Digital Marketing Adoption in SMEs: A Technology-Organization-Environment (TOE)-Based Assessment of Business Growth and Competitiveness

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Abstract

Adopting digital marketing approaches has emerged as a key factor in Small and medium-sized enterprises (SMEs) competitive advantage and business success. The Technology-Organization-Environment (TOE) framework is used in this study to evaluate the variables affecting SMEs' digital transformation. The degree and efficacy of digital marketing adoption are influenced by organizational competencies, technological preparedness, and external market dynamics. Results show that SMEs that use new digital technologies, like automation and AI-driven analytics, see an increase in customer engagement and market share. By showing that SMEs may achieve sustainable business growth and competitive advantage by aligning their plans with organizational adaptability, technical advancements, and favorable environmental conditions, the study emphasizes the significance of a balanced approach across all TOE aspects. The findings give SMEs a road map for utilizing digital marketing to improve long-term success and business performance. The findings contribute to a deeper understanding

of AI's capabilities, presenting a strategic roadmap for integrating these technologies into digital marketing ecosystem to achieve sustainable growth in the digital age. Using a random sampling technique, 450 respondents were selected from the 500 SMEs in the study area. Of the completed questionnaires, almost 90% were recovered and deemed valuable for the data analysis. The results of the study indicated that significant portion of SMEs (52%) generated between 2 and 4 million Naira in revenue after implementing AI-driven digital marketing, which is more than they did in the year before digital marketing automation was put into place.

Keywords: Technology, Organization, Environment, Digital Marketing, E-Commerce, SMEs, Social Media, Information Communication Technology, Artificial Intelligence.

1. Introduction

The Technology-Organization-Environment (TOE) framework provides Small and medium-sized enterprises(SMEs) a structured method for comprehending the adoption of digital marketing[1]. This study uses TOE to evaluate how organizational competencies, external factors, and technology developments impact SMEs' digital transformation. By using technology such as artificial intelligence (AI), automation, and analytics, SMEs enhance their digital presence, optimize customer engagement, and streamline operations. Organizational readiness through leadership commitment, digital literacy development, and resource allocation determines the success of digital initiatives. Environmental factors, including market competition, regulatory policies, and consumer trends, shape SME adoption and adaptation strategies. The degree to which SMEs are successful with digital marketing depends on how these three factors combine. In order to shed light on digital entrepreneurship, this study uses the TOE framework to analyze the relationships between technology, organizational preparedness, and environmental restrictions. The TOE framework assists companies in methodically navigating digital transformation, despite the fact that SMEs face obstacles like budgetary limitations, technological hurdles, and complex regulations. Businesses can attain long-term competitiveness, sustainable growth, and enhanced digital marketing efficacy by adopting innovation, investing in staff development, and adhering to market rules. Moving forward, SMEs that continuously integrate technology, enhance innovation, and adapt to market demands will remain at the forefront of digital entrepreneurship, ensuring business resilience in an evolving digital economy. This study aims to provide insights into how SMEs

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can effectively adopt and implement digital entrepreneurship using the TOE framework, helping them navigate challenges and seize emerging opportunities in the online business landscape. Understanding the interplay of technology, organizational readiness, and external market forces is vital for SMEs striving for long-term success. SMEs dominate most economies, especially in developing nations where government employment capacity is limited, making up the majority of businesses globally and are significant contributors to job creation and global economic development; accounting for approximately 90% of businesses and over 50% of employment in Africa[2]. Formally, SMEs contribute up to 40% of national income (GDP) in emerging economies; these figures are significantly higher when informal SMEs are included[3]. According to[4], 600 million jobs will be required by 2030 to accommodate the expanding global workforce, making SME development a top priority for many governments worldwide.

This study explores the transformative role of AI-driven tools in enhancing digital marketing effectiveness, encompassing personalized customer experiences, predictive analytics, and automated campaign management. AI has emerged as a transformative technology, reshaping industries, occupations and redefining the way businesses operate amidst rapid technological advancements and evolving consumer behavior[5]. AI-powered solutions can help SMEs increase the efficacy of their digital marketing campaigns, competing with larger companies as a result of these technologies, which include automated content generation, predictive analytics, and personalized client engagement[6]. Chatbots driven by AI enhance customer care, while machine learning improves advertising tactics for more precise targeting, brand visibility through social media algorithms that spot trends and maximize outreach. AI-powered Search engine optimization (SEO) technologies also improve page rankings and draw in natural traffic that enable SMEs increase return on investment and cut expenses by using AI to analyze data and make well-informed marketing decisions. AI enables SMEs to effectively adapt, scale, and maximize their market influence as digital environments change, guaranteeing steady growth in competitive sectors. By examining the integration of AI-powered tools and techniques, it highlights the potential to overcome resource constraints, streamline operations, and unlock new growth opportunities. The study emphasizes the need for accessible and scalable AI solutions customized to the unique needs and limitations of SMEs, enabling them to use the full potential of this revolutionary technology. In the rapidly evolving landscape of the digital era, online marketing has emerged as a foundation for

business growth and brand recognition[7]. The convergence of advanced technologies and data analytics has revolutionized the way organizations connect with their audiences, enabling highly targeted and efficient product marketing strategies to emerge. Digital marketing technologies encompasses tools like search engine optimization (SEO), AI and social media platforms that empower businesses to understand consumer behavior, optimize campaigns, and measure performance in real time.

