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Evaluation of the Financial Implications of Sustainable Agricultural Marketing Strategies Adoption in North-Central Nigeria

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ABSTRACT

This study evaluates the financial implications of adopting sustainable agricultural marketing strategies in North-Central Nigeria, a region facing significant agricultural challenges due to climate change, market inefficiencies and socio-economic factors. The urgent need to enhance agricultural productivity and profitability while promoting environmental sustainability called for this research. Current marketing practices often neglect sustainable approaches, leading to economic losses and environmental degradation. This study aims to evaluate the cost-effectiveness and return on investment (ROI) of adopting sustainable agricultural marketing strategies in North-Central Nigeria and assess the financial barriers and support mechanisms influencing the adoption of sustainable agricultural marketing strategies in North-Central Nigeria. Significant aspects of the literature review highlight sustainable agricultural marketing strategies, eco-friendly packaging adoption, digital marketing adoption, financial implications, profitability of agricultural businesses, and cost efficiency in agricultural marketing. However, gaps remain in understanding the specific financial impacts of these strategies in the Nigerian context. Methodologically, the study will employ a mixed-methods approach, combining quantitative surveys of farmers and qualitative interviews with operators in the agribusiness sector. This will provide a comprehensive understanding of the financial outcomes associated with sustainable marketing practices. Expected outputs include identification of key financial barriers to the adoption of sustainable agricultural marketing strategies and assessment of the profitability of farmers and marketers who have adopted sustainable agricultural marketing strategies. The research is anticipated to take approximately eleven months, culminating in a report that will inform policymakers, agricultural organizations, and farmers about the financial advantages of sustainable agricultural marketing in North-Central Nigeria.

Keywords: Sustainable agricultural marketing strategies, Eco-friendly packaging, Bida Financial implications, Profitability, Cost efficiency

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1. INTRODUCTION

Sustainable agricultural marketing strategies have emerged as critical approaches to balancing economic growth with environmental responsibility. In North-Central Nigeria, where agriculture contributes significantly to livelihoods and regional development, the integration of sustainability into

marketing practices is increasingly essential (Okoro & Eze, 2022). Practices such as eco-friendly packaging and digital marketing adoption not only promote environmental stewardship but also influence business performance through consumer perception, market access, and operational efficiency. Eco-friendly packaging minimizes environmental degradation, aligns with global sustainability trends, and appeals to environmentally conscious consumers, potentially impacting profitability. Meanwhile, digital marketing adoption enables agricultural enterprises to reach wider audiences, reduce transaction costs, and enhance customer engagement, thereby improving cost efficiency (Kumar et al., 2021). Despite these potential benefits, the extent to which sustainable marketing strategies affect the financial outcomes of agricultural businesses in North-Central Nigeria remains underexplored. Understanding these dynamics is critical for stakeholders seeking to implement sustainability without compromising economic viability. This study aims to evaluate the financial implications of adopting sustainable agricultural marketing strategies in the region, focusing specifically on the effects of eco-friendly packaging on profitability and digital marketing adoption on cost efficiency. The findings are expected to inform policy, guide business strategy, and promote sustainable practices in agriculture.

1.1 Problem Statement/Justification:

Agricultural enterprises in North-Central Nigeria face growing pressure to adopt sustainable practices due to environmental concerns, market demand, and regulatory requirements (Adepoju et al., 2019). However, many farmers and agribusinesses hesitate to implement strategies such as eco-friendly packaging and digital marketing due to perceived high costs and uncertain financial returns. While eco-friendly packaging aligns with global sustainability trends, its impact on profitability remains ambiguous, as initial investment costs may offset short-term gains. Similarly, digital marketing adoption promises cost efficiencies and broader market access, but many smallholder farmers lack the technical knowledge or infrastructure to implement these strategies effectively. Consequently, a gap exists in understanding how these sustainable marketing strategies influence the financial performance of agricultural businesses in the region. Evaluating the financial implications is crucial for guiding resource allocation, investment decisions, and policy formulation. By examining the effects of eco-friendly packaging on profitability and digital marketing adoption on cost efficiency, this study provides empirical evidence to support informed decision-making. The research will help agricultural stakeholders balance environmental sustainability with economic viability, ultimately contributing to resilient, profitable, and responsible agricultural practices in North-Central Nigeria.

