

Decoding the Online Reputation of China's Energy Storage Products in the Cross-Border E-Commerce B2B Market

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Abstract: As a core technological solution for balancing the intermittency of renewable energy, energy storage products play a pivotal role in global energy transition and carbon neutrality initiatives. China, leveraging its competitive advantages in lithium battery technology and integrated supply chains, has established dominance in the global energy storage market. However, escalating trade barriers and diminishing cost advantages are compelling enterprises to seek breakthroughs through cross-border e-commerce. This study focuses on deciphering the online reviews for Chinese energy storage products in B2B cross-border e-commerce markets, addressing three research questions: (1) Sentiment distribution characteristics of B2B users on Alibaba International and Amazon Business platforms; (2) Demand disparities between Regional Comprehensive Economic Partnership(RCEP) and non-RCEP procurement entities; (3) Common pain points reflected in platform user reviews. Employing TextBlob sentiment analysis and Biterm Topic Model (BTM) text mining techniques, the author analyzed 34,073 user reviews from Alibaba International and Amazon Business spanning 2018–2024. Key findings reveal that Median sentiment scores of 0.457 for Alibaba International and 0.229 for Amazon Business. Non-RCEP buyers prioritize brand reputation and transactional efficiency, while RCEP counterparts emphasize technical specifications and long-term partnerships. Logistics efficiency and product performance emerge as universal concerns globally, with heightened severity in emerging markets due to infrastructure limitations. The study proposes actionable strategies, including differentiated branding frameworks, logistics optimization protocols, and localised innovation pathways, to empower Chinese energy storage enterprises in overcoming trade barriers and enhancing global competitiveness. These insights provide theoretical foundations and practical benchmarks for policymakers and industry stakeholders navigating the evolving B2B cross-border e-commerce landscape.

Keywords: energy storage products, text mining, sentiment analysis, BTM (Biterm Topic Modeling)

1. Introduction

Driven by global energy transition and carbon neutrality objectives, energy storage technologies have emerged as a critical solution for balancing renewable energy intermittency, with market demand experiencing sustained exponential growth. Projections indicate that the global stationary and transportation energy storage market will expand to 3–5 times its 2020 size by 2030, with China, North America, and Europe constituting primary demand hubs [1]. Leveraging lithium battery

innovation and vertically integrated supply chains, China has established itself as a pivotal player in the global energy storage industry [2], achieving \$65 billion in energy storage exports in 2023 and capturing over 55% of the global market share. However, escalating international trade barriers and diminishing cost advantages are compelling Chinese enterprises to pivot toward digitalized globalization strategies. Protectionist policies—exemplified by the U.S. Inflation Reduction Act (IRA) and the EU’s Carbon Border Adjustment Mechanism (CBAM)—have raised market entry thresholds for Chinese energy storage products. Concurrently, subsidized capacity expansions by Western competitors are narrowing cost differentials, rendering traditional price competition models unsustainable.

In this context, cross-border e-commerce has emerged as a high-efficiency, low-cost digital trade channel, offering Chinese energy storage firms opportunities to bypass geographical constraints and directly engage global consumers [3,4]. Nevertheless, these enterprises face multifaceted challenges: geopolitical risks compound market access complexities [5], while industry homogenization perpetuates perceptions of "low-cost, low-quality" products. Additionally, insufficient understanding of cross-border e-commerce regulations, regional market demands, and localization strategies further impedes global expansion.

User reviews, as direct market feedback, hold critical value for understanding customer needs, refining product quality and services, enhancing customer retention, and identifying market trends—a consensus well-documented in academia [6–8]. This study analyzes 34,073 user reviews from Alibaba International and Amazon Business platforms, innovatively integrating TextBlob sentiment analysis and Biterm Topic Model (BTM) to systematically decode B2B customer experience dimensions. The findings propose actionable strategies—differentiated branding frameworks, logistics optimization protocols, and regional market prioritization—to empower Chinese energy storage enterprises in overcoming trade barriers and advancing global market penetration. These insights offer theoretical and practical contributions to academia and industry stakeholders navigating the evolving energy storage and cross-border e-commerce nexus.

