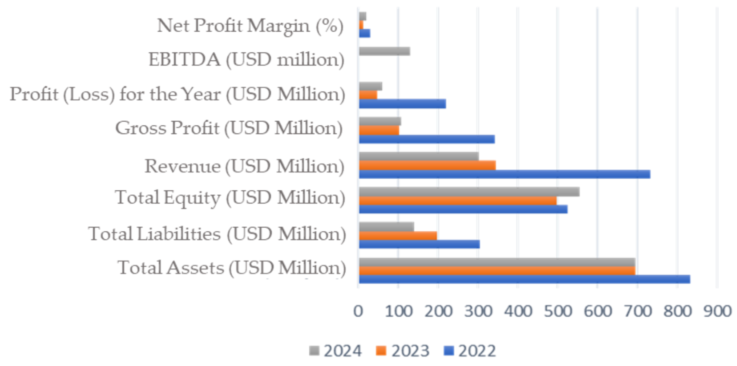

Figure 1. Financial performance of PT XYZ, 2022-2024

2. Literature Review

The literature review in this study is organised to establish a clear conceptual foundation for analysing external industry dynamics, internal capabilities of PT XYZ, and the formulation of sustainable strategic alternatives in the blue ammonia business. It begins by outlining key business and strategic management theories that explain how incumbent firms navigate transformation toward low-carbon energy systems. Building on this theoretical grounding, the second section introduces strategic analysis frameworks that are commonly used to assess external and internal conditions and to translate these assessments into coherent strategic options. Finally, the third section synthesises prior research on blue ammonia development and on PT XYZ specifically, enabling the identification of a focused research gap that this article seeks to address.

2.1. Business and Strategic Management in the Energy Transition

Business management provides the overarching lens for understanding how firms plan, organise, lead, and control resources to achieve objectives effectively and efficiently in dynamic environments (Daft & Armstrong, 2021). In the context of energy transition, management is no longer oriented solely toward short term profit, but also toward social and environmental responsibility, including carbon emission reduction and alignment with sustainable development goals (David & David, 2016). For incumbent energy and chemical companies, this implies the need to redesign business portfolios, governance, and capabilities in order to compete in emerging low carbon value chains such as blue ammonia.

Strategic management refines this perspective by emphasising the integrated process of strategy formulation, implementation, and evaluation across functions (David & David, 2016). Through structured environmental analysis and goal setting, firms are expected to align their vision, mission, and strategic initiatives with long term competitiveness in a carbon constrained world. The resource based view (RBV) complements this process by arguing that sustainable competitive advantage is rooted in valuable, rare, inimitable, and well organized resources and capabilities (Barney, 1991; Hesterly & Barney, 2014). For PT XYZ, blue ammonia development can be viewed as a strategic move that leverages and upgrades core assets such as existing ammonia plants, process know how, CCS capabilities, and human capital to build a defensible position in low carbon energy markets.

2.2. Strategic Analysis Frameworks for the Blue Ammonia Business

To translate the above theoretical perspectives into actionable strategic analysis, this study draws on several well established frameworks. Porter's Five Forces is used to evaluate the structure and attractiveness of the blue ammonia industry by examining industry rivalry, threat of new entrants, bargaining power of suppliers and buyers, and threat of substitutes (Porter, 2008). This framework helps position PT XYZ within the competitive landscape and identify external pressures and opportunities that shape profitability in low carbon ammonia markets.

Macro environmental conditions are further examined using PESTLE analysis, which systematically assesses political, economic, social, technological, legal, and environmental factors that influence business development (Whittington et al., 2019). In the case of blue ammonia, this includes national energy and climate policies, carbon pricing and incentives, export market dynamics, technological progress in CCS and low carbon ammonia production, as well as growing expectations for sustainability and environmental stewardship. Internal conditions, on the other hand, are analysed using the RBV and the VRIO framework to evaluate whether PT XYZ's resources and capabilities related to technology, infrastructure, finance, and human resources can be sources of sustained competitive advantage in blue ammonia (Barney, 1991; Hesterly & Barney, 2014). The results of external and internal analyses are then synthesised through SWOT and TOWS matrices to identify strengths, weaknesses, opportunities, and threats and to derive coherent strategy alternatives that respond to both market opportunities and transition risks (Gürel, 2017; Weihrich, 1982). In this article, these tools are used to formulate, rather than to prioritise, strategic options for PT XYZ.

2.3. Previous Research

Previous research on blue ammonia and low-carbon ammonia value chains has expanded substantially over the past five years, particularly in response to global net-zero commitments and the growing interest in hydrogen-based energy carriers. Recent techno-economic assessments and life-cycle analyses demonstrate that blue ammonia can achieve substantial emissions reductions relative to conventional grey ammonia, often exceeding 50–70% on a life-cycle basis, depending on carbon capture rates, CCS transport and storage costs, natural gas price volatility, and the availability of carbon pricing or fiscal incentives (Asgharian et al., 2025; Pozo & Cloete, 2022; Shin et al., 2023; Tjahjono et al., 2023).

