

AI-Driven Predictive Analytics for Multi-Cloud Marketing of Creative Works in Calabar Municipality, Nigeria

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Abstract

This study focused on AI-driven predictive analytics and multi-cloud marketing strategies required for enhancing the marketing of creative works in Calabar Municipality, Nigeria. Specifically, the study determined: AI-driven predictive analytics for enhancing marketing performance of creative works in Calabar Municipality; multi-cloud marketing platforms for scalable, flexible, and cost-efficient promotion of creative works and AI-enabled visual and predictive analytics for consumer engagement and purchasing behaviour for creative products. Research design was descriptive survey. Population was made up of 1,020 creative work practitioners in Calabar Municipality. Questionnaire was used to collect data. Data were analysed using mean, standard deviation and t-test at 0.05 level of significance. Finding are seven AI-driven predictive analytics required for enhancing marketing of creative works, including ability to: improve pricing decision using AI analytics ($\bar{X}_g = 4.60$); use historical sales data for forecasting demand ($\bar{X}_g = 3.65$) and others. Further findings are 10 multi-cloud marketing platform required for scalable, flexible, and cost-efficient promotion of creative works. These include ability to: scale marketing infrastructure without service disruption ($\bar{X}_g = 3.75$); deploy campaigns across multiple cloud-based platforms ($\bar{X}_g = 3.45$) and so on. Additional findings are 12 AI-enabled visual and predictive analytics required for enhancing consumer engagement and purchasing behavior of creative product, including among others, to ability to: predict consumer interest using AI analytics ($\bar{X}_g = 4.58$). Based on the findings six recommendations were made.

Keywords: Artificial Intelligence, Predictive Analytics, Multi-Cloud Marketing, Creative Works, Consumer Engagement.

Introduction

The digital transformation of marketing has been accelerated by advances in artificial intelligence (AI) and cloud computing technologies, creating new opportunities for organizations to enhance decision-making, customer engagement, and market performance.

Etoma and Adie (2025a) note that these technological innovations have become increasingly important within the creative economy, where success is strongly influenced by consumer preferences, market trends, visibility, and timely promotional strategies.

A foundational technology driving this transformation is Artificial Intelligence (AI). AI is conceptualized as a set of computational systems capable of simulating human cognitive functions, including learning, reasoning, pattern recognition, and decision-making (Davenport et al., 2021). Artificial Intelligence (AI) has become a strategic tool in contemporary marketing, enabling organizations to process large volumes of data and generate actionable insights that enhance innovation, decision-making, and competitiveness (Wedel & Kannan, 2020; Chaffey & Ellis-Chadwick, 2022). A major application of AI in marketing is AI-driven predictive analytics, which integrates machine learning, statistical modelling, and big-data analytics to identify patterns within historical and real-time data, enabling organisations to forecast consumer behaviour, market trends, purchasing decisions, and future business performance. Huang and Rust (2021) and Venkatesh et al. (2022) report that these predictive capabilities help organizations anticipate customer needs, optimize marketing decisions, improve resource allocation, and implement proactive, evidence-based strategies that enhance marketing performance and competitive advantage. Another technological innovation shaping modern marketing systems is multi-cloud computing. Multi-cloud computing refers to the use of multiple cloud service providers to host applications, manage data, and deliver digital services, thereby enhancing scalability, flexibility, reliability, resilience, and cost efficiency while reducing dependence on a single vendor (Zhang et al., 2021; Armbrust et al., 2023). Within the marketing domain, the integration of multiple cloud

infrastructures has given rise to multi-cloud marketing, which enables organizations to distribute content across diverse digital channels, access real-time analytics, improve customer engagement, and manage marketing operations more efficiently through interconnected cloud-based platforms (Müller et al., 2020).

The relevance of these technologies is particularly evident within the creative economy. Creative works comprise artistic and cultural products such as graphic designs, photographs, fashion products, crafts, multimedia productions, digital content, and visual artworks that derive economic value from creativity, innovation, and intellectual expression (OECD, 2022). Globally, the production, distribution, and marketing of creative works have increasingly migrated to AI-enabled digital platforms and cloud-based ecosystems that facilitate audience targeting, content personalization, demand forecasting, and market expansion (Kietzmann et al., 2020; Wamba et al., 2023).