2. Data Sources and Research Methodology

This study employs a multi-dimensional data collection framework and hybrid analytical approach. We extracted 3,484 reviews from 1,746 products on Alibaba International and 30,589 reviews from 530 products on Amazon Business, covering three major energy storage categories: lithium-ion batteries, uninterruptible power supplies (UPS), and portable power stations. The dataset spans July 2018 to August 2024. Detailed preprocessing procedures and the research design workflow are illustrated in Figure 1.

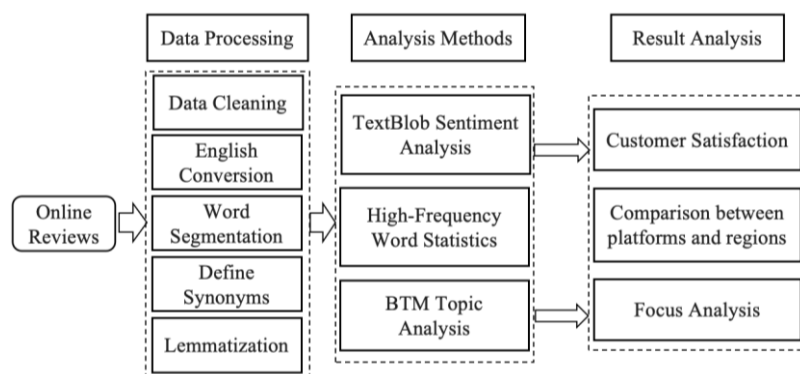


Figure 1: Research Process

3. Research Findings

3.1. Sentiment Analysis of User Reviews

Sentiment analysis reveals widespread recognition of Chinese energy storage products in B2B cross-border e-commerce markets, yet significant inter-platform disparities exist. Alibaba International exhibits a median sentiment score of 0.457, with 83% of reviews classified as positive, demonstrating a bimodal distribution peaking in neutral and high-satisfaction intervals. This reflects strong user approval of product performance and services. Sentiment trends show an initial rise, subsequent decline, and eventual stabilization: peaking at 0.55 in 2019 before stabilizing within 0.46–0.47 post-2022, indicating sustained reputation management and operational optimization. In contrast, Amazon Business displays a lower median sentiment score of 0.229, with 15% negative reviews—significantly higher than Alibaba International. Negative feedback primarily stems from delayed after-sales service response, high logistics damage rates, and price volatility issues. Amazon’s sentiment trajectory shows gradual recovery following a persistent decline from 2018 to 2020, suggesting incremental platform improvements.

Regional disparities further highlight divergent priorities: non-RCEP countries exhibit heightened sensitivity to brand premiums, whereas RCEP nations emphasize technical specifications, directly shaping sentiment evaluation foci. Overall, Alibaba International excels in user retention and market breadth, while Amazon Business dominates transaction volume and Western market penetration, albeit challenged by service standardization and user loyalty gaps.

3.2. Focus Analysis

3.2.1. Term Frequency Analysis

Term frequency analysis identifies key textual themes by quantifying word occurrences. This section employs the technique to uncover priorities among global buyers of Chinese energy storage products, with regional segmentation revealing demand heterogeneity. As shown in Table 1, the top 10 high-frequency terms (e.g., “excellent”, “thanks”) are remarkably consistent across regions, dominated by positive sentiment, signaling broad product acceptance. “Quality” and “service” emerge as universal priorities. Expanding the analysis to the top 200 terms reveals additional insights: “recommend” appears universally, indicating latent word-of-mouth diffusion, while “second” and “repeat” reflect repurchase demand across markets. Notably, “brand” exclusively ranks in non-RCEP (e.g., EU/U.S.) term lists, highlighting developed economies’ brand consciousness. In contrast, RCEP buyers prioritize technical indicators like “internal resistance”, underscoring regional demand heterogeneity. These findings necessitate differentiated branding strategies for global market expansion.