Other strands of the literature position blue ammonia as a transitional decarbonisation pathway and a potential export commodity for gas-rich countries, particularly in the Middle East and Asia–Pacific. These studies identify specific determinants of competitiveness, including access to large-scale CCS infrastructure, port and shipping readiness for ammonia handling, long-term offtake agreements, and alignment with international carbon and hydrogen certification regimes (Al-Yafei et al., 2025; Palandri et al., 2025; Tanzeem & Al-Thubaiti, 2023). Taken together, this literature underscores that the commercial viability of blue ammonia depends not on isolated technological performance, but on coordinated technological deployment, policy support, and supply-chain integration across the value chain.

In contrast, prior research focusing on PT XYZ has predominantly examined traditional financial and capital-market dimensions, such as determinants of capital structure, stock returns, and financial distress, employing methods including regression analysis, financial ratio trend analysis, and portfolio optimisation models (Al-Yafei et al., 2025; Palandri et al., 2025; Tanzeem & Al-Thubaiti, 2023). While these studies provide valuable insights into PT XYZ's historical financial performance and market positioning, they offer limited guidance for strategic decision-making in the context of emerging low-carbon businesses. Specifically, they do not examine how PT XYZ's resources, capabilities, and external operating environment interact to shape its strategic options for entering the blue ammonia business amid energy transition pressures.

Consequently, a clear gap exists in the literature related an integrated analysis that connects external industry dynamics, internal strategic readiness, and sustainability-oriented strategy formulation for PT XYZ. This work fills this gap by applying strategic management and strategic analysis frameworks to develop context-specific, sustainability-driven strategic alternatives for PT XYZ's entry into the blue ammonia business.

3. Methodology

3.1. Research Design

This study adopts a mixed-method, multiphase research design that sequentially integrates qualitative and descriptive quantitative approaches to produce a comprehensive and credible strategic analysis for PT XYZ (Creswell, 2015). In the first phase, qualitative analysis is employed to examine PT XYZ's external and internal environment using Porter's Five Forces, PESTLE, and RBV–VRIO frameworks. Data for this phase are collected through a review of relevant literature, analysis of internal company documents, and semi-structured interviews with key informants, including PT XYZ management, energy experts, and stakeholders from the chemical and energy sectors.

Building on the results of the first phase, the second phase translates the qualitative findings into a structured set of internal and external strategic factors. These factors are then systematically organised into SWOT and TOWS matrices to generate alternative sustainability-oriented strategies for PT XYZ (Gürel, 2017;

Weihrich, 1982). To complement this qualitative synthesis, a short, structured questionnaire is administered to capture expert assessments of the relevance and practical feasibility of the proposed strategies. Through this sequential integration of qualitative exploration and structured expert input, the study enhances both the analytical robustness and the managerial relevance of its findings.

3.2. Research Sample

The research uses purposive sampling to select informants and experts who have relevant knowledge, experience, and strategic roles in relation to the blue ammonia business and energy transition agenda (Etikan et al., 2016). Three main stakeholder groups are involved: (1) internal decision makers of PT XYZ, (2) external experts and academics in energy and strategic management, and (3) regulators or representatives of energy and chemical industry associations. This composition ensures that the analysis captures regulatory, market, and internal organizational perspectives. Stakeholder groups and roles in the study are shown in the table 1.

Table 1. Stakeholder groups and roles in the study

Stakeholder group	Approx. number	Main role in the study
PT XYZ board members and senior managers	5	Assess internal resources and capabilities, validate internal factors and strategies
External experts and academics	4	Provide views on industry trends, policy, and strategy tools
Regulators or industry association members	3	Provide insight on policy context and industry structure

The final number of informants in each group is adjusted to data saturation and feasibility of access, while still prioritizing the depth and credibility of information obtained for each analytic stage.

3.3. Data Collection Tools and Procedure

Data collection combines document analysis, semi structured interviews, focus group discussion (FGD), and a short structured questionnaire. First, company documents (annual reports, internal memos, project plans) and policy documents related to energy and decarbonization are reviewed to support PESTLE and RBV-VRIO analyses (Bougie & Sekaran, 2019). Second, semi structured interviews are conducted with regulators, industry association representatives, and PT XYZ managers guided by question lists organized by the dimensions of Porter's Five Forces, PESTLE, and VRIO.

Third, an FGD with PT XYZ's key managers and selected experts is held to refine and validate internal and external factors, and to jointly formulate alternative strategies using SWOT and TOWS matrices. Finally, a short structured questionnaire using a Likert scale is distributed to the expert panel to assess the relevance and perceived impact of each proposed strategy. All participants are informed about the purpose of the study, and their participation is voluntary and confidential. Table 2 below reveals the summary of data collection tools and procedures.

Table 2 . Summary of data collection tools and procedures

Stage / objective	Main tool	Respondents / sources
Map external environment (PESTLE, Five Forces)	Document review, interviews	Regulators, experts, reports, policies
Assess internal resources (RBV–VRIO)	Interviews, FGD	PT XYZ board and senior managers
Formulate strategies (SWOT, TOWS)	FGD	PT XYZ managers and experts
Assess strategic relevance and practicality	Structured questionnaire	Expert panel and PT XYZ management

3.4. Data Analysis

Data analysis is conducted in four main steps, each designed to address a specific research objective. First, qualitative data from interviews and document reviews are coded using thematic analysis to systematically identify key patterns within each PESTLE and Porter's Five Forces dimension (Braun & Clarke, 2006; Porter, 2008). This step is essential for capturing the regulatory, technological, market, and competitive conditions that shape the external opportunities and threats facing PT XYZ in Indonesia's blue ammonia industry. Second, internal data are analysed using the resource-based view (RBV) and VRIO frameworks by mapping PT XYZ's resources and capabilities into a VRIO matrix (Barney, 1991; Hesterly & Barney, 2014). This analysis is undertaken to assess whether the firm's existing assets and capabilities can generate sustained competitive advantage, thereby directly informing the evaluation of PT XYZ's readiness to enter the blue ammonia business.

