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Research Article

SSVSM-An SEO-SEM model to improve E-commerce product visibility

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Abstract:

In the fast-paced world of e-commerce, especially on platforms like Amazon, standing out with your products is essential for attracting customers and boosting sales. Often, businesses rely on traditional Search Engine Optimization (SEO) and Search Engine Marketing (SEM) separately, which can lead to less-than-ideal outcomes. This paper introduces a new model called the Strategic SEO and SEM Visibility Model (SSVSM), which combines the best of both SEO and SEM to improve product visibility and rankings. The model uses a mix of on-page and off-page SEO techniques along with SEM strategies like pay-per-click (PPC), retargeting, and display ads, all while continuously optimizing in real-time. A case study was performed on Amazon.com, comparing products that were optimized using standard SEO/SEM methods (Group A) against those using the SSVSM hybrid model (Group B). The evaluation focused on key performance indicators such as ranking improvements, impression growth, conversion rates, and precision. The results showed that Group B outperformed Group A significantly, achieving a 4-page ranking boost, a 35% increase in impressions, a 20% conversion rate, and a precision rate that was four times higher than the control group. These findings confirm that the SSVSM model effectively targets the right users while maximizing both organic and paid traffic results. This research offers a practical and statistically backed framework for digital marketers and e-commerce businesses looking to enhance their visibility strategies in ever-changing online markets.

1. Introduction

In our modern world, online shopping has become the go-to method for everyday purchases. This trend is often referred to as e-commerce shopping. The rapid rise of e-commerce has completely transformed the way we shop, making online visibility a crucial element for a product's success. With countless listings on platforms like Amazon, Shopee, and Lazada, sellers are up against fierce competition to secure prime positions in search results(Rahman et al., 2024). In this fast-paced digital marketplace, achieving good visibility on e-commerce platforms can greatly impact customer engagement and overall sales. To differentiate themselves, businesses typically employ two main strategies: Search Engine Optimization (SEO) and Search Engine Marketing (SEM). SEO focuses on enhancing the content of product listings to boost their discoverability in organic search results, while SEM uses paid advertising to place products directly in front of targeted audiences(Information Systems Management Department, BINUS Graduate Program – Master of Information Systems Management, Bina Nusantara University, Jakarta et al., 2020). Each strategy has its own advantages and

techniques. SEO fosters long-term credibility and steady traffic, whereas SEM provides quick visibility and targeted outreach. While SEO is widely adopted, SEM is often used in isolation, which can limit the overall effectiveness of product performance. Traditional SEO approaches usually concentrate on organic traffic strategies, neglecting the quicker, data-driven benefits of paid advertising. On the other hand, SEM campaigns frequently overlook the foundational structure and content quality that SEO brings to the table(Ibrahim et al., 2024; Ologunebi & Taiwo, 2023). To address this disconnect, researchers have suggested models like PR-SEO and others which merge structured keyword planning with insights from ranking algorithms such as PageRank and Amazon's A9(Khan et al., 2021). However, this model still falls short in integrating paid marketing strategies. This paper presents a unified, dual-strategy model, SSVSM, that combines the strengths of both SEO and SEM into a comprehensive framework designed specifically for e-commerce platforms. Rooted in both theoretical models and practical application, this approach is validated through a case study on Amazon.com. The study illustrates how combining organic optimization with targeted advertising can dramatically improve product rankings, drive higher traffic, and increase conversion rates. In doing so, the paper aims to provide a holistic strategy for marketers, sellers, and digital analysts navigating the evolving demands of online commerce.

2. Literature review

SEO is all about boosting a website or product page's visibility in organic search results without paying for ads. We can think of SEO strategies as falling into two main buckets: on-page SEO and off-page SEO(Asrigo & Kaburuan, 2024).

A. On-Page SEO: This involves tweaking elements right on the product or webpage to help it rank better in search results. Here are some common techniques:

- **Keyword Optimization**: This means making sure that product titles, descriptions, and metadata include relevant keywords that potential customers are actually searching for(Erdmann et al., 2022).
- **Content Quality:** It's crucial to create high-quality, informative content that answers customer questions, which can significantly improve your chances of ranking well(Mulyandi et al., 2022).
- **Internal Linking:** By adding internal links that connect related pages on your site, you can boost page authority and keep visitors from bouncing away(Zhang et al., 2024).

Research, like the studies by above metioned, shows that websites with solid on-page SEO tend to outperform others, especially when they use well-researched keywords.

B. Off-Page SEO: This strategy is all about building a website's authority through external signals. Key off-page tactics include:

- **Backlinks:** Getting links from reputable websites tells search engines that your product page is trustworthy and relevant.(Raza et al., 2023)
- **Social platforms:** Engagement on social media platforms like Facebook, Twitter, and Instagram can really boost a product's visibility and ranking, as these platforms often drive traffic to e-commerce sites(Bhandari & Bansal, 2019).

