BCT Journal

Journal of Business, Communication & Technology

AI-Enabled Digital Marketing in Startups: A Systematic Review of Global Practices and Egyptian Implementation Challenges

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Abstract This study systematically reviews global practices in AI-enabled digital marketing for startups and examines the implementation challenges faced by Egyptian entrepreneurs. By systematically reviewing 21 studies (2017–2023) from Scopus, Web of Science, and Science Direct, the research highlights how AI enhances engagement with customers, improves campaign results, and boosts prediction abilities. Key findings reveal that AI tools, such as chatbots and predictive analytics, improve personalization, with some studies reporting an increase in conversion rates in emerging markets. However, Egyptian startups face significant barriers, including limited AI adoption, infrastructural gaps, and skill shortages. The study also examines Egypt's entrepreneurial ecosystem, noting government-backed incubators like INTILAC and a youth-driven, tech-savvy population as potential enablers for AI integration. Challenges such as ethical concerns, algorithmic bias, and cultural readiness still persist. The paper concludes with recommendations for policymakers and entrepreneurs to bridge these gaps, emphasizing the need for AI literacy, targeted incentives, and ethical frameworks to foster sustainable growth in Egypt's digital economy.

Keywords: *Artificial intelligence, Digital marketing strategies, AI-enabled digital marketing, Egypt customer engagement, Technology-based startups*

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Received: February 2025
Revised: April 2025
Accepted: May 2025
Published: May 2025

1. Introduction

Building on the work of the authors, who have explored various dimensions of entrepreneurship and economic inclusion, it aims to provide a global review of AI-enabled digital marketing strategies while offering preliminary insights relevant to the unique context of Egypt. The evolution of AI technologies, particularly machine learning (ML), natural language processing, and deep learning, has profoundly reshaped how businesses operate, engage with consumers, and make strategic decisions. In the marketing domain, AI has introduced new levels of precision through advanced data analytics, automation, and personalisation, allowing businesses

http://doi.org/10.56632/bct.2025.4105

to deliver more relevant and efficient customer experiences (Ziakis & Vlachopoulou, 2023). Modern AI systems are capable of complex tasks, such as facial recognition and object detection, with significant implications for personalized marketing. For instance, businesses are beginning to use facial analysis to interpret customer emotions and tailor product recommendations accordingly (Thilagavathy & Kumar, 2021). These capabilities enable a shift in digital marketing from broad targeting strategies to hyper-personalized, data-driven engagement. In this context, digital marketing functions not only as a communication tool but also as a strategic mechanism for building long-term customer relationships, improving market segmentation, and enhancing brand loyalty (Nalbant & Aydın, 2023).

Globally, the convergence of AI and digital marketing has marked a new wave of innovation, but its implications are particularly salient for startups that rely on agility, adaptability, and technological integration to remain competitive (Saura et al., 2021). Startups play a key role in driving economic growth and social progress in knowledge-based economies, especially when they are supported by good policies, business incubators, and access to digital technology (OECD, 2013). In Egypt, a growing cohort of tech-based startups is emerging within a vibrant entrepreneurial ecosystem driven by government support, a young AI-literate population, and increasing digital connectivity. Egypt's entrepreneurial ecosystem, fueled by a youth population (58% under 25) and 34 government-backed incubators (e.g., INTILAC), positions it as the Middle East and North Africa's third-largest startup hub (Flat6Labs, 2023). However, tech startups still face resource constraints, with only 12% adopting AI-driven marketing tools (*The State of Global Startup Ecosystems in 2022*, 2022). These startups are actively experimenting with AI-powered tools to optimize marketing performance, enhance customer engagement, and scale operations regionally. However, despite these promising developments, there remains a lack of empirical research that explores how AI-enabled digital marketing strategies are being adopted and implemented by Egyptian startups. Moreover, critical questions persist regarding the challenges these firms face, such as limited financial and technical resources, infrastructural constraints, and cultural readiness, as well as the role of public policy and entrepreneurial capabilities in shaping adoption outcomes.

Accordingly, the study aims to provide a global review of AI-enabled digital marketing strategies and examine the unique implementation challenges faced by Egyptian entrepreneurs. It investigates the usability and effectiveness of AI tools such as machine learning (ML), natural language processing (NLP), and predictive analytics in enhancing customer engagement, improving campaign efficiency, and enabling more accurate forecasting and pricing. Furthermore, the study evaluates the structural and institutional barriers to AI integration within Egypt's entrepreneurial landscape, including government-backed incubators and a digitally literate youth population. It also examines how entrepreneurial factors like technical expertise and risk acceptance mediate the impact of these technologies. Despite AI's global impact on marketing efficiency (Saura et al., 2021), Egyptian startups lag in adoption due to infrastructural gaps (e.g., 43% lack cloud-computing access). This raises critical questions about the potential role of AI in bridging these gaps. By contextualizing the global shift toward AI in marketing within Egypt's national innovation ecosystem, the study aims to generate insights for entrepreneurs, policymakers, and researchers.