Internet-based platforms provide an exceptional digital infrastructure for intelligent electronic data interchanges, which have enabled electronic commerce (e-commerce) transactions, marketing campaigns, information retrieval, and electronic data mining in today's competitive online business community[8]. In the current information communication technology(ICT) consumer-centric economy[9], digital marketing has emerged as a key element of SMEs strategy for growth and sustainability. This work aims to give SMEs owners a realistic road map for navigating the digital landscape, improving their online presence, optimizing customer experiences, and eventually achieving sustainable growth in the digital age. It specifically addresses the obstacles that SMEs owners in developing nations like Nigeria face in their pursuit of economic sustainability. This study highlights how SMEs play a vital role in the economy, how digital entrepreneurship has the ability to revolutionize the sector, and how useful the strategic model is for helping SMEs thrive in the digital sphere. In order to improve SME competitiveness, expedite digital integration, and close technology gaps, policymakers can create plans by utilizing TOE. By empowering SMEs to adopt new technologies through TOE, emerging markets can achieve long-term prosperity and economic resilience. SMEs can find new opportunities for growth and success by embracing digital technologies and customer-centric approaches through existing digital landscape, and forge a solid position, maintain competitiveness, and create a prosperous future with the correct strategic economic climates. This study is structured thematically into introduction, research objectives, theoretical framework, research question, research design and methodology, data analysis, discussion of research finding, future research focus, recommendation and conclusion.

2.   Research Objectives

In order to help SMEs successfully implement digital entrepreneurship and online marketing strategies, the research attempts to create a structured framework based on the TOE paradigm. It looks into how organizational skills, technical advancements, and environmental

factors affect small and medium-sized businesses' digital transformation. Along with internal organizational elements like leadership, knowledge, and resource allocation, the study cites important drivers like AI, automation, social media, and e-commerce. It also looks at outside factors including consumer behavior, legal regulations, and market competition. The framework assists SMEs in improving their online visibility, streamlining their marketing plans, and gaining a competitive edge in a rapidly changing digital environment by combining these components. The results will help SMEs overcome obstacles to digital adoption, promote innovation, and propel business expansion through strategic digital engagement. The research ultimately provides practical insights to help SMEs navigate the challenges of online marketing and digital entrepreneurship adventures.

3. Research Questions

There are five research questions that explore the application of the TOE framework in digital entrepreneurship and online marketing for SMEs:

- How does technological adoption within the TOE framework impact SMEs' digital marketing effectiveness and customer engagement?
- What organizational factors influence SMEs' readiness and willingness to integrate AI-driven digital marketing tools?
- How do external environmental elements such as government policies, competition, and consumer behavior shape SMEs' digital entrepreneurship strategies?
- What are the key barriers preventing SMEs from fully utilizing the TOE framework for digital transformation, and how can they be addressed?
- How does the TOE framework enhance the scalability and sustainability of SMEs in emerging digital markets?

4. Theoretical Framework

The adoption of the TOE framework enables SMEs to navigate digital entrepreneurship and online marketing development, strengthening local industries, and promotes sustainable entrepreneurship[1]. By appraising three essential factors: technology, organization, and environment, the TOE framework promotes innovative marketing technologies and plays a vital role in improving digital marketing for SMEs. Technology

enhances AI-driven analytics, automation, and personalized strategies, improving customer engagement. Organizational readiness, including leadership commitment and resource allocation, dictates successful digital transformation. Environmental factors, such as competition, regulatory policies, and consumer trends, shape adoption rates. According to[10],TOE's role ensures streamlining digital marketing tools, enhancing efficiency, and ensuring market competitiveness that equips SMEs to optimize strategies, scale operations, and sustain growth in rapidly evolving digital landscapes. Supportive policies further accelerate adoption. The integration of AI in digital marketing and data analytics have significantly transformed how SMEs operate. According to [11], AI-driven marketing tools improve efficiency, optimize advertising strategies, and boost customer retention. AI is expected to further revolutionize digital marketing, providing more sophisticated tools for personalization, customer engagement, and real-time analytics that enable SMEs remain competitive in an increasingly digital marketplace[12]. With the rise of digital entrepreneurship and the resulting global economic paradigm change, digital marketing techniques are critical to the expansion and sustainability of SMEs. The TOE framework is a widely recognized model used to analyze how businesses adopt technology, including digital entrepreneurship and online marketing strategies. In the context of SMEs, TOE provides a structured approach to understanding the factors influencing digital transformation and marketing effectiveness.

When it comes to SMEs' performance with digital marketing, the relationship between technology, organization, and environment is essential. By striking a balance between organizational readiness, external challenges, and technological improvements, businesses must take a comprehensive approach. When analyzing the adoption of digital marketing in SMEs, the TOE framework provides a useful theoretical framework. The complexity of digital transformation is highlighted in this study through an analysis of organizational, technological, and environmental aspects. Emerging technology are incorporated, internal competencies are reinforced, and external market forces are accommodated by successful SMEs. By balancing technology, organizational readiness, and environmental influences, SMEs can strategically utilize digital tools to enhance brand visibility, improve consumer engagement, and drive business growth[13]. SMEs may maximize their digital strategy for long-term business growth, improved brand awareness, and improved customer engagement by assessing the three dimensions: technology, organization, and environment as illustrated in Figure 1.