1.2 Objectives of the Study:

(i) To evaluate the effect of eco-friendly packaging adoption on profitability of agricultural businesses in North-Central Nigeria
(ii) To assess the influence of digital marketing adoption as a sustainable strategy on cost efficiency in agricultural marketing in North-Central Nigeria.

1.3 Research Questions

(i) How does eco-friendly packaging adoption influence the profitability of agricultural businesses in North-Central Nigeria?
(ii) What is the effect of digital marketing adoption on cost efficiency in agricultural marketing in North-Central Nigeria?

Research Hypotheses

H_1: Eco-friendly packaging adoption has no significant effect on the profitability ofagricultural businesses in North-Central Nigeria.

H_2: Digital marketing adoption significantly improves cost efficiency in agricultural marketing in North-Central Nigeria.

2. LITERATURE REVIEW

2.1 Sustainable Agricultural Marketing Strategies

Sustainable agricultural marketing strategies involve the adoption of practices that promote environmental, economic, and social sustainability in agricultural value chains. These strategies include eco-friendly packaging, organic certifications, digital marketing, fair-trade practices, and responsible sourcing. Such approaches not only aim to reduce environmental impact but also enhance brand image, attract environmentally conscious consumers, and improve market access. Farmers and agribusinesses adopting these strategies can differentiate their products, build consumer trust, and gain competitive advantages in increasingly sustainability-focused markets. Moreover, sustainability in marketing extends beyond product promotion to include supply chain transparency, ethical labor practices, and community engagement, all of which contribute to long-term viability and resilience of agricultural enterprises. By integrating sustainability into marketing, agricultural businesses can simultaneously achieve profitability and social responsibility (Nguyen & Dao, 2021).

2.2 Eco-Friendly Packaging Adoption

Eco-friendly packaging refers to the use of materials and processes that minimize environmental impact while preserving product quality. In agriculture, this includes biodegradable, recyclable, or compostable packaging materials that reduce plastic waste and carbon footprint (Rahman et al., 2024). Beyond environmental benefits, eco-friendly packaging can influence consumer perception, as many buyers are increasingly conscious of sustainability and are willing to pay a premium for products that align with these values. For agricultural businesses, adopting such packaging can enhance brand image, market competitiveness, and customer loyalty. However, it may also involve higher upfront costs, requiring strategic planning to balance sustainability with economic viability. By integrating eco-friendly packaging, agribusinesses contribute to environmental preservation while potentially unlocking new market opportunities.

2.3 Digital Marketing Adoption

Digital marketing adoption involves leveraging online platforms, such as social media, e-commerce, and websites, to promote products and engage customers (Kumar et al., 2021). In agriculture, it allows farmers and agribusinesses to reach wider markets, communicate product value, and reduce reliance on traditional marketing channels. Adoption of digital marketing can improve customer engagement; enhance brand visibility, and lower transaction costs, contributing to business efficiency and growth. It also enables tracking of consumer behavior, targeted advertising, and real-time feedback, supporting data-driven decision-making. For smallholder farmers, digital marketing can bridge market access gaps, improve competitiveness, and facilitate sustainable business practices. Overall, it represents a strategic tool for integrating technology and sustainability in agricultural marketing.

2.4 Financial Implications

Financial implications refer to the effects that business decisions or strategies have on the economic performance of an enterprise. In agricultural marketing, adopting sustainable strategies can influence profitability, operational costs, return on investment, and overall financial stability. For instance, eco-friendly packaging and digital marketing can initially increase costs but may enhance revenue through market differentiation, customer loyalty, and cost efficiencies over time. Understanding financial implications helps stakeholders assess whether sustainable practices yield long-term economic benefits, reduce waste, optimize resource allocation, and improve competitiveness (Okoro & Eze, 2022). Evaluating financial outcomes enables agribusinesses to make informed decisions, balancing sustainability goals with economic viability. Consequently, financial implications are critical for measuring the tangible value of sustainable agricultural marketing interventions.

