

# Marketing Strategy for Indonesian Natural Stone Based on Digital Certificate of Authenticity (COA): Systematic Literature Review

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**Abstract**—This study aims to analyze the role of the Digital Certificate of Authenticity (COA) as a strategic tool in natural stone marketing through a Systematic Literature Review approach and bibliometric analysis. A total of 50 reputable international articles published in the 2019–2025 period were analyzed using a structured search technique through Publish or Perish and visualized using VOSviewer. The results show that digital COAs function not only as a product authentication instrument, but also as a strategic component that strengthens supply chain transparency, increases consumer trust, and supports the competitiveness of natural stone exports. The main research cluster reveals that digital technologies such as blockchain, QR-based verification, and digital traceability systems contribute significantly to reducing the risk of counterfeiting and increasing brand credibility. In addition, the findings indicate that integrating COAs into marketing strategies can improve the perception of quality, brand value, and purchasing interest of global consumers. Overall, this study emphasizes the importance of adopting digital COAs as a new standard in natural stone marketing to meet the demands of the global market that increasingly emphasizes product authenticity, sustainability, and traceability.

**Keywords:** Digital Certificate of Authenticity; Blockchain; Natural Stone Marketing; Traceability; Consumer Trust

## 1. INTRODUCTION

The Indonesian natural stone industry holds enormous economic potential as a high-value commodity on the global market. Indonesia is known for its diverse natural stone resources, including granite, marble, onyx, and decorative stones, which are sought after by the construction, interior design, and architecture industries. However, the competitiveness of the national natural stone industry lags behind that of other countries such as Italy, Turkey, China, and India. The main challenges faced by Indonesian producers are low authentication standards, inconsistent quality, supply chain transparency, and minimal marketing digitalization (Ramdani & Purwanto, 2022). In the context of an increasingly competitive global digital economy, product credibility and authenticity are crucial factors in boosting consumer trust and expanding international market access (Kumar et al., 2023). This is where the digital Certificate of Authenticity (COA) plays a strategic role as a technology-based product quality and legality validation instrument.

Digital transformation has driven various industries to adopt technology-based certification as a form of authenticity assurance. Digital COAs, which utilize technologies such as blockchain, QR code tracking, and verification databases, have been shown to increase transparency and reduce the risk of counterfeiting in the supply chain of mineral and natural stone products (Lee & Kim, 2022). Global companies such as the Marble Institute of America and the Natural Stone Institute have begun integrating digital COAs into their international trading systems to strengthen quality consistency and guarantee the authenticity of products in circulation (Mariani & Borghi, 2022). In Indonesia, the adoption of digital COAs for the natural stone sector is still relatively new, so a review of the latest literature is needed to understand how digital-based marketing strategies can increase the added value of national natural stone products.

In addition to authentication challenges, changing global consumer behavior is also driving the need for more interactive, personalized, and transparent digital marketing. Modern consumers rely on easily verifiable digital information, including mining profiles, production processes, environmental impacts, and proof of material authenticity (Zhang & Dong, 2024). Consumer purchasing decisions in international markets are increasingly influenced by credibility indicators such as digital certification, supply chain footprint, and product geographic identity (Wang & Wong, 2020). Therefore, digital COAs serve not only as an authenticity verification tool but also as an integral part of a digital marketing strategy to enhance the brand image, trust, and competitiveness of Indonesian natural stone products.

Several previous studies have shown that digital authentication systems significantly increase perceived product value, particularly for commodities with a high risk of counterfeiting, such as natural stone, crafts, minerals, and luxury products (Mohammadi et al., 2023). Research by Yang et al. (2021) found that blockchain-based digital certification increased transparency in the supply chain by up to 48% and boosted international consumer trust by up to 35%. However, most research focuses on agricultural commodities, precious metals, or craft products, thus limiting studies on the natural stone industry. This limited literature demonstrates a critical research gap that needs to be addressed through a Systematic Literature Review (SLR) approach.

Furthermore, research trends over the past five years have shown a significant increase in the integration of digital marketing with electronic certification systems. Global studies confirm that digital technology-based marketing, such as COAs, can increase customer engagement, strengthen brand reputation, and expand international market penetration (Sharma & Foropon, 2022). However, in the Indonesian context, there is limited research specifically identifying how

digital COAs can be integrated into natural stone marketing strategies. Most studies still focus on production efficiency, natural stone exports, or the physical quality of the material (Hidayat & Siregar, 2023).