Figure 1. Technology-Organization-Environment Framework for Online Digital Marketing, Author Illustration

- **Technology**

The technological infrastructure that SMEs have access to and how it affects digital entrepreneurship and marketing efficacy are the main subject matter of the technology component of the TOE framework. To be competitive in the quickly changing digital market, SMEs need to make use of cutting-edge technologies to penetrate the market. Simplifying marketing procedures is greatly aided by contemporary AI and automation technologies. Chatbots, predictive analytics, and AI-driven customer insights improve individualized interactions and increase customer retention. By evaluating enormous volumes of customer data, machine learning algorithms improve targeting tactics, allowing SMEs to create successful marketing campaigns. SMEs must prioritize SEO in order to increase their online visibility. SEO technologies driven by AI raise website rankings and increase a company's discoverability. Social media algorithms also maximize outreach, making sure SMEs use customized content to engage with the appropriate audience. By allowing SMEs to reach a wider audience without the need for physical stores, e-commerce platforms lower operating expenses while increasing client accessibility.

- **Organizational Dimension**

The organization component of the TOE framework looks at internal issues that affect SMEs' adoption of technology. In order to propel digital entrepreneurship and online marketing initiatives, these involve financial investment, workforce preparedness, innovation culture, and leadership commitment. The ability of SMEs to include digital marketing is primarily dependent on the choices made by its executives. Managers and owners of businesses need to be visionary and understand how digital tools may help them expand. Leadership

commitment guarantees the essential expenditures for staff training, digital infrastructure, and the development of an innovative culture. Managing data analytics, social media interaction, and AI-driven marketing initiatives requires a workforce with digital competency. Regretfully, a lot of SMEs have trouble using advanced marketing technologies because of limitations in their digital literacy. Investing money into seminars and online courses to improve digital upskilling increases marketing effectiveness and guarantees that digital plans are implemented successfully. Businesses can optimize their digital marketing potential without incurring exorbitant expenditures by effectively allocating resources, such as by choosing cloud-based solutions, social media advertising, and inexpensive automation tools. Budgetary restrictions can also be lessened by collaborations with technology suppliers and government initiatives that give funding.

- **Environmental Dimension**

External factors that impact SMEs' adoption of digital technology are assessed by the environmental component, which include regulations, consumer behavior, industry dynamics, and competition all have a significant impact on how digital marketing strategies are developed[14]. Due to intense competition in the digital sphere, SMEs are under pressure to build a strong online presence. Due to the dominance of larger firms with larger marketing expenditures on digital platforms, SMEs must set themselves apart through customer-centric tactics, individualized branding, and targeted advertising. Many governments have put laws in place to encourage the adoption of digital technology because they understand how important SMEs are to economic growth. SMEs can easily migrate into digital entrepreneurship with the support of tax advantages, technology investment subsidies, and digital training initiatives. SME marketing strategies are being influenced by consumers' growing preference for online transactions, personalized experiences, and quick delivery. Engagement between businesses and consumers has changed as a result of the growth of influencer marketing, mobile commerce, and AI-driven customer interactions. SMEs improve their market positioning and customer loyalty by comprehending and responding to changing consumer expectations.

4.1 AI Transforming Online Digital Marketing for SME

AI is revolutionizing entrepreneurship and online digital marketing, providing SMEs with advanced technology, organizational growth, and market adaptability within the TOE framework[15]. AI-powered tools optimize data analytics, automation, and personalization,

enabling SMEs to enhance digital marketing strategies efficiently. Strong leadership commitment, workforce reskilling, and financial planning ensure SMEs integrate AI successfully, while regulatory compliance, competition analysis, and consumer personalization help businesses adapt to environmental challenges[16]. Despite technological barriers, AI offers unparalleled growth potential, shaping the future of entrepreneurship and digital marketing. SMEs adopting AI through TOE-based strategies secure market positioning, customer trust, and long-term sustainability in the evolving digital economy. By transforming entrepreneurship opportunities through online digital marketing for SMEs, AI dramatically improves TOE dynamics. Automation and analytics driven by AI increase productivity, lower operating expenses, and enhance marketing personalization. AI increases SME agility in enterprises by streamlining workforce training, digital adoption, and decision-making, promoting sustainable growth in the environment by assisting companies in adapting to changes in the market, laws, and customer preferences[17]. SMEs increase scalability, competitive advantage, and customer engagement by incorporating AI into the TOE framework, guaranteeing long-term success in changing digital environments. AI speeds up entrepreneurship, strategic marketing, and innovation, increasing the impact and accessibility of digital transformation that maximizes SME digital capabilities within the technology dimension of TOE by enhancing outreach potential, increasing efficiency, and improving data accuracy. How SMEs use AI into their internal structures, leadership, workforce training, and financial plans is assessed by the organization component of the TOE framework. The organizational preparedness and digital skills of an organization play a major role in the adoption of AI in marketing and entrepreneurship. The environment component of TOE looks at how outside factors affect AI-driven entrepreneurship and internet marketing, including consumer trends, market competitiveness, and regulatory laws. SMEs can use AI to predict changes in the industry and modify their business plans appropriately to comply with the demand and supply economic dynamics.
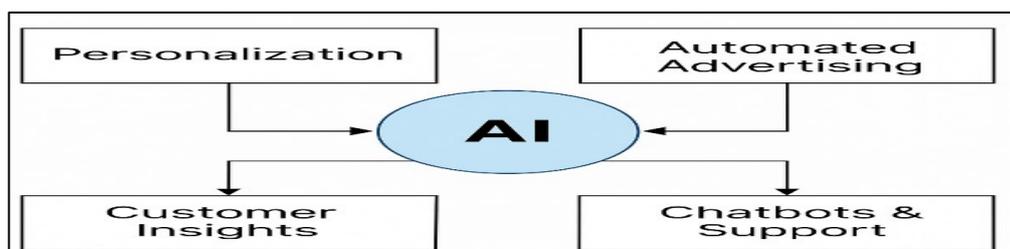