However, traditional SEO can hit some bumps in the road in e-commerce settings, where rankings depend not just on content quality and backlinks, but also on real-time user behavior and sales performance. So, businesses need to step up their game and look beyond traditional SEO methods to adopt more advanced strategies.

C. SEM:

As discussed in the introduction, SEM is all about using paid advertising strategies to boost visibility and attract targeted traffic to product pages. One of the most popular SEM techniques is pay-per-click (PPC) advertising, where businesses place bids on relevant keywords. This approach is particularly appealing for companies looking for quick visibility and results(Somvanshi & Mahajan, 2023).

- **PPC Ads:** These ads pop up in search engine results when users search for specific keywords. Take Amazon, for instance; they feature sponsored product listings right at the top of their search results. PPC ads are especially useful for new products or those in highly competitive markets.
- **Retargeting:** Retargeting ads focus on users who have visited a website but didn't make a purchase. These ads help boost conversion rates by reminding potential customers about the products they were interested in. While SEM can give you a quick visibility boost, it's important to note that this effect doesn't last

long. Once the budget runs out, the product's ranking usually takes a hit. Plus, in competitive niches, the cost-per-click (CPC) can be quite high, which might create challenges for smaller businesses.

D. Amazon A9 Algorithm:

The Amazon A9 algorithm is the backbone of the search and ranking system in Amazon's marketplace, designed specifically to boost sales rather than just provide information. Unlike traditional search engines, A9 focuses on showcasing products that are most likely to lead to a purchase, using a mix of relevance, performance, and user behavior metrics. At its heart, the algorithm assesses keyword relevance by looking at various text fields like product titles, bullet points, descriptions, and backend search terms(Fritz Pierre, 2024). But it goes beyond just matching keywords; A9 also takes into account historical performance data—like sales speed and conversion rates—as key indicators of how effective a listing is. Products that consistently perform well for a given search term tend to climb the ranks over time, highlighting the algorithm's tendency to favor proven winners. Customer behavior signals, such as click-through rates (CTR), add-to-cart actions, and how long users stay on a page, also play a crucial role in shaping the algorithm's choices, as they offer insights into listing quality and user satisfaction. Moreover, Amazon gives a leg up to listings with steady inventory levels and those that are part of Fulfillment by Amazon (FBA) or offer Prime shipping, since these options enhance reliability and improve the customer experience. Pricing strategy is another important factor; items that are competitively priced and offer strong perceived value usually outperform those with less favorable price-to-feature ratios(Sorokina & Cantu-Paz, 2016). Additionally, customer feedback—especially the volume, recency, and average rating of reviews—acts as a stand-in for post-purchase satisfaction and can influence rankings. While paid ads through Sponsored Products don't directly change organic rankings, they can still affect A9 indirectly by boosting a product's visibility, clicks, and sales data—elements that feed back into the algorithm's learning process.

E. Amazon 10 Algorithm:

The Amazon A10 algorithm marks a significant upgrade from the A9 search ranking system, bringing in more sophisticated signals to better align with the evolving trends in e-commerce search behavior and Amazon's overall strategy. While A9 mainly focused on sales performance and keyword relevance to drive conversions, A10 aims for a more balanced approach that considers relevance, trustworthiness, and seller authority in a more holistic way. Although Amazon hasn't shared the exact workings of A10, feedback from sellers and industry experts suggests some key changes. For instance, A10 places less importance on historical ad spend and paid traffic, indicating a shift away from favoring advertisers and instead prioritizing organic seller performance. It tends to favor listings from sellers with solid reputations, high feedback ratings, and low return rates, even if they aren't heavily investing in advertising(Fritz Pierre, 2024). Another key aspect of A10 is its greater focus on external traffic sources, like visitors coming from social media, blogs, or search engines, which are viewed as valuable trust signals and are rewarded more than just internal traffic. Plus, while A9 heavily relied on conversion rates and keyword matching within product listings, A10 broadens its criteria by including a wider range of engagement metrics—such as dwell time, customer retention patterns, and the richness of content (think enhanced brand content, videos, and mobile-friendly listings)(Sorokina & Cantu-Paz, 2016). Inventory reliability and fulfillment methods still matter under A10, but the algorithm now more clearly penalizes listings from sellers who frequently run out of stock, have delivery problems, or receive customer service complaints. Essentially, A10 is designed with the customer in mind, aiming to highlight listings from trustworthy, engaging, and actively involved sellers, which aligns with Amazon's larger goal of fostering customer trust and satisfaction(Ologunebi & Taiwo, 2023). It rewards sellers who not only focus on sales but also provide ongoing value and reliability throughout the shopping experience.