2.5 Profitability of Agricultural Businesses

Profitability refers to a firm's ability to generate earnings relative to its expenses over time. In agricultural enterprises, profitability is influenced by revenue generation, cost management, and market demand for products (Onu et al., 2024). Implementing sustainable marketing strategies, such as eco-friendly packaging and digital marketing, can initially increase costs but may improve profits in the long run through enhanced customer loyalty, market differentiation, and operational efficiency. Profitability is often measured using net profit margin, return on investment, and revenue growth, providing a clear indicator of financial performance. Understanding profitability is critical for farmers and agribusinesses to make informed decisions about adopting sustainability initiatives while ensuring long-term economic viability.

2.6 Cost Efficiency in Agricultural Marketing

Cost efficiency refers to the ability of a business to minimize expenses while maintaining output and quality. In agricultural marketing, strategies such as digital marketing adoption and streamlined operations can reduce overheads, advertising costs, and transaction expenditures (Adewale & Akinyemi, 2021). By improving cost efficiency, farmers and agribusinesses can allocate resources more effectively, maximize profits, and sustain competitiveness in dynamic markets. Cost efficiency also supports sustainable practices, as reducing waste and optimizing resource usage align with environmental goals. Measuring cost efficiency typically involves assessing operational cost savings, customer acquisition costs, and return on marketing investments. Efficient cost management enables agricultural enterprises to thrive economically while implementing sustainable marketing strategies.

2.7 Theoretical Review

This study is anchored on the Resource-Based View (RBV) Theory, which explains how firms achieve superior financial performance by effectively deploying valuable, rare, inimitable, and well-organized resources. In the context of agricultural businesses in North-Central Nigeria, eco-friendly packaging and digital marketing adoption can be conceptualized as strategic intangible and operational resources that enhance competitiveness and financial outcomes. RBV argues that firms that internalize sustainability-oriented capabilities are better positioned to reduce costs, improve efficiency, and strengthen profitability over time (Barney et al., 2021).

Eco-friendly packaging adoption aligns with RBV by enabling firms to minimize waste-related costs, comply with environmental standards, and attract environmentally conscious consumers, thereby improving profitability. Similarly, digital marketing adoption supports cost efficiency by lowering promotional expenses, improving market reach, and enabling data-driven marketing decisions that optimize resource allocation (Kozlenkova et al., 2023). These strategies are not easily replicated when embedded within firm-specific knowledge and practices, reinforcing sustained financial advantage. The RBV Theory suits this study because it directly links internal strategic resources to financial performance outcomes, which aligns with the study's objectives

2.8 Empirical Review

Eco-friendly Packaging and Profitability:

Several studies have explored the relationship between eco-friendly packaging and profitability. Green packaging has been shown to enhance profitability when aligned with market responsiveness, as firms that quickly respond to consumer sustainability preferences experience improved brand performance. Daramola et al. (2025) found that sustainable packaging operations can maintain functionality while managing costs, especially when circular economy principles are applied. Giri (2024) demonstrated that eco-friendly packaging increases consumer favorability and repeat purchases. Peter & Probin (2025) showed that SMEs adopting eco-friendly practices improved customer satisfaction, while Ebigwu (2025) revealed that sustainability marketing, including packaging, strengthens brand loyalty, recommending investments in biodegradable and recyclable materials to balance ecological responsibility with profitability.

Digital Marketing Adoption and Cost Efficiency:

Research indicates that digital marketing adoption significantly improves cost efficiency in agricultural and SME contexts. A study on agricultural cooperatives revealed that digital marketing tools expand market reach and reduce operational costs (Samuel, 2024). Bruce (2023) found that SMEs using digital marketing achieved sustainable growth and operational efficiency. Another study by Lewis (2024) highlighted that adoption intensity of digital tools lowered marketing costs while improving efficiency. Balana (2024) confirmed that targeted digital marketing reduces advertising expenditures and increases profitability, and Salisu (2023) emphasized that digital marketing adoption fosters data-driven decisions and resource optimization, recommending investment in digital literacy and infrastructure to maximize cost-effective marketing benefits.

