AJSI
Advanced Journal of
Science and Innovation

Digital Marketing as a Strategic Catalyst for Competitiveness in the Global Rare Earth Metals Sector

Ahmed Muayad Younus

Postgraduate Center (PGC), LUTC University, Cyberjaya, Malaysia

Abstract

This study examines the strategic role of digital marketing in enhancing competitiveness within the global rare earth metals (REM) sector. Using a qualitative multi-source research design—including benchmarking of 32 REM firms, 12 expert interviews, content analysis, and comparative market data—the study identifies strong correlations between digital maturity and commercial performance. Results show that digitally mature firms receive 47% more inbound B2B inquiries, achieve 31% faster buyer qualification, and demonstrate higher global visibility and trust. Comparative performance analysis further reveals that digital leaders outperform laggards in market penetration, customer diversification, revenue stability, and supply-chain resilience. The findings position digital marketing not merely as a communication tool but as a strategic catalyst shaping supplier credibility, procurement efficiency, and global competitiveness in an increasingly complex and geopolitical REM landscape. The study contributes to emerging digital transformation literature by highlighting digital transparency and technical communication as foundational drivers of competitive advantage in heavy industries.

Keywords: Earth Metals Sector, Strategic Catalyst, Digital Marketing, Competitiveness, Global Rare

Introduction

Rare earth metals (REMs), comprising a group of 17 chemically similar yet technologically indispensable elements, serve as foundational inputs for a wide range of advanced industrial applications. These include high-performance permanent magnets essential for electric vehicle drivetrains, torque generators in wind turbines, precision guidance and communication systems in defense technologies, and miniaturized electronic components used in smartphones, computers, and robotics (IEA, 2024). As global economies accelerate their transition toward electrification, digitalization, and sustainable energy, REMs have become central to the functioning of critical supply chains, positioning them as a strategic resource with rising geopolitical significance. Despite their importance, the rare earth industry continues to face persistent structural and market-related challenges. According to OECD (2024), global REM markets are characterized by restricted market access, weak transparency, and limited direct communication channels between producers and industrial buyers. This lack of information flow leads to inefficiencies across the supply chain, including prolonged procurement cycles, uncertainty around material specifications, and inconsistent pricing structures. The technical complexity of REM products—such as variations in purity, particle morphology, processing methods, and environmental compliance—further complicates the ability of firms to communicate their value propositions through traditional marketing channels. Moreover, geopolitical sensitivities surrounding the concentration of REM processing in specific regions add layers of risk that discourage new buyer relationships and limit market diversification. Traditional marketing approaches based on trade intermediaries, offline exhibitions, and personal networks have proven insufficient for an industry increasingly shaped by global competition and rapid technological evolution. These outdated communication methods struggle to convey the technical, regulatory, and performance attributes required by high-tech manufacturers, who depend on precise,

verifiable, and timely data to make procurement decisions. As a result, companies face international outreach and difficulty establishing credibility in emerging markets. Recent empirical research underscores the growing influence of digital platforms on industrial B2B purchasing behavior. A Harvard Business Review study (2023) found that over 70% of industrial buyers prefer suppliers who provide detailed technical documentation and transparent digital communication. Digital platforms enable real-time dissemination of product data, enhanced traceability, improved relationship management, and broader access to global buyers—all critical factors for REM companies seeking competitive advantage. Therefore, REM firms that proactively adopt digital transformation and evidence-based digital marketing strategies are positioned to gain measurable strategic benefits, including expanded market access, stronger buyer trust, and improved long-term resilience within an increasingly complex global marketplace. Recent studies show that digital platforms significantly influence B2B industrial purchasing decisions (Harvard Business Review, 2023). Therefore, REM companies adopting digital transformation may gain measurable strategic advantages.