F. Comparison between SEO and SEM:

SEO and SEM are both key strategies for boosting your product's visibility online, especially for e-commerce businesses(Mulyandi et al., 2022; Somvanshi & Mahajan, 2023). Though businesses aim for the same goal, getting more people to see your product, they go about it in different ways, with distinct costs and timelines for results.SEO is all about improving your website's ranking in search engines through organic methods. It involves both on-page and off-page techniques. On-page SEO means tweaking your product listings—like refining titles, descriptions, and adding the right keywords (Aryani et al., 2023). Off-page SEO involves building backlinks from trusted external websites and driving traffic via social media(Aryani et al., 2023; Kumar & Paul, 2020). The beauty of SEO is its long-term payoff: once your product ranks high, it can keep bringing in traffic without needing

ongoing investments(Guddu & Jaiswal, 2019). But SEO isn't a quick fix—it can take time to see significant changes in rankings and visibility. The main costs come from things like content creation and making technical improvements to the product we are targetting(Arief et al., 2023).SEM, on the other hand, is all about paid ads to get immediate visibility and attract targeted traffic to the product. The most common form of SEM is pay-per-click (PPC) ads, where businesses pay every time someone clicks on their ad(Pruthi & Kumar, 2012). Other SEM tactics include retargeting ads (for people who've already visited the product page) and display ads (eye-catching banners for brand awareness)(Somvanshi & Mahajan, 2023, 2023). SEM's big advantage is that it works fast, making it ideal for new products or highly competitive markets. But it requires ongoing financial investment—once the budget runs out, the visibility drops, and product might fall in search rankings. Unlike SEO, the benefits of SEM are temporary unless you keep funding it.The key difference is in their approach. SEO is a long-term, organic strategy that builds trust and credibility over time, while SEM is a quick, paid option that provides immediate results but requires constant spending. Both strategies can be powerful on their own, but when used together, they create a balanced approach(Ologunebi & Taiwo, 2023). By combining the lasting impact of SEO with the quick wins from SEM (as suggested by models like the Strategic SEO and SEM Visibility Model), businesses can improve their visibility and drive traffic more efficiently, all while boosting their rankings and conversions(Osan, n.d.; Somvanshi & Mahajan, 2023).

3. Proposed methodology

This proposed methodology brings together both SEO and SEM strategies to boost product visibility and rankings on e-commerce platforms (Osan, 2018). By focusing on both aspects, we aim to harness the long-term benefits of organic rankings while also leveraging the immediate effects of paid advertising. This balanced approach provides businesses with a more effective way to rank their products in the fiercely competitive e-commerce landscape. Here is the Flow Chart of SSVSM.

A. Data Collection: We kick things off by gathering crucial data from various sources to get a clear picture of both organic and paid search performances. The main goal here is to create a comprehensive view of how products are performing and how customers are engaging, which will help us fine-tune our SEO and SEM strategies. Key data sources for the hybrid SEO and SEM methodology include: -

- **User Interaction Data**: This encompasses metrics like clicks, product views, add-to-cart actions, purchases, and bounce rates. These figures help us understand how engaged and interested customers are in the products(Pruthi & Kumar, 2012).
- **Product Performance Metrics**: Key indicators such as product ratings, customer reviews, and sales figures enable the algorithm to assess how well products are doing and how relevant they are to users(Ahluwalia et al., 2013).
- **Competitor Analysis:** A closer examination of how competitor products are ranked, their pricing strategies, and their overall performance on the e-commerce platform.
- **Search Engine Data:** Ranking information from search engines for specific keywords, which helps us measure a product's visibility in both organic and paid search results. This thorough dataset allows us to make strategic tweaks to our SEO and SEM practices, ultimately enhancing product rankings.

The process of Data collection in explained in the figure 2 as shown below describing the sub modules of the section.

Figure 2 illustrates the process of data collection module to optimize their product performance using data-driven insights. The process begins with the seller inputs the keyword to the system with a specific product keyword, which triggers data collection. This data is then used to gather competitor information and ranking, focusing on three critical areas:

(i) keywords, (ii) pricing, and (iii) positioning. These factors deep dive into performance matrices, which track essential metrics which are reviews and ratings, along with sales rates and click data. The collected performance data is then processed during the extracted data evaluation phase to generate actionable insights. These insights help the seller refine strategies, improve product listings, and enhance overall performance in the marketplace, creating a continuous improvement loop for sustained growth.

B. **SEO Techniques Implementation** To boost a product's organic visibility on e-commerce platforms, we implement a mix of traditional on-page and off-page SEO techniques.

- **On-Page SEO:** Keyword Optimisation: By pinpointing high-traffic and high-conversion keywords, we can enhance product titles, descriptions, and metadata. When keywords are placed correctly, it makes it easier for users to find the product they're searching for.
- **Listing and Content Optimization:** It's all about crafting rich, engaging content—think product Titles, descriptions, EBC content, and specifications—that not only adds value for customers but also weaves in those targeted keywords seamlessly.
- **Internal Linking:** This involves linking related products within the same website, which boosts page authority, lowers bounce rates, and makes navigation a breeze for users.