Table 1: Word Frequency Statistics by Region

Number	Non-RCEP		RCEP			
	Word	Frequency	ASEAN		Non-ASEAN	
			Word	Frequency	Word	Frequency
1	excellent	5059	excellent	712	excellent	658
2	products	4057	products	435	products	407
3	thanks	2333	thanks	308	thanks	336
4	quality	1579	quality	231	service	184
5	service	1272	service	176	quality	168
6	fast	994	fast	119	fast	120

Table 2: Alibaba.com User Reviews BTM Theme Results

Theme	Words	Proportion
Service Quality	service, professionalism, fast, response, efficiency, committed	18.41%
Product Performance	products, solar, storage, lithium, technology, stable, capacity	24.46%
Customer Satisfaction	satisfied, trust, glad, happy, recommend, honor	11.92%
Logistics Efficiency	delivery, time, shipping, arrived, packaging	15.60%
Technical Support	engineers, solution, project, design, system, protection	4.17%
Repurchase Intention	continue, future, cooperation, next, years, keep	6.99%
Corporate Reputation	quality, doublepow, reliable, high, ensuring, long	18.45%

The logistics theme focuses on “customs clearance efficiency” and “transportation damage rate”, indicating that underdeveloped infrastructure in emerging markets leads to buyers' high sensitivity to logistics risks.

According to Table 3, the key factors driving repeat purchases among Amazon. Business users are high efficiency and standardized service processes. The frequent mention of purchase experience and after-sales service highlights the demand for transactional convenience among European and American users. Users not only prioritize transactional efficiency but also emphasize product performance, reflecting their strict control over product quality.

Table 3: Amazon User Reviews BTM Theme Results

Theme	Words	Proportion
Purchase Experience	excellent, buying, price, brand, recommend, reviews	30.02%
After-sales Service	warranty, replacement, problems, return, support, update	9.83%
Logistics Packaging	shipping, packaging, arrived, condition, time	14.68%
Product Performance	solar, charger, portable, power, efficient, fast	20.02%
Price and Cost	cost, original, value, budget, affordable	4.61%
Performance		
User Needs	needs, home, camping, outages, devices, portable	12.66%
Matching		
Repurchase Intention	repeat, future, again, years, recommend	8.17%

4. Conclusion

Chinese energy storage products in the B2B cross-border e-commerce market demonstrate platform-specific differentiation and regional heterogeneity in reputation. Alibaba.com garners higher satisfaction through technical compatibility and service guarantees, while Amazon Business faces elevated negative feedback due to logistics inefficiencies and inadequate after-sales responsiveness. Regionally, non-RCEP countries such as Europe and the U.S. prioritize brand premium and transactional efficiency, whereas RCEP nations like Southeast Asia emphasize technical specifications and long-term cooperation assurances. Core challenges center on logistics damage rates and product performance stability. In emerging markets with underdeveloped

infrastructure, customs clearance efficiency and supply chain reliability emerge as critical barriers to repeat purchases.

To address these challenges, a differentiated strategy framework is proposed: platform optimization will enhance technical parameter transparency and customized solutions on Alibaba.com while streamlining logistics efficiency and standardized after-sales systems on Amazon; regional market focus involves cultivating premium brand positioning in non-RCEP regions and developing environment-adaptive products with localized service networks in RCEP markets; experience innovation includes establishing dedicated energy storage logistics corridors and blockchain traceability systems complemented by AI-enabled smart monitoring devices; data-driven management will implement real-time NLP-based sentiment analysis for review monitoring and design tailored incentives for high-value clients. Implementation prioritizes short-term process improvements on Amazon and technical tool pilots on Alibaba, with mid-to-long-term plans focusing on overseas R&D hubs and data infrastructure to transition from cost-based manufacturing advantages to sustainable brand equity.

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