AI-supported SEO for Early-Stage Start-ups: A GPT-3 experiment in Blog Marketing

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Abstract

A poor customer acquisition strategy is a common cause of start-up failure due to limited resources and wrong marketing strategies. Therefore, startups must be smart and cost-efficient in their customer acquisition efforts. Increasingly, startups use SEO to attract customers. A common strategy is to run a blog to enhance SEO by using keyword-driven content. A successful blog requires professional knowledge and time, resources early-stage startups lack. AI offers new opportunities to rethink blog marketing and SEO to automate blog marketing processes. In this experiment, we use GPT-3 as a LLM to create optimized AI-generated blog posts and evaluate AI-generated and human-written blog posts over four months, measuring key metrics such as impressions, clicks, and average position. Findings show human-written blog posts perform significantly better in SEO, while AI-generated blog posts offer cost efficiency. Human effort remains critical for optimal results, but the cost-efficiency of AI is helpful for startups with limited resources. We therefore propose a semi-automated approach that optimizes the cost-benefit ratio. As AI technology evolves, it could lead to AI outperforming human-generated content, increasing the relevance of this domain for further research.

Keywords*:* Blog Marketing, Search Engine Optimization, Start-up, Large Language Model, GPT-3

Introduction

During the early days of digital marketing, it was easier for companies to generate leads due to less competition, the timely novelty, and the unexplored nature of digital marketing techniques. Back then, fewer companies used digital channels, so one stood out and attracted the attention of potential customers more prominently. This area has become highly professionalized, and digital marketing is now a highly competitive market in which companies with high financial budgets are fighting for the users' attention (Dwivedi et al., 2021). Start-ups in the early stages with limited resources have difficulties succeeding in this area. Most start-ups fail in the first few years due to limited resources and the resulting challenges, especially in customer acquisition (Giardino et al., 2014). Thus, lead generation efforts to achieve maximum efficiency are crucial for the business's survival, as a smart lead generation strategy can make the difference between success and failure (Blank, 2020).
For many start-ups, search engine optimization (SEO) has become a key strategy that improves online visibility and cost-effectively attracts potential customers. SEO improves a website in every way to achieve higher rankings in search engine results, leading to higher online visibility with more visitors who can become customers, increasing overall market share (Bhandari & Bansal, 2018). Other benefits are the longer average time users spend on the website, higher user engagement, and increased revenue (Poturak et al., 2022). Popular optimizations are improving the overall user experience, technical improvements for faster loading speed, and providing high-quality content to the audience. Another SEO practice, which has become common, is writing blog posts to push websites to be more visible in search engines without investing financial resources as it uses personal working time (Garcia et al., 2022). Helping blog authors create blog posts faster could save valuable resources.
With the rapid development of artificial intelligence (AI), the area of large language models (LLM) has developed significantly. LLMs are advanced AI systems designed to understand and generate human language. They are based on deep learning technology, in which neural networks are trained on large data sets with high-quality texts (LeCun et al., 2015). In this light, LLMs can already generate text content that is hardly distinguishable from human-written texts (Lui et al., 2023). LLMs are so advanced that evil actors could attack search engines with fake content (Nestaas et al., 2024).

Thus, the question arises in which way AI can support blog writing to enhance lead generation through SEO. Previous research provides minimal insights into this research area. Studies have identified SEO strategies for start-ups (Saura et al., 2020) and how they can benefit from common best practices (Enge et al., 2012). A distinction is made between on-page and off-page. While off-page focuses on optimizations unrelated to the website itself, on-page focuses on its optimization. Start-ups can mostly benefit from creating and optimizing their on-page content, especially through blog posts, as these are easy and affordable to implement and position the company as an expert offering high-quality content (Luo et all., 2017). Although studies have shown that startups benefit from SEO (Baye et al., 2016), some start-ups and

other practitioners achieve poor SEO results and have a negative experience with SEO (Saura et al., 2020). The developments in AI could provide new opportunities to support them in their implementation. Start-ups will have to adapt their strategies, as search engines and the market will most likely change with the age of AI. Therefore, we want to investigate whether and what advantages AI-generated blog posts offer start-ups in terms of SEO and profitability. We assume that if the blog author is supported in writing the content faster and better, resources can be saved. It can be a valuable time saver, especially for start-ups in the early stages, where founders often write the content themselves even though resources are scarce. In this paper, we explore whether AI-generated or human-written blog posts perform better in the given context and if AI can support a human author with a sufficient cost-benefit ratio. For this reason, this paper presents an experiment in which AI-generated blog posts compete against human-written blog posts. We used Generative Pre-trained Transformer 3 (GPT-3), the most sophisticated LLM at the time, to generate AI-generated blog posts. Our goal is to provide relevant insights for start-ups and deliver comprehensive results for the academic community regarding evaluating LLMs in the context of blog marketing and SEO. Therefore, the following two research questions are investigated:

RQ1: How do AI-generated blog posts perform in the context of SEO compared to human-written blog posts?