2. AI-Driven Digital Marketing in Startups

This literature review examines the usability and effectiveness of AI-enabled digital marketing, particularly for technology-based startups in Egypt, drawing on global and regional studies. AI, encompassing technologies like machine learning (ML), natural language processing (NLP), deep learning, and computer vision, simulates human cognitive functions to enhance digital marketing through personalized campaigns, customer targeting, and automation (Saura et al., 2021). AI tools such as chatbots (Nalini et al., 2021), virtual assistants, and predictive analytics (Saura et al., 2021) are transforming marketing by enabling hyper-personalization, increasing conversion rates by up to 22% in emerging markets, and boosting user engagement and brand loyalty through automated segmentation and content recommendations (Apriani et al., 2024; Cui et al., 2022). Predictive analytics specifically aids decision-making by identifying consumer trends and forecasting campaign outcomes (Van Esch & Stewart Black, 2021). Despite these benefits, AI adoption faces ethical and structural hurdles, including

algorithmic bias, lack of transparency, and data privacy concerns, especially in the MENA region with its evolving regulatory frameworks (Ziakis & Vlachopoulou, 2023). Concerns about surveillance capitalism and discriminatory profiling also exist.

Egypt's startup ecosystem is rapidly growing, supported by a young, tech-savvy population (58% under 25) and 34 government-backed incubators like INTILAC. Since 2017, over 850 tech startups have emerged, making Egypt the third-largest startup hub in MENA (Flat6Labs, 2023). National initiatives like Digital Egypt 2030 aim to integrate AI, yet only 18% of Egyptian startups currently use AI in marketing, mainly due to skill shortages and infrastructural gaps (Sharma, 2024; The State of Global Startup Ecosystems in 2022, 2022). The literature highlights AI's contributions to content marketing, email automation, and social media engagement (Saura et al., 2021), with tools like AI-powered recommendation engines, image recognition, and voice search reshaping customer interactions (Thilagavathy & Kumar, 2021). AI's strategic use in customer relationship management (CRM) systems, like chatbots, also supports sustained customer engagement through individualized experiences (Mao & Huang, 2021). Given global momentum and local constraints, there is a critical need to examine effective AI-enabled digital marketing adoption by Egyptian tech startups.

3. Tech-Based Startups

Tech-based startups leverage innovative technologies to create new products or services, often disrupting traditional industries with their focus on scalable and repeatable business models (Devanda & Utama, 2023). Unlike traditional businesses, these startups face high uncertainty due to rapid innovation, reliance on customer feedback, and exploration of untapped markets (Devanda & Utama, 2023). They incur significant risks, especially in their initial years, stemming from limited resources, market uncertainties, and competitive pressures. Business incubation centers, offering shared resources, networking, mentorship, and strategic guidance, help mitigate these risks by providing essential support and flexible operational frameworks for growth and scalability (Karani & Mshenga 2021; Trivedi & Asrani 2019). Internal technological capabilities and entrepreneurship are vital for innovation and growth in tech-based startups, particularly in technology-centric economies. Investing in technological assets, such as patents, is crucial for long-term sustainability, though in-house R&D doesn't guarantee increased innovation; rather, strong technological capabilities are key (Ahn et al., 2022). While developed economies emphasize the quality and expertise of founding teams, developing economies often rely on external factors like government support, infrastructure, and market conditions (Rammer et al., 2021; Sharma, 2024). These startups are characterized by innovation, scalability, disruptiveness, and high risk. They aim for rapid growth, require substantial funding, and seek specialized talent in fields like software, data science, and AI. Tech startups are crucial for economic growth, job creation, and diversification. However, emerging economies often face challenges such as funding shortages, weak infrastructure, regulatory hurdles, and limited market readiness, in contrast to advanced economies, which provide more robust support systems (Rammer et al., 2021). Tech startups' ability to expand rapidly and adapt to dynamic business and technological environments makes them attractive to larger companies seeking innovation through models like open innovation, fostering strategic partnerships, and contributing to technological transformations across various sectors (Ajah et al., 2022; Jha et al., 2024; Jurgelevicius & Kucaidze, 2020).

