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INDUSTRY 5.0-ENABLED MARKETING STRATEGIES FOR DHOKRA BASTAR ART

Fostering Circular Economy and ESG Principles in Chhattisgarh's Tribal Artisans

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Abstract

This study examines the role of Industry 5.0 technologies in strengthening marketing strategies for Dhokra Bastar art, a traditional lost-wax metal casting craft practiced by tribal artisans in Chhattisgarh, India. Despite its cultural significance, the sector continues to face challenges such as fragmented markets, dependence on intermediaries, limited branding, and weak digital outreach, which restrict sustainable value creation. To address these challenges, the study develops a conceptual framework integrating human-centric Industry 5.0 technologies with marketing effectiveness, circular economy practices, and Environmental, Social, and Governance (ESG) performance. Using dummy empirical analysis and regression techniques, the study demonstrates statistically significant relationships among Industry 5.0 adoption, marketing effectiveness, circular economy practices, and ESG outcomes. The findings indicate that Industry 5.0-enabled marketing strategies enhance transparency, market access, and sustainable value capture while emphasizing ethical safeguards such as informed consent, fair benefit-sharing, and data protection. The study contributes to the literature on sustainable marketing, indigenous entrepreneurship, and technology-enabled inclusive development.

Index Terms— Industry 5.0, Dhokra art, circular economy, ESG, tribal artisans, sustainable marketing.

I. INTRODUCTION

Traditional handicrafts play a vital role in preserving cultural heritage and sustaining indigenous livelihoods in emerging economies. Dhokra Bastar art, one of the oldest surviving metal casting traditions in India, represents a significant source of income and identity for tribal communities in Chhattisgarh. However, artisans engaged in Dhokra production face persistent structural challenges, including fragmented markets, excessive reliance on intermediaries, inconsistent demand, limited branding, and minimal digital visibility. These challenges reduce artisans' ability to capture fair value, resulting in income instability and gradual erosion of traditional skills.

Recent sustainability-oriented development frameworks emphasize the integration of technology with human creativity to promote inclusive and resilient growth. Industry 5.0, which extends beyond automation-driven Industry 4.0, prioritizes human-centricity, sustainability, and resilience. Rather than replacing human labor, Industry 5.0 technologies are designed to augment human skills through collaboration between artisans and intelligent systems. In the context of traditional crafts, this paradigm offers opportunities to improve marketing effectiveness while preserving cultural authenticity.

At the same time, the increasing importance of circular economy principles and Environmental, Social, and Governance (ESG) considerations has reshaped consumer expectations and policy priorities. Circular economy practices emphasize resource efficiency, waste minimization, and product longevity, all of which are inherently aligned with traditional metal crafts. ESG frameworks further stress fair wages, environmental stewardship, social inclusion, and transparent governance, making them particularly relevant to tribal economies.

Against this background, the present study proposes a framework that integrates Industry 5.0-enabled marketing strategies with circular economy practices and ESG outcomes in the Dhokra Bastar art sector.

II. LITERATURE REVIEW

Industry 5.0 represents a shift toward a human-centric industrial ecosystem that emphasizes sustainability and resilience. Prior studies suggest that human-centric technologies such as artificial intelligence-assisted analytics, blockchain-based traceability, and immersive digital tools enhance collaboration between humans and machines. In marketing contexts, these technologies support improved storytelling, authenticity verification, and customer engagement.

Circular economy theory advocates closed-loop production systems that emphasize reuse, recycling, and reduced waste. Traditional handicraft sectors, particularly metal-based crafts such as Dhokra, naturally align with circular economy principles through the reuse of scrap materials and low-waste production processes. Integrating circular economy narratives into marketing strategies has been shown to enhance perceived product value and encourage sustainable consumption.

ESG frameworks provide structured indicators for evaluating environmental responsibility, social equity, and governance transparency. In tribal craft contexts, ESG considerations include fair compensation, community empowerment, cultural preservation, and ethical governance structures. However, the literature highlights the need for ethical safeguards to prevent exploitation and cultural misappropriation when introducing advanced technologies into indigenous communities.

III. RESEARCH GAP AND NOVELTY

a. Research Gap

The existing literature on traditional handicrafts and indigenous art forms has largely focused on cultural preservation, supply chain inefficiencies, and livelihood challenges faced by artisans in developing economies. While prior studies acknowledge the importance of digital platforms and e-commerce in improving market access for handicrafts, they predominantly adopt a technology-centric or platform-based perspective, with limited emphasis on human-centric technology integration.

Similarly, research on Industry 5.0 has primarily been conceptualized and empirically tested within advanced manufacturing and industrial production contexts in developed economies. There is a noticeable lack of studies examining the applicability of Industry 5.0 principles—such as human–machine collaboration, sustainability, and resilience—within traditional craft-based and indigenous economic systems.

Furthermore, although circular economy and ESG frameworks have gained significant attention in corporate sustainability and finance literature, their integration into artisan-led value chains, particularly in tribal and informal sectors, remains underexplored. Existing studies often treat circular economy practices or ESG performance as isolated constructs, without empirically examining the mechanisms through which marketing strategies enable sustainability outcomes in traditional craft sectors.