RQ2: How does AI-generated blog posts affect the lead generation of an early-stage start-up in terms of the cost-benefit ratio?

Findings show human-written blog posts perform better in SEO, but AI-generated blog posts are much more cost-effective and have the better cost-benefit ratio. As a result, a semi-automated approach is presented that enables start-ups to cost-effectively create new blog posts with a human in the loop while achieving better SEO results than using only AI. The remaining paper is structured as followed. After the literature review, discussing the current state of research on early-stage start-ups, SEO using blog marketing and large language models, the experiment is presented in the research design chapter. Finally, the findings and results are presented and discussed.

Literature Review

Early-Stage Start-ups

Start-ups are newly founded companies characterized by a high degree of innovation and a scalable business idea (Ehsan, 2021). As a result, start-ups provide a significant contribution to market transformations, which has a positive impact on the entire economy at a regional and global level. Thus means, start-ups are a driving force for national and social prosperity (Szarek & Piecuch, 2018). Start-ups operate in a highly dynamic environment characterized by uncertain conditions and face various challenges that can broadly categorized into uncertainties regarding the founders and the team,

limited resources, lack of visibility, uncertainties regarding customer needs, competitive pressure, legal and social uncertainties (Santisteban et al., 2022). Up to 90 % of all start-ups fail in the first few years due to these challenging circumstances (Giardino et al., 2014). One of the biggest challenges is the lack of resources which in turn makes online visibility and customer acquisition more difficult (Paternoster et al., 2014). They typically have limited access to capital and rely primarily on personal savings, small loans or initial investments from friends and family. They do not have the proven financial history and track record required to obtain substantial financing from traditional financial institutions. Due to the limited financial resources, it is also difficult to attract and retain talent. In addition, the marketing budgets are very small compared to the big budgets of competitors on the market. Especially early-stage start-ups with limited resources need to manage their resources very well to overcome their challenges. Another well-known challenge is the lack of paying customers caused by poor lead generation which is also due to limited resources (Blank, 2020). A lead is a potential customer who shows interest in a company's offer and may turn into a paying customer. The more leads are generated, the more potential customers become aware of the company's offer, which in turn leads to more paying customers. The process of lead generation is therefore crucial for the survival and growth of a start-up (Linton & Ståhlberg, 2022). Key difficulties include misalignment with customer needs, insufficient understanding of target customers and market dynamics, and ineffective and inefficient lead generation strategies required for cost-effective marketing. As a result, there is a high risk that the limited resources available are invested in the wrong and underperforming marketing channels.

Search Engine Optimization

Internet use by adults is 87% and approaches 100% for demographic groups with a higher level of education and income (Bizhanova et al., 2019). Most of this internet traffic starts with a search in a search engine (Nyagadza, 2022). Therefore, lead generation via search engines is one of the most valuable marketing tools for companies. The website can be optimized using SEO to ensure that the company website can be discovered via search engines (Garcia et al., 2022). SEO is the optimization of a website regarding performance, user experience, content quality, and authority aimed at achieving a better ranking by the search engine algorithm (Enge et al., 2012). The first result on the search engine result page is clicked by 35% of all users, the second by 18% and the seventh by only 6%, so the click rate decreases drastically the closer to the bottom the search result is (Fubel et al., 2023). As a result, not well-rated websites by search engines do not appear on the first page and are almost excluded from search traffic. To participate in search traffic, the website must be optimized for the search engine algorithm so that the website is classified as relevant and important and therefore appears at the top of the search engine result page even without paid advertising. Reach that is not achieved through paid advertising is also called organic reach. Therefore, organic reach is very attractive for early-stage start-ups with limited resources. Instead of placing paid advertising, the organic reach can be

improved, for instance, through personal working hours instead of investing financial resources. Organic reach has the advantage that it can build up a long-term reach (Erdmann et al., 2022). Once a search engine classifies a website as highly relevant and displays it at the top of the search engine results, it can be assumed that this classification will be maintained for some time, resulting in a continuous, long-lasting reach. The major disadvantage of organic reach is that the increase in reach does not occur overnight and requires a long ramp-up time until the search engine algorithm has done its job to rank the website (Khan & Mahmood, 2018). That's why SEO is a process that can take months before the first good results are visible.