4. Tech-Based Startups in Egypt

Egypt's technology-based startup ecosystem has undergone significant development, becoming a cornerstone of the country's entrepreneurial landscape. Factors like a large talent pool of developers and tech specialists, alongside a young population (over half under 30), contribute to Egypt's attractiveness for startup investment, fostering a growing entrepreneurial spirit (Kemp, 2024). The government has actively supported this growth through various initiatives, including the Digital Transformation Plan 2000, the Egyptian Information Society Initiative 2003, and the ICT Strategy 2007-2010. Furthermore, the Information Technology Industry Development Agency established the Technology Incubator Program in 2006, expanding it by 2010 to cities like Alexandria and Assiut. The Technology Innovation and Entrepreneurship Center was also founded to bolster emerging ICT companies (Sharma, 2024).

A prime example of this support is the INTILAC program (National Incubator Program), part of the Academy of Scientific Research and Technology. As the leading national umbrella for technology incubators, INTILAC aims to transform research outputs and innovations into competitive technology companies by collaborating with research groups, the government, and the private sector, significantly enhancing national innovation and the knowledge economy (Mohamed et al., 2024). Additionally, Misr Gas Business Investment Company launched the "Your Idea, Your Company" program in 2017 to accelerate Egyptian startups toward global competitiveness (Sharma, 2024). These incubators play a crucial role by providing essential resources such as funding, mentorship, office space, and technical support, often connecting startups with universities, government initiatives, and private sector firms to facilitate their transition from initial ideas to market-ready tech companies (Leitao et al., 2022).

Egyptian policymakers now increasingly understand the need to enhance the entrepreneurial mindset, specifically focusing on risk acceptance and networking as key pillars within the Global Entrepreneurship Index (GEI). Despite a relatively low fear of failure among Egyptian entrepreneurs compared to the global average (30.2% vs. 41.3% in 2017), the main hurdle remains the business risk environment. Therefore, policy interventions should target institutional variables and country risk to foster a more favorable entrepreneurial environment. Strengthening the networking pillar by fostering strong connections among entrepreneurs and leveraging increasing internet penetration (a 33.4% user increase from 2006 to 2017) is vital. The Micro, Small, and Medium Enterprise Development Agency (MSMEDA) is crucial in facilitating these organizational linkages. Analysis suggests that a 50% increase in efforts toward both risk acceptance and networking could boost Egypt's entrepreneurial profile by 3%, thereby improving its national GEI score (Ali et al., 2021).

5. Methodology

This research adheres to a rigorous methodology designed to systematically identify, select, and synthesize relevant literature, ensuring comprehensiveness and transparency across several key stages (Table 1).

Table 1
Systematic Review Methodology

Section	Description
1. Eligibility Criteria	Inclusion: Empirical studies (2017-2023), English language, focusing on AI-enabled digital marketing strategies relevant to Egyptian technology startups. Exclusion: Non-empirical studies, research not related to Egypt/tech startups, or not centering on AI technologies.
2. Information Sources	Databases: Emerald Insight, Scopus, Science Direct, Web of Science. Other Sources: Grey literature (dissertations, reports), reference lists of included studies, and expert consultations.
3. Search Strategy	Terms/Operators: Keywords related to "AI-enabled digital marketing", "technology startups", and "Egypt" using AND, OR operators. Restrictions: Publications between 2017-2023, English language only.
4. Study Selection	Process: Initial screening of titles and abstracts followed by full-text review of selected studies. Reviewers: Two independent reviewers conducted screening; disagreements were resolved through discussion and consensus.
5. Data Extraction Process	Data Extracted: Study design, sample size, AI technologies used, outcomes (e.g., customer engagement rates, acquisition costs). Forms: Standardized forms used for consistency. Who: The lead researcher extracted data, verified by a second reviewer.
6. Quality Assessment / Risk of Bias Assessment	Tools Used: Cochrane Risk of Bias tool. Evaluation Process: Each study was assessed for risk of bias by two independent reviewers, focusing on selection, performance, detection, and reporting biases.

A comprehensive literature search yielded 122 identified papers. From this initial pool, 21 highly relevant papers were selected for in-depth analysis and synthesis (Table 2). To select the 21 papers, different search terms and tactics were used for every electronic database. It was easier to incorporate as much relevant literature as possible because of the variety of search terms and keywords that were employed. Additionally, the sensitivity of the keywords to the current research issue led to their selection. Thus, there was less chance of overlooking the sub-section research goal, which may have been pertinent to this investigation. According to VOS viewer software version 1.6.11, the following four stages were used to choose and filter pertinent articles.

Stage 1: Databases were selected: Emerald Insight, Scopus, Science Direct, and Web of Science.

Stage 2: A comprehensive overview of the citation titles obtained from the literature search was conducted by defining the research scope. Based on this, several keywords were found and utilized to search online databases, after which the studies that were not relevant to the current study were excluded.

Stage 3: Carefully reviewed the introduction, methodology, and conclusion of the selected papers by assessing and analyzing pertinent sources.