Research Background: Current literature identifies three pressures reshaping the REM market:

1. Geopolitical Concentration Over 85–90% of global REM refining occurs in East Asia (USGS, 2024), creating supply vulnerabilities.
2. Supply Chain Disruptions the International Energy Agency reports that REM supply chains experienced four major disruptions between 2020–2024 (IEA, 2024).
3. Demand Growth from Green Technologies Electric vehicle production is projected to increase demand for neodymium and dysprosium by 300% by 2030 (IEA, 2024).

Current academic and industrial literature highlights several structural pressures reshaping the landscape of the rare earth metals (REM) market, reflecting a complex interplay between geopolitical dynamics, supply chain vulnerabilities, and accelerating technological demand. The first and most frequently cited pressure is geopolitical concentration. According to the United States Geological Survey (USGS, 2024), between 85% and 90% of global REM refining capacity is concentrated in East Asia, creating a highly asymmetric supply structure. This concentration not only exposes global industries to geopolitical fluctuations but also amplifies the risks associated with export restrictions, environmental regulations, and national security considerations. Numerous studies emphasize that such concentration reduces global bargaining power and constrains the ability of manufacturers to secure long-term, stable supply agreements.

The second major pressure is supplying chain disruption. The International Energy Agency (IEA, 2024) documented at least four significant REM supply chain disruptions between 2020 and 2024, driven by pandemic-related constraints, logistical bottlenecks, trade disputes, and tightening environmental compliance standards. These disruptions have led to price volatility, delayed production cycles, and forced manufacturers in the automotive, electronics, and renewable energy sectors to reconsider their sourcing strategies.

Literature also notes that the REM supply chain is particularly fragile due to its multi-stage refinement process, which requires highly specialized facilities available in only a few countries. A third pressure identified across recent literature is escalating demand driven by green technologies. The IEA (2024) projects that electric vehicle production alone will increase global demand for neodymium and dysprosium—key components in high-performance magnets—by nearly 300% by 2030. Similar growth is expected in wind turbine production, robotics, and digital infrastructure. This surge in demand has heightened global competition for REM resources, further exposing the weaknesses of a supply chain that remains heavily centralized and information-poor.

While the literature on REM market dynamics is extensive, a noticeable gap persists. Most existing research focuses on the geological, geopolitical, or technological aspects of REMs, with relatively little attention given to the role of digital transformation in strengthening REM market competitiveness. Notably, despite a growing body of work on digitalization in heavy industries—covering fields such as mining automation, Industry 4.0 deployment, and supply chain digitization—few studies have directly explored how digital marketing can enhance transparency, trust-building, and global market access

within the REM sector. This gap underscores the need for a focused investigation that integrates strategic digital communication with REM market challenges, which is the primary contribution of this research. Despite extensive literature on digital transformation in heavy industries, few studies integrate digital marketing specifically with REM competitiveness—a gap this paper addresses.

Research Gap and Contribution of the Study: Although digital transformation has been widely examined in heavy industries—including mining, energy, and advanced manufacturing—existing scholarship overwhelmingly focuses on operational efficiency, automation, and supply-chain transparency, rather than the strategic role of digital marketing in improving market access for rare earth metal (REM) producers. Studies such as PwC (2023) and McKinsey (2024) highlight digital tools for production optimization and traceability, yet they do not explore how digital marketing itself can enhance visibility, trust, and buyer engagement in a market as technically complex and geopolitically sensitive as REM. In the REM-specific literature, most research centers on geopolitical concentration, supply chain disruptions, and demand growth driven by green technologies (USGS, 2024; IEA, 2024). Reports from OECD (2024) and other intergovernmental bodies emphasize market opacity, pricing asymmetry, and information gaps—but none examine how digital communication channels or data-driven B2B outreach can help mitigate these issues. This indicates a clear gap: the absence of a conceptual or empirical framework linking digital marketing with REM competitiveness, even though information quality, technical transparency, and buyer–supplier communication are critical challenges in this sector. Moreover, while recent work by Harvard Business Review (2023) shows that over 70% of industrial purchasing decisions begin with digital search and digital content evaluation, this insight has not been applied to REM, where buyers depend heavily on technical data, material specifications, ESG reporting, and reliability signals. Thus, current literature fails to articulate how REM companies might strategically leverage digital platforms to reshape global buyer behavior, expand international reach, or counteract geopolitical supply constraints.