Blog Marketing

Blog marketing plays an important role in digital marketing and can be used for SEO by publishing blog content to help improve search engine rankings to generate more reach (Ashwini & Varma, 2020). Blogs are text-based online content on websites that arousing the interest of potential customers and are often intended to be found via search engines. Users enter specific keywords in their search queries, whereupon the search engines provide suggestions for relevant websites. These often include blogs that are optimized for the chosen search terms. Therefore, it is decisive to optimize blogs in this manner. As a result, blogs have the great potential to reach many visitors. Blogs are considered a trustworthy source of information (Chu & Kamal, 2008) and customers often rely on information from blogs (Hsu et al., 2013). Commercial blogs run by companies contain high-quality information (Hu et al., 2011). In this way, they promote interaction and sales, while sharing expert knowledge and building customer retention with the target group. It has been shown that blogs have a strong advertising impact. This organic reach achieved through blog marketing can be built by creating blogs with paid resources or without funding through personal working time, simply by creating new blog content.

Large Language Model

Deep learning is one of the various learning methods for AI systems in which neural networks are used that are trained on large data sets with high-quality texts of all kinds (LeCun et al., 2015). LLMs are advanced AI systems based on deep learning to generate texts (Strasser, 2024). With the latest developments in the field of LLMs, new possibilities are considered to enable AI-generated blog posts. By using LLMs, texts can be generated in a way indistinguishable from real human-written texts (Lui et al., 2023). Evaluating LLMs from the scientific perspective can be divided into an intrinsic and an extrinsic evaluation (Reiter & Belz, 2009). Intrinsic evaluation is based on human experiments evaluating the generated text for quality, correctness, naturalness, comprehensibility, and other metrics. Extrinsic evaluation does not directly target the generated text but consists of an evaluation of the effects generated text has. Extrinsic methods are assumed to be more fundamental compared to intrinsic methods since new information can be obtained apart from the text evaluation (Gkatzia & Mahamood, 2015). GPT-

3 is an LLM trained on a large dataset and not tailored to a specific context so that it can be used to generate any text content (Dale, 2021). GPT-3 expects a text-based input. This input is understood with the help of natural language understanding and can generate completely new texts based on the previously learned dataset of texts. In simple words, GPT-3 predicts the probability of the next word occurring in the whole context and thus generates complete sentences that fit the context very well. In contrast to the common opinion on the internet that search engines punish AI-generated content when it comes to SEO, there is a clear statement from the search engine provider Google (Google, 2023). It states that the search engine algorithm always rewards high-quality content, regardless of how it was produced. This statement unlocks great automation opportunities, as AI-generated blog posts are at a disadvantage. Therefore, they can potentially achieve good rankings if they are of high quality.

Research Design

To study the impact of AI-generated blog posts in SEO, the following experiment was conducted. AI-generated blog posts competed with human-written blog posts. The aim of the experiment was to measure the most important key performance indicators (KPI) related to SEO produced by the blog posts. These KPI provided information on how well a blog post was rated by a search engine, indicating whether a blog post was considered relevant for users. The better a blog post performed in these KPIs, the higher the probability of acquiring more customers. In this experiment, blog posts were created and published to collect SEO data. The blog posts were divided into two different groups, each with ten blog posts. A test group was created consisting of AI-generated blog posts created with GPT-3. As a control group, human-written blog posts were written by a human author. Blog posts consisted of different texts that could differ in quality. Therefore, we could not compare perfectly comparable blog posts. To enable the fairest possible comparison between human-written and AI-generated blog posts, they needed to be designed very similarly. The following three aspects were considered, namely keywords, blog post structure, and the approach.

Keywords

Since a search engine algorithm classifies a blog post based on the keywords contained in the text, the keywords and their KPI should be balanced. This means that the keywords are distributed equally across the entire blog content and that the keywords have the same KPI values. Depending on the keyword, both KPI search volume and SEO difficulty are important in terms of search engine ranking, which were collected using the tool Ubersuggest that gathered this data from Google. The search volume for a keyword refers to the average number of search queries for a keyword within a certain period in the search engine, indicating how important and how relevant the keyword is. A keyword with a higher search volume indicated more users are searching for it, which in turn lead to higher traffic. SEO difficulty is a metric indicating the difficulty to rank for a keyword in relation to the competition. The more

often content on the internet is optimized for a certain keyword, the more difficult it becomes to rank for this keyword. A main keyword was selected for each blog post. The keywords were selected so that they are balanced in pairs. Therefore, the AI-generated and human-written blog posts had very similar keyword metrics. The KPI values of search volume and SEO difficulty of the keywords used in the created blog posts are shown in Table 1. As a result, the strength of the keywords is equally distributed, which minimizes the confounding factor on a different scoring by the search engine algorithm.