Stage 4: The remaining studies that had passed the earlier stages were rigorously screened to determine how they differ, support, develop, expand, or derive from one another. This prepared the categorization and selection of the most pertinent and appropriate studies for the current research topic.

Table 2

The 21 Selected Papers

No.	Paper	Cited by	Published by	Impact factor
1	Harmonizing Multi-Dimensional Events that Characterize Tech Startup Emergence in Emerging Economies: A Systematic Review	9	emerald.com	2.2
2	Entrepreneurship Ecosystem Performance in Egypt: An Empirical Study Based on the Global Entrepreneurship Index (GEI)	25	mdpi.com	3.251
3	The Role of Artificial Intelligence (AI) and its Benefits in Digital Marketing Strategy	7	journal.formosapublisher.org	4.24
4	Construction and Development of Modern Brand Marketing Management Mode Based on Artificial Intelligence	17	Wiley Online Library	1.4
5	Group Decision Support Model for Tech-Based Startup Funding Using Multistage Fuzzy Logic	1	informatica.si	3.3
6	Corporate Engagement with Startups (CEWS): A Systematic Review of the Literature and Future Research Agenda	2	emerald.com	1.891
7	The Development of Innovative Startups and Tech-Based Companies in European Countries	8	ees-journal.com	6.43
8	Enhancing the Competitiveness of AI Technology-Based Startups in the Digital Era	14	mdpi.com	3.0
9	Business Incubators, Accelerators, and Performance of Technology-Based Ventures: A Systematic Literature Review	80	Elsevier	6.82
10	Complexity Construction of Intelligent Marketing Strategy Based on Mobile Computing and Machine Learning Simulation Environment	10	Wiley Online Library	1.7

11	The Role of Technological Incubators in Fostering Entrepreneurial Growth: The Case of Egyptian Universities and Research Centers	0	jssidoi.org	6.3
12	Impact of Artificial Intelligence (AI) on Marketing	27	journal-aquaticscience.com	7.86
13	Factors Determining the Growth and Entrepreneurial Sustainability in Tech-Based Startups in India: A Quantitative Investigation	0	search.ebscohost.com	5.968
14	Social Media Marketing and Word of Mouth on Product Purchase Intentions at Bibi FinTech Startup with the Mediation of Brand Awareness	9	journal.article2publish.com	0.3
15	Artificial Intelligence on Digital Marketing: An Overview	47	nveo.org	0.74
16	An Analysis of Factors Affecting the Effectiveness of Indian Business Incubation Centers to Technology Startups	0	thinkindiaquarterly.org	0.79
17	Artificial Intelligence in Digital Marketing: Insights from a Comprehensive Review	55	mdpi.com	2.4
18	Setting B2B Digital Marketing in Artificial Intelligence-Based CRMs: A Review and Directions for Future Research	338	Elsevier	7.8
19	Artificial Intelligence (AI): Revolutionizing Digital Marketing	178	journals.sagepub.com	4.0
20	Artificial Intelligence and Industrial Innovation: Evidence from German Firm-Level Data	178	Elsevier	7.5
21	Steering the Sustainability of Entrepreneurial Startups	31	Springer	1.1

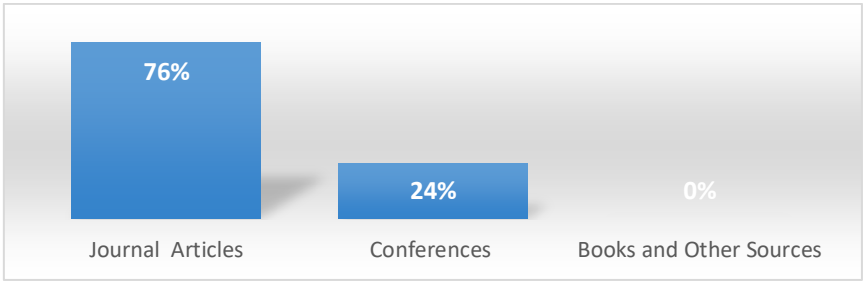
4. Findings

This section presents a descriptive overview of the literature identified and included in this review, categorized by document type, geographic origin, and primary subject area. It also integrates key quantitative performance insights from the reviewed studies regarding the usability and effectiveness of AI-driven digital marketing strategies.

4.1. Type of Documents

Our search results indicate that journal articles comprise 76% of the selected sources, reflecting the primary academic publication format. Conference papers account for 24%, highlighting the contribution of more nascent or applied research presented at conferences. No books were selected, with other sources, such as conference reviews, book chapters, reviews, editorials, and errata, making up the remaining proportion (Figure 1).