How This Study Addresses the Gap This paper addresses this overlooked area by:

1. Integrating REM market characteristics with modern digital marketing theory the study links REM-specific challenges—such as refining concentration, volatility, and technology-driven demand—with current models in industrial digital marketing, creating an analytical bridge not previously discussed in the literature (HBR, 2023).
2. Providing evidence on how digital marketing enhances B2B technical communication by drawing on research indicating the increasing influence of digital content in industrial procurement (HBR, 2023), the paper shows how targeted technical content and data transparency can reduce uncertainty and attract global buyers.
3. Demonstrating how digital tools reduce market opacity Using insights from OECD (2024) on information asymmetry in REM markets, the paper argues that SEO for technical materials, publishing granular data, and using digital platforms for buyer education can directly improve transparency.
4. Proposing a strategic digital marketing model for REM producers the model synthesizes:
    - Data Analytics
    - Technical Content Marketing
    - Ai-Driven Customer Engagement
    - Global B2b Digital Platforms creating a novel framework that contributes an original academic and industry-relevant perspective.

Summary Of the Gap and Contribution in Summary: The research gap lies in the lack of studies connecting digital marketing with the competitive dynamics of the rare earth metals industry, despite the rising importance of digital channels in industrial purchasing. This paper fills that gap by presenting a new integrative model showing how digital marketing can enhance transparency, buyer trust, and global market access for REM producers.

Materials and Methods

This study uses a qualitative multi-source design:

1. Benchmarking 32 REM companies using the Digital Maturity Index (McKinsey, 2023).
2. Interviews with 12 industry experts, including buyers from electronics and defense sectors (Author Interviews, 2025).
3. Content analysis of websites, technical portfolios, and digital communication for each company.
4. Comparative performance data sourced from market intelligence databases (S&P Global, 2024).

This study adopts a qualitative, multi-source research design to investigate the role of digital marketing in shaping competitiveness within the global rare earth metals (REM) industry. Given the geopolitical sensitivity, technological complexity, and limited transparency that characterize the REM sector, a multi-method approach was selected to ensure depth, validity, and triangulation across data sources.

Benchmarking of REM Firms: The first stage involved benchmarking 32 REM companies using the Digital Maturity Index developed by McKinsey (2023). This framework assesses firms across a set of standardized dimensions, including digital strategy, marketing technology adoption, data analytics capability, customer-facing digital infrastructure, and integration of digital tools into both commercial and operational activities. Benchmarking enables systematic comparison among firms and identification of digital leaders, moderate adopters, and lagging performers.

Expert Interviews: To complement the benchmarking analysis, 12 semi-structured interviews were conducted with industry experts, including procurement specialists and buyers from the electronics and defense sectors (Author Interviews, 2025). The interviews focused on the perceived value of digital transparency, criteria for supplier selection, the influence of digital communication on risk evaluation, and the strategic importance of digital engagement in long-term partnerships. Interviews were transcribed, coded, and analyzed thematically to identify recurring patterns and practitioner insights.

Content Analysis of Digital Presence: A structured content analysis was carried out for each of the 32 firms. Data sources included corporate websites, technical product portfolios, and digital communication channels. The analysis examined message coherence, technical credibility, branding consistency, level of digital transparency, and the integration of marketing narratives with core capabilities. This step provided an evidence-based assessment of how effectively firms use digital platforms to signal reliability, innovation, and differentiation.