Third, the identified external and internal factors are integrated into a SWOT matrix and subsequently synthesised through a TOWS matrix to derive SO, WO, ST, and WT strategic alternatives (Gürel, 2017; Weihrich, 1982). This step serves to translate environmental and organisational analysis into actionable strategic options that are logically aligned with PT XYZ's specific context and the structural characteristics of the blue ammonia industry. Finally, responses from the structured questionnaire are summarised using descriptive statistics to assess the degree of convergence among expert judgments regarding the relevance and potential impact of each proposed strategy. This step is intended to enhance the practical validity of the strategic recommendations by incorporating practitioner perspectives and prioritising strategies that are considered both feasible and impactful. Overall, the combination of thematic analysis, strategic matrix mapping, and descriptive expert assessment, supported by triangulation of data sources and analytical methods, is intended to generate strategic recommendations that are theoretically grounded while remaining practically applicable for PT XYZ's entry into the blue ammonia business (Creswell, 2015; Denzin, 2017).

4. Results and Discussion

4.1. Research Results

4.1.1. Business profile and recent performance of PT XYZ

PT XYZ is an integrated energy and chemical company that operates along the value chain from upstream gas to downstream ammonia, LPG, and condensate. In 2024 the company maintained stable operational performance despite global energy price volatility and the accelerating transition toward low-carbon energy. Ammonia and LPG production slightly decreased compared with 2023, but plant reliability and process efficiency remained high, indicating a relatively robust operating base to support blue ammonia development.

On the marketing side, all ammonia output is sold to Genesis Corporation under a long-term export arrangement indexed to Fertecon, while LPG and condensate are sold to Pertamina and Pertamina EP with prices linked to CP Aramco and international benchmarks. This configuration positions PT XYZ as both an export-oriented ammonia producer and a domestic energy supplier. However, the company's revenue profile is still dominated by conventional ammonia, so any transition into blue ammonia must preserve short-term cash flow while gradually reshaping the portfolio toward lower-carbon products. The production, sales, and revenue of PT XYZ from 2023 to 2024 are depicted in figure 2 below.

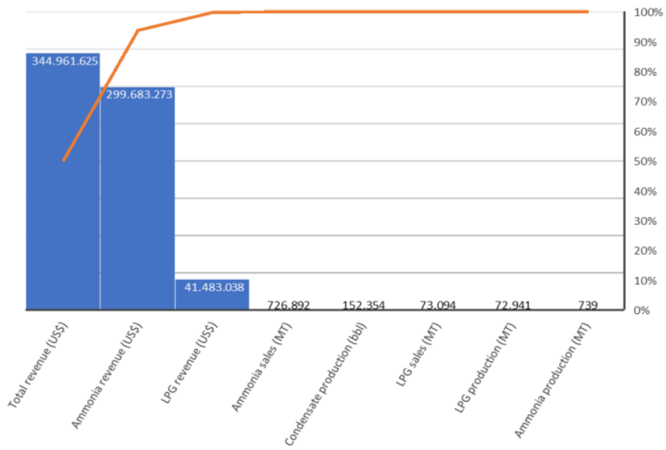

Figure 2. Production, sales, and revenue of PT XYZ, 2023-2024

Total revenue in 2024 declined relative to 2023, mainly driven by lower global ammonia prices. LPG revenues remained relatively stable and partly cushioned the overall decline. This confirms that PT XYZ has a credible operating track record but also underlines the need to diversify into low-carbon products, such as blue ammonia, to reduce exposure to commodity price cycles while aligning with global decarbonisation trends.

4.1.2. External macro environment of the blue ammonia industry

External factors at the macro level were analysed using the PESTLE framework based on structured interviews with four experts (energy and industry regulators, and two academics in economics and management) complemented by policy and market documents. Politically, Indonesia has signalled consistent support for decarbonisation through the Enhanced NDC, the carbon pricing framework under Government Regulation 98/2021, a hydrogen-ammonia roadmap, and Presidential Regulation 14/2024 on carbon capture and storage. These instruments form an early regulatory corridor and create medium-term demand signals for low-carbon hydrogen and ammonia, although implementation still depends on derivative regulations and effective cross-agency coordination.

Economically, rising interest from Japanese and Korean utilities in low-carbon ammonia creates opportunities for long-term offtake contracts that can anchor project cash flows. At the same time, the economics of blue ammonia remain sensitive to gas prices, carbon capture costs, cost of capital, and exchange-rate volatility. Socially, stakeholders tend to support projects that provide tangible local benefits, vocational partnerships, and transparent health, safety, and environmental (HSE) performance, yet they remain cautious toward CO_2 pipelines and storage facilities. Technologically, core CCS and ammonia technologies are mature, and international certification schemes for low-carbon ammonia already exist, but success depends on disciplined integration and audit-ready monitoring, reporting, and verification (MRV). Legally, Indonesia has established an end-to-end CCS permitting framework, including Carbon Storage Permit Areas (WIPK) and post-closure liability transfer, but no one-stop shop and high documentation requirements increase regulatory complexity. Environmentally, the project must achieve and sustain credible emission intensity thresholds and manage geologic, water, and biodiversity risks under a robust MRV system that links with the national registry.