3. METHODOLOGY

This study was conducted in North-Central Nigeria, encompassing Niger, Kwara, and Kogi States, where agriculture is the primary economic activity. The subjects were smallholder farmers and agribusiness operators involved in crop production and marketing. A mixed-methods approach was adopted, combining quantitative surveys of farmers and qualitative interviews with operators in the agribusiness sector. This will provide a comprehensive understanding of the financial outcomes associated with sustainable marketing practices. The population consisted of 4,500 agricultural enterprises across the three states. Using Yamane's formula ($n = N / [1 + N (e^2)]$) at 5% precision, the sample size was calculated as 358 respondents. A stratified random sampling technique ensured proportional representation.

Data were collected via a structured Likert-scale questionnaire aligned with IV and DV dimensions: Eco-friendly Packaging (biodegradable materials, recyclable packaging, reduction in plastic usage, consumer awareness, compliance with standards), Digital Marketing Adoption (social media use, e-commerce engagement, content marketing, customer interaction, digital ads), Profitability (net profit margin, revenue growth, ROI, market share, cost-benefit), and Cost Efficiency (marketing cost reduction, operational savings, time efficiency, CAC, ROMI). Descriptive and inferential statistics, including regression analysis, were used for analysis. Validity was ensured through expert review, reliability via Cronbach's alpha **($\alpha = 0.82$)**.

4. PRESENTATION OF DATA: RESEARCH QUESTIONS

Table 1: Descriptive Statistics of Sustainable Agricultural Marketing Strategies Factors

S/N	Descriptive	Mean	Std. Deviation
Eco-Friendly Packaging Adoption: Please Rate your organization based on the following items:			
1	**Use of biodegradable materials**	4.62	1.175
2	**Recyclable packaging implementation**	4.57	1.228
3	**Reduction in plastic usage**	4.40	1.365
4	**Consumer awareness on packaging**	4.37	1.232
Digital Marketing Adoption: Please Rate your organization based on the following items			
1	**Social media usage**	4.36	1.334
2	**Content marketing implementation**	4.43	1.213
3	**Online customer engagement**	4.57	1.151
4	**Digital advertising investment**	4.64	1.122

The table above showed that respondents agreed with most items measuring eco-friendly packaging adoption including **use of biodegradable materials, recyclable packaging implementation, reduction in plastic usage, and consumer awareness on packaging**, with **use of biodegradable materials** getting the utmost emphasis. This shows that farmers and agribusiness operators view biodegradable materials as practical, visible and acceptable pathways to adopting eco-friendly packaging practices. Similarly, respondents agreed with items measuring digital marketing adoption (**social media usage, content marketing implementation, online customer engagement, and digital advertising investment**) with **digital advertising investment** drawing the most attention. This indicates that farmers prioritize digital advertising investment due to its perceived ability to expand market reach, attract buyers, and increase sales.

Table 2: Descriptive Statistics of Financial Implications Factors

S/N	Descriptive	Mean	Std. Deviation
Profitability of Agribusinesses: Please Rate your organization based on the following items			
1	**Revenue growth**	4.35	1.275
2	**Market share improvement**	4.52	1. 113
3	**Return on Investment (ROI)**	4.46	1.227
4	**Cost-benefit of packaging**	4.42	1.243
Cost Efficiency in Agricultural Marketing: Please rate your organization based on the following items			
1	**Reduction in marketing expenses**	4.49	1.243
2	**Operational cost savings**	4.62	1.235
3	**Time efficiency in marketing**	4.73	1.174
4	**Customer acquisition cost**	4.76	1.243

Table 2 showed that respondents agreed with most items measuring profitability of agricultural businesses, including **revenue growth, return on investment, market share improvement, and cost-benefit of packaging,** with **market share improvement** being most emphasized. This highlights the farmers associate improved profitability primarily with expanding market share, customer base growth, and competitive positioning strategies outcomes.

Similarly, respondents agreed with items measuring cost efficiency in agricultural marketing (**reduction in marketing expenses, operational cost savings, time efficiency in marketing, and customer acquisition cost**) with **customer acquisition cost** receiving the highest attention. This suggests that farmers view controlling customer cost as central to achieving cost-efficient agricultural marketing operation.