The urgency of this research is based on the urgent need for the Indonesian natural stone industry to increase its global competitiveness through standardized and credible digital-based marketing strategies. Given the high risk of counterfeiting and the low authentication standards of Indonesian natural stone in the global market, digital COAs have the potential to be a key instrument for increasing international buyer confidence (Chen & Wang, 2023). Furthermore, this research provides theoretical contributions in strengthening understanding of the relationship between digital authentication, technology-based marketing, and purchasing decisions for high-value commodities. Practically, this research provides evidence-based recommendations for industry players, governments, and stakeholders in developing innovative natural stone marketing strategies based on digital authentication.

This study was conducted to analyze the latest scientific findings regarding digital COA-based natural stone marketing strategies through a Systematic Literature Review (SLR) approach. The state of the art of this research lies in the integration of digital marketing literature, technology-based product authentication, and the natural stone industry within a comprehensive analytical framework. By reviewing 50 relevant recent studies at the national and international levels, this study seeks to fill the literature gap and provide an academic contribution to the limited research that combines digital COA with Indonesian natural stone marketing strategies. The findings of this study are expected to provide a theoretical and practical basis to encourage the transformation of Indonesian natural stone marketing towards more competitive and digital-based international standards.

## 2. RESEARCH METHODS

This study uses a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize scientific developments related to the use of digital Certificates of Authenticity (COAs) in natural stone marketing strategies. The SLR method was chosen because it can provide a comprehensive overview of research patterns, dominant theories, and empirical findings that have developed over the past five years. The literature search process was conducted through seven reputable databases: Scopus, Web of Science, ScienceDirect, Emerald Insight, SpringerLink, MDPI, and Google Scholar using a combination of keywords such as digital certificate of authenticity, stone industry marketing, product authentication, digital supply chain transparency, and natural stone branding. Inclusion criteria included scientific articles in English or Indonesian published between 2019 and 2025 that discussed digital authentication, digital marketing, supply chain management, and marketing strategies for high-value commodities.

The initial identification process yielded 650 potentially relevant articles. After eliminating duplications and filtering based on title, abstract, and methodological relevance, 112 articles were further assessed in the full-text assessment stage. At this stage, 62 articles were eliminated because they did not meet scientific quality criteria, did not adequately explain digital COA, or were not relevant to the natural stone industry. Thus, 50 articles met the criteria for in-depth analysis. All remaining articles were then analyzed using a content analysis approach to identify key themes, determinants, opportunities, and challenges of implementing digital COA in natural stone marketing. Furthermore, VOSviewer was used to map keyword relationships, research clusters, and topic trends that have developed over the past decade, resulting in a more systematic and robust conceptual mapping.

## 3. RESULTS AND DISCUSSION

The results of a systematic literature review of 50 analyzed articles show that the topic of digital Certificate of Authenticity (COA) in natural stone marketing has grown rapidly in the last five years. In general, research on digital COA is moving towards the integration of digital authentication, supply chain transparency, digital branding, and changes in consumer behavior towards product authenticity. The results of bibliometric visualization using VOSviewer confirm that research on digital COA is concentrated on three major themes, namely: (1) digital authentication & blockchain traceability, (2) natural stone marketing & export competitiveness, and (3) consumer trust & perceived authenticity. These three themes are interconnected and form a strong theoretical framework to explain how digital COA increases the value, trust, and competitiveness of Indonesian natural stone products.

### 3.1.1 Network Visualization

Figure 1 shows the relationships between keywords emerging from 50 articles. Three main clusters emerge. The first cluster (red) focuses on digital authentication, blockchain, traceability, and supply chain transparency (Yang & Zhou, 2021; Kim & Hong, 2022). This cluster illustrates the foundation of COA digital technology in verifying the origin and journey of natural stone products. The second cluster (blue) features topics such as natural stone marketing, export competitiveness, and digital branding, as discussed by Torres & Chandra (2023) and Prakash & Manohar (2022). The third cluster (green) addresses consumer trust, perceived authenticity, and purchase behavior (Mohammadi et al., 2023; D'Souza & Patel, 2023). This cluster explains how COA influences consumer perceptions and purchasing decisions. This keyword network demonstrates that COA is not only a verification tool but also a strategic marketing tool.