Table 1. *The keyword metrics are equally distributed in pairs.*

Blog Post Pair	**AI-generated**	**Human-written**
	Search Volume / SEO Difficulty	**Search Volume / SEO Difficulty**
1	1900 / 35	1900 / 35
2	260 / 34	260 / 35
3	140 / 48	140 / 43
4	110 / 38	110 / 39
5	110 / 48	110 / 46
6	90 / 48	90 / 44
7	90 / 40	90 / 39
8	70 / 33	70 / 34
9	50 / 31	50 / 33
10	40 / 39	40 / 40
Total	**2860 / 394**	**2860 / 390**

Blog Post Structure

A standardized format was used to conduct the experiment to ensure that the blog posts were more comparable besides the keywords. In this way, all blog posts were structured in the same manner. Thus, they contained similar headings, content sections, text length, and a similar number of keywords.

Approach

A well-defined approach was specified to minimize other confounding factors. The experiment was carried out step by step as follows. First, blog post topics were selected to ensure the AI-generated and human-written blog posts contained very similar topics. Secondly, keywords for each blog post were selected according to search volume and SEO difficulty to ensure balance across all blog posts. Then, a standardized format was defined for the blog posts to promote the same structure among them. Next, reusable GPT-3 prompts were created to generate the content. All AI-generated blog posts were created using these templates by simply changing the topic selection and keywords. The human author did not have access to the AI-generated content until the human-written blog posts had been created to avoid an unfair advantage. Then, a human author wrote the human-written blog posts based on the selected keywords and the blog post format. The working time was

measured with a stopwatch. Finally, blog posts of both groups with the balanced keyword metrics were published in pairs.

The blog posts were published in an environment as authentic as possible to provide meaningful data to derive a valuable conclusion for start-ups. We collected data replicating a real start-up environment. For this reason, we simulated the founding of a start-up aiming to launch a new app. The focus of customer acquisition was organic search engine marketing using SEO on the company website. Blog posts were published on the website that should be ranked as highly as possible by the search engine. The aim was to attract potential customers to the website via organic reach provided by search engines.

To determine the performance of AI-generated blog posts, they were compared against human-written blog posts. For measuring the marketing performance, we collected the following SEO KPI: Impressions, clicks, and average position. They provide information on how well a blog post is rated by a search engine and whether a blog post is considered relevant for the target group. The better these metrics are, the better the marketing performance, which indicates better customer acquisition.
Impressions. Measures the number of times a website is listed as a result of a search query in a search engine on the search engine results page. It indicates how many users may have seen the website in the search engine. Impressions do not show how many users have clicked on the featured search result or how many visitors the website has attracted.
Clicks. Measures the number of clicks users perform on the featured search result of the website after a search query. It shows how many users are redirected to the website by the search engine.
Average Position. The average position measures the average position in which the website is listed by a search engine on the search engine results page. The closer the average position is to position one, the higher the probability a user will see the featured search result of the website and click on it.
In addition, the working time spent on creating human-written blog posts by the human author was also measured. The working time includes the preparation time with the research on the topic, the writing time of the content, the content revision, and the rest time. The aim was to identify the economic efficiency of AI-generated and human-written blog posts in terms of the marketing performance and the resulting costs.

The blog posts indexing and the consecutive ranking by the search engine algorithm can take up to several months. For this reason, the data was collected over a period of 124 days between December 5, 2022 and April 7, 2023. We chose Google to collect data from a search engine as it is the most widely used in the western part of the world (Bianchi, 2024). The data was collected via the Google Search Console tool, which is connected to the website to gather data. Google Search Console then tracked all search queries and their SEO data from the connected website. Once a user entered a search query into Google matching the content of one of the published blog posts,

there was a chance the blog post would be listed on the search engine results page based on the scoring of the search engine algorithm. For every search query in which a blog post was listed, the impressions increased. For every click on a listed preview of a blog post, the clicks increased. The closer the listed preview was to position one, the better the average position.

The amount of time spent to complete a blog post by the human author was measured with a stopwatch. The working time of a blog post highly depended on the subject, the level of quality, and the author's experience. Nevertheless, we intended to capture a first orientation point. We assumed the figures shown in Table 2 represent a reasonable lower limit for at least mediocre blog posts, which was probably a good assumption for the quality delivered by an early-stage startup.

Table 2. *The average working time of the human author in the format (Hours:Minutes:Seconds).*

Time	Mean
Preparation	00:08:42
Writing	02:11:15
Revision	00:18:51
Rest	00:07:57
Total	**02:46:45**

Since the search engine algorithm was a black box and could not be inspected in detail, there were confounding factors that could not be fully eliminated.
Blog post structure (Format). Although we have introduced a standardized blog format, there were always some content variations, which is the nature of text content.
Balance of keywords (Keyword Balance). We did try to balance the keywords in a fair way across the blog posts based on their search volume and SEO difficulty. However, there was still a risk the search engine algorithm may privilege some keywords for unknown reasons.