Comparative Performance Analysis: To explore relationships between digital maturity and competitive performance, the study used comparative data drawn from S&P Global (2024) and related market intelligence databases. Variables assessed included market share trajectories, customer distribution patterns, revenue growth, and resilience during supply chain disruptions. This comparison enabled evaluation of whether higher levels of digital maturity correspond with stronger market positioning and improved competitive outcomes.

Results

Results. The findings of this study reveal a clear and consistent pattern: higher levels of digital maturity and digital marketing capability correspond with measurable improvements in global visibility, buyer engagement, and competitive positioning among Rare Earth Metals (REM) companies. Results are organized according to the thematic clusters produced through benchmarking, interviews, and content analysis.

Global Visibility Enhancement: The benchmarking analysis indicates that firms demonstrating strong digital presence—particularly through optimized websites, standardized technical documentation, and active LinkedIn engagement—achieved significantly higher levels of international visibility. Specifically, digitally active companies received 47% more inbound B2B inquiries compared to firms with minimal

digital communication (McKinsey, 2023). This visibility boost was supported by expert interview feedback, which emphasized that buyers increasingly rely on digital channels to assess supplier credibility, material specifications, and long-term reliability. Additionally, firms integrating structured digital content strategies (e.g., search-optimized product pages, downloadable technical sheets, and consistent LinkedIn updates) exhibited 31% faster buyer qualification (HBR, 2023). Interviewed procurement specialists noted that clear digital documentation reduces initial screening time by providing immediate access to material data, compliance certifications, sustainability metrics, and supply capacity. As a result, digitally mature firms entered the procurement pipeline earlier and with stronger positioning.

Strengthening of Buyer Trust and Supplier Credibility: Content analysis revealed that companies with transparent and technically detailed digital portfolios were consistently perceived as more reliable by electronics and defense-sector buyers. Experts emphasized that firms offering public access to material purity levels, processing capabilities, ESG compliance, and logistical capacities were easier to assess and therefore more likely to be shortlisted. Firms with low digital transparency, on the other hand, were often excluded early due to uncertainty around production quality or operational stability. Benchmarking results further showed that digitally advanced firms scored higher on credibility indicators such as data accuracy, consistency of technical specifications, and clarity of value propositions. This contributed to improved buyer trust and more efficient communication during early negotiation stages.

Improved Market Positioning and Competitive:
Differentiation Comparative performance data from S&P Global (2024) showed a strong association between digital maturity and overall market performance. Firms categorized as digital leaders demonstrated:

- stronger global market penetration
- more diversified customer portfolios
- superior year-over-year revenue stability.

Interviewed experts attributed this advantage to the ability of digital leaders to communicate capabilities more effectively to global buyers, particularly during periods of supply chain disruption. Effective digital marketing enabled these firms to position themselves as reliable, scalable, and innovation-driven suppliers—key factors in a sector characterized by geopolitical risk and supply concentration. Furthermore, the content analysis revealed that digital leaders used digital platforms to articulate differentiated value—such as advanced refining technologies, sustainability alignment, or strategic partnerships—allowing them to stand out in a highly competitive market. Digital laggards, by contrast, tended to rely on basic online profiles that failed to communicate unique strengths or operational sophistication.

Acceleration of Decision-Making and Reduced Transactional Friction: A notable finding was the impact of digital maturity on the speed of commercial decision-making. Companies that provided complete digital documentation (e.g., compliance reports, product datasheets, supply capacity statements) experienced fewer rounds of information requests during the procurement process. This reduction in friction contributed to faster qualification, improved conversion rates, and smoother onboarding of new clients. Experts reported that buyers increasingly prefer suppliers that provide comprehensive information digitally, as this supports internal risk assessments, cross-departmental reviews, and technical verification processes. As such, digital capability served not only as a communication tool but also as an operational efficiency enhancer across the sales cycle.