4.1.3. Industry structure and competitive forces

At the meso level, Porter’s Five Forces analysis was applied using validated interview instruments with three key informants (energy regulator, industry regulator, and solar energy association representative) and secondary data. The threat of new entrants is high in terms of barriers, which favours early movers. Blue ammonia projects require very large capital expenditure for capture, compression, pipeline, and storage infrastructure; multi-layered permits including AMDAL, WIPK, exploration and storage licences; and compliance with strict international certification and MRV regimes. These factors raise entry barriers and limit the number of credible domestic players in the short to medium term.

Supplier power is concentrated in critical inputs, especially natural gas and CCS services. The gas market and storage capacity are oligopolistic, so securing long-term Gas Sales Agreements (GSA) with pass-through formulas and reliable CCS capacity reservations is essential to stabilise costs. Buyer power is high because export demand is concentrated in a limited number of large utilities in Japan and Korea that impose stringent sustainability, MRV, and contractual requirements and can easily switch among global suppliers. The threat of substitutes is moderate in the near term but likely to increase in the long term as green ammonia, LNG, renewable power with storage, and alternative marine fuels become more competitive. Rivalry among existing and emerging competitors is already intense at the regional level, with producers in the Gulf, the United States, and Australia moving rapidly, while domestically the market is expected to be shaped by a small number of large players including PT XYZ and the Pupuk Indonesia group.

4.1.4. Integration of external and internal factors into SWOT

Internal conditions were evaluated using a VRIO framework grounded in the Resource-Based View. Data were collected through a hybrid focus group discussion involving five internal decision-makers (COO, CFO, another Director, Human Capital Head, and Procurement Manager for ammonia) and four external experts who had previously served as PESTLE validators. The resulting VRIO matrix covered access to gas and upstream contracts, CCS partnerships and storage rights, process and CCS integration capabilities, MRV and international certification readiness, project and transition finance, alliances with offtakers and traders, logistics and port infrastructure, supporting energy (such as solar PPA), HSE and compliance culture, and organisational dynamic capabilities. The analysis identified one sustained competitive advantage: a mature HSE management system and audit readiness that are considered valuable, rare, difficult to imitate, and supported by the organisation. Several resources and capabilities provide temporary advantages, including medium–long-term GSA with competitive pricing structures and volume flexibility, integrated FEED design for ATR/SMR plus CCS, design-for-certification and MRV dashboards aligned with international standards, a transition-finance framework, contract structures that incorporate take-or-pay and green-upgrade clauses, existing storage and port infrastructure, supporting power options, and organisational arrangements that enable KPI and SLA-based contracts and strategic partnerships.

At the same time, several critical weaknesses remain. PT XYZ does not yet have equity participation or strong upstream links in gas supply, nor secured WIPK rights and CCS service agreements with firm availability guarantees. Blended-finance structures with second-party opinions are still under preparation, and the company does not yet have an anchor offtake agreement with Japanese or Korean utilities. These gaps directly affect project bankability, resilience to input price shocks, and the ability to monetise low-carbon premiums in export markets.

4.1.5. Integration of external and internal factors into SWOT

Findings from the external analyses (PESTLE and Porter's Five Forces) and the internal VRIO assessment were then integrated into a SWOT matrix through an online FGD on 6 October 2025 with the same internal and external panel. External opportunities and threats were distilled from a longer list of detailed issues by clustering similar items related to regulatory direction, contractual schemes, CCS reliability, certification and MRV, financing, logistics and infrastructure, supporting energy, HSE and social licence, and service governance. Internal strengths and weaknesses were taken directly from the VRIO outcomes.

Table 3 summarizes the final SWOT configuration used as the basis for strategy formulation. The list was kept focused to preserve analytical clarity while still reflecting the main drivers of competitiveness and risk for PT XYZ's entry into the blue ammonia business.

Table 3. SWOT summary for PT XYZ in entering the blue ammonia business

Category	Main factors
Strengths (S)	S1. Medium-long-term GSA ensuring competitive gas supply and pass-through pricing. S2. FEED architecture for ATR/SMR integrated with CCS that supports process efficiency. S3. Multi-well CCS design and injection KPIs that enhance storage reliability. S4. Design-for-certification since FEED with methodologies aligned to IPCC and ISO 14064. S5. Chain of custody and MRV dashboard that strengthen data traceability. S6. Transition-finance framework and contractual clauses (take-or-pay, green-upgrade) that support revenue stability. S7. Existing tanks, terminal and safety systems, and supporting power (for example solar PPA). S8. Mature HSE system and audit readiness regarded as a sustained competitive advantage. S9. Organisational capability to manage KPI and SLA-based contracts and orchestrate strategic partnerships and EPC.
Weaknesses (W)	W1. Absence of equity gas or direct upstream participation to enhance resilience of gas supply. W2. WIPK rights and site access for CO_2 storage not yet fully secured. W3. No CCS service agreement with explicit availability guarantee and clear performance KPIs. W4. Blended-finance structure and second-party opinion still in preparation. W5. No anchor long-term offtake contract with Japanese or Korean utilities.
Opportunities (O)	O1. Strengthening national decarbonisation and CCS policy that provides legal certainty and medium-term demand signals. O2. Potential long-term offtake contracts with net-zero utilities in Japan and Korea. O3. Sustainable finance taxonomy, industrial green standards, and blended finance that can reduce the cost of capital. O4. Pricing and contractual schemes (pass-through, take-or-pay, Contracts for Difference) that stabilise revenue. O5. Gas indexation and hedging that can protect margins. O6. Access to premium markets for low-carbon ammonia with credible certification and MRV. O7. Technological maturity of CCS components and partnerships with experienced operators. O8. International standards (API, ISO, DNV) and green-industry standards (SIH, SNI, QA/QC) that support reliability. O9. Integrated logistics and port development that can reduce midstream costs. O10. Community programmes and TVET that strengthen social licence and talent readiness.