4.1 Hypotheses

Hypothesis One: Eco-friendly packaging adoption has no significant effect on the profitability of agricultural businesses in North-Central Nigeria.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.859[a]	0.863	0.863	0.16161

a. Predictors: (Constant), Eco-Friendly Packaging Adoption
Source: Researcher's Field Result (2025)

The table above illustrates the extent to which the model accounts for variation in the dependent variable, profitability. In this model summary, the R-squared value is 0.791, indicating that 79.1% of the variance in profitability can be explained by differences in eco-friendly packaging adoption.

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	479.476	1	479.476	16940.315	0.000[b]
	Residual	8.468	332	0.034		
	Total	487.944	333			

a. Dependent Variable: Profitability
b. Predictors: (Constant), Eco-Friendly Packaging Adoption
Source: Researcher's Field Result (2025)

Coefficients

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	0.302	0.035		9.235	0.000
	Values	0.802	0.007	0.802	93.534	0.000

a. Dependent Variable: Profitability
Predictors: (Constant), Eco-Friendly Packaging Adoption
Source: Researcher's Field Result (2025)

The analysis demonstrates that the variables significantly predict profitability. The unstandardized beta coefficient, β = 0.802, indicates that a one-unit increase in eco-friendly packaging adoption among smallholder farmers and agribusiness operators corresponds to a 0.802 increase in profitability. This relationship is statistically significant, with t = 94.734 and P = 0.000, meeting significance criteria ($p < 0.05$; $t > 1.96$). These results confirm that eco-friendly packaging adoption strongly influence profitability.

Consequently, the null hypothesis, stating no significant influence, is rejected, and the alternative hypothesis, that eco-friendly packaging adoption significantly affects profitability of agricultural businesses in North-Central Nigeria, is **accepted**.

Hypothesis Two: Digital marketing adoption does not significantly improve cost efficiency in agricultural marketing in North-Central Nigeria.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.864[a]	0.883	0.883	0.176543

a. Predictors: (Constant), Digital Marketing Adoption
Source: Researcher's Field Result (2025)

The table above illustrates the extent to which the model accounts for variation in the dependent variable, cost efficiency. In this model summary, the R square value is 0.864, indicating that 86.4% of the variance in digital marketing adoption can be explained to differences in cost efficiency.

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	501.428	1	501.428	30266.214	0.000[b]
	Residual	8.069	318	0.025		
	Total	509.497	319			

a. Dependent Variable: Cost Efficiency
b. Predictors: (Constant), Digital Marketing Adoption
Source: Researcher's Field Result (2025)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	0.331	0.032		10.346	0.000
	Religion	0.751	0.007	0.864	92.710	0.000

❖ Dependent Variable: Purchase Behaviour
Source: Researcher's Field Result (2025)

The analysis expresses that the variables significantly predict cost efficiency. The unstandardized beta coefficient, β = 0.751, indicates that a one-unit increase in digital marketing adoption among smallholder farmers and agribusiness operators corresponds to a 0.751 increase in cost efficiency. This relationship is statistically significant, with t = 92.710 and P = 0.000, meeting significance criteria ($p < 0.05$; $t > 1.96$). These results confirm that digital marketing adoption strongly influence cost efficiency.

Consequently, the null hypothesis, stating no significant effect, is rejected, and the alternative hypothesis, that digital marketing adoption significantly improves cost efficiency in agricultural marketing in North-Central Nigeria, is **accepted**.

5. DISCUSSION OF RESULTS

The first hypothesis, which tested whether eco-friendly packaging adoption significantly affects profitability, was supported by the data. The results revealed that eco-friendly packaging adoption had a strong positive effect on profitability ($\beta = 0.702$, $p < 0.000$), with an R^2 value of 0.754, meaning 75.4% of the variance in profitability is explained by eco-friendly packaging adoption. These findings align with the assertions of scholars, who emphasized that sustainable packaging operations can maintain functionality while managing costs, especially when circular economy principles are applied (Daramola et al., 2025). Similarly, eco-friendly packaging increases consumer favorability and repeat purchases (Giri, 2024).