Due to time, resource, and other constraints, we were not able to eliminate the following confounding factors.
Same human author (Selected Author). All human-written blog posts were written by the same author, who only had basic knowledge of marketing and was not an expert in copywriting. The human author probably represented a very typical start-up founder. A generalization to other authors, especially with different marketing experience, was not possible.
Topics from just one domain (Selected Domain). We have only selected one domain. The blog posts in this experiment were about sleep and dreams as they can be designed very similar. Each domain had a different marketing performance and was a different challenge for SEO optimization. We could not assume with certainty the results of one domain also apply to another.
Different blog post topics (Selected Topic). The blog posts were based on the same domain but differed slightly in topic, resulting in different text content. Furthermore, when blog posts with the same topic and keywords were

published on the same website, there was a risk of keyword cannibalization. It leads to the situation where blog posts competing for search engine rankings, in turn would have a negative impact and be a further confounding factor. It is therefore extremely difficult to compare blog posts and the results might be different for other selected topics.
Different interest of users (Target Group). Users have different interests, which affects their behavior in the search engine. Blog posts with different topics attract different levels of interest from different target groups. But not only the interest in the blog post topics is different. Interest in different domains also varies greatly. For example, topics from one domain have more traffic than topics from another domain. We could not assume that the behavior of one target group regarding SEO was generalizable to others.

We intended to verify if our result is statistically significant. The samples of the experiment were random and independent due to the way users interact with search engines. It is not known whether a user enters several search queries during the experiment and thus possibly comes across several different blog posts or just one. Furthermore, the users and blog posts do not influence each other. However, the data was not sufficiently normally distributed. For this reason, the statistical significance for each KPI was tested using the Wilcoxon-Mann-Whitney test.

Results

For each day, the KPI impressions, clicks and average position were recorded for each blog post. In Table 3, all data is aggregated to create a comparison of AI-generated vs. human-written blog posts. The result is a data set that summarizes the total impressions, total clicks, and average position for all AI-generated and human-written blog posts for each day.

Table 3. *The aggregated SEO data of the test and control group.*

	Impressions		**Clicks**		**Avg. Pos.**	
Date	**Human**	**AI**	**Human**	**AI**	**Human**	**AI**
05.12.22	0	3	0	0	0	5
06.12.22	8	8	1	0	3	14
07.12.22	22	27	0	0	2	12
…	…	…	…	…	…	…
05.02.23	634	533	10	6	11	16
06.02.23	599	594	19	4	16	16
07.02.23	596	607	18	1	10	18
…	…	…	…	…	…	…
05.04.23	2064	1121	92	20	12	18
06.04.23	2106	1121	92	16	9	20
07.04.23	1982	1109	90	18	13	20

Based on the aggregated data from Table 3, line charts are created showing the collected SEO KPIs: Impressions (Figure 1), clicks (Figure 2) and average position (Figure 3), comparing AI-generated (red line) and human-written (blue line) blog posts.

The line chart in Figure 1 shows the human-written blog posts generated more impressions during the experiment than the AI-generated blog posts. Furthermore, the chart in Figure 2 shows the human-written blog posts performed better and generated more clicks than the AI-generated blog posts. The same applies to the average position shown in Figure 3, where the human-written blog posts are closer to the best position one than the AI-generated ones.

Figure 1. *Comparing the SEO KPI impression of AI-generated and human-written blog posts.*