Threats (T)	T1. Complex, multi-agency permitting without a one-stop shop that may delay projects. T2. Uncertain fiscal incentives and changing gas policies that can affect input costs. T3. High buyer power and risk of commoditisation in export markets. T4. Risk of certification and MRV failure that would eliminate premiums and hinder financing. T5. Potential instability of CCS performance and single-point storage dependency. T6. Social resistance and safety concerns regarding CO_2 pipelines and storage. T7. Seismic risks and long-term storage integrity challenges that can increase CAPEX, OPEX, and liabilities. T8. Long lead times for specialised equipment and skill gaps that may delay commissioning and increase costs. T9. Operational disruptions that may trigger contractual penalties and loss of premiums. T10. Risk of under-utilisation if demand does not materialise as projected. T11. Rapid green transition and technological shifts that may shorten the economic life of blue ammonia assets.

4.1.6. Strategic alternatives based on the TOWS matrix

Using the validated SWOT, strategic alternatives were formulated with a TOWS matrix during the FGD on 6 October 2025. The panel comprised the same four external experts and five internal executives. Strategies were grouped into four categories: SO (using strengths to exploit opportunities), WO (using opportunities to overcome weaknesses), ST (using strengths to mitigate threats), and WT (defensive strategies that minimise weaknesses and avoid threats). Each strategy was drafted in SMART form with clear objectives, time frames, indicative targets, and responsible units; Table 4 presents a condensed version suitable for journal publication.

Table 4. Strategic alternatives for PT XYZ in entering the blue ammonia business

Quadrant	Strategic alternatives (summary)
SO - Maxi-Maxi	SO1. Premium offtake anchoring. Use strengths in GSA, MRV, and contract management to secure 15–20-year premium offtake agreements with net-zero utilities in Japan and Korea that cover a substantial share of nameplate capacity and include take-or-pay clauses. SO2. Certification and MRV readiness. Fully implement design-for-certification and audit-ready MRV so that blue ammonia meets internationally accepted emission-intensity thresholds and passes third-party conformity assessments. SO3. CCS reliability and logistics integration. Leverage process and logistics strengths to design multi-well CCS with high injection uptime and integrated port facilities, thereby reducing midstream cost and enhancing supply reliability. SO4. Transition finance and energy efficiency. Capitalise on sustainable finance and industrial green standards by structuring transition finance with second-party opinions, combined with solar PPA and efficiency measures to reduce cost of capital and Scope 2 emissions. SO5. Standardisation and social licence. Institutionalise SIH, SNI, and QA/QC standards, integrated logistics planning, and community as well as TVET programmes to strengthen social licence and operational readiness.
WO - Mini-Maxi	WO1. Securing CCS storage rights. Use the favourable regulatory momentum to finalise WIPK and site access, supported by a detailed compliance playbook and coordinated permitting strategy so that key permits are obtained within a defined time frame. WO2. CCS service agreements. Translate CCS opportunities into firm service contracts with availability guarantees, multi-well design, and clear injection KPIs to close internal gaps in storage reliability. WO3. Blended-finance structuring. Develop a blended-finance package that meets sustainable-finance taxonomy criteria and includes transition tranches, thereby addressing current weaknesses in project financing. WO4. Anchor offtake negotiation. Exploit strong market interest by negotiating back-to-back offtake term sheets with Japanese or Korean utilities that reflect pass-through, floor–ceiling, and CfD elements, converting the absence of anchor buyers into a bankable strength. WO5. Limited equity gas or tie-in. Use opportunities in gas infrastructure and nearby fields to obtain limited equity gas or tie-in arrangements that reduce exposure to spot prices and cost volatility.
ST - Maxi-Mini	ST1. KPI and SLA-based contracting. Deploy strengths in contract design, MRV, and SLA to protect margins against regulatory and market volatility through availability guarantees, re-opener clauses, and well-defined penalty regimes. ST2. Audit-ready certification to protect premiums. Use HSE and MRV strengths to anticipate tightening buyer requirements so that the project retains access to premium markets and sustainable finance even as standards become more stringent. ST3. CCS risk management. Translate design and organisational capabilities into robust CCS risk-management programmes that address seismological and integrity risks through redundancy, monitoring, and emergency response plans. ST4. Energy and supply resilience. Combine solar PPA or captive power, critical-spares frameworks, and integrated logistics to mitigate risks from equipment lead times, operational disruptions, and energy-price shocks. ST5. Social licence and transparency. Use strong HSE and MRV capabilities to manage social and reputational threats via

