

ANALYZING THE IMPACT OF AI-GENERATED EMAIL MARKETING CONTENT ON EMAIL DELIVERABILITY IN SPAM FOLDER PLACEMENT

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Abstract

This study investigated the impact of AI-generated email content on email marketing deliverability, specifically its placement in spam folders. A controlled experiment was conducted with 450 participants who received AI-generated emails sent from different domains using plain text content and clear subject lines. The emails were analyzed for placement in inboxes or spam folders based on participant responses. The results revealed no significant impact of AI-generated content on email deliverability, regardless of the sender's domain or the recipient's email provider. All emails consistently reached primary inboxes, suggesting that the applied precautions (plain text, clear subject lines, and avoidance of suspicious elements) mitigated any potential spam triggers. This study shows AI-generated email content can be deliverable and personalized, challenging concerns about spam placement. Marketers can use AI to craft engaging emails that land in inboxes, not spam folders. This finding also aligns with SEO trends, where AI content isn't automatically penalized.

Keywords: *AI-generated email content; Email deliverability; Email provider; Inbox; Spam.*

1. Introduction:

In the world of communication, email has long stood as a stalwart messenger, connecting individuals and organizations across the globe. With its versatility and reach, email emerged as an indispensable tool in conveying information, building relationships, and conducting business. But in the ever-evolving landscape of technology, a new contender has entered the arena, forever altering the dynamics of this trusted companion – artificial intelligence (AI).

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As the use of AI in various sectors gained momentum, it was only a matter of time before it cast its gaze upon email communication. AI brought with it the promise of personalized content, efficient marketing, and enhanced customer interactions (Ramnarayan, 2021). The age-old question of how to optimize email deliverability, particularly in avoiding the dreaded spam folder, found itself at the center of this AI-driven evolution.

The current study posits a hypothesis: "AI-generated email content has a negative impact on email deliverability in spam folder placement in this controlled environment". To investigate this hypothesis. The study will conduct a controlled experiment in which participants will receive AI-generated emails. The findings of this study will provide valuable insights into the impact of AI on email deliverability and help marketers to develop more effective email campaigns.

2. Literature review

The growing influence of artificial intelligence (AI) in marketing is revolutionizing various facets of the field, from Customer Relationship Management (CRM) to content creation, Search Engine Optimization (SEO), and data analysis (Gkikas & Theodoridis, 2019; Kumar Deb et al., 2018; Kumar et al., 2019; Yuniarthe, 2017). AI, powered by advanced language models, has the capacity to analyze vast datasets, predict consumer behavior, reducing advertising costs, and personalize marketing strategies (Adwan & Aladwan, 2022; Gao & Liu, 2022; Khan, 2022; Kuang, 2022). It is within this transformative landscape that the study, "Analyzing the Impact of AI-Generated Email Content on Email Deliverability in Spam Folder Placement," finds its relevance.

One of the pivotal applications of AI in marketing lies in customizing content for email marketing (Patel et al., 2019). AI-driven content personalization offers the ability to craft tailored emails (Ayodele & Zhou, 2008), ensuring that each customer receives relevant and engaging content (Kim et al., 2020; Prins, 2022). This personalized approach is made possible by AI's capacity to understand consumer preferences and behaviors, enabling marketers to optimize email communication.

Moreover, the integration of artificial intelligence (AI) extends well beyond email deliverability and has sparked discussions in various facets of the marketing field. Several notable studies have explored AI's applications in email communication, shedding light on its multifaceted impact on content, user interfaces, and the overall email experience. Dredze et al. (2008) discusses the application of AI techniques to enhance email user interfaces, including tasks such as summary keyword generation and reply prediction. Maarek (2014) highlights the dominance of machine-generated email and the challenges it poses in terms of mining and consuming this type of email. Najork (2016) explores the use of machine learning to improve the email experience, including techniques such as learning-to-rank and extracting key information from appointment and reservation emails. Potti et al. (2018) focuses on extracting information from

commercial emails using image content and text features, resulting in improved identification of email templates and offers.