Figure 2. AI Transforming Online Digital Marketing for SMEs, Author Illustration

From Figure 2, facilitating automation, personalization, and data-driven decision-making, AI is transforming digital marketing [18]. AI evaluates enormous volumes of consumer data to improve audience targeting, optimize marketing, and forecast behavior. While recommendation engines make customized product and content recommendations, AI-powered chatbots offer immediate client service. Through programmatic advertising, machine learning enhances advertisement placement, increasing effectiveness and return on investment. AI also speeds up SEO tactics and produces large quantities of excellent content. The emergence of digital entrepreneurship has been greatly influenced by the expansion of social media platforms and the creation of creative digital marketing techniques[19]. Entrepreneurs in the digital economy use internet resources to reach a wider audience, interact with them, and create scalable companies. Due to these advancements, conventional marketing paradigms have changed, presenting both new opportunities and difficulties. Data-driven tactics are being given priority in digital marketing plans, allowing companies to develop highly focused advertising campaigns. Big data analytics and AI developments allow business owners to learn more about the habits, inclinations, and patterns of their customers through sentiment analysis. This has resulted in personalized marketing, where companies create material specifically for each customer to increase engagement and loyalty. Digital entrepreneurship now requires the use of strategies like SEO, pay-per-click (PPC) advertising, email marketing, and content marketing, which help companies increase their exposure and influence in an extremely competitive marketplace. Social networking sites like Facebook, Instagram, Twitter, LinkedIn, and TikTok have completely changed the way business owners interact with their target market. These platforms offer affordable avenues for community development, consumer engagement, and business promotion. Businesses are now able to create engaging stories and promote real-time communication because to features like live streaming, storytelling, and influencer partnerships.

5. Research Design and Methodology

The study adopted systematic research approach to collect and analyze relevant literature regarding the role of digital marketing for SMEs in the digital entrepreneurship economy to establish the theoretical framework. On the empirical realization of the study objective, the research employed qualitative data analysis and a survey approach to collect and examine information pertinent to the research objectives. The study looked at how digital marketing affected SMEs in the Nasarawa Local Government Area of Kano State, which is in

North West Nigeria that has embraced the digital entrepreneurship SMEs model. To accomplish the study's objective, the respondents who run SMEs in the areas were specifically selected at random. Data was collected with a focus on digital entrepreneurship using a field survey. Owing to time constraints, a four-point Likert scale questionnaire and a one-on-one interview centered on the key questions from the SMEs questionnaire were administered. Using a random sampling technique, 450 respondents were selected from the 500 SME population in the study area; almost 90% of the completed questionnaires were recovered and were deemed valuable for data analysis. Details about the SMEs in the research region are shown in Table 1 below. Of the SMEs in the sample, 24% are partnerships, 27% are limited liability firms, and 49% are single proprietorships. Additionally, the results show that while 47% of the sampled SMEs have sales turnover bellow 1million naira, 33% have between 1million to 2.5million naira, 16% between 3million to 4.5million naira, and 4% above 4.5million naira annually, before adopting digital marketing.

The majority of SMEs (24%) make between 1.5 and 3.5 million Naira after implementing digital marketing, which is a higher turnover than the year before when digital marketing platforms for interactive communication were not implemented. This allows entrepreneurs in the digital sector to effectively interact with their target audience using search engine, social media platforms, email service and electronic commerce payment gateways[20]. The results of a descriptive analysis of the sales improvement, a larger percentage of business organizations (18%) produce less than N1.5million in sales value annually after adoption digital marketing, indicating that digital entrepreneurship can offer networks that increase their capacity to sell more goods and services. The economic and investment implication is that while sales values above N1.5M in Naira but not exceeding N6M (in Naira) were observed to experience significant rise for SMEs by 24% and 33% turnover respectively. SMEs with sales over one million but under three and half million were shown to have increased (24%) following the use of digital marketing, compared to 16% prior to this. The implementation of digital marketing has resulted in implied value shifts of more than 33%, and additional sales that exceed N6 million have been found to be more profitable than they were prior to the usage of digital marketing tools. A descriptive assessment of years of business experience marking the duration of business operation shows that 89% of respondents have been in business for more than 6years, 9% have a minimum of 5years in business, and 2% have a minimum of 4years SMEs experience and adoption digital entrepreneurship marketing implementation.