	regular community engagement, transparent safety and environmental reporting, and responsive grievance mechanisms.
WT - Mini-Mini	WT1. Coordinated permitting and compliance. Address internal weaknesses in CCS rights and documentation while mitigating complex permitting and social risks through a structured compliance playbook, integrated permitting "sprints", and proactive community engagement. WT2. CCS availability and contingency planning. Reduce combined CCS and operational threats by concluding CCS MoUs with availability guarantees, buffer capacity, and contingency routes to hubs, thereby lowering the probability and impact of downtime. WT3. Financial buffers and hedging. Respond to fiscal, gas, and demand volatility by combining blended finance with liquidity buffers and hedging policies, reducing the vulnerability associated with current financing gaps. WT4. Long-term offtake with risk-sharing. Offset buyer power and commoditisation risk by finalising long-term offtake contracts that incorporate volume flexibility, floor–ceiling prices, and options for future green upgrades. WT5. Partial equity gas and inventory strategies. Limit the combined risks of gas-price shifts and equipment lead times through partial equity gas or tie-in arrangements and vendor-managed inventory for critical components.

The TOWS analysis therefore produces a structured portfolio of strategic options that directly link the external environment and internal capabilities of PT XYZ. These alternatives constitute the main empirical output of the study and form the basis for subsequent prioritisation and deeper interpretation, which are elaborated in the discussion section.

4.2. Discussion

The findings of this study confirm that PT XYZ is entering the blue ammonia business within an external environment that is simultaneously supportive and highly demanding. At the macro level, the PESTLE analysis shows that Indonesia's decarbonisation policy mix, including the Enhanced NDC, Government Regulation 98/2021, the hydrogen–ammonia roadmap, and Presidential Regulation 14/2024 on CCS, forms an enabling but still evolving framework for low-carbon projects. These instruments are broadly consistent with the strategic management view that regulatory context can act as both constraint and opportunity for firms that are able to reposition their portfolios toward low-carbon value chains (David et al., 2017; Whittington et al., 2019). At the industry level, Porter's Five Forces analysis indicates high entry barriers, concentrated bargaining power of gas and CCS providers, strong buyer power from a small group of Japanese and Korean utilities, and a medium to long-term threat from green ammonia and other low-carbon substitutes. This means that PT XYZ cannot depend on conventional commodity pricing; competitive advantage will need to be built on credible low-carbon credentials, reliable CCS operations, and disciplined commercial structures that translate technical performance into stable cash flows.

The internal analysis using the RBV and VRIO framework provides further insight into PT XYZ's readiness to respond to this environment. The identification of a mature HSE management system and audit readiness as a sustained competitive advantage, alongside temporary advantages such as medium to long-term GSA, integrated FEED for ATR/SMR with CCS, design-for-certification, and an MRV dashboard, is consistent with the proposition that not all resources contribute equally to sustainable competitive advantage (Barney, 1991; Hesterly & Barney, 2014). In line with the literature on energy transition and low-carbon industries, the results suggest that in the blue ammonia context, critical resources are not only physical assets and plant capacity, but also governance capabilities related to certification, data integrity, project and transition finance, and risk-sharing contracts with offtakers and CCS partners. When interpreted together, the external and internal findings show that PT XYZ's strategic challenge is to orchestrate these tangible and intangible resources so that they remain valuable and difficult to imitate as global standards, buyer expectations, and domestic regulations continue to tighten.

The integration of external and internal factors through SWOT and TOWS matrices directly addresses the third research objective, namely the formulation of sustainability-oriented strategic alternatives for PT XYZ. The SO and ST strategies make explicit use of the company's recognised strengths, such as GSA, FEED, CCS design, MRV readiness, transition-finance preparation, and HSE culture, to exploit opportunities in premium low-carbon markets and to mitigate threats related to regulatory complexity, CCS performance, and buyer dominance. This is aligned with classical SWOT logic and contemporary strategic management thinking, where firms are encouraged to leverage unique resources to shape their competitive position within structurally challenging industries (Gürel, 2017; Porter, 2008; Weihrich, 1982). At the same time, WO and WT strategies translate identified weaknesses, such as the absence of equity gas, incomplete WIPK and CCS agreements, and lack of anchor offtakers, into concrete work programmes that can be pursued under favourable regulatory and financial conditions. In practical terms, the resulting portfolio of strategies provides PT XYZ's management with a structured roadmap that links external pressures, internal capabilities, and stepwise actions for de-risking blue ammonia investments while enhancing long-term business sustainability.

From a theoretical perspective, the study illustrates how combining PESTLE, Porter's Five Forces, RBV–VRIO, SWOT, and TOWS in a mixed-method, multiphase design can enrich strategic analysis for incumbent firms undergoing low-carbon transitions. The sequential process, in which qualitative mapping of external and internal factors is followed by structured expert validation and strategy formulation, reflects recommendations in the literature on mixed methods and triangulation for complex strategic and policy contexts (Creswell, 2012; Denzin, 2017). For the Indonesian context, the case of PT XYZ also shows how national decarbonisation and CCS policies, sustainable-finance taxonomies, and emerging low-carbon product standards can be operationalised at firm level through concrete strategic choices, instead of remaining at the level of abstract commitments. In doing so, the article contributes to the limited empirical work on how Indonesian energy and chemical companies design firm-level strategies to enter blue ammonia and other low-carbon markets.