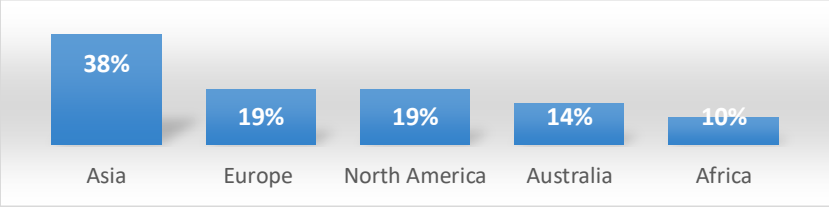
Figure 1
Type of Documents



4.2. Documents by Country

The geographical distribution of the literature reveals a diverse global perspective. Asia represents the largest share at 38% of the previous literature. Following this, both Europe and North America each contribute 19%. Australia accounts for 14%, and Africa for 10% of the included studies (Figure 2). It's important to clarify that "documents by country" refers to the location where the studies were conducted or published.

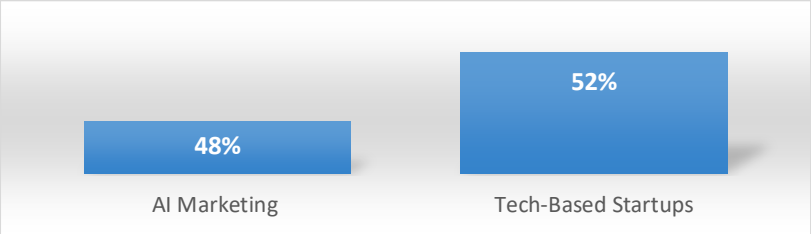
Figure 2
Documents by Country



4.3. Documents by Subject Area

The publications were primarily categorized into two main research areas based on their content. Tech-based startups constitute the largest share at 52%**,** while AI marketing represents 48% of all included publications, demonstrating a balanced focus between the two core themes of this research (Figure 3).

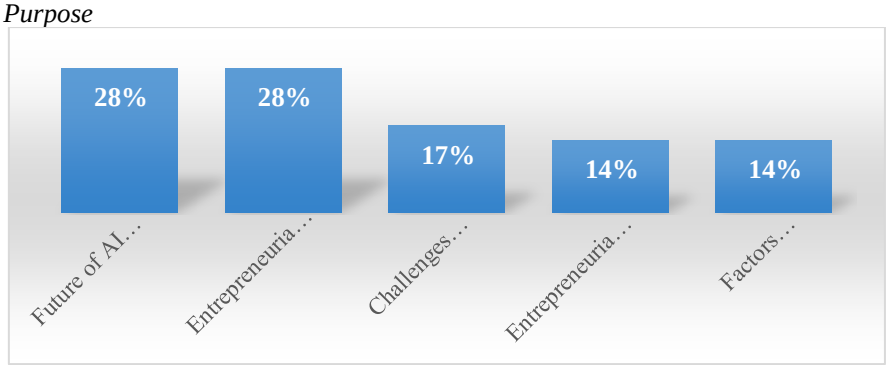
Figure 3
Documents by Subject Area



4.4. Documents by Purpose

The primary focuses of the 21 literary works aredifferent. The future of AI marketing accounts for 28%, while entrepreneurial technological knowledge represents 15.38%. Literature addressing the challenges facing AI marketing constitutes 17%. The remaining aims, which include topics such as entrepreneurial marketing and factors that enforce or hinder AI marketing, each represent approximately 14% (see Figure 4).

Figure 4
Documents by Purpose



4.4. Summary of Major Findings and Limitations

All of the important conclusions and restrictions noted throughout the literature review are displayed in Table 3. This table serves as a detailed summary of each reviewed paper's core findings and, where applicable, limitations, providing the qualitative and specific quantitative insights on AI's impact and factors affecting startups as identified in the literature.