Table 1. SMEs Digital Entrepreneurship Characterizations in the Study Area

SMEs Digital Entrepreneurship Features	SMEs Characteristics	Frequency	Percentage
Investment Category	Sole Proprietorship	220	49%
	Partnership	110	24%
	Limited Liability Company	120	27%
	Total	**450**	**100**
Workforce Size	Less than 5 Employees	215	48%
	Between 5 and 21 Employees	145	32%
	Between 22 and 41 Employees	85	19%
	More than 41 Employees	5	1
	Total	**450**	**100**
SMEs Annual Returns Prior to Digital Marketing Implementation	Bellow 1Million	210	47%
	Between 1 Million and 2.5Million	150	33%
	Between 3 Million and 4.5Million	70	16%
	Above 4.5 Million	20	4%
	Total	**450**	**100**
SMEs Annual Returns after Digital Marketing Implementation	Less than 1.5Million	80	18%
	Between I.5million and 3.5million	110	24%
	Between 3.5Million and 6Million	150	33%
	More than 6Million	110	24%

	Total	450	100
Number of SMEs Investment Life Cycle	Bellow 2 Year	2	0
	Between 2year and 4years	8	2
	Between 5year and 6years	40	9
	Above 6years	400	89
	Total	**450**	**100**

SMEs Field Survey 2024

5.1 Population of the Research Sample

The study's population consisted of 500 SMEs in the Nassarawa business district of Kano, North West Nigeria that had transformed into a digital entrepreneurial economy and effectively deployed digital marketing techniques. From among all SMEs, the researcher selected those with planed digital marketing systems as the primary emphasis of the digital entrepreneurial economy to take part in the study. The instances for this study were selected using a deliberate sampling technique. Using a non-random research technique called purposeful sampling, a researcher selects certain examples from the sample that may yield data pertinent to the study's goals. The deliberate practice of selecting particular cases from a population of a specified distribution is known as sampling. The population of SMEs, the logistical difficulties of reaching examples of digital marketing, and the nature of the underlying elements the research aims to establish all have an impact on the sample strategy selection. The researcher used an intended sample strategy to identify instances and participants who met the qualifying criteria for engagement. To qualify and reflect the digital entrepreneurial economy, participants must be owners or managers of retail SME businesses with intentions to implement e-commerce systems and the SME must be situated in Kano, Nigeria. Using a non-random research technique called purposeful sampling, a researcher selects certain examples from the sample that may yield data that is pertinent to the investigation, as was the case study that is currently underway.

5.2 Instruments of Data Collection

This research made use of primary data collection techniques which include interview and questionnaire to gather relevant information pertinent to the study. The first strategy involved conducting a survey on how digital marketing affects the economy of digital entrepreneurship and the managerial propensity of SMEs to achieve organizational objectives in terms of growing revenue base. The study examined the impact of social media, email, search engine, and mobile marketing on business productivity by distributing a structured questionnaire survey to 500 SMEs in the study area. Out of the total number of questionnaires, 450 were properly completed and returned, reflecting a 90% response rate.

5.3 Analysis of Data

In order to find relevant information and make inferences that aid in decision-making, data analysis is a thorough process that involves examining, cleaning, manipulating, and modeling data[21].   With their attractive GDP contribution, SMEs are at the heart of the Nigerian economy. Their effects on long-term economic growth, including job creation, wealth distribution, and poverty alleviation nationwide, have been extensively studied and evaluated. The emergence of ICT globalization, the expansion of the digital market, and the stimulation of the digital entrepreneurship economy have not yet led to a significant consensus among scholars, researchers, and national economists about the definition of SMEs. Notwithstanding definitional disputes, there is no denying SMEs' significant contribution to Nigeria's economy, which is often attributed to their revenue generating capacity. SMEs in Nigeria are essential in giving the nation's low- and middle-class citizens job and income-generating options. An in-depth investigation of Nigerian SMEs' organizational structures shows that 38% are in distribution, 29% are in manufacturing, 22% are in agricultural, and 11% are in other services. More over 20% of Nigeria's manufacturing output and 70% of industrial jobs are accounted for by SMEs, which as of December 2022 employed 84.02% of the country's workforce. Nigeria, which currently has the largest economy in Africa and is home to more than 220 million people, is expected to have more than 140 million smartphone users by 2025. This has forced SMEs to adapt to the proliferation of social media applications and the economy of scale of digital marketing. Nigeria currently has over 84million smartphone users, according to estimates from a variety of sources[22]. This increases the need for SMEs to expand their market share as well as for the commercialization and monetization of the continent's most popular social media

applications. With reference to Figure 3, the information show case the characterization of SMEs digital marketing adoption characterization.
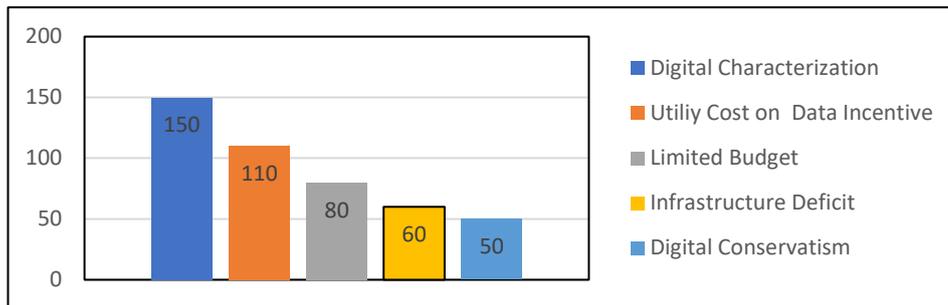

