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THE STATE OF SEO OF E-COMMERCE WEBSITES THAT SELL ELECTRONICS IN BOSNIA AND HERZEGOVINA AND THE IMPACT OF SEO FACTORS ON TRAFFIC AND REVENUE

Abstract

Purpose: The research aims to assess the SEO status of electronics e-commerce websites in Bosnia and Herzegovina and analyze the impact of certain SEO factors on website traffic and company revenue.

Methodology: Empirical research was conducted on 47 out of 50 identified e-commerce websites that sell consumer electronics in Bosnia and Herzegovina. Descriptive statistical analysis was used to determine the share and structure of organic search visits, the current state of SEO factors, and their impact on user experience and visitor behavior. Path analysis was used to identify and quantify the relationship between SEO factors and website traffic as well as between website traffic and company revenue.

Results: Organic search visits represent 23.6% of traffic, with branded visits comprising 48.9%. Mobile optimization needs attention, with 6.4% lacking mobile-friendly design and 75.4% exhibiting poor mobile performance. Desktop performance scores are generally low, with only 12.8% rated as good. An average number of pages per visit is 2.67, and the average bounce rate is 61.4%. The authority score, which measures the quantity and quality of backlinks, has a strong positive impact on the number of keywords. In turn, the number of keywords has a strong positive impact on the number of visits. Finally, visits have a strong positive impact on the revenue of e-commerce websites.

Conclusion: Path analysis determined the link between SEO factors, traffic, and revenue. Recommendations of the most critical tactics for attracting web visitors and improving user experience and retention through SEO optimization are given.

Keywords: SEO, search engine optimization, e-commerce, website traffic

1. Introduction

Business success of an online retailer largely depends on the number of visitors to the e-commerce website and the conversion rate. There are several possible sources of website visits: direct visits achieved by entering a known web address in a web browser, visits from online advertisements, visits through referral links (links on other web-

sites, social networks, or e-mail messages), and visits from search engines known as organic traffic (Mahmutović, 2021).

Organic traffic denotes the flow of visitors who use search engines to locate desired information at no cost (Roumeliotis et al., 2022). Following a keyword search, search engine results display a list of websites relevant to the searched terms (Luh et al., 2016), ranking them based on various factors, such as content relevance, the number and rank of incoming links and the link structure (Tomasi & Li, 2015). Out of 100 searches conducted for a specific keyword, 88 users clicked on one of the first ten results (Sgueo, 2023). A website will receive more visitors from a search engine (organic search) when websites rank higher on the search engine results page (SERP), and these visitors can then be converted into customers (Ortiz-Cordova & Jansen, 2012). Achieving a high organic search ranking is typically tricky since it cannot be bought (Matošević et al., 2021). Websites aiming for top positions must meet specific criteria, termed ranking factors, outlined in guidelines periodically issued by search engine companies (Google, 2023e). While these factors are publicly announced, the exact impact on search rankings remains undisclosed as search engines keep their algorithms and ranking criteria confidential (Iqbal et al., 2022).

According to BrightEdge's 2019 report, organic search is the channel that brings the most traffic to websites, on average, organic search accounts for 53.3% of traffic across all industries and 41% in retail and e-commerce (BrightEdge, 2019). The same report states that, in terms of revenue, organic search is the largest channel, accounting for 44.6% across all industries and 36.4% in retail and e-commerce. However, according to SemRush's (2023a) report, the last three years have seen a decrease in organic traffic to e-commerce sites worldwide. For example, Amazon lost 37.5% of organic visits in 2021 compared to 2020. The same report states that in 2022, organic search visits were the second most significant source of visits to e-commerce websites, with a share of 27.6% of visits in Europe and 12.7% in the U.S, while direct visits make up more than 85% of all U.S. e-commerce traffic, compared to 55.9% in Europe. Considering the primary sources of visits, building brand awareness (for direct visits), and optimizing websites for better positions on search engines (Search Engine Optimization - SEO) have become the most critical marketing tools for attracting visitors to online stores. This paper aims to investigate the SEO factors that affect higher rankings of e-commerce websites in search engines and how they impact the number of visits and revenue for online retailers.

2. Literature review

2.1 What is Search Engine Optimization (SEO) and why is it important?

While strengthening brand awareness through long-term investments in promotion, especially advertising and public relations, can increase the number of direct visits to the website, search engine optimization (SEO) can achieve more visits from search engines.