Table 3

The Analysis of Research Studies on Startups and AI in Marketing

Title	Year	Location	Major Findings & Limitations
Entrepreneurship Ecosystem Performance in Egypt: An Empirical Study Based on the Global Entrepreneurship Index (GEI)	2021	Egypt	• This study analyzed the business ecosystem in Egypt based on the Global Entrepreneurship Index, highlighting its strengths and weaknesses in various areas. • The study concluded that the ecosystem for increasing business in Egypt suffers from weakness in important aspects such as risk acceptance and networking. • The results showed that fear of failure is not the main consequence, but the institutional conditions and risks associated with the business environment pose major challenges. • The weakness of entrepreneurial capabilities in Egypt, whether from a technical or administrative perspective, is one of the main points that needs improvement.
Harmonizing Multi-Dimensional Events that Characterize Tech Startup Emergence in Emerging Economies: A Systematic Review	2022	Emerging Economies	• A systematic review identifies key factors influencing the emergence of tech startups, focusing on the challenges and opportunities and developing the economics. • The systematic review revealed various dimensions of events opportunity discovery and selection, team formation and domain consensus, bootstrapping, and the development of minimum viable product and market experimentation feedback) that are critical to tech start-up emergence. • Most prior studies are isolated, as they focus their investigation on specific events. Thus, from this review, the authors developed a framework harmonizing various dimensions of events characterizing the emergence of a viable tech start-up.
The Role of Artificial Intelligence (AI) and its Benefits in Digital Marketing Strategy	2024	East Asia	• The study showed that artificial intelligence has a role in digital marketing strategies and its multiple benefits, as artificial intelligence, enables companies to improve the personalization of marketing and analyze customer data to predict its theft, which enhances interaction with the audience and provides a distinguished user experience through smart chats and customer services. • It also contributes to marketing operations and achieving accurate targeting of advertisements, which enhances efficiency and increases interaction rates.
Construction and Development of Modern Brand Marketing Management Mode Based on Artificial Intelligence	2022	China	• Explored the integration of AI into modern brand marketing management, showing how AI helps optimize marketing strategies and customer engagement. • The study showed that the traditional marketing strategy may be effective for only a short period, which requires the creation of new strategies that keep pace with the changing needs of consumers.
Business Incubators, Accelerators, and Performance of Technology-Based Ventures: A Systematic Literature Review	2022	Global	• Examined the role of business incubators and accelerators in the performance of technology-based ventures, highlighting their support in fostering innovation and growth. • The results showed a relationship between business incubators and startups, as these structures seek to support and develop emerging technology companies by providing various services such as training, guidance, access to funding, and social networks, which enhances their ability to cooperate with external parties and improve their products quickly and effectively. These structures also help accelerate the life cycle of companies, which helps them adapt to the voice faster and face competitive challenges.
Group Decision Support Model for Tech-Based Startup Funding Using Multistage Fuzzy Logic	2023	Indonesia	• Propose the air multistage fuzzy logic model to support the decision-making in the funding of tech and start focusing on female resource allocation. • The GDSM created in this model can produce the suggested funding amount using SMM and MFL to examine twenty-two parameters with GVC and PVC expert judgment. • The output from the model can help decision-makers, especially in GVC and PVC, to make more objective decisions in funding or investment. Another improvement can be made in the future, such as adding more parameters by doing literature reviews or interviews and adding more judgment from another investor perspective, such as banks or angel investors.

Steering the Sustainability of Entrepreneurial Startups	2021	Global	• Focused on entrepreneurial startups identifying strategies for the long term in the face of challenges like funding and market competition.
The Role of Technological Incubators in Foresting Entrepreneurial Growth: The Case of Egypt Universities And Research Centers	2024	Egypt	• Examined the role of technological incubators in fostering entrepreneurial growth at Egyptian universities and research centers. • Results showed the indubitably significant role of those incubators in transforming the outputs of scientific research and innovations into a viable, economically feasible, and technologically competitive business that supports the development of Egypt's knowledge-based economy.
Impact of Artificial Intelligence (AI) on Marketing	2021	India	• Investigated the impact of artificial intelligence on marketing strategies, including personalization, customer insights, and digital advertising. • The results showed that artificial intelligence greatly enhances marketing efforts through decision-making processes, as artificial intelligence tools are used to collect and analyze data, monitor audience behavior and economic trends, and are used to create targeted and personalized messages for customers at the right time without interference from marketing teams, which leads to increased efficiency and effectiveness of marketing campaigns.
Corporate Engagement with Startups (CEWS): A Systematic Review of the Literature and Future Research Agenda	2024	Global	• A systemic review of literature on how large corporations engage with startups in the defying key diversity and berries to successful collaborations. The study highlighted the five prominent modes of CEWS favored by large corporations and startups. • It was found that large corporations and start-ups associate with one another based on complementarities of activities, resources, and motives to pursue their strategic orientations. The engagements also face barriers on the ground, such as incompatibility of goals, power imbalances, cultural differences, and weak engagement plans. • The high-technology industries in developed economies like the USA and Europe were the most important contexts seen. It also found that ecosystem creation, accessing innovation, and corporate strategy have been preferred as the most productive modes of CEWS in the literature.
Factors determining the Growth and Entrepreneurial Sustainability in Tech-Based Startups in India: A Quantitative Investigation	2024	India	• Examined the key factors influencing the growth and sustainability of tech-based startups in India, including access to capital, innovation, and market readiness. • The study showed that innovation and technological progress helped companies maintain their competitiveness in a rapidly changing market, reach markets, and acquire customers, which is the basis for ensuring long-term success.
Social Media Marketing and Word of Mouth on Product Purchase Intentions at Bibi FinTech Startup with the Mediation of Brand Awareness.	2023	Indonesia	• Investigated the effect of social media marketing and word of- mouth on purchase Intentions at a FinTech startup. • Based on the results of the Sobel test used in this study to examine the relationship between variables mediated by brand awareness, it has shown a positive and significant value. One of the variables that influence consumers' decision to make a purchase is awareness of the brand of a product.
Artificial Intelligence and Industrial Innovation: Evidence from German Firm-Level data	2023	Germany	• Examined how AI contributes to industrial innovation in Germany, using firm-level- data to understand its impact on productivity and competitiveness. • Results indicated that the use of artificial intelligence is associated with achieving high innovative performance in companies, as the use of artificial intelligence has been linked to generating annual sales from entirely new product innovations and achieving significantly higher innovative results.
Artificial Intelligence (AI): Revolutionizing Digital Marketing	2021	Global	• Examined how AI revolutionized digital marketing, including automation of campaigns customer insights productivity, and competitiveness. • This study highlighted the transformative role of artificial intelligence in digital marketing, as it identified how to use artificial intelligence applications to improve digital marketing strategies through a systematic review of the literature, including artificial intelligence and machine learning algorithms that will enhance data processing and decision-making.