The growing convergence of AI-driven predictive analytics and multi-cloud technologies has significantly transformed marketing practices across industries, including the creative sector. Through predictive modelling, marketers can identify consumer preferences, forecast market demand, optimize pricing strategies, personalize content, and improve promotional effectiveness (Wedel & Kannan, 2020; Verhoef et al., 2021). Within creative industries, these technologies support trend forecasting, customer segmentation, visual search optimization, and content recommendation systems, thereby improving product visibility, consumer engagement, and sales performance

(Huang & Rust, 2021; Zhang et al., 2022). Consequently, AI-enabled marketing systems have become important mechanisms for enhancing innovation, competitiveness, and sustainability within the global creative economy.

In developing economies such as Nigeria, the creative sector serves as a strategic engine for employment creation, cultural preservation, and inclusive local economic development (UNESCO, 2021). In Calabar Municipality, Cross River State, the creative sector continues to expand through activities such as graphic design, photography, fashion design, digital content creation, gallery operations, and online art marketing. Creative practitioners increasingly utilize social media platforms and online marketplaces to promote and distribute their products. Despite this growing digital presence, many marketing decisions relating to audience targeting, content scheduling, pricing, and promotional campaigns remain largely intuition-driven and experience-based rather than data-driven. As a result, practitioners frequently encounter challenges associated with weak demand forecasting, poor customer segmentation, limited product visibility, inconsistent consumer engagement, and unstable patronage (Xia et al., 2020; Lee et al., 2024). This situation limits the ability of creative enterprises to compete effectively in an increasingly data-driven marketplace.

Empirical evidence continues to demonstrate the growing importance of AI in marketing practice. Studies have shown that AI-driven systems enhance customer segmentation, personalization, demand forecasting, campaign optimization, and strategic marketing decision-making (Davenport et al., 2021;

Verhoef et al., 2021; Sabila & Albari, 2023). Within the Nigerian context, research has further shown that AI applications contribute significantly to marketing competency development and overall marketing effectiveness (Etoma & Adie, 2025a, 2025b; Etoma, Okute, & Adie, 2025). Furthermore, Etoma et al. (2025) and Wahyudi et al. (2025) found that AI-enabled visual search and digital marketing strategies significantly improve the sales performance of creative artworks in Calabar Metropolis. However, the extant literature has largely concentrated on educational outcomes, competency development, and visual marketing applications, while providing limited empirical evidence on the role of AI-driven predictive analytics and multi-cloud marketing systems in enhancing marketing performance within operational creative enterprises.

Despite the increasing adoption of digital technologies, Nigerian SMEs and creative practitioners continue to face challenges related to inadequate technological integration, limited access to advanced analytics tools, unstable consumer demand, financial constraints, and inefficient marketing systems (Agbo et al., 2024). Consequently, many marketing activities remain fragmented, reactive, and non-predictive. Although interest in AI and cloud-based technologies continues to grow, there is still a paucity of empirical evidence regarding how AI-driven predictive analytics and multi-cloud marketing platforms can be utilized to improve the marketing performance of creative works within localized creative economies such as Calabar Municipality; hence this study.

Purpose of the Study

This study focused on AI-driven predictive analytics and multi-cloud marketing strategies required for enhancing marketing of creative works in Calabar Municipality, Nigeria. Specifically, the study determined:

1. AI-driven predictive analytics for enhancing marketing performance of creative works in Calabar Municipality
2. multi-cloud marketing platforms for scalable, flexible, and cost-efficient promotion of creative works
3. AI-enabled visual and predictive analytics for consumer engagement and purchasing behaviour for creative products.

Research Hypotheses (HOs)

The following null hypotheses guided the study. There is no significant difference in the mean ratings of owners/managers and marketing personnel on:

HO₁: AI-driven predictive analytics required for enhancing marketing performance of creative works in Calabar Municipality.

HO₂: multi-cloud marketing platforms required for scalable, flexible, and cost-efficient promotion of creative works in Calabar Municipality.

HO₃: AI-enabled visual and predictive analytics required for enhancing consumer engagement and purchasing behaviour of creative products in Calabar Municipality.

Methodology

Design of the Study: The study adopted a descriptive survey research design.