The spam folder, also known as the junk folder, is an important component of email management systems. It serves as a designated area for storing harmful or unwanted emails (Vinitha, Renuka, & Bharathi, 2018). They use a broad range of criteria to analyze emails and decide whether a message is spam (Sanz, Gómez Hidalgo, & Cortizo Pérez, 2008). While spam folders are designed to protect email users, they do have some disadvantages for the receiver. Legitimate emails can sometimes be mistakenly marked as spam, causing the receiver to miss important communications or opportunities. For business, emails landing in the spam folder are less likely to be opened, read, or acted upon, leading to poor marketing results. Sorting through spam emails can be a waste of time for sales staff and a waste of money for the marketing department. And if the emails consistently land in recipients' spam folders, it can harm the company reputation as a reliable communicator, and bringing financial damage (Blanzieri & Bryl, 2008).

In the foundational work by Blanzieri & Bryl, (2008), the conceptualization of spam filtering is elucidated as a mathematical function denoted by:

$$f(m, \theta) = \begin{cases} C_{spam}, & \text{if the message } m \text{ is considered spam} \\ C_{leg}, & \text{if the message } m \text{ is considered legitimate mail} \end{cases}$$

Here, m signifies the message under classification, θ represents a vector of parameters, and C_{spam} and C_{leg} denote labels assigned to spam and legitimate messages, respectively. Notably, this function encapsulates the essence of spam filters, which primarily serve to distinguish between unsolicited and legitimate communications. Blanzieri and Bryl underline that the determination of θ relies on the machine learning classification techniques employed by most spam filters. In the context of learning-based techniques, the parameter vector θ is derived through the training of a classifier using a pre-collected dataset:

$$\theta = \Theta (M),$$

$$M = \{(m_1, y_1), (m_2, y_2), \dots (m_n, y_n)\}, \quad y_i \in \{C_{spam}, C_{leg}\},$$

where m_1, m_2, \dots, m_n are previously collected messages, $y_1, y_2 \dots y_n$ are the corresponding labels, and Θ is the training function.

Several studies have explored the use of Artificial Intelligence (AI) and Machine Learning (ML) in detecting spam emails. Annadatha & Stamp (2018) introduces the use of Principal Component Analysis and Support Vector Machines for detecting image spam. They found these methods to be highly accurate and computationally efficient, especially when applied to a new dataset with unique features. This finding aligns with Olatunji (2019), who also utilized Support Vector Machines for email spam detection and achieved an accuracy of 95.87% and 94.06% for training and testing sets, respectively. Faris et al. (2019) proposed an intelligent detection system based on Genetic Algorithm and Random Weight Network, which demonstrated remarkable

results in accuracy, precision, and recall. This system could automatically identify the most relevant features of spam emails. Dedetürk & Akay (2020) introduced a spam detection method that combines the artificial bee colony algorithm with a logistic regression classification model. This method outperformed others in classification accuracy and efficiently handled high-dimensional data.

A study by Karim et al (2019) highlight the effectiveness of AI and ML methods in detecting spam emails by analyzing headers, SMTP envelopes, and email body content. Similarly, Ibrahim, (2018) advocates for a combination of preventive and curative techniques, such as whitelisting and blacklisting, to enhance spam detection and prevent delivery.

Dada et al. (2019) identified Deep Learning and Deep Adversarial Learning as promising future techniques for combating email spam, with potential applications in ISPs like Gmail, Yahoo, and Outlook. This was further confirmed by Gangavarapu, Jaidhar, & Chanduka, (2020), who reported that Machine Learning models could accurately detect spam and phishing emails with a 99% overall accuracy.

While numerous studies discuss the use of AI in detecting spam, there is a noticeable gap in research related to the deliverability of AI-generated email content and its placement in spam folders

Within the realm of AI-generated email content, a diverse array of content types emerges. These can include marketing messages, transactional emails, customer service responses, and beyond. The versatility of AI-generated content introduces a level of complexity in terms of how these emails are categorized and received by email providers.