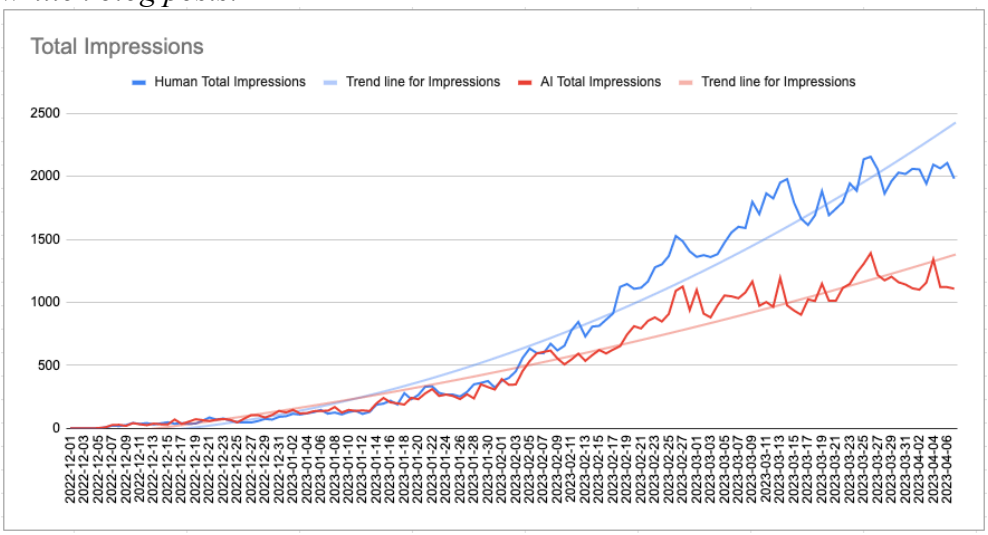


Figure 2. *Comparing the SEO KPI clicks of AI-generated and human-written blog posts.*

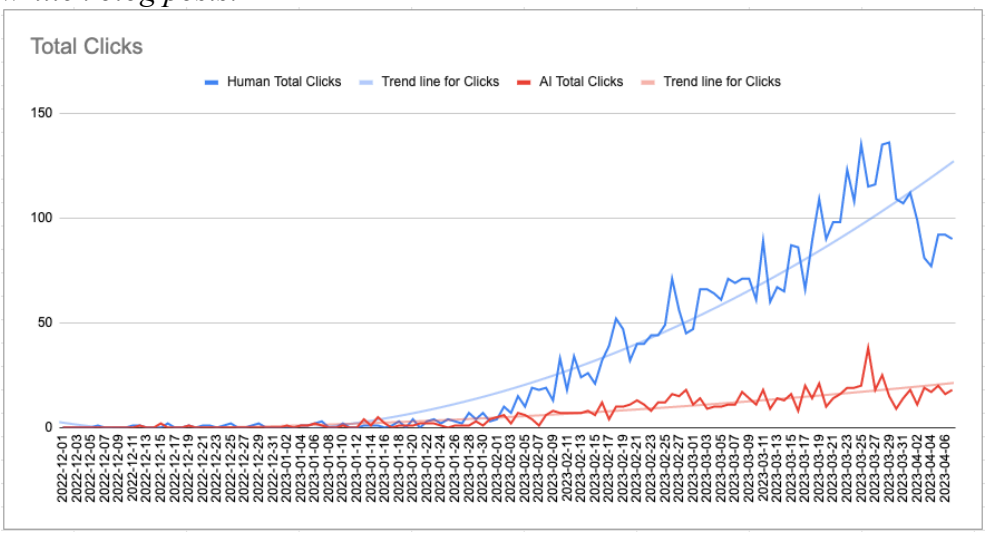
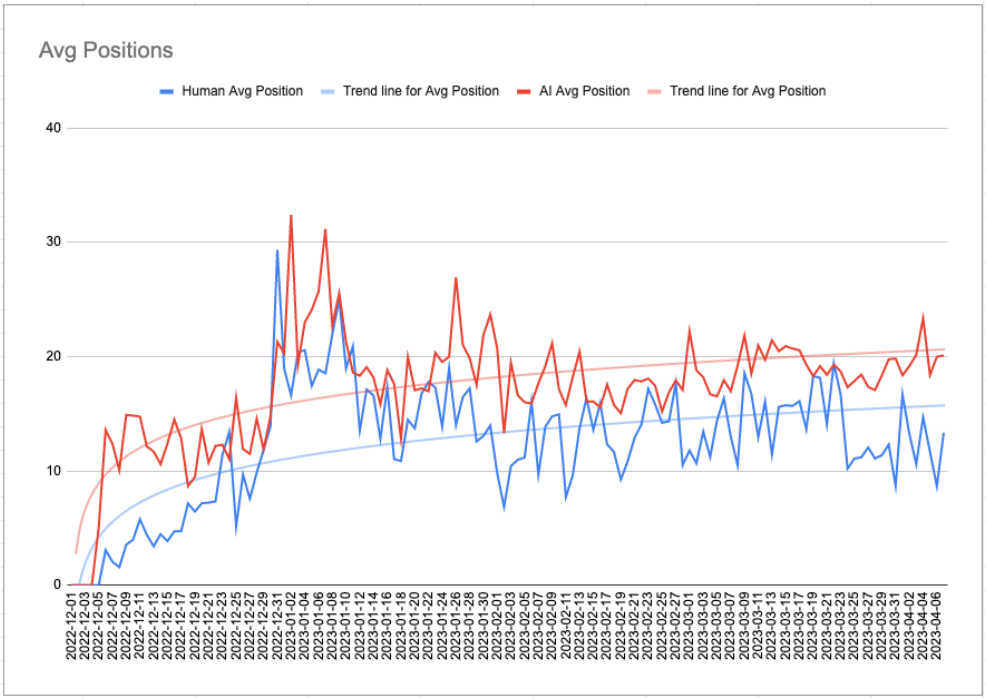