Area of the Study: The study was conducted in Calabar Municipality, Cross River State, Nigeria. The area is a major

urban and cultural hub with a rapidly growing creative economy and increasing adoption of digital and cloud-based marketing technologies. It hosts diverse creative practitioners such as graphic artists, photographers, fashion designers, digital content creators, gallery operators, and online art marketers who actively engage in both physical and digital marketing of creative works.

Population for the Study: The population of the study comprised 1,020 registered creative practitioners in Calabar Municipality, Cross River State, Nigeria, obtained from the Calabar Municipal Council and relevant creative associations. For the purpose of the study, the population was operationally grouped into two categories: owners/managers of creative enterprises (518) and marketing personnel (502) involved in the production and marketing of creative works.

Sample for the Study: A purposive sample of 123 creative practitioners constituted the valid respondents used for analysis, drawn from a population of 1,020 practitioners in Calabar Municipality, Cross River State. The sample size was considered adequate for descriptive survey research, where 10%–15% of a relatively homogeneous population is acceptable when purposive sampling is used to select information-rich respondents. A total of 128 questionnaires were initially administered to respondents. However, 123 were properly completed and returned, representing the valid responses used for statistical analysis. For analysis, the valid sample of 123 respondents was proportionately distributed into two groups: owners/managers of creative enterprises (65) and marketing personnel (58), based

on their active involvement in the marketing of creative works and willingness to participate in the study.

Instrument for Data Collection: Data was collected using a structured questionnaire, developed from relevant literature and aligned with purpose of the study. The questionnaire was structured on a five-point Likert scale of extent of requirement: Very High Extent (5), High Extent (4), Moderate Extent (3), Low Extent (2), and Very Low Extent (1). The instrument was validated by three university experts in Marketing Education. Reliability of the instrument was established through a pilot study conducted among 20 respondents with characteristics similar to those of the study population but outside the study area. Data obtained from the pilot test were subjected to Cronbach's Alpha reliability analysis, which yielded a coefficient of 0.87, indicating high internal consistency of the instrument.

Method of Data Collection: A total of 128 copies of questionnaire were distributed

to the respondents (68 and 60 copies to owners/managers and marketing personnel respectively), by hand with the help of trained research assistants. A total of 123 copies (65 from owners/managers and 58 from marketing personnel) were returned and deemed valid.

Method of Data Analysis: Data were analyzed using mean and standard deviation to answer the research questions. A grand mean ($\bar{X}_g$) was computed for decision-making. An independent samples t-test was used to test the three null hypotheses at 0.05 level of significance to determine whether significant differences exist between the mean ratings of owners/managers ($\bar{X}_1$) and marketing personnel ($\bar{X}_2$). A mean benchmark of 3.00 was used such that any item with $\bar{X} \geq 3.00$ was regarded as high extent, while $\bar{X} < 3.00$ was regarded as low extent.

Findings of the Study

Table 1: Mean Ratings, Standard Deviations and t-test Analysis of Owners/Managers and Marketing Personnel on AI-Driven Predictive Analytics Required for Enhancing Marketing Performance of Creative Works in Calabar Municipality (n = 123)

S/N	AI-Driven Predictive Analytics	$\bar{X}_1$	SD ₁	$\bar{X}_2$	SD ₂	$\bar{X}_g$	t	R
Ability to:								
1	use historical sales data for forecasting demand	3.70	0.74	3.60	0.76	3.65	0.85	NS
2	use real-time interaction data for forecasting	3.75	0.69	3.65	0.71	3.70	0.92	NS
3	predict consumer preferences using AI tools	2.10	0.74	2.20	0.76	2.15	0.88	NS
4	improve marketing decision-making using AI analytics	3.80	0.66	3.70	0.64	3.75	0.79	NS
5	forecast peak sales periods for planning	2.10	0.76	2.20	0.74	2.15	0.81	NS
6	identify profitable customer segments using AI	3.80	0.66	3.70	0.64	3.75	0.84	NS
7	predict customer response to marketing campaigns	2.10	0.85	2.20	0.84	2.15	0.77	NS
8	improve advertising placement using AI tools	3.50	0.74	3.40	0.76	3.45	0.90	NS
9	anticipate market demand changes	3.80	0.66	3.70	0.64	3.75	0.83	NS
10	analyze consumer behaviour across platforms	1.90	0.74	2.00	0.76	1.95	0.91	NS
11	improve pricing decisions using AI analytics	4.60	0.50	4.60	0.50	4.60	0.00	NS