Email deliverability, a persistent concern for email marketers, is influenced by multifaceted factors. These include sender reputation, email content quality, and recipient engagement (Gongwen et al., 2016; Google, 2023a; Sakuraba et al., 2021). These aspects collectively determine whether an email reaches the primary inbox or is rerouted to the spam folder.

3. Methods

In order to analyze the impact of AI-generated email content on email deliverability, a study was conducted among participants who voluntarily offered their email addresses without any remuneration. The participants used different email providers such as Gmail, Yahoo, and Outlook, and none of them were locked to skip spam traps.

The study aimed to minimize the chances of emails being filtered into spam folders by gateways by using Plain text content without HTML, clear subject lines, and avoiding suspicious phishing or scam content. The emails were sent from two domains: Yahoo and a professional university email. To avoid poor IP reputation, the emails were sent throttling or spreading, with a low sending rate and random sending times (Duffy, 2007;

Google, 2023a; Microsoft, 2023b, 2023a; Yahoo Inc, 2023). The participants were then asked to indicate the folder in which they received the emails.

Emails were sent to participants in a throttled manner, with low sending rate and random intervals between emails to avoid sending too many emails to any participant within a short timeframe. No email sending programs or services were used, to avoid any negative impact on send reputation This helped to minimize the chances of the emails being flagged as spam by gateways(Google, 2023a; Microsoft, 2023b, 2023a; Yahoo Inc, 2023).

All participant received an email and reported back whether the email arrived in their inbox or their spam folder. Responses were recorded in a spreadsheet with the participant's email provider and the folder destination.

The sample size is 450 participant and it is above 385, which acceptable for an unlimited population (and this sample size is assumed for an infinite population). For 5% margin of error and 95% confidence level the sample size is allowed (Arya et al., 2012; Naing et al., 2006; PATHAK, 2013)

The data collected from the study was analyzed to determine the impact of AI-generated email content on email deliverability, as well as to identify any significant differences in deliverability between the two domains used to send the emails and the recipient's email provider.

4. Results and Discussion

The results, as presented in Table 1, reveal the outcome of this investigation in terms of email placement.

Table 1 Email Delivery Results

Sender Domain	Participants email providers	Number	Inbox	Spam
Yahoo	Gmail	151	151	0
	Yahoo	52	52	0
	Others*	82	82	0
Professional	Gmail	80	80	0
	Yahoo	30	30	0
	Others*	55	55	0
Total		450	450	0

**Other include: Outlook, GMX, University-affiliated email services, and professional email accounts.*

Table 1 demonstrates that a dataset consisting of 450 emails was analyzed. These emails were directed to participants who used a variety of email providers, with Gmail emerging as the most prevalent choices, which can be attributed to the widespread adoption of Google's Android mobile operating system among the participants (Ejiyi et al., 2021; Kaczmarczyk & Zabierowski, 2021). Yahoo Mail secured the second position in

terms of preference. Smaller numbers of participants employed other email providers, including Outlook, GMX, University-affiliated email services..., and professional email accounts.

The results, as displayed in Table 1, reveal that the sender's domain (Yahoo or professional university email) exhibited no discernible impact on email deliverability. Irrespective of the sender's domain, all emails found their way to the primary inbox, without any instances of placement in the spam folder.

When considering the recipient's email provider (Gmail, Yahoo, or others), the results indicate that the destination email provider had no observable influence on the final destination of the emails. In all cases, the emails consistently reached the primary inbox, avoiding placement in spam folders entirely.

The SMTP (Simple Mail Transfer Protocol) , a standard communication protocol, is used for sending and receiving email. It serves as an important component in the email delivery process, defining how email servers should transfer and deliver messages from senders to recipients (Goralski, 2017). In the controlled environment involved the careful manipulation of SMTP settings during the email sending process. By employing a low sending rate and random intervals between emails, the study mitigated the risk of triggering spam filters that ISPs (Internet Service Providers) often use to identify potential spammers (Dada et al., 2019). The controlled sending rate and random intervals mimic natural human email behavior, reducing the likelihood of emails being flagged as spam by ISPs. This aligns with best practices to maintain a positive sender reputation, which is important for achieving good email deliverability.