However, several limitations need to be acknowledged. First, the external analysis relies on a relatively small sample of regulators, experts, and industry association representatives selected purposively; although their views were triangulated with policy and market documents, they may not fully represent the diversity of market participants, financial institutions, and international buyers. Second, the VRIO assessment is based on a single-company case and expert judgement in FGD format, which limits the generalisability of the findings to other firms and sectors. Third, the strategic alternatives derived from SWOT and TOWS have not yet been prioritised using a formal multi-criteria decision-making tool; further work, for example through AWOT or AHP-based weighting, is required to identify which strategies should be implemented first under realistic financial and organisational constraints. Future research could therefore expand the range of stakeholders, integrate quantitative scenario and sensitivity analysis on key variables such as gas prices, capture rates, and cost of capital, and compare PT XYZ's positioning with other regional blue ammonia projects. Such extensions would sharpen the strategic roadmap for PT XYZ and deepen the contribution of this study to the broader literature on strategic management and energy transition in emerging economies.

5. Conclusion

This study has analysed PT XYZ's readiness and strategic options for entering the blue ammonia business in the context of Indonesia's energy transition. Using an integrated framework of PESTLE, Porter's Five Forces, RBV–VRIO, SWOT, and TOWS within a mixed-method, multiphase design, the findings indicate that PT XYZ operates within an external environment that is simultaneously enabling and highly demanding. This environment is shaped by evolving decarbonisation policies, complex permitting processes, concentrated buyer and supplier power, and increasing competitive pressure from alternative low-carbon pathways. Internally, PT XYZ demonstrates notable strengths in HSE culture, gas procurement, process and CCS design, MRV readiness, and contract-management capabilities, while also exhibiting critical gaps related to equity gas availability, CCS rights and service agreements, access to blended finance, and the securing of anchor offtake contracts.

The resulting portfolio of SO, WO, ST, and WT strategies provides a structured basis for reducing investment risk, accessing premium low-carbon markets, and aligning PT XYZ's business model with long-term decarbonisation objectives. From a managerial perspective, the findings suggest that PT XYZ must prioritise three interrelated strategic imperatives. First, the firm needs to secure long-term anchor offtake agreements and innovative financing structures to enhance project bankability and mitigate demand and funding risks. Second, PT XYZ must establish robust and legally secure arrangements for gas supply and CCS infrastructure, as these elements constitute foundational assets for the viability and credibility of blue ammonia projects. Third, the company should institutionalise internationally recognised certification, MRV systems, and HSE standards across the entire value chain to sustain market access, regulatory compliance, and stakeholder trust. Beyond its managerial implications, this study contributes to the limited empirical literature on how incumbent firms in emerging economies operationalise national climate policy objectives into firm-level low-carbon strategies. Future research may extend this work by applying formal multi-criteria decision-making techniques to prioritise the proposed strategic alternatives and by benchmarking PT XYZ's positioning against comparable blue ammonia initiatives in other regions.

6. References

Al-Yafei, H., Aseel, S., Alnouss, A., Al-Kuwari, A., Abdussamie, N., Al Tamimi, T., Al Mannaei, H., Ibrahim, H., Abu Hashim, N., Al Delayel, B., & Nasr, H. (2025). Blue Ammonia and the Supply Chain Pioneering Sustainability Assessment for a Greener Future. *Energies*, *18*(5), e1137. https://doi.org/10.3390/en18051137

Aryanti, N., Dewi, R. R., & Siddi, P. (2020). Faktor-Faktor yang Mempengaruhi Struktur Modal pada Perusahaan Pertambangan di Bursa Efek Indonesia Periode 2015-2018. *Ekonomis: Journal of Economics and Business*, *4*(1), 224–229. https://doi.org/10.33087/ekonomis.v4i1.90

Asgharian, H., Lund, H., Thellufsen, J. Z., Iov, F., Nielsen, M. P., & Liso, V. (2025). Green ammonia production in Denmark: Assessing future potentials and challenges. *Fuel*, *387*, e134423. https://doi.org/10.1016/j.fuel.2025.134423

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

BCC Publishing. (2024). *Global Blue Ammonia Market*. BCC Publishing.

Boero, A. J., Kardux, K., Kovaleva, M., Salas, D. A., Mooijer, J., Mashruk, S., Townsend, M., Rouwenhorst, K., Valera-Medina, A., & Ramirez, A. D. (2021). Environmental Life Cycle Assessment of Ammonia-Based Electricity. *Energies*, *14*(20), e6721. https://doi.org/10.3390/en14206721

Bougie, R., & Sekaran, U. (2019). *Research methods for business: A skill building approach*. John Wiley & Sons.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Burritt, R. L., Christ, K. L., Rammal, H. G., & Schaltegger, S. (2020). Multinational Enterprise Strategies for Addressing Sustainability: the Need for Consolidation. *Journal of Business Ethics*, *164*(2), 389–410. https://doi.org/10.1007/s10551-018-4066-0

Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson Education.

Daft, R. L., & Armstrong, A. (2021). *Organization Theory and Design*. Cengage.

David, F. R., & David, F. R. (2016). *Strategic Management: A Competitive Advantage Approach, Concepts and Cases, Global Edition*. Pearson Education.