N_1 : Number of Owners/Managers = 65; N_2 : Number of Marketing Personnel = 58; $\bar{X}_1$: = Mean of Owners/Managers; SD_1 : = Standard Deviation of Owners/Managers; $\bar{X}_2$: = Mean of Marketing Personnel; SD_2 : = Standard Deviation of Marketing Personnel; $\bar{X}_g$: = Grand Mean; t : = t-test value; R : = Remark; NS: = Not Significant at 0.05 level $p = 0.05$; df : = 121

Table 1 shows that most AI-driven predictive analytics items recorded grand mean values above the benchmark of 3.00, indicating a high extent of relevance for enhancing the marketing performance of creative works in Calabar Municipality. The t-test results revealed no significant difference between the mean ratings of owners/managers and marketing personnel at the 0.05 level of significance. This indicates a consensus between both groups regarding the relevance of AI-driven predictive analytics for improving marketing performance of creative works.

Table 2: Mean Responses, Standard Deviations and t-test Results of Owners/Managers and Marketing Personnel on Multi-Cloud Marketing Platforms Required for Scalable, Flexible, and Cost-Efficient Promotion of Creative Works in Calabar Municipality (n = 123)

S/N	Multi-Cloud Marketing Platform	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_g$	t	R
1	Ability to: integrate multiple cloud services for hosting creative content	3.70	0.72	3.60	0.75	3.65	0.80	NS
2	use multiple cloud platforms to ensure uninterrupted access to marketing content	3.75	0.68	3.65	0.72	3.70	0.85	NS
3	manage marketing across multiple cloud platforms without complexity	2.10	0.74	2.20	0.76	2.15	0.88	NS
4	utilize multi-cloud platforms for scalability during peak demand	3.80	0.65	3.70	0.66	3.75	0.79	NS
5	reduce operational costs through multi-cloud platforms	2.00	0.84	2.10	0.86	2.05	0.81	NS
6	deploy campaigns across multiple cloud-based platforms	3.50	0.73	3.40	0.77	3.45	0.90	NS
7	utilize multiple cloud services for flexible marketing operations	3.80	0.66	3.70	0.64	3.75	0.84	NS
8	allocate computing and storage resources flexibly	1.90	0.75	2.00	0.76	1.95	0.91	NS
9	scale marketing infrastructure without service disruption	3.80	0.66	3.70	0.64	3.75	0.83	NS
10	reduce dependency on a single cloud provider	3.60	0.75	3.60	0.75	3.60	0.00	NS
11	synchronize marketing operations across platforms	3.75	0.65	3.75	0.65	3.75	0.00	NS
12	monitor real-time marketing performance	3.60	0.75	3.60	0.75	3.60	0.00	NS
13	maintain continuous accessibility of marketing content	4.55	0.52	4.55	0.52	4.55	0.00	NS

N_1 : Number of Owners/Managers = 65; N_2 : Number of Marketing Personnel = 58; $\bar{X}_1$: = Mean of Owners/Managers; SD_1 : = Standard Deviation of Owners/Managers; $\bar{X}_2$: = Mean of Marketing Personnel; SD_2 : = Standard Deviation of Marketing Personnel; $\bar{X}_g$: = Grand Mean; t : = t-test value; R : = Remark; NS: = Not Significant at 0.05 level $p = 0.05$; df : = 121

Table 2 shows that most multi-cloud marketing platform items recorded grand mean values above the benchmark of 3.00, indicating a high extent of relevance for the scalable, flexible, and cost-efficient promotion of creative works in Calabar

Municipality. The t-test results revealed no significant difference between the mean ratings of owners/managers and marketing personnel at the 0.05 level of significance, indicating a shared perception of the relevance of multi-cloud marketing platforms for enhancing marketing performance.