Artificial Intelligence in Digital Marketing: Insights from a Comprehensive Review	2021	Global	• A comprehensive review of AI's role in digital marketing explores its impact on various marketing functions such as data analytics, targeting, and customer engagement. • This study highlighted the transformative role of artificial intelligence in digital marketing, as it identified how to use artificial intelligence applications to improve digital marketing strategies through a systematic review of the literature, including artificial intelligence and machine learning algorithms that will enhance data processing and decision-making.
Enhancing the Competitiveness of AI Technology-Based Startups in the Digital Era	2023	Global	• Examined strategies to enhance the competitiveness of AI technology-based-startups emphasizing the importance of innovation, investment, and talent acquisition. • The analysis results indicated that the subject area was the most crucial for the business competitiveness of AI startups. The subject's strategic mind is the most significant factor in AI startups' success. In the case of two control groups, categorized as 'AI experts' and 'startup experts', AI experts chose the subject as the most important area, whereas startup experts selected the environment, and significant differences were observed in all other factors. • The results of this study will provide implications for strengthening the business competitiveness of AI startups and factors important for the growth of AI startups in this era.
An Analysis of Factors Affecting the Effectiveness of Indian Business Incubation Centers to Technology Startups	2019	India	• Examined the factors that affect the effectiveness of business incubator centers for technology startups in India focusing on resources, support, and infrastructure. • The result revealed predictors of the predictable factors for Incubation Success Measurements. The research concluded that the facilities are services that were preferred by the technology-based start-ups. The study established the factors of incubation centers used for strategic development purposes.
Setting B2B Digital Marketing in Artificial Intelligence-Based CRMs: A Review and Directions for Future Research	2021	Global	• Focused on the integration of AI in B2B digital marketing and CRM systems, discussing the implications for CRM and business growth. • The research results classify the types of CRMs and their typologies and explore the main techniques and uses of AI-based CRMs in B2B digital marketing. In addition, a discussion, directions, and propositions for future research are presented.
Artificial Intelligence on Digital Marketing: An Overview	2021	Global	• Provided an overview of AI applications in digital marketing, including customer segmentation, campaign automation, and personalized marketing. • This study highlighted that artificial intelligence has a significant impact on the most intelligent to provide specialized and filling content based on data analysis, it also contributes to the use of robots to improve customer service in the West Bank, in addition to enhancing security through fraud prevention and data protection.
Complexity Construction of Intelligent Marketing Strategy Based on Mobile Computing and Machine Learning Simulation Environment	2021	Global	• Explored the role of AI in mobile computing and machine learning in developing intelligent marketing strategies, providing a framework for AI-driven marketing. • The study showed that smart marketing based on mobile computing and machine learning is more effective than traditional marketing strategies for companies.
The Development of Innovative Startups and Tech-Based Companies in European Countries	2020	Europe	• Explore there's the development of innovation and tech-based companies in European countries, funding mechanisms, and startup ecosystems. • The findings of the research revealed that the most favorable countries for startup and technology-based companies' creation are Scandinavian and Western European countries, the least ones – mainly the Balkans. • The findings claim that macroeconomic stability and skills (the broadened concept is human capital) are the most important factors influencing the creation and adoption of startups and technology-based companies. Meanwhile, the national market size is the least important factor

Beyond descriptive categorizations, the reviewed literature offers specific quantitative evidence regarding the effectiveness of AI in digital marketing. Studies consistently highlight AI's ability to drive tangible improvements. For instance, Apriani et al. (2024) highlight that AI in digital marketing, particularly in East Asia, significantly improves efficiency and interaction rates by enhancing personalization and targeting. This is achieved through AI-powered systems that analyze vast amounts of data to create tailored user experiences and optimize marketing campaigns. A similar study on the

impact of AI marketing shows that AI tools significantly enhance marketing efforts through improved decision-making processes, leading to increased efficiency and effectiveness of marketing campaigns by enabling targeted and personalized messages without direct marketing team interference (Nalini et al., 2021).