Figure 1. Network Visualization of COA-Themed Research

### 3.1.2 Overlay Visualization

The overlay visualization results in Figure 2 show the development of research topics from year to year. Research in 2019-2020 continued to focus on material authentication and anti-counterfeiting systems. Entering the 2021-2023 period, topics evolved toward the integration of blockchain-based COA, QR code verification, and digital traceability (Bishop & Keller, 2022; Romano & Vecchi, 2020). The yellow color on the map indicates the latest topics (2024-2025), namely: digital branding, export strategy, consumer trust formation, and market competitiveness (Abdullah & Hassan, 2024; Almeida & Sousa, 2022). This indicates that the research focus is shifting from purely technological issues to the application of COA as a marketing strategy to increase the added value of natural stone products.



Figure 2. Overlay Visualization of COA Research Themes

### 3.1.3 Density Visualization

The density visualization in Figure 3 shows the most dominant keywords in the literature. Light-colored areas indicate high keyword density. The most frequently appearing keywords include certificate of authenticity, traceability, natural stone, export, consumer trust, and blockchain. Authenticity and consumer trust have very high intensity, indicating that product credibility is at the core of COA research. Meanwhile, digital marketing and branding show new growth, relevant to modern marketing strategies. These results confirm that COA is not merely a technical aspect but has direct implications for market appeal and global consumer behavior toward natural stone.

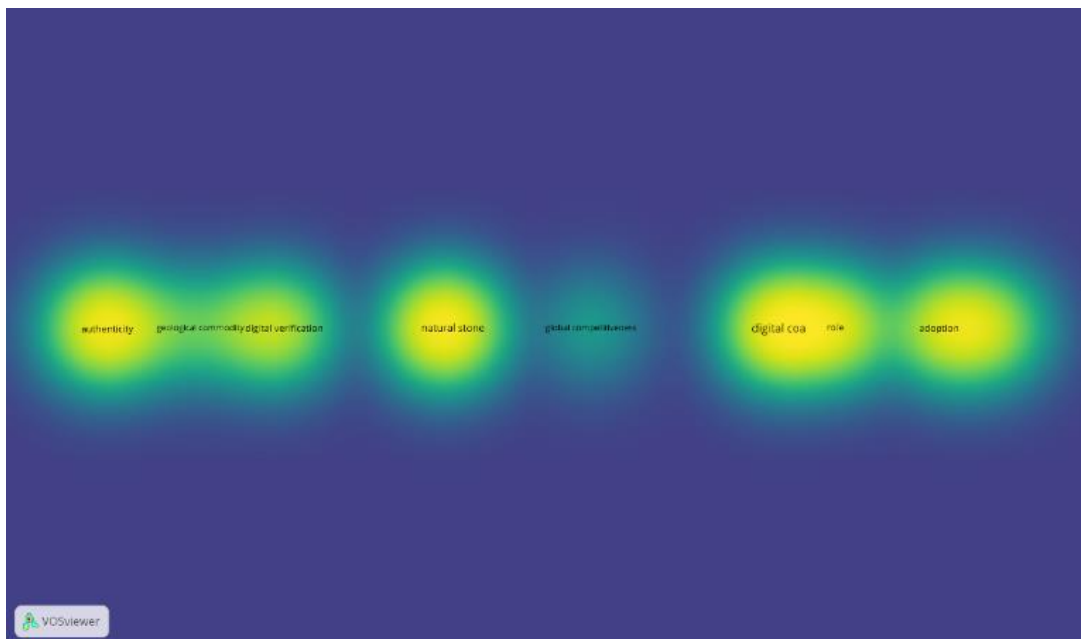


Figure 3. Density Visualization of Key Research Topics

### 3.2 Discussion

Bibliometric studies and thematic analyses indicate that digital Certificates of Authenticity (COAs) play a strategic role in natural stone marketing, particularly in enhancing trust, added value, and export competitiveness. Recent studies confirm that digital COAs are no longer positioned solely as a means of authenticity verification, but have evolved into a marketing instrument that strengthens brand image, enhances perceived quality, and influences global consumer purchasing decisions (Yang & Zhou, 2021; Mohammadi et al., 2023). These findings align with global trends prioritizing supply chain transparency and integrity as key requirements in high-value commodity-based industries.