C. **Off-Page SEO:**

- **Backlink Acquisition:** Gaining backlinks from reputable websites that link back to your product page can really boost your credibility in the eyes of search engines, enhancing your product's authority and search ranking.
- **Social Media Engagement:** Utilizing social media platforms to drive traffic and create brand mentions serves as additional signals for search engines, helping to elevate your visibility.

By consistently optimizing both on-page and off-page elements, SEO ensures that products enjoy lasting visibility in organic search results.

D. **SEM Techniques Implementation**

While SEO is all about the long game, Search Engine Marketing (SEM) focuses on generating immediate traffic and visibility through paid ads. In all types of campaigns written below in the we are focusing on 2 things majorly.

- Age limit
- Gender

- **PPC Campaigns:** By using tools like Google Ads or Amazon Sponsored Products, businesses can bid on relevant keywords to get their products right at the top of search results. This strategy guarantees instant visibility, which is especially useful for new or highly competitive products.
- **Retargeting Ads:** These ads target users who have visited the product page but didn't make a purchase, and they've been shown to boost conversion rates significantly.
- **Display Ads:** Running eye-catching banner ads across e-commerce platforms can grab the attention of potential customers. These ads are particularly effective for building brand awareness and promoting products.
- **Bid Management:** It's all about fine-tuning those keyword bids based on how they're performing, making sure that the most effective ads stay competitive in the bidding game. By honing in on these SEM strategies, businesses can quickly attract targeted traffic, which boosts their chances of converting sales and enhances their paid rankings.

E. **Real-Time Adjustment and Optimization:** A crucial part of this methodology is the real-time tweaking of both SEO and SEM strategies based on the latest performance data. As customer behavior shifts, it's vital for SEO and SEM efforts to adapt swiftly to maintain product visibility and ranking.

- **Keyword Performance Monitoring**: Keeping a close eye on which keywords are bringing in the most traffic and conversions, and adjusting bids and content strategies as needed. Competitor Analysis: Tracking competitors' product performance in real-time, allowing for quicker responses to market changes and competitive dynamics.
- **Ad Performance Optimization:** Evaluating how well PPC ads and retargeting efforts are doing, and fine-tuning targeting, creatives, and bidding strategies to get the most bang for your buck. This agile approach ensures that the product consistently ranks well in both organic and paid search results.

F. Integration of SEO and SEM: The standout feature of this methodology is the seamless integration of SEO and SEM. While traditional SEO strategies aim for long-term organic growth, SEM provides quick visibility through paid efforts. By merging these two, businesses can reap the benefits of both

G. **Long-Term Organic Visibility (SEO):** Making sure the product continues to rank high in search results even after the paid advertising campaigns wrap up. Immediate Paid Visibility (SEM): Ensuring the product shows up at the top of search results right away, driving traffic and conversions in no time. This hybrid strategy not only boosts visibility but also enhances conversion rates by attracting both organic and paid traffic to the product page. Figure 2 represts the working of SEO and SEM.

4. Results and Validation

To evaluate the results and the effectiveness of the model for improved product visibility on e-commerce platforms, we set up an experiment that includes data collection, performance tracking, and comparison with traditional methods. The evaluation aims to measure the success of this combined strategy in terms of ranking improvement, visibility enhancement, and conversion rate.

Platform Selection

For this study, we are using Amazon.com as the target e-commerce platform due to its vast customer base and competitive nature. Amazon is one of the largest e-commerce platforms globally, with millions of active users and products. It uses an A9 and A10 algorithm that already includes some SEO and SEM factors, but does not fully integrate a dual approach. This experiment aims to demonstrate how combining both SEO and SEM improves product visibility and sales conversion.

Metrics for Evaluation

The effectiveness of the model evaluated based on the following key metrics:

1. **Ranking Improvement (ΔR)**

   This metric measures the change in product ranking before and after applying the SEO and SEM strategies.

$$\Delta R = R_{final} - R_{initial} \quad \textit{eq 1}$$

Where:

ΔR= Change in Ranking

R final = Final Ranking

R initial = Initial Ranking

A positive change indicates an improvement in the product's position in search results.

2. **Visibility Increase (Impressions)**

   This measures the increase in the number of views a product receives in search results.

$$\textbf{Visibility increase}\ (\%) = \frac{Vfinal - Vinitial}{2} * 100 \quad \textit{eq 2}$$

Where,

Vfinal = Final number of impressions

Vinitial = Initial nubmer of impressions

A higher percentage indicates that the product is being viewed more frequently.