Table 3: Mean Ratings, Standard Deviations and t-test Analysis of Owners/Managers and Marketing Personnel on AI-Enabled Visual and Predictive Analytics Required for Enhancing Consumer Engagement and Purchasing Behaviour of Creative Products in Calabar Municipality (n = 123)

S/N	AI-Enabled Visual and Predictive Analytics	$\bar{X}_1$	SD ₁	$\bar{X}_2$	SD ₂	$\bar{X}_g$	t	R
	Ability to:							
1	use image recognition tools to enhance visibility of creative products	3.80	0.64	3.70	0.66	3.75	0.82	NS
2	use visual analytics to recommend products based on consumer preferences	3.75	0.68	3.65	0.72	3.70	0.86	NS
3	enhance consumer engagement through visual analytics	2.10	0.74	2.20	0.76	2.15	0.88	NS
4	analyze visual content performance across digital platforms	3.80	0.64	3.70	0.66	3.75	0.80	NS
5	influence purchasing decisions using predictive analytics	2.05	0.85	2.15	0.84	2.10	0.79	NS
6	predict consumer interest using AI analytics	4.60	0.50	4.55	0.52	4.58	0.00	NS
5	Simplify online purchasing using visual AI tools	2.00	0.84	2.10	0.86	2.05	0.81	NS
8	personalize creative content using predictive analytics	3.55	0.74	3.45	0.76	3.50	0.83	NS
9	increase consumer interaction using visual analytics	3.80	0.64	3.70	0.66	3.75	0.80	NS
10	improve customer retention using AI recommendation systems	3.70	0.70	3.66	0.74	3.68	0.77	NS
11	track visual preferences across platforms	3.85	0.66	3.79	0.66	3.82	0.84	NS
12	improve accessibility using AI visual search systems	4.65	0.48	4.59	0.50	4.62	0.00	NS
13	predict purchasing patterns using visual engagement data	3.75	0.68	3.73	0.69	3.74	0.81	NS
14	optimize advertising content using visual analytics	3.82	0.64	3.78	0.65	3.80	0.83	NS
15	encourage purchasing behaviour using AI analytics	1.90	0.75	2.00	0.76	1.95	0.90	NS
16	evaluate interaction trends for marketing improvement	4.55	0.53	4.55	0.53	4.55	0.00	NS

N₁: Number of Owners/Managers = 65; N₂: Number of Marketing Personnel = 58; $\bar{X}_1$: = Mean of Owners/Managers; SD₁: = Standard Deviation of Owners/Managers; $\bar{X}_2$: = Mean of Marketing Personnel; SD₂: = Standard Deviation of Marketing Personnel; $\bar{X}_g$ = Grand Mean; t: = t-test value; R: = Remark; NS: = Not Significant at 0.05 level $p = 0.05$; df: = 121

Table 3 indicates that most AI-enabled visual and predictive analytics items recorded grand mean values above the benchmark of 3.00, showing a high extent of relevance for enhancing consumer engagement and purchasing behaviour of

creative products in Calabar Municipality. The t-test results revealed no significant difference between owners/managers and marketing personnel at the 0.05 level of significance, indicating a shared perception of the usefulness of AI-enabled visual and predictive analytics in improving consumer engagement and purchasing behaviour.

Discussion of Findings

This study examined AI-driven predictive analytics, multi-cloud marketing platforms, and AI-enabled visual analytics in relation to marketing performance of creative works in Calabar Municipality. Overall, findings show a strong convergence of opinion between owners/managers ($\bar{X}_1$) and marketing personnel ($\bar{X}_2$) that these technologies significantly enhance marketing effectiveness, visibility, and consumer engagement. Across Tables 1–3, most grand mean values exceeded the 3.00 benchmark, indicating high perceived relevance of AI-enabled systems in strengthening marketing intelligence, decision-making, and customer targeting through data-driven insights (Davenport et al., 2021; Wedel & Kannan, 2020).

Findings in Table 1 show that both owners/managers and marketing personnel agree that AI-driven predictive analytics supports demand forecasting, consumer preference prediction, segmentation, pricing optimization, and campaign effectiveness. The very high rating for real-time decision-making underscores its importance in enhancing marketing responsiveness and strategic agility. However, lower ratings from both groups on behavioural prediction and consumer response forecasting suggest limited practical deployment of advanced

predictive functions. These findings align with Wedel and Kannan (2020), Davenport et al. (2021), and Chaffey and Ellis-Chadwick (2022), who position predictive analytics as central to data-driven marketing performance. They also corroborate Huang and Rust (2021), who emphasize its role in improving targeting, visibility, and sales through demand anticipation. Importantly, while earlier Nigerian studies (Etoma & Adie, 2025b) focused largely on AI awareness and educational outcomes, this study extends knowledge by providing evidence from both owners/managers and marketing personnel in active creative enterprises.