Figure 3. *Comparing the SEO KPI average position of AI-generated and human-written blog posts.*



The sample distribution in Figure 4 shows the distribution of the data and shows outliers around the null coordinate for impressions and clicks. It can be explained by the fact that the blog posts need a certain amount of time before they are indexed by the search engine and ready to be delivered to users. The results of the Wilcoxon-Mann-Whitney test to determine whether the data are statistically significant were calculated on the statistical results in Table 4 and are summarized in Table 5. All p-values are below the specified significance level (α=0.05), revealing statistically significant data.

Figure 4. *Sample distributions of the data.*

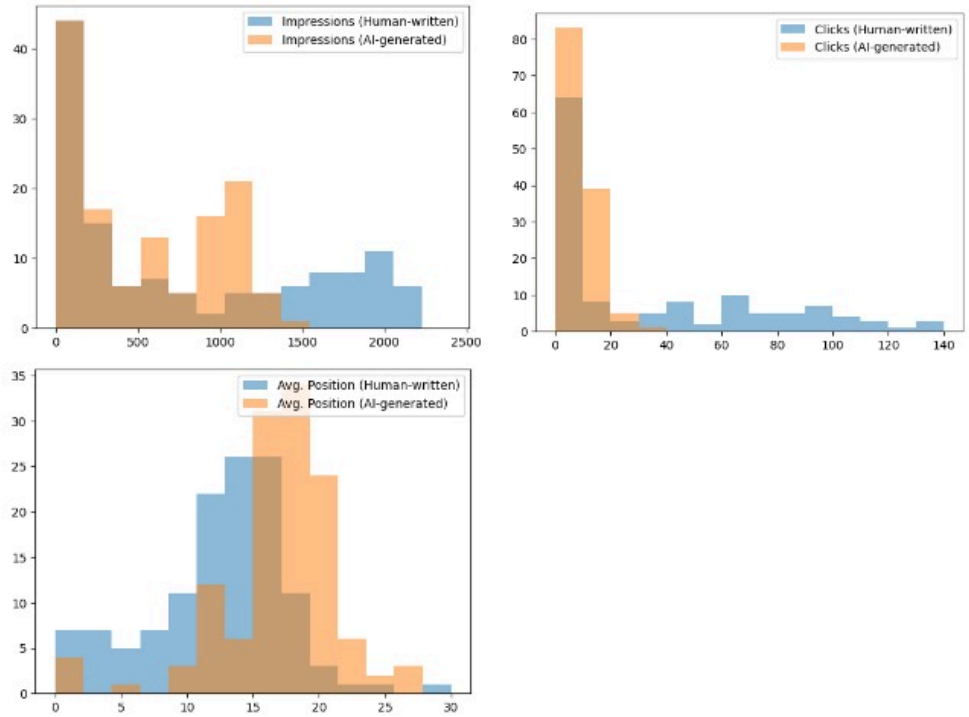


Table 4. *Statistical numbers of the data.*

	KPI	Mean	Variance	SD
Human	Impressions	798.85	579470.19	761.23
	Clicks	33.70	1650.92	40.63
	Avg. Pos.	12	28.99	5.38
AI	Impressions	532.85	195604.79	442.27
	Clicks	6.80	54.34	7.37
	Avg. Pos	17	25.73	5.07

Table 5. *Result of the Wilcoxon-Mann-Whitney-Test.*

KPI	t-statistic	p-value
Impressions	3.42	2.41e-12
Clicks	7.37	0.0007
Average Position	-7.33	3.03e-12

RQ1: How do AI-generated blog posts perform in the context of SEO compared to human-written blog posts?

To provide an answer to RQ1, we summarized the result as follows. The experiment demonstrated human-written blog posts achieve better results than AI-generated blog posts for the selected SEO KPIs impressions, clicks and average position. The Wilcoxon-Mann-Whitney test confirmed the statistical significance of this result. Thus, under the given conditions, human-written blog posts perform better in the context of SEO than AI-generated blog posts.

RQ2: How does AI-generated blog posts affect the customer acquisition of an early-stage start-up in terms of the cost-benefit ratio?