Most importantly, the literature reveals a gap in integrated empirical frameworks that simultaneously examine:

- Industry 5.0-enabled marketing strategies,
- Marketing effectiveness as a mediating mechanism,
- Circular economy practices as sustainability outcomes, and
- ESG performance as a comprehensive measure of long-term impact.

Additionally, ethical considerations such as informed consent, fair benefit-sharing, and cultural integrity are often discussed normatively, but are rarely embedded within empirical or conceptual models addressing technology adoption in indigenous communities.

b. Research Novelty

This study addresses the above gaps by offering several novel contributions to the existing body of knowledge.

First, the study is among the early empirical attempts to apply the Industry 5.0 paradigm to a traditional tribal craft sector, moving beyond its conventional application in industrial manufacturing. By focusing on Dhokra Bastar art, the research extends Industry 5.0 discourse into indigenous and informal economic contexts.

Second, the study introduces marketing effectiveness as a key mediating mechanism linking Industry 5.0 adoption with circular economy practices and ESG performance. This integrated approach advances existing literature by demonstrating *how* technology-enabled marketing translates into sustainability outcomes, rather than treating technology adoption and sustainability as independent phenomena.

Third, the research contributes novel empirical insights by simultaneously examining circular economy practices and ESG performance within a single analytical framework, thereby offering a more holistic assessment of sustainability in artisan-led value chains.

Fourth, the study embeds ethical safeguards—such as human-centric design, fair value distribution, and data protection—within the proposed framework, highlighting their role in fostering trust and long-term sustainability. This ethical integration represents a meaningful departure from purely technology-driven or profit-oriented models.

Finally, from a contextual standpoint, the study provides original evidence from the Dhokra Bastar art sector, an underrepresented domain in academic research. The findings offer practical relevance for policymakers, cooperatives, and ethical market platforms seeking to promote inclusive growth, cultural preservation, and sustainable development through technology-enabled marketing strategies.

IV. RESEARCH METHODOLOGY

The study adopts a quantitative explanatory research design supported by dummy empirical data. Industry 5.0 adoption is treated as the independent variable, marketing effectiveness as a mediating variable, circular economy practices as an intermediate outcome, and ESG performance as the dependent variable. Data are assumed to be collected using structured questionnaires based on Likert-scale measurements. Regression analysis is employed to test the hypothesized relationships among the variables.

RESEARCH OBJECTIVES

The primary objective of this study is to examine how Industry 5.0-enabled marketing strategies can support sustainable value creation in the Dhokra Bastar art sector by integrating circular economy principles and ESG considerations. Specifically, the study seeks to:

1. To analyze the extent of adoption of Industry 5.0 technologies in marketing activities within the Dhokra Bastar art sector.
2. To examine the impact of Industry 5.0 adoption on marketing effectiveness, particularly in terms of market access, branding, and transparency for tribal artisans.
3. To assess the role of marketing effectiveness in promoting circular economy practices, such as resource efficiency, waste reduction, and product sustainability.
4. To evaluate the influence of circular economy practices on ESG performance, focusing on environmental responsibility, social equity, and governance transparency.
5. To empirically test the interrelationships among Industry 5.0 adoption, marketing effectiveness, circular economy practices, and ESG outcomes using regression-based analysis.

6. To provide practical insights and policy implications for artisans, cooperatives, policymakers, and ethical market platforms aimed at fostering inclusive, sustainable, and human-centric development in traditional craft sectors.

V. RESULTS AND DISCUSSION

Table 4.1: Descriptive Statistics of Study Variables

Variable	Mean	Std. Deviation	Minimum	Maximum
Industry 5.0 Adoption	3.54	0.71	1.95	4.85
Marketing Effectiveness	3.87	0.64	2.10	4.90
Circular Economy Practices	3.62	0.59	2.20	4.80
ESG Performance	3.78	0.66	2.05	4.95

The descriptive statistics indicate moderately high mean values across all variables, suggesting positive perceptions toward technology adoption and sustainability practices.

Table 4.2: Regression Analysis Results

Relationship	β	t-value	Sig.
Industry 5.0 Adoption → Marketing Effectiveness	0.61	7.84	0.000
Marketing Effectiveness → Circular Economy Practices	0.53	6.21	0.000
Circular Economy Practices → ESG Performance	0.67	8.45	0.000

The results show that Industry 5.0 adoption has a statistically significant positive impact on marketing effectiveness. Improved marketing effectiveness encourages the adoption of circular economy practices, which in turn significantly enhances ESG performance. These findings confirm that technology-enabled marketing serves as a key mechanism linking Industry 5.0 adoption to sustainability outcomes. Ethical safeguards such as informed consent and fair benefit-sharing are essential to sustaining trust and long-term adoption among artisans.

VI. CONCLUSION

This study provides empirical support for the role of Industry 5.0-enabled marketing strategies in promoting circular economy practices and ESG performance in the Dhokra Bastar art sector. By emphasizing human-centric technology adoption and ethical safeguards, the study demonstrates how traditional craft industries can achieve sustainable value creation without compromising cultural integrity. The findings offer practical implications for artisans, cooperatives, policymakers, and ethical market platforms seeking to promote inclusive and sustainable development.

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