Denzin, N. K. (2017). *The Research Act*. Routledge. https://doi.org/10.4324/9781315134543

Endri, E., Rinaldi, M., Arifian, D., Saing, B., & Aminudin, A. (2021). Oil Price and Stock Return: Evidence of Mining Companies in Indonesia. *International Journal of Energy Economics and Policy*, *11*(2), 110–114. https://doi.org/10.32479/ijeep.10608

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1–4.

Febriani, F. D., & Iswoyo, A. (2021). Analisis Penggunaan Metode Altman Z-Score untuk Memprediksi Kondisi Financial Distress pada Perusahaan Manufaktur Sektor Minyak Bumi dan Gas (Migas) yang Terdaftar di Bursa Efek Indonesia (BEI). *Income*, *2*(1), 28–35. https://doi.org/10.38156/akuntansi.v2i1.89

Gürel, E. (2017). SWOT Analysis: A Theoretical Review. *Journal of International Social Research*, *10*(51), 994–1006. https://doi.org/10.17719/jisr.2017.1832

Hesterly, W., & Barney, J. B. (2014). *Strategic management and competitive advantage*. Pearson Education.

Kaipainen, J., & Aarikka-Stenroos, L. (2022). How to renew business strategy to achieve sustainability and circularity? A process model of strategic development in incumbent technology companies. *Business Strategy and the Environment*, *31*(5), 1947–1963. https://doi.org/10.1002/bse.2992

Ministry of Environment and Forestry (MoEF) of Indonesia. (2021). *Indonesia Long-Term Strategy for Low Carbon and Climate Resilience 2050 (Indonesia LTS-LCCR 2050)*. Ministry of Environment and Forestry (MoEF) of Indonesia. https://repository.kemkes.go.id/book/1073

Ocfrin, F., Syaipudin, U., Azhar, R., & Oktavia, R. (2022). Pengaruh Kinerja Keuangan terhadap Return Saham Perusahaan Pertambangan Go Public di Bursa Efek Indonesia. *Niqosiya: Journal of Economics and Business Research*, *2*(2), 191–200. https://doi.org/10.21154/niqosiya.v2i2.547

Palandri, J., Rahmanifard, H., Layzell, D., & Hastings-Simon, S. (2025). Blue vs. Green: A comparative analysis of ammonia production and export in Western Canada and Australia. *Renewable Energy*, *239*, e121953. https://doi.org/10.1016/j.renene.2024.121953

Porter, M. E. (2008). The Five Competitive Forces That Shape Strategy. *Harvard Business Review*, *86*(1), 78–93.

Pozo, C. A. del, & Cloete, S. (2022). Techno-economic assessment of blue and green ammonia as energy carriers in a low-carbon future. *Energy Conversion and Management*, *255*, e115312. https://doi.org/10.1016/j.enconman.2022.115312

Putra, R. A., & Purnamawati, P. (2023). Financial Distress Analysis using Altman Z-Score and Zmijewski Methods in Oil and gas sector listed on the IDX in the 2018-2021 period. *Jurnal Kajian Ilmu Manajemen (JKIM)*, *3*(4), 643–653. https://doi.org/10.21107/jkim.v3i4.21197

Shin, B.-J., Mun, J.-H., Devkota, S., Kim, S.-M., Kang, T.-H., Mazari, S. A., Cho, K., Kim, S. H., Chun, D.-H., Kim, K.-M., Yoon, H. C., & Moon, J.-H. (2023). Comparative assessment and multi-objective optimization for the gray and blue ammonia synthesis processes: Energy, Economic and Environmental (3E) analysis. *International Journal of Hydrogen Energy*, *48*(90), 35123–35138. https://doi.org/10.1016/j.ijhydene.2023.05.205

Sin, B. K., & Fong, F. (2022). Transformasi Keuangan PT Surya Esa Perkasa melalui Analisis Trend. *Hectocorn*, *3*(2), 114–133.

Tanzeem, M., & Al-Thubaiti, M. M. (2023). Blue ammonia an attractive pathway to decarbonize conventional ammonia plants. *World Journal of Advanced Engineering Technology and Sciences*, *9*(1), 119–126. https://doi.org/10.30574/wjaets.2023.9.1.0121

The Business Research Company. (2024). *Blue Ammonia Global Market Report 2024*. The Business Research Company. https://www.thebusinessresearchcompany.com/report/blue-ammonia-global-market-report

The Business Research Company. (2025). *Blue Ammonia Global Market Report 2025*. The Business Research Company. https://www.researchandmarkets.com/reports/5954486/blue-ammonia-global-market-report

Tjahjono, M., Stevani, I., Siswanto, G. A., Adhitya, A., & Halim, I. (2023). Assessing the feasibility of gray, blue, and green ammonia productions in Indonesia: A techno-economic and environmental perspective. *International Journal of Renewable Energy Development*, *12*(6), 1030–1040. https://doi.org/10.14710/ijred.2023.58035

Weihrich, H. (1982). The TOWS matrix—A tool for situational analysis. *Long Range Planning*, *15*(2), 54–66. https://doi.org/10.1016/0024-6301(82)90120-0

Whittington, R., Regnér, P., Johnson, G., Angwin, D., & Scholes, K. (2019). *Exploring Strategy, Text and Cases* (12th ed.). Pearson.