3. **Conversion Rate (CR)**
   This measures the percentage of users who complete a purchase after viewing the product. An increase in conversion rate indicates that the product is not only being viewed more but also being purchased more frequently.

$$CR\ (\%) = \frac{Purchases}{Impressions} * 100 \quad \textit{eq 3}$$

Testing Procedure

The experiment is conducted with an A/B testing approach, comparing products with our mode and traditional SEO or SEM approach. The following steps are implemented:

- **Group A**: Products ranked using traditional SEO OR SEM methods separately.
- **Group B**: Products ranked using the SSVSM
  - **SEO**: optimized listing title, bullets, ebc content and backlinks.
  - **SEM**: Targeted paid ads, retargeting ads, and bid management based on performance

Each group is tracked for a **4-week period**. During this time, we monitor the following metrics daily:

- Product visibility on Amazon

- Number of impressions and click-through rates (CTR)
- Conversion rates and sales data

Experimental Phases

The experiment will be divided into three phases:

1. **Phase 1: Data Collection**

In this phase, baseline data for product performance using traditional SEO and SEM methods will be collected. This includes initial rankings, impressions, and conversion rates.

2. **Phase 2: Algorithm Application**

For Group B, SEO strategies is refined with real-time data, and SEM strategies are optimized based on continuous performance tracking.

3. **Phase 3: Performance Comparison**

After the 4-week period, the results from Group A and Group B wis compared based on:

- Ranking improvements
- Visibility increase (impressions)
- Conversion rates

5. Results:

Based on all the above procedures below are the produced results:

The SSVSM (combined SEO and SEM strategy) used in Group B outshone the traditional method employed by Group A across all important metrics. To break it down, Group B made a remarkable leap in product ranking, jumping from page 5 all the way to page 1 ($\Delta R = -4$), while Group A only managed to move up to page 3 ($\Delta R = -2$). When it comes to visibility, Group B saw a fantastic 35% boost in impressions, far surpassing Group A's 15% increase. On top of that, Group B's conversion rate hit 20%, which is a whopping four times higher than Group A's 5%. These results clearly demonstrate how effective it can be to blend real-time SEO tweaks with data-driven SEM strategies to improve search visibility and conversion rates on a competitive e-commerce platform.

Validation:

Results are validated statistically based on the precision formula as dicussed below:

$$\textbf{Percision}\ (\%) = \frac{\boldsymbol{Purchases}}{\boldsymbol{Clicks}} * \mathbf{100} \quad \boldsymbol{eq\ \ 4}$$

The empirical findings revealed that Group A, which used traditional SEO or SEM methods separately, brought in 480 page views, resulting in 24 purchases and a precision rate of 5.00%. On the other hand, Group B, which adopted the new dual-focused strategy, saw a remarkable 5,00 page views and 1,00 purchases, leading to a much higher precision of 20.00%. This significant boost in precision highlights that combining SEO and SEM not only enhances visibility and conversion rates but also sharpens targeting accuracy. It ensures that a greater percentage of the audience reached through this model are genuine buyers, confirming the model's effectiveness in real-world market conditions.

Table 1: *Changes comparison between Amazon A9 and A10 Algorithm*

Factor	A9 Algorithm	A10 Algorithm
Main Objective	Maximize sales	Maximize customer trust/ relevance and authority
Ad Spend Influence	Strongly favors paid traffic (PPC) only	Deprioritized; priority on both SEO and SEM
External Traffic	Minimal impact	Highly valued (from Google, social, blogs, etc.)
Seller Authority	Less influential	Strong focus on seller ratings, history, return rate
Keyword Relevance	High weight on exact match	Still important, but balanced with other signals
Conversion Rate	Primary ranking factor	Still important, but combined with engagement quality

Table 2. *Results*

Evaluation Metric	Group A (Traditional SEO/SEM)	SSVSM (SEO + SEM)	Performance Difference
Initial Ranking (Page)	5	5	Same baseline
Final Ranking (Page)	3	1	Group B (SSVSM) achieved a higher final rank
Ranking Improvement	−2 pages	−4 pages	Group B (SSVSM) improved by 2

(ΔR)			additional pages
Visibility Increase (%)	+15.0%	+35.0%	Group B (SSVSM) received 20% higher visibility
Conversion Rate (CR%)	5.00%	20.00%	Group B (SSVSM) achieved 4× higher conversion rate

Table 3: *Precision validation*

Group	**Clicks**	**Purchases**	**Precision (%)**	**Interpretation**
Group A	480	24	**5.00%**	Low targeting
Group B SSVSM	500	100	**20.00%**	Strong targeting