SEO optimizes web pages and edits website content and code to improve its visibility and ranking in the organic (non-paid) search results within one or more search engines (Li et al., 2014; Killoran, 2013).

Successful SEO should push a web page to the top of search results for the requested keyword or phrase. Being at the top of search results is essential because visitors mostly visit only the first links on search results pages. Research conducted by Sistrix, which analyzed over 80 million keywords and billions of search results, showed that out of 100 searches conducted, 88 users click on one of the first 10 results, 70 of them click on one of the first five results, and 55 users click on one of the first three results (Sgueo, 2023).

SEO includes on-page and off-page optimization (Chotikitpat et al., 2015). On-page optimization focuses on content optimization according to keywords, content and URL structure optimization, image optimization, internal and outgoing links (outbound links) optimization and technical website optimization to ensure the validity of the code, high loading speeds and adaptability for different screen size devices (Chotikitpat et al., 2015; Hui et al., 2012; Viney, 2008; Fuxue et al., 2011; Iqbal et al., 2022). This process should help search engines understand and present content (Google, 2023b) to users. Google claims that its algorithms look at many factors and signals, including the words of query, relevance, and usability of pages, the expertise of sources, and user location and settings, and when all things are relatively equal, page experience (mobile friendliness and page loading speed) will be the deciding factor for ranking (Google, 2023d). Mobile friendliness is ensured with responsive

design. Responsive design ensures dynamic adaptation of the contents to the display size, thus ensuring a good viewing experience regardless of the web access device (Almeida & Monteiro, 2017). The loading speed of websites reflects website performance and significantly influences user experience and satisfaction (Bartuskova & Krejcar, 2015). Outbound links refer to links originating from websites and directing users to external sources. Related outgoing links provide helpful information to the visitors, and a quantity of unique outbound links improves a website's ranking (Nath & Ahuja, 2014; Iqbal et al., 2022).

Off-site optimization relates to the practices through which the website and its contents are propagated over the Internet to increase its traffic, which enhances a website's ranking (Khan & Mahmood, 2018). It includes link building and website submission to search engines and link directories (Mahmutović, 2021). Link building aims to ensure that as many other sites as possible link to the e-commerce website, thus showing the web search engines that the website is authoritative and relevant for the targeted keywords. If other prominent websites link or refer to web page content, the search engine will prioritize that page, rating it positively for expertise, authoritativeness and trustworthiness (Google, 2023d). Essential factors for link building are backlink quality (the total number of backlinks, the number of referring domains, and the quality of the web page where the link is placed), anchor text used and social media activity (Alfiana et al., 2023). Utilization of on-site optimization is known as the content SEO strategy, while off-site optimization is known as link building and social sharing strategies (Zhang & Cabbage, 2017).

SEO requires significantly lower investment than advertising, so it is no surprise that in recent years, it has become one of the favorite techniques of digital marketers to secure free traffic. The estimated value of the SEO services market increased from USD 62.75 billion in 2022 to USD 74.76 billion, with an expected growth of USD 146 billion by 2027 at a CAGR of 18.4% (The Business Research Company, 2023).

For a company to have insight into search engine optimization of its website and the amount of traffic it achieves through organic search, it is necessary to use digital analytics. Digital analytics includes collecting, measuring, analyzing, visualizing, and interpreting digital data that illustrate user behavior on websites and mobile applications. It includes web, social media, SEO, and user experience analytics (Mahmutović, 2021). While web analytics is focused on collecting and processing data related to website performance, SEO analytics is focused on tracking the signals that dictate a website's position on search engine results pages. These signals include the number of incoming links and their quality (backlinks), keywords, website indexing errors, broken links, and user experience measured through website performance and loading speed (Mahmutović, 2021).

According to StatCounter (2023), Google dominates the search engine market today, with a 91.85% market share. It is followed by Bing (3.02%), Yandex (1.49%), Yahoo (1.17%), Baidu (1.06%), and DuckDuckGo (0.54%). As the largest and most important player on the market, Google uses automated ranking systems that look at many factors and signals about hundreds of billions of web pages and other content in its search index to present the most relevant and valuable results. Over time, the company has developed several AI systems that help Google rank results more effectively in its index