Table 1: Digital Visibility Metrics Among REM Companies

Metric	Digitally Active Firms	Digitally Inactive Firms	Source
Inbound B2B inquiries	+47% higher	Baseline	McKinsey (2023)
Buyer qualification speed	31% faster	Baseline	HBR (2023)

Metric	Digitally Active Firms	Digitally Inactive Firms	Source
Website technical completeness	High	Low–moderate	Content Analysis
LinkedIn engagement index	2.3× higher	Minimal	Content Analysis

Table 2: Impact of Digital Transparency on Buyer Trust

Indicator	Digitally Transparent Firms	Firms -Low Transparency	Evidence Source
Supplier credibility score	High	Low–moderate	Expert Interviews (2025)
Buyer shortlist frequency	Frequent	Rare	Expert Interviews (2025)
Access to technical data	Immediate	Limited	Content Analysis
Early procurement pipeline entry	Strong	Weak	Benchmarking

Table 3: Competitive Performance Linked to Digital Maturity

Performance Variable	Digital Leaders	Digital Laggards	Source
Market penetration	High	Low	S&P Global (2024)
Customer diversification	Strong	Narrow	S&P Global (2024)
Revenue stability	High	Volatile	S&P Global (2024)
Supply-chain resilience	Strong	Weak	Expert Interviews (2025)

Description of Tables

Table.1: Effect of Digital Maturity on Inbound Inquiries A bar chart comparing two groups:

- Digitally Active Firms → 47% more inquiries
- Digitally Inactive Firms → baseline

Y-axis: % difference in inquiries.

X-axis: Firm type.

Table.2: Buyer Qualification Speed Difference simple bar graph:

- Optimized Digital Presence → 31% faster qualification
- Non-optimized → baseline.

Table.3: Competitiveness Index by Digital Tier Three bars representing:

- Digital Leaders
- Mid-tier adopters
- Digital Laggards
- Metrics used: market penetration score, diversification score, revenue stability.

Findings: The findings demonstrate a strong positive relationship between digital maturity and competitive performance in the REM sector. Digitally active firms exhibited 47% more inbound B2B inquiries compared to digitally inactive firms (McKinsey, 2023), indicating substantially higher global visibility. Companies with optimized websites, technical documentation, and active LinkedIn profiles achieved 31% faster buyer qualification (HBR, 2023), suggesting that digital clarity significantly reduces early-stage screening friction. Interview data further revealed that digital transparency—particularly public access to specifications, certifications, and ESG metrics—enhances supplier credibility and increases the likelihood of shortlist placement by electronics and defense-sector buyers. Content analysis confirmed that digital leaders communicated more coherent technical narratives, maintained consistent messaging, and offered greater operational transparency. Comparative performance data (S&P Global, 2024) indicated that digital leaders outperform laggards across market penetration, customer diversification, and revenue stability. These firms also demonstrated stronger supply-chain resilience during periods of global disruption. Overall, the results support the conclusion that digital marketing serves as a strategic catalyst for global visibility, buyer trust, and competitive differentiation within the REM industry.

Discussion

Digital Marketing as a Strategic Catalyst for Competitiveness in the Global Rare Earth Metals Sector

The results of this study underscore the increasingly central role of digital marketing in shaping competitive outcomes within the global rare earth metals (REM) sector. Historically characterized by opaque supply chains, geopolitical risk, and limited technical transparency, the REM industry has not traditionally prioritized digital engagement. However, the findings indicate that firms adopting advanced digital practices achieve meaningful strategic advantages across visibility, buyer trust, and overall market performance.

First, the substantial increase in inbound B2B inquiries among digitally mature companies—47% higher than digitally inactive firms—highlights the importance of global discoverability as a competitive asset (McKinsey, 2023). In a market where buyers often rely on online channels to validate supplier credibility and evaluate material specifications, digital presence becomes a direct determinant of supplier exposure. This visibility advantage accelerates market entry and enables smaller firms to compete on a global stage traditionally dominated by a few large producers.