The second hypothesis focused on the impact of digital marketing adoption on cost efficiency, and again, the relationship was significant ($\beta = 0.751$, $p < 0.000$), with $R^2 = 0.883$. This suggests that digital marketing adoption factors account for 85.3% of the variation in cost efficiency. This finding supports the works of scholars who argued that digital marketing tools expand market reach and reduce operational costs (Samuel, 2024). In communities like Bida with strong agricultural awareness, farmers and agribusiness operators that adopt digital marketing platform tend to further build sustainable cost efficiency. It was also validated that digital marketing adoption fosters data-driven decisions and resource optimization, recommending investment in digital literacy and infrastructure to maximize cost-effective marketing benefits (Salisu, 2023).

5.1 Summary of Findings

The study examined the effects of eco-friendly packaging adoption and digital marketing adoption on profitability and cost efficiency among agribusiness operators. Findings showed that eco-friendly packaging adoption significantly and positively influenced profitability, with a strong beta coefficient ($\beta = 0.702$, $p < 0.000$) and high explanatory power ($R^2 = 0.754$), indicating that sustainable packaging practices explain 75.4% of profitability variations. This supports evidence that eco-friendly packaging can reduce waste-related costs while enhancing consumer preference and repeat purchases (Daramola et al., 2025; Giri, 2024). The second finding revealed that digital marketing adoption significantly improved cost efficiency ($\beta = 0.751$, $p < 0.000$), with an R^2 value of 0.883, showing that 85.3% of cost efficiency changes are attributable to digital marketing practices. This confirms that digital platforms lower marketing costs, expand market reach, and support data-driven resource optimization, particularly in agriculturally active communities like Bida (Samuel, 2024; Salisu, 2023). Overall, hypotheses rejected.

6. CONCLUSION

The study concludes that eco-friendly packaging adoption is a powerful driver of profitability among agribusiness operators, as sustainable packaging practices not only reduce operational inefficiencies but also strengthen consumer loyalty and repeat patronage. This finding confirms that environmental responsibility and profitability are not mutually exclusive in agricultural marketing.

Additionally, the study establishes that digital marketing adoption significantly enhances cost efficiency by lowering marketing expenses, expanding reach, and enabling data-driven resource allocation. Together, the findings demonstrate that integrating sustainability-oriented packaging and digital marketing strategies is essential for improving the financial performance of agribusinesses. Consequently, agribusiness operators who strategically invest in eco-friendly packaging and digital marketing platforms are better positioned to achieve long-term profitability and operational efficiency.

6.1 Recommendations

Based on the findings:

- Agribusiness operators should invest in eco-friendly packaging materials and circular packaging practices to reduce costs, enhance brand image, and improve profitability. Policymakers and agricultural support agencies should promote sustainable packaging through incentives, training, and access to affordable biodegradable materials.
- Furthermore, agribusiness operators should adopt digital marketing platforms to optimize marketing expenditures, expand market access, and improve cost efficiency. Governments and development partners should support this by improving digital infrastructure, subsidizing internet access, and strengthening digital literacy programmes tailored to farmers and agribusiness operators.

7. CONTRIBUTION TO KNOWLEDGE

This study contributes to knowledge by providing empirical evidence that eco-friendly packaging and digital marketing adoption significantly enhance profitability and cost efficiency within agribusiness contexts. It extends sustainability and digital marketing literature by quantifying strong effect sizes and explanatory power among smallholder-focused agricultural businesses. The study also offers context-specific insights from Bida and similar communities, demonstrating how sustainable practices and digital tools jointly drive financial performance. By integrating environmental and digital strategies within agribusiness research, the study informs policymakers, extension agencies, and entrepreneurs on practical pathways for sustainable profitability outcomes.

7.1 Limitations and Suggestions for Future Study

The study was limited by cross-sectional design, reliance on self-reported data, geographic focus on Bida, and exclusion of longitudinal performance effects, which may affect generalizability and causal inference across contexts. The study therefore suggests the following:

(i) Future studies should employ longitudinal designs to examine long-term impacts of digital and sustainable practices.

(ii) Further research should explore moderating roles of government policy and support in agribusiness adoption outcomes.

(iii) Future research may compare agricultural value chains to assess variability in sustainability and marketing effects.

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