Writing human-written blog posts involves a certain amount of effort. Early-stage start-ups have very few resources available and need to use them carefully to run the business and to attract new customers. Even if AI-generated blog posts perform worse in context of SEO, AI can generate blog posts much faster than humans. To assess whether it is economically viable for start-ups to generate blog posts with AI to attract customers, we calculated the cost-benefit ratio. The blog posts created in the experiment had an average length of 3,622 words and the human author took an average of 167 minutes to create them. Based on this data, the average salaries in German start-ups (Klotz, 2023; Kununu, 2023; Apel, 2023), and the average costs for external services such as agencies and freelancers (Content, 2024), the blog post costs are calculated and presented in Table 6 and 7. While costs may vary due to certain circumstances, we could assume a reasonable lower cost limit of 43.50€ and an upper cost limit of 289.76€ to calculate the cost-benefit ratio.

Table 6. *Average costs for a blog post with in-house efforts.*

Job	Hourly wage	Blog post costs
Student	15.63 €	43.50 €

Employee	24.56 €	68.36 €
Founder	31.49 €	87.65 €

Table 7. *Average costs for a blog post with third-party resources.*

External marketing services		
Text quality level	**Costs per word**	**Blog post costs**
2	1.6 Cents	57.95 €
3	2.2 Cents	79.68 €
4	3.0 Cents	108.66 €
5	8.0 Cents	289.76 €

The cost of generating text with GPT-3 is $0.02 per 1000 tokens. On average, 1 token corresponds to 0.75 words. The cost of one word is therefore $0.000268. Based on 3,622 words per blog post, the generation of a full blog post costs $0.097 (8.9 Cents). Based on the average impressions and clicks (Table 4) and the costs per blog post, the impressions and clicks per Euro spent are shown in Table 8.

Table 8. *Impressions and clicks per Euro spent.*

	AI	**Human (lower cost limit / upper cost limit)**
Impressions per 1€	5987.08	18.36 / 2.76
Clicks per 1€	76.40	0.77 / 0.12

The cost-benefit ratio calculation with the given data shows the use of AI is 326 to 2,169 more efficient than that of humans in terms of impressions and 99 to 637 more efficient in terms of clicks. It is therefore much more economically efficient to use AI to achieve impressions and clicks. Assuming the conversion rate for acquiring new customers is similar for AI-generated and human-written blog posts, AI offers a more efficient way of acquiring customers.

Discussion

Since this research investigated text content and its interaction with people on the Internet via search engines, there were numerous confounding factors that could not be eliminated. The experiment did not include the quality of the created texts and their impact on readers. It is therefore only possible to draw conclusions about the reach of the blog posts via the search engine, but not about the customers acquired as a result. However, we assume AI can be used to create a cost-optimized first touch point with the start-up. Of course, further steps are necessary to acquire a customer. Accordingly, the further customer journey must be of sufficient quality to convince potential customers.

A semi-automated approach combining the advantages of humans and AI could be a very promising approach. The AI could create fully automated blog

posts at regular intervals. With the help of SEO analytics, the performance of each blog post could be measured and evaluated to create a monthly report. In this way, blog posts with excellent performance can be identified, regarding how relevant the content is for the target group and whether the appropriate keywords have been selected. In this case, it would be useful to have these blog posts reviewed and edited by a human author to further optimize the content to improve the SEO performance. This process continuously generates new blog posts, from which only the best is selected for human optimization. This process ensures the human author's efforts pay off and avoids high costs for blog posts not achieving good results. It allows a data-driven blog to be run in an extremely cost-efficient way, retaining only the best and most relevant blog posts.

Conclusion

AI-generated text can be of varying quality. Some of this content was almost identical to content written by humans. Others may contain obvious flaws and are easy to expose as AI-generated. The experiment was limited to measuring the performance of blog posts in the context of organic search engine marketing. We could not make any statements about the quality of blog posts for a human reader nor about how good the conversion rate of these blog posts was. Therefore, it could not be assumed that the content of a website having a high search engine rating had high content quality. In this experiment, we were only investigating how a search engine rated both types of blog posts and how it rewarded them with reach. We collected data exclusively from the Google search engine. It could not be assumed that other search engines produced similar results.

It has been shown that human-written blog posts perform better in the context of SEO, but AI-generated blog posts achieve a better cost-benefit ratio for impressions and clicks. Especially for early-stage start-ups with limited resources, the use of AI-generated blog posts is a powerful tool to increase reach and support customer acquisition. Start-ups could benefit from the proposed semi-automated approach to combine the strengths of humans and AI. Not only start-ups could benefit from further research in this area, but all those who want to acquire customers with the help of online content. Based on current developments of AI, AI might deliver equivalent or even better content than humans in the future. In this case, the search engine market will have to adapt its algorithms and develop further. With the ongoing establishment of AI for content creation in general, the internet is likely to be flooded with huge amounts of content. It could become a new challenge to produce particularly innovative and new content with a high degree of differentiation. Further research will contribute to an important gain in knowledge about how AI should be used in the future.

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