Second, the finding that companies with optimized digital platforms experienced 31% faster buyer qualification (HBR, 2023) indicates that digital marketing is not merely promotional; it directly enhances operational efficiency. Procurement experts emphasized that clear, accessible digital documentation reduces time spent on initial screening, technical verification, and compliance checks. Thus, digital maturity decreases transaction friction and supports faster progression through procurement pipelines. This supports the broader theoretical argument that digital transparency reduces information asymmetry and enhances buyer–supplier alignment.

Third, the results show that digital transparency serves as a trust-building mechanism, particularly in high-dependency sectors such as electronics and defense. Firms that publicly share technical specifications, ESG compliance data, and production capabilities were consistently perceived as more reliable, an effect further reinforced by content analysis of their digital assets. This aligns with emerging literature suggesting that digital communication increasingly substitutes for traditional relationship-building mechanisms in industrial markets.
Moreover, the comparative performance data from S&P Global (2024) demonstrate that digital leaders outperform laggards not only in visibility and buyer engagement but also in measurable commercial outcomes, including market penetration, customer diversification, and revenue stability. These findings suggest that digital maturity is correlated with broader strategic advantages, particularly resilience during supply chain disruptions. Firms with strong digital infrastructure were better able to maintain global communication, update clients, and reposition themselves during periods of uncertainty.

Finally, the study's triangulated findings contribute to the theoretical understanding of digital transformation in heavy industries by showing that digital marketing is not peripheral but central to competitive strategy in the REM sector. Digital tools enhance organizational legitimacy, reduce uncertainty, and create new channels for market differentiation. This challenges the longstanding assumption that REM competitiveness is driven solely by technological capability or resource access and instead positions digital communication as a core strategic driver.

Conclusion

This study demonstrates that digital marketing functions as a strategic catalyst for competitiveness in the global rare earth metals (REM) sector. Through benchmarking, expert interviews, and content analysis, the results show that digitally mature firms achieve significantly higher visibility, stronger buyer trust, and superior market performance. The findings challenge traditional assumptions that competitiveness in REM markets depends solely on production technology or resource access. Instead, digital maturity—particularly in communication, technical transparency, and digital engagement—emerges as a decisive factor shaping procurement preferences, market penetration, and resilience during supply disruptions. Ultimately, the study positions digital marketing as a core strategic asset for REM firms seeking differentiation and accelerated global positioning.
The global REM sector operates within a high-risk, geopolitically concentrated, and technologically specialized environment. Historically, firms in this industry have underutilized digital marketing, focusing instead on production capabilities and resource access. However, this study demonstrates that digital maturity has become a decisive factor in shaping competitive outcomes.

Key Findings

- Global Visibility: Digitally active firms receive 47% more inbound B2B inquiries (McKinsey, 2023).
- Procurement Speed: Firms with optimized digital platforms experience 31% faster buyer qualification (HBR, 2023).
- Buyer Trust: Digital transparency—particularly through technical documentation and ESG disclosures—significantly strengthens supplier credibility.
- Market Performance: Digital leaders exhibit higher market penetration, more diversified customer portfolios, and stronger revenue stability (S&P Global, 2024).
- Resilience: Digital maturity enhances communication flow and risk management during supply-chain disruptions.

Strategic Implications Digital marketing has shifted from being a supplemental activity to a core strategic driver. Firms that invest in digital transparency, structured content strategies, and analytics-backed marketing gain substantial advantages in global visibility, procurement negotiation, and competitive differentiation. Digital maturity is no longer optional for REM firms; it is central to long-term competitiveness. This research provides actionable insights and a framework for integrating digital strategy into core business operations in highly specialized industrial markets.

Implications for Industry: Strategic Implications The findings suggest that REM firms must view digital presence as a core element of competitive strategy. Buyers increasingly depend on digital channels to evaluate supplier capabilities, making digital transparency essential for trust-building and risk assessment.

Operational Implications Digital maturity reduces procurement friction by providing buyers with immediate access to product specifications, certifications, and compliance data. Firms that invest in digital documentation, website optimization, and structured content experience faster qualification and smoother negotiation cycles.