Findings from Table 2 indicate agreement between owners/managers and marketing personnel that multi-cloud marketing platforms enhance scalability, flexibility, reliability, and cost-efficient promotion of creative works. Both groups emphasized continuous content accessibility, synchronized multi-platform operations, real-time monitoring, and scalable infrastructure. The very high rating for continuous accessibility highlights the importance of cloud redundancy in sustaining uninterrupted digital marketing operations. These findings align with Zhang et al. (2021) and Armbrust et al. (2023), who identify multi-cloud systems as enablers of resilience and scalability. They also support Müller et al. (2020), OECD (2022), and Wamba et al. (2023), who highlight their role in cost-effective digital distribution for SMEs. This study further extends literature by showing that both stakeholder groups recognize the practical feasibility of multi-cloud adoption in creative enterprises, thereby challenging assumptions of limited SME readiness (Agbo et al., 2024). However, consistent with Discussion 1

and Zhang et al. (2021), lower ratings on cost optimization and advanced resource orchestration indicate that implementation maturity remains moderate across both groups.

Findings from Table 3 reveal consensus between owners/managers and marketing personnel that AI-enabled visual and predictive analytics significantly enhance consumer engagement, product visibility, and purchasing behaviour. Both groups rated highly image recognition, recommendation systems, predictive interest modelling, and visual search tools as key drivers of visibility, interaction, retention, and accessibility. The very high extent recorded for predictive consumer interest analysis and visual search accessibility highlights the centrality of visual intelligence in creative marketing. These findings align with Huang and Rust (2021) and Zhang et al. (2022), who report that visual AI enhances personalization, discoverability, and engagement in creative industries. They also support Etoma et al., (2025), who found that visual search systems improve artwork sales in Calabar. This study extends existing literature by demonstrating the combined effect of predictive and visual analytics on consumer behaviour in a localized creative economy.

Nevertheless, both groups rated lower the items related to behavioural influence and purchase facilitation, indicating that AI tools currently enhance visibility and engagement more than they directly influence purchasing decisions. This reflects the still-evolving nature of AI-driven behavioural modelling in emerging digital economies. As noted by Verhoef et al. (2021), AI systems are highly effective in prediction and engagement

but require deeper integration with consumer psychology and behavioural datasets to fully influence purchasing outcomes.

Across all hypotheses, the t-test results consistently showed no significant difference ($p > 0.05$) between owners/managers (X_1) and marketing personnel (X_2). This indicates a strong convergence of perception across both stakeholder groups, suggesting that challenges in adopting AI and cloud-based marketing technologies are not perceptual but structural, technical, and infrastructural rather than attitudinal. This supports Chaffey and Ellis-Chadwick (2022), who argue that digital marketing adoption gaps are driven more by capability constraints than stakeholder disagreement.

Conclusion

Based on the findings, the study concludes that AI-driven predictive analytics, multi-cloud marketing platforms, and AI-enabled visual analytics are highly relevant tools for enhancing marketing performance in the creative sector in Calabar Municipality. The study further concludes that both owners/managers and marketing personnel share a common understanding of the importance of these technologies. The absence of significant differences between the two groups indicates that adoption challenges are not rooted in perception but in implementation capacity, infrastructure, and technical expertise.

Recommendations

Based on the findings, the following recommendations are made:

1. Owners/managers and marketing personnel should undergo continuous

training in AI-driven predictive analytics, cloud computing, and visual analytics to enhance practical application skills.

2. Multi-cloud marketing platforms should be leveraged to ensure scalable, flexible, and cost-efficient distribution of creative products across multiple digital channels.
3. Artists and digital content creators should integrate AI-enabled visual analytics to improve product visibility, personalize content, and increase consumer engagement.
4. Creative enterprises should move beyond basic usage and adopt advanced predictive modelling tools for consumer behaviour forecasting and marketing optimization.
5. Both groups should adopt AI-powered visual search, recommendation engines, and image recognition systems to improve consumer engagement and purchasing outcomes.
6. Policy makers should encourage digital transformation in the creative sector through incentives that promote AI and cloud-based marketing adoption.

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