Figure 3. SMEs Digital Marketing Implementation Characterization

With reference to Table 2, it is clear that 66.7% of SMEs use Google Analytics, 88.9% use Electronic Mail Services for SMEs' digital marketing implementation, 64% use corporate websites, 71.1% use bulk SMS for customer research and follow-up, 77.8% use business WhatsApp, 62.2% use Twitter, 68.9% use YouTube channels, and 93.3% use Facebook. The idea of digital marketing is promoted by 84.4% of SMEs using LinkedIn, 44.4% using Blog Media Platform, and 66.7% using Instagram Social Media Platform. In line with this, SMEs mostly employ the, Facebook, Electronic Mail Services, Business WhatsApp platform, Bulk SMS, and Twitter as electronic marketing methods to obtain a competitive edge. These findings are in line with the assertion made by [23] , that social media platforms (Facebook, WhatsApp, and Twitter) are the most widely used electronic digital tools for advertising and customer involvement. In another study, Twitter is a good tool for businesses that wish to communicate with clients immediately and expect timely answers[24]. By utilizing social media effectively, businesses can engage with customers, generate significant results, and establish a direct line of communication with their clientele. Companies that reply to mentions, mails, and comments can create a feeling of community and cultivate deep connections. This implies that social media sites like Facebook, Twitter, and Business WhatsApp are relationship-oriented and require a sustained engagement [25].

Table 2. SMEs Digital Marketing Platforms (SMEs Survey 2024)

Platform for SMEs Digital Marketing	Yes	No	Total
Google Analytics	300(66.7%)	150(33.3%)	450(100%)

Electronic Mail Services	400(88.9%)	50(11.1%)	450(100%)
Corporate Websites	290(64.4%)	160(35.6%)	450(100%)
Bulk SMS	320(71.1%)	130(28.9%)	450(100%)
Business WhatsApp Platform	350(77.8%)	100(22.2%)	450(100%)
Twitter Social Media Platform	280(62.2%)	170(37.8%)	450(100%)
You Tube Media handle	310(68.9%)	140(31.1%)	450(100%)
Facebook Social Media Platform	420(93.3%)	30(6.7%)	450(100%)
LinkedIn Social Media Platform	380(84.4%)	70(15.6%)	450(100%)
Blog Media Platform	200(44.4%)	250(55.6%)	450(100%)
Instagram Social Media Platform	300(66.7%)	150(33.3%)	450(100%)
Podcast Social Media Broadcast	311(69.1%)	139(30.9)	450(100%)

6. Analysis of Research Findings

The results of the study on the use of the TOE framework in online marketing and digital entrepreneurship for SMEs provide important new information. Adoption of technology varies according on SMEs' level of digital readiness, with automation and AI-driven analytics showing great promise. The integration of digital tools is significantly influenced by organizational characteristics, including digital literacy and leadership commitment. Environmental factors that influence SMEs' digital strategy include consumer behavior, market competition, and regulatory rules. The success of digital entrepreneurship is determined by the interplay of technology, organization, and environment, with flexibility playing a important role. In general, SMEs who align their strategy with the TOE framework see an increase in their market reach and digital presence. To maximize their digital transformation and marketing performance, SMEs should take a balanced approach to all three areas, according to the research. Since SMEs usually make a substantial contribution to the growth of the country's GDP and the global economy, performance is one of the most crucial issues in the broader economic discourse. An organization's degree of success in the SMEs digital entrepreneurship is evaluated based on its performance over a specified time period. Based on supply and demand, a SME's strategies for achieving its financial goals and commercial accomplishments usually determine how well it can meet its operational needs.

A combination of non-financial and financial criteria, such as competitive performance, employee development, customer satisfaction, and corporate sustainability, were used in this study to evaluate the performance of SMEs. As a measure of business productivity, such indicators are used by one or more users and are profitably applied to areas of investment concern for SMEs digital marketing campaigns towards economic sustainability. Of the companies listed in table 1 above, 49% are sole proprietorships, 24% are partnerships, and 27% are limited liability corporations. Additionally, the results show that 47% of the SMEs in the sample had yearly sales of less than one million naira, 33% have sales turnover among one million and 2.5 million naira, 16% have sales between three million and 4.5 million naira, and 4% have sales beyond 4.5 million naira. Most SMEs had sales of well over one million dollars before they started using digital marketing. The majority of SMEs (36%) generate between 1.5 million and 6 million Naira in revenue after using digital marketing, which is more than they did in the year before.   A descriptive examination of the sales improvement shows that a larger percentage of enterprises (18%) produce less than N1.5 million in sales value annually after adoption. It is implied that digital marketing had less of an effect on sales growth for transactions less NGN 1.5 million, but firms saw strong growth for sales values over N3.5 million but not beyond N6 million. However, it was found that after using digital marketing, SMEs' sales of 1.5 million to 3.5 million were 4 percent higher than their pre-implementation sales of 33%. Other sales exceeding N3.5 million were found to be better off than they were prior to the usage of digital marketing, and there are inferred value shifts of over 20% as a result of its adoption. 89% of respondents have been in business for more than six years, 9% have between one and five years, and 2% have fewer than four years of experience, according to a descriptive analysis of years of operating experience determined through years of operation of the business.