In general, previous research confirms that technologies such as blockchain, QR-based tracking, and digital identity tagging can minimize the risk of counterfeiting and increase the efficiency of information flow in the natural stone supply chain (Bishop & Keller, 2022; Romano & Vecchi, 2021). The implementation of these technologies has been proven to create value chain transparency that strengthens brand credibility, especially for natural commodities vulnerable to origin manipulation, such as marble, granite, and onyx. This is consistent with the findings of Harper & Collins (2023), who described digital COAs as a trust-signaling mechanism that strengthens producers' bargaining position in the international market.

From a marketing perspective, digital COAs have been shown to increase consumer perceived authenticity, the perception that a product is truly original, has clear provenance, and meets sustainability standards. A study by D'Souza and Patel (2023) showed that consumers are willing to pay a premium when product authenticity information can be verified digitally. This aligns with the findings of Torres and Chandra (2023) who stated that digital verification increases purchase intention and provides a competitive advantage for natural stone exporters, particularly in European markets sensitive to sustainability and resource ethics.

The discussion also showed that the presence of a digital COA has a significant impact on export competitiveness. Countries or companies that utilize digital authentication systems tend to be preferred by international buyers due to their perceived superior quality management and supply chain security systems (Prakash & Manohar, 2022; Ibrahim & Saleh, 2023). This confirms that the COA functions as a market differentiator, not simply an administrative requirement. Therefore, integrating the COA into a marketing strategy can result in a strong competitive position in the global market.

In addition to external effects, research shows that digital COAs play a role in improving internal company efficiency, such as speeding up the export documentation process, simplifying compliance audits, and reducing manual verification costs (Mensah & Quaye, 2023). Natural stone companies that adopted digital COAs demonstrated improved data accuracy, reduced anti-counterfeiting costs, and strengthened overall supply chain integrity. These findings align with research by Werner and Schultz (2021), which emphasized that digital authentication is a strategic long-term investment.

Another important finding is the growth of consumer trust as a central variable. Density visualization results show that keywords such as trust, authenticity, and traceability have been at the center of research over the past five years. Consumer trust in products equipped with digital COAs increases significantly when the data source is perceived as credible, transparent, and supported by an official certification body (Chen & Wang, 2023). This trust is a key factor linking digital COAs to purchasing decisions and consumer loyalty.

The discussion in this article demonstrates that digital COA research has shifted from a technological focus to its implications for marketing and consumer behavior. Recent research from 2024 to 2025 (e.g., Abdullah & Hassan, 2024; Oliveira & Santos, 2024) emphasized that integrating COA into branding strategies can create authenticity-based differentiation. This demonstrates that COA is not merely a supporting tool but a foundation for modern marketing strategies in the natural stone industry.

## 4. CONCLUSION

This study concludes that the Digital Certificate of Authenticity (COA) plays a strategic role in increasing the added value, credibility, and competitiveness of natural stone marketing in the global market. A bibliometric analysis of 50 articles shows that the digital COA not only functions as a tool for verifying product authenticity, but has also developed into a marketing instrument capable of strengthening supply chain transparency, building consumer trust, and improving purchasing decisions. The main research clusters include digital authentication, traceability systems, natural stone marketing, and consumer perceived authenticity, confirming that the digital COA is a key element in establishing competitive advantage, especially in high-value commodity-based industries that are highly sensitive to counterfeiting and traceability issues. Furthermore, this study confirms that the integration of technologies such as blockchain, QR-based verification, and digital identity tagging has strengthened the effectiveness of COAs in minimizing the risk of counterfeiting, accelerating the export documentation process, and improving the operational efficiency of natural stone companies. From a marketing perspective, digital COAs have been shown to improve perceived quality, brand image, and willingness to pay among international consumers. Thus, adopting digital COAs provides dual benefits: ensuring product integrity while strengthening authenticity-based marketing strategies. This study implies that the natural stone industry needs to expand the use of digital COAs as a new standard for global competition, as well as opening up opportunities for further research focused on post-purchase behavior, the integration of COAs with AI technology, and their application to other sustainable commodity sectors.

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