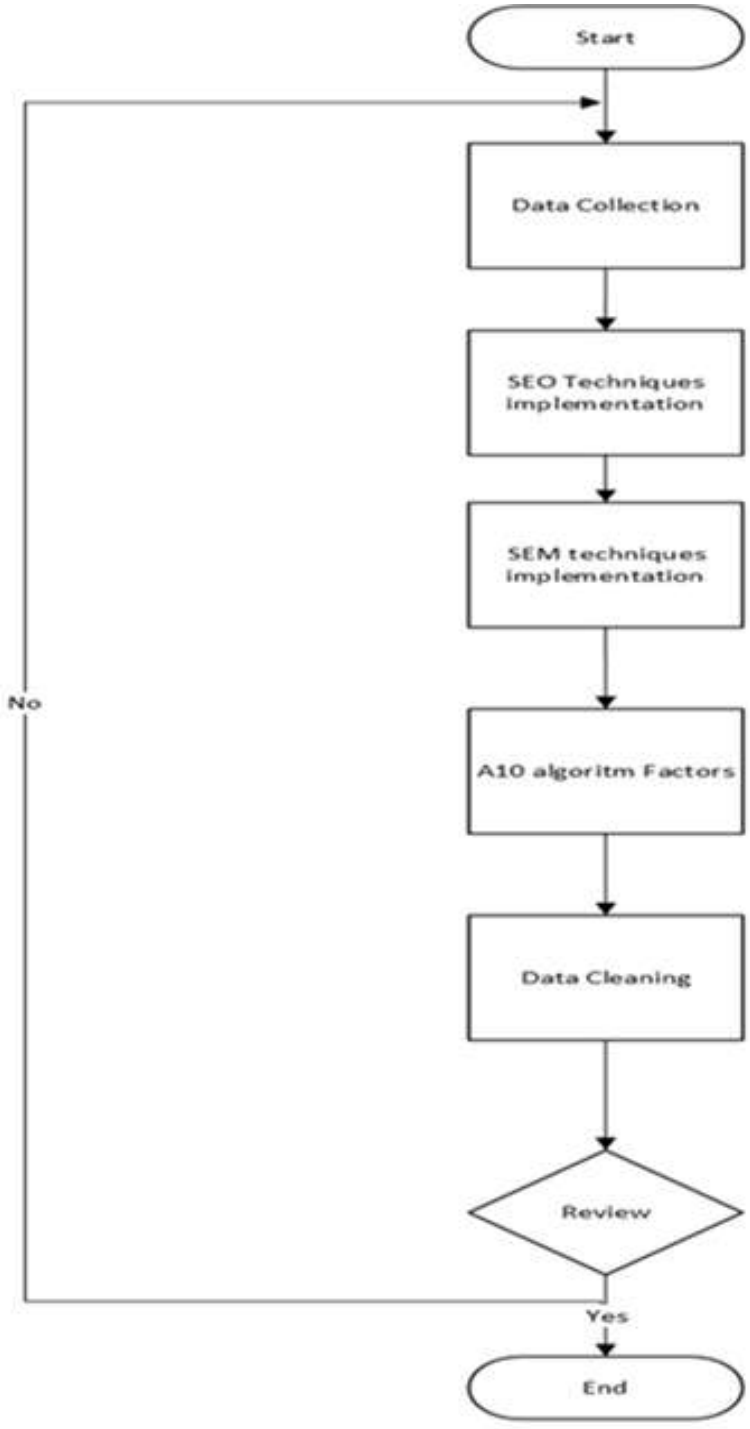

Figure 1 *Data flow chart*

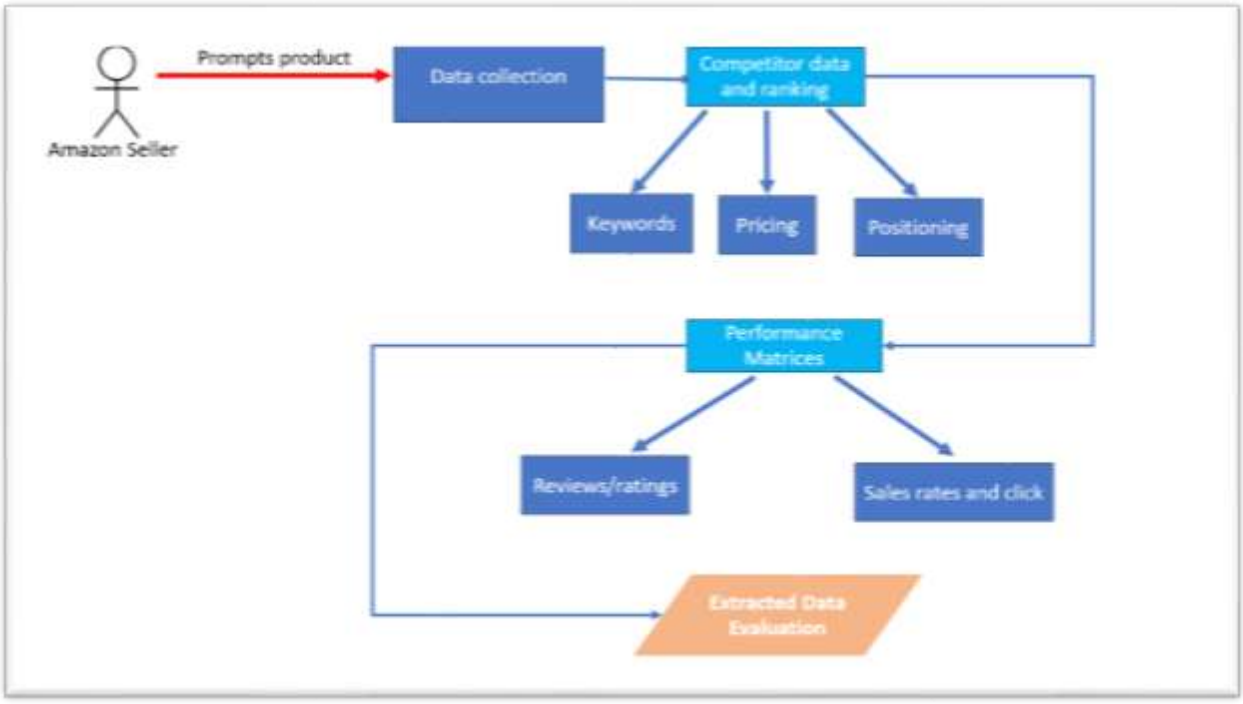

Figure 2 *Data collection module*

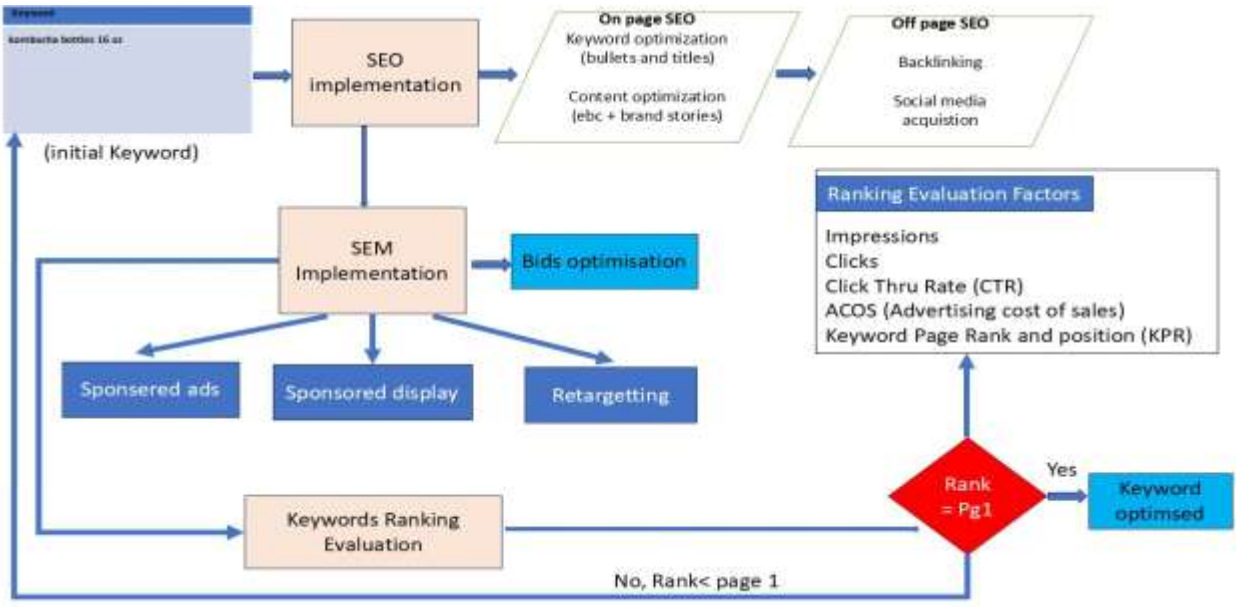

Figure 3 *SEO and SEM implementation module*

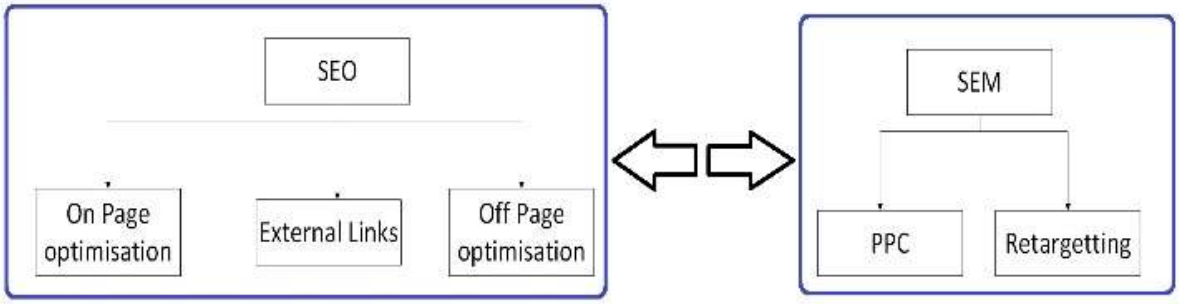

Figure 4 *SEO and SEM working*

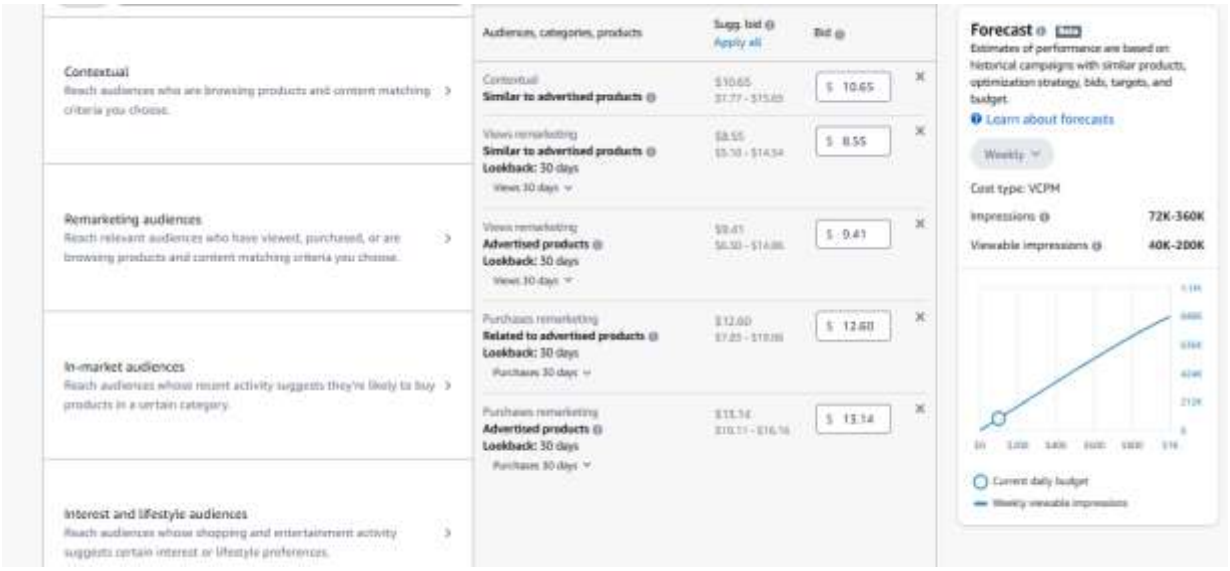

Figure 3 *SEM and SEM targetting*

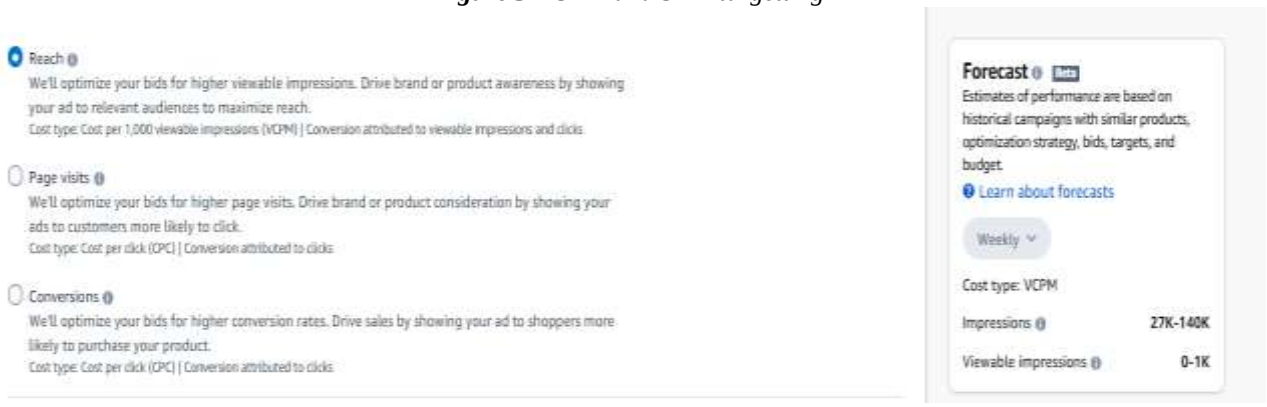

Figure 4 *Retargetting*

6. Conclusions

This study introduced and validated the SSVSM model, a unique blend of SEO and SEM strategies designed to boost product visibility on competitive e-commerce platforms. By combining long-term organic optimization with short-term paid advertising tactics, the model effectively tackled the challenges of using these methods separately. Its implementation on Amazon showed impressive improvements in key performance metrics, such as ranking, visibility, and conversion rates. The model enhances user targeting accuracy, boasting a 20% precision rate, and it improves the conversion rates compared to traditional approaches. Additionally, statistical validation through precision metrics provided solid empirical support for the model's effectiveness. The SSVSM model thus presents a strong, data-driven strategy for e-commerce businesses looking to expand their digital presence and performance. Future research could investigate the application of this model across various platforms and industries to evaluate its broader applicability and long-term effects.

Author Statements:

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