7. Analysis of Facts from Computational AI Application in Online Digital Marketing for SMEs

- **Numerical Validation of AI-Driven Strategies Against SME Revenue Outcomes**

The validity of AI-powered digital marketing simulations can be checked by contrasting projected revenue patterns with SMEs' real financial reports. Analyzing correlations between AI-generated insights and actual revenue growth can be done with regression models like linear regression or machine learning-based forecasting (like XGBoost).

Results are guaranteed to be reliable through statistical significance testing (e.g., p-values, confidence intervals).

- **Controlled Experimental Setup to Isolate AI's Impact**

    A controlled A/B testing strategy can be created in which one SME group uses AI-enhanced marketing techniques and another group employs conventional marketing techniques over the period of time. Standardized elements like customer targeting, advertisement frequency, and budget allocation are maintained for both groups in order to isolate the impact of AI. An additional way to assess performance trends throughout several marketing periods is using time-series analysis.

- **Monte Carlo Simulations for Uncertainty Validation**

    To measure uncertainty and evaluate the resilience of AI-driven digital marketing campaigns for SMEs, Monte Carlo simulations are frequently employed in predictive analytics. By modeling the spectrum of potential outcomes through repeated random sampling, this technique offers probabilistic insights into predicted income variations, market behavior, and strategic performance. The confidence intervals of AI-based revenue projections can be ascertained by SMEs by adding stochastic noise to prediction models. SMEs can assess the variance and standard deviation in revenue estimates using Monte Carlo methods for measuring statistical uncertainty. To quantify the departure from actual financial results, statistical measures like RMSE (Root Mean Squared Error), MAE (Mean Absolute Error), and MAPE (Mean Absolute Percentage Error) can be used.

- **Numerical Validation of Ethical AI's Impact on Consumer Trust**

    The numerical validation of ethical AI models can be achieved through the examination of customer involvement, satisfactory approvals, and retention rates. Quantitative indicators can be obtained through sentiment analysis of customer reviews and trust ratings. It is possible to compare surveys and trust scores with pre-established ethical AI performance indicators.

- **Enhancing Marketing KPIs: Engagement, Lead Conversion, and Revenue**

    The strategic application of AI-driven tools, customized marketing strategies, and data analytics is necessary to improve key marketing performance indicators (KPIs) like customer

engagement, lead conversion, and revenue growth. Long-term revenue estimates are improved by using AI-driven recommendation systems and predictive customer lifetime value (CLV) models.

8. Conclusion

An organized method for comprehending how SMEs implement online marketing and digital entrepreneurship is provided by the TOE framework. By incorporating technical innovations like AI, automation, and data analytics, SMEs improve their market competitiveness, efficiency, and client engagement. A key factor in determining the direction of digital transformation is the organizational dimension, which includes financial investment, workforce digital literacy, and leadership commitment. The environmental aspect, which includes customer behavior, governmental laws, and market competition, has a direct impact on SMEs' capacity to maintain digital adoption. SMEs can increase market reach, enhance branding, and optimize operations by utilizing TOE, even in the face of obstacles like resource and regulatory limitations. SMEs may optimize digital potential, guaranteeing long-term sustainability and competitive advantage in changing digital landscapes, by encouraging innovation, strategic planning, and policy assistance. Thus, the TOE framework continues to play an important role in helping SMEs achieve optimal online marketing performance and successful digital entrepreneurship. In this study, a completely new investment environment signified by digital entrepreneurship has emerged as a result of the growth of the digital economy. The substantial influence of digital marketing on Nigerian SMEs is examined in this study, which also emphasizes how successful tactics can raise revenue and consumer engagement. The study discovered that a significant portion of SMEs reported higher turnover after implementing digital marketing, demonstrating the techniques' transformative power. In the broader context of digital marketing for SMEs, the study's findings emphasize the significance of management, technology and data utilization, and business model innovation. In order to help business practitioners and associated stakeholders create more flexible and successful digital marketing strategies for SMEs, this research has important implications. This study concluded by highlighting how SMEs that interact directly with their customers on social media and ask for feedback have changed business communication tactics that have supported investment returns.

References

[1]   D. Vrontis, R. Chaudhuri, and S. Chatterjee, "Adoption of digital technologies by SMEs for sustainability and value creation: Moderating role of entrepreneurial orientation," Sustainability, vol. 14, 2022, 7949.

[2]   G. Mugano and N. Dorasamy, SMEs and Economic Development in Africa: Taylor & Francis Group, 2023.

[3]   M. Amin, "Does competition from informal firms hurt job creation by formal manufacturing SMEs in developing and emerging countries? Evidence using firm-level survey data," Small Business Economics, vol. 60, 2023, 1659-1681.

[4]   Z. T. Rahman, R. Lal, and R. Rena, "Industry, Innovation, and Infrastructure: Contribution of SMEs in the Developing Economies," in Entrepreneurship in the BRICS, ed: Routledge, 2025, 218-248.