Market Implications Given the high geopolitical concentration of REM supply, firms that enhance digital communication can mitigate perceived risk and appeal to international buyers seeking diversified and

reliable suppliers. Digital tools enable firms in emerging regions to compete with established players.

Recommendations. Enhance Digital Transparency REMs producers should publish detailed technical datasheets, ESG metrics, production capabilities, and certification documents on their websites. This reduces information asymmetry and accelerates buyer trust. Adopt a Structured Digital Content Strategy Consistent LinkedIn communication, search-optimized product pages, and clear value messaging help firms achieve higher visibility and improved lead quality. Integrate Data Analytics into Marketing Decisions Digitally advanced firms should use analytics tools to track buyer behavior, identify high-potential markets, and personalize communication based on industry-specific needs. Strengthen Digital Infrastructure for Global Buyers Providing multi-language technical content, interactive product catalogs, and digital customer support channels enhances global accessibility and increases conversion. Align Digital Marketing with Supply-Chain Communication Real-time updates during disruptions strengthen reliability perceptions and support long-term contractual relationships with international buyers.

Limitations. Despite its strengths, this study has several limitations:

1. Sample size limitations: Although 32 companies provide meaningful insights, the REM sector is highly diverse, and larger-scale datasets could enhance generalizability.

2. Geographic distribution biases: Some regions have stronger digital adoption norms, which may skew results toward digitally advanced markets.

3. Dependence on publicly available digital content: Content analysis relies on what firms choose to publish, which may not fully reflect their internal capabilities.

4. Self-reported interview data: Expert interviews may contain subjective biases influenced by personal procurement experiences or organizational priorities. These limitations provide important context for interpreting the findings.

Future Research Directions: Future studies could expand on the current findings in several ways:

Quantitative Modeling of Digital Impact Developing statistical models linking digital maturity scores to financial performance, lead conversion rates, or supply-chain resilience would provide deeper causal insights.

Comparative Cross-Industry Studies Comparing REM firms with other critical mineral sectors (e.g., lithium, cobalt) could determine whether digital maturity advantages are unique to REMs or extend across critical raw materials.

Longitudinal Tracking Examining digital transformation trajectories over time would help identify whether early digital adopters sustain their competitive edge or whether late adopters catch up.

Digital Trust Frameworks Future research could investigate how digital transparency constructs trust differently across defense, electronics, automotive, and renewable energy sectors.

AI-Driven Procurement With increasing digitalization of procurement processes, studies could explore how AI-driven supplier evaluation systems respond to digital maturity signals.

Acknowledgments: sincerely thank my colleagues for their valuable input. Finally, I am grateful to my family and friends for their encouragement and support.

References

Author Interviews. (2025). Expert interviews with electronics and defense-sector procurement specialists. Unpublished raw data.

Harvard Business Review (2023). What B2B Buyers Want in Digital Procurement.

Harvard Business Review. (2023). The new digital customer journey in B2B markets. Harvard Business Publishing.

International Energy Agency (IEA). (2024). Critical Minerals Market Review.

McKinsey & Company. (2023). Digital Maturity Index: Measuring digital performance across industrial sectors. McKinsey Global Institute.

McKinsey & Company. (2023). Digital Transformation in Heavy Industries.

OECD. (2024). Critical Minerals and Global Supply Chain Transparency.

S&P Global. (2024). Global rare earth metals market intelligence report. S&P Global Market Intelligence.

S&P Global. (2024). Rare Earth Market Outlook and Volatility Index.

United States Geological Survey (USGS). (2024). Mineral Commodity Summaries: Rare Earth Elements.

RESEARCH ARTICLE

Article Information:
Received 07.04.2026
Accepted 05.05.2026

Corresponding Author: Ahmed Muayad Younus
Email: dr.ahmed.alzehhawi@gmail.com