ISPs use sophisticated filtering algorithms to determine whether an e-mail should be delivered to the inbox or marked as spam (Blanzieri & Bryl, 2008; Dada et al., 2019). The precautions taken, including the use of plain text content, clear subject lines, and avoidance of suspicious elements, align with the criteria used by ISPs to distinguish between legitimate and potentially harmful emails. The effective use of filtering algorithms resulted in a positive assessment of the e-mails, leading to successful delivery.

The controlled environment likely ensured that the AI-generated emails adhered to email authentication standards like DomainKeys Identified Mail (DKIM), Sender Policy Framework (SPF), and Domain-based Message Authentication, Reporting, and Conformance (DMARC) (Rose, Nightingale, Garfinkel, & Chandramouli, 2019). Proper authentication contributes to a positive sender reputation and can prevent emails from being flagged as suspicious.

Spam filters often look for specific triggers or indicators associated with phishing or suspicious activities (Bergholz et al., 2010). The precautions taken in this study, such as avoiding suspicious elements in the content, likely prevented the AI-generated emails from being flagged as potential phishing attempts or spam. Phishing indicators may include the use of certain keywords, formatting patterns, or links that mimic common

phishing tactics (Varshney, Misra, & Atrey, 2016). By steering clear of such elements, the AI-generated content adhered to best practices, minimizing the chances of triggering spam filters sensitive to phishing indicators.

The findings underscore that, under the controlled conditions employed, AI-generated email content, in conjunction with the applied precautions (plain text content, clear subject lines, and avoidance of suspicious elements), did not prompt emails to be flagged as spam. This uniform outcome across different sender domains and recipient email providers underscores the effectiveness of these precautions in maintaining favorable email deliverability.

This finding Do NOT confirm the hypothesis saying that that AI-generated email content has a negative impact on email deliverability in spam folder placement in this controlled environment.

It is worth noting that the impact of AI-generated content extends beyond email deliverability, often sparking discussions regarding its influence on search engine optimization (SEO). In this context, it is worth mentioning that Somosi (2022), Nhavkar (2023), and Google (2023b), has explicitly clarified that their search engines do not penalize AI-generated content by default. Whether content is generated by AI or authored by humans is not a direct factor in search engine rankings. This further affirms that the judicious use of AI-generated content, as demonstrated in this study, can be employed without incurring penalties, potentially offering various advantages in email communication marketing and content generation.

5. Conclusion

The study underscores the significant implications of AI-generated email content for email deliverability. The results provide confidence in the use of AI for crafting personalized email content while maintaining optimal deliverability. These findings not only have practical relevance for email marketers but also extend to the broader context of AI-generated content in the digital landscape. It is worth noting that the impact of AI-generated content goes beyond email deliverability. The study affirms the potential of AI-generated content in email marketing and content generation.

The consistent email delivery across various domains and providers underscores the robustness of precautions applied. This study adds to the growing body of knowledge on AI's role in modern marketing and highlights its value in enhancing customer interactions. The results open avenues for marketers to craft more effective email campaigns, ensuring that content is both engaging and successfully delivered to the primary inbox. By using AI to generate personalized and engaging email content, businesses can improve their open rates, click-through rates, and conversion rates. This can lead to increased sales, improved customer satisfaction, and stronger brand loyalty.

6. Research limitation:

While these findings are promising within the context of this controlled study, it is essential to recognize the limitations. Real-world email deliverability can be influenced by a plethora of factors not accounted for in this study, including the diversity of email content, recipient behaviors, and specific email gateways. Further research and testing in diverse email communication scenarios are necessary to validate and extrapolate these results to broader contexts.

Nevertheless, this study provides valuable insights into the role of AI-generated email content in email deliverability, emphasizing the importance of content optimization using AI to avoid spam folder placement.

LLM Statement:

During the preparation of this work the author used LLM in order to generate email content, which was kept unaltered in accordance with the study's requirements, and used LLMs to improve the language and readability of the article. After using this tool, the author reviewed and edited the remaining content as needed and takes full responsibility for the content of the publication.

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