[5]   D. O. T. Oyekunle, U. Okwudili Matthew, D. Preston, and D. Boohene, "Trust beyond technology algorithms: A theoretical exploration of consumer trust and behavior in technological consumption and AI projects," Journal of Computer and Communications, vol. 12, 2024, 10.4236.

[6]   D. O. Oyekunle, A. C. B. Esseme, M. A. Oladipupo, V. E. Oseni, N. T. Adebola, M. Nwaiku, et al., "Artificial Neural Network Algorithm in Nutritional Assessment: Implication for Machine Learning Prediction in Nutritional Assessments," in Precision Health in the Digital Age: Harnessing AI for Personalized Care, ed: IGI Global Scientific Publishing, 2025,253-276.

[7]   A. Pandey and A. Srivastava, "Brand loyalty in the era of online marketing," Learnovate-International, 2025, 8-12.

[8]   A. C. Nwanakwaugwu, U. O. Matthew, A. A. Kazaure, and K. Haruna, "Data Mining Business Intelligence Applications in Retail Services Using Artificial Neural Networks," in Handbook of Research on Cybersecurity Risk in Contemporary Business Systems, ed: IGI Global, 2023, 186-210.

[9]   I. Bardhan, R. Kohli, E. Oborn, A. Mishra, C. H. Tan, M. C. Tremblay, et al., "Human-Centric Information Systems Research on the Digital Future of Healthcare," Information Systems Research, 2025.

[10]   M. F. Samat, M. N. H. Yusoff, N. Anual, and S. J. A. N. Mohamad, "Mediating role of social media marketing adoption between TOE Framework and competitive intelligence

towards SMEs performance," Review of Integrative Business and Economics Research, vol. 13, 2024, 224-238.

[11] F. Saboune, "AI-Driven Marketing Strategies: Unlocking Growth Potential and Operational Efficiency in the Digital Communication Landscape," in 2024 International Conference on Intelligent Computing, Communication, Networking and Services (ICCNS), 2024,295-301.

[12] B. Rolando, "Marketing Automation in E-Commerce: Optimizing Customer Journey, Revenue Generation, and Customer Retention Through Digital Innovation," Jurnal Ilmiah Manajemen dan Kewirausahaan (JUMANAGE), vol. 4, 2025, 566-580.

[13] S. Philbin, R. Viswanathan, and A. Telukdarie, "Understanding how digital transformation can enable SMEs to achieve sustainable development: A systematic literature review," Small Business International Review, vol. 6, 2022, e473.

[14] M. H. Shahadat, M. Nekmahmud, P. Ebrahimi, and M. Fekete-Farkas, "Digital technology adoption in SMEs: what technological, environmental and organizational factors influence in emerging countries?" Global Business Review, p. 09721509221137199, 2023.

[15] H. T. Bawono, W. Winarno, and K. Karyono, "Effect of Technology, Organization, And External Environment on Business Performance Mediated ByThe Adoption of Technology 4.0 In SMEs," Jurnal Manajerial, vol. 9, 2022, 28-248.

[16] N. Omrani, N. Rejeb, A. Maalaoui, M. Dabić, and S. Kraus, "Drivers of digital transformation in SMEs," IEEE transactions on engineering management, vol. 71, 2022, 334.

[17] S. A. R. Khan, A. A. Sheikh, I. R. A. Shamsi, and Z. Yu, "The Implications of Artificial Intelligence for Small and Medium-Sized Enterprises' Sustainable Development in the Areas of Blockchain Technology, Supply Chain Resilience, and Closed-Loop Supply Chains," Sustainability, vol. 17, 2025, 334.

[18] M. A. Islam, S. I. Fakir, S. B. Masud, M. D. Hossen, M. T. Islam, and M. R. Siddiky, "Artificial intelligence in digital marketing automation: Enhancing personalization, predictive analytics, and ethical integration," Edelweiss Applied Science and Technology, vol. 8, 2024, 6498-6516.

[19] N. Razak, N. Syamsu, M. R. Djunaid, and A. Tenriolle, "Exploring Digital Entrepreneurship: A Qualitative Study on New Business Models and Digital Marketing

Strategies," Golden Ratio of Marketing and Applied Psychology of Business, vol. 4, 2024, 140-151.

[20] S. A. Khan, "E-marketing, e-commerce, e-business, and internet of things: an overview of terms in the context of small and medium enterprises (SMEs)," Global applications of the internet of things in digital marketing, 2023, 332-348.

[21] B. Yu and R. L. Barter, Veridical data science: The practice of responsible data analysis and decision making: MIT Press, 2024.

[22] A. A. Gumel, A. B. Abdullahi, and U. M. O, "The Need for a Multimodal Means of Effective Digital Learning through Data Mining and Institutional Knowledge Repository: A Proposed System for Polytechnics in Northern Nigeria," in Proceedings of the 2019 5th International Conference on Computer and Technology Applications, 2019,81-85.

[23] U. M. Okwudili and J. S. Kazaure, "Digital activism and digital revolution in objective journalism," International Journal of Interactive Communication Systems and Technologies (IJICST), vol. 10, 2020, 39-56.

[24] C. Salvatore, S. Biffignandi, and A. Bianchi, "Social media and twitter data quality for new social indicators," Social indicators research, vol. 156, 601-630, 2021, 601-630.