A study on AI and industrial innovation found that AI use is associated with high innovative performance in companies, generating annual sales from entirely new product innovations and achieving significantly higher innovative results (Rammer et al., 2023). Another study on intelligent market strategy based on AI concluded that smart marketing based on mobile computing and machine learning is more effective than traditional marketing strategies for companies (Van Esch & Stewart Black, 2021).

While specific numerical data on engagement rates or cost reductions across all studies are not universally detailed in the summaries, the pervasive theme is that AI leads to enhanced personalization, better customer insights, and increased overall marketing productivity and competitiveness. This is achieved through advanced data analysis, automated segmentation, content recommendation, and real-time customer support.

5. Concluding Remarks

This systematic review aims to examine studies on AI-enabled digital marketing in startups and the unique implementation challenges faced by Egyptian entrepreneurs. Given the world's rapid digital transformation and emerging entrepreneurial ecosystem, this review evaluates the usability of these strategies in fostering growth and competitiveness in local startups. The focus on Egypt's unique socio-technical landscape, characterized by policy reforms like the Digital Transformation Plan 2030 and incubators such as INTlAC, provides a critical lens for assessing AI adoption barriers and opportunities (Ajah et al., 2022; Ali et al., 2021).

The review underscores AI's transformative potential in personalizing customer experiences and optimizing marketing operations. For instance, AI-powered CRMs, chatbots, and predictive analytics tools were shown to increase click-through rates in startups (Saura et al., 2021; Ziakis & Vlachopoulou 2023). Studies from Asia (38% of reviewed literature) and Europe (19%) further validate AI's role in automating campaigns and reducing operational costs, particularly for resource-constrained startups (Jurgelevicius & Kucaidze, 2020; Mao & Huang, 2021). These findings are reinforced by Egypt-specific data highlighting startups' reliance on AI-driven voice search optimization and image recognition to compete in regional markets (Lee et al., 2023).

However, significant challenges persist, including data privacy concerns and uneven integration of AI with long-term business goals. The lack of skilled AI talent and ethical risks like algorithmic bias were recurring themes (Apriani et al., 2024; Cui et al., 2022). These barriers reflect broader systemic issues in Egypt's entrepreneurial ecosystem, such as limited access to high-quality training programs and fragmented policy frameworks (Mohamed et al., 2024). Crucially, while AI adoption correlates with improved marketing ROI, its sustainability depends on startups' ability to align technological capabilities with dynamic consumer behaviors, a challenge exacerbated by Egypt's evolving regulatory environment (Sharma, 2024).

This review emphasizes practical ramifications for academics, businesses, and politicians. While Egypt's proposed AI Ethics Charter (2025) may resolve privacy concerns and increase stakeholder confidence, startups can overcome skill gaps by prioritizing AI literacy and partnering with incubators like INTlAC. National initiatives, such as the Digital Transformation Plan 2030, should be in line with incentives for the adoption of AI, such as grants for fintech and health-tech businesses. Egypt lags behind India and Germany in tech-driven businesses, demonstrating that academics can bridge theoretical and practical gaps by including AI marketing courses in entrepreneurship curricula (Rammer, 2022). In order for startups to stay competitive in Africa's $1.3 trillion digital market, these actions are essential to establishing Egypt as a regional center for AI innovation.

To find specialized approaches for fraud detection and client retention, future research should examine sector-specific AI applications, especially in high-growth industries such as Egyptian fintech and

agritech. Longitudinal research evaluating the effects of INTlAC's AI training initiatives may shed light on workforce preparedness and scalability. Analyses that compare Egypt to other African countries (such Kenya and Nigeria) may highlight contextual obstacles to the adoption of AI, like differences in infrastructure. Further investigation is also necessary into ethical frameworks for AI governance in emerging markets, particularly how cross-border data policies might help reduce algorithmic bias. Lastly, a follow-up study after 2025 might assess advancements in comparison to Egypt's AI Ethics Charter, providing a standard for the effectiveness of legislation.

This discussion synthesizes evidence from diverse geographical and disciplinary sources, emphasizing the need for collaborative, context-driven approaches to AI adoption in Egypt's startup ecosystem. By addressing technical, ethical, and structural barriers, stakeholders can unlock AI's potential to drive inclusive growth and digital resilience.

Disclosure Statement

The authors claim no conflict of interest.

Funding

The research did not receive any specific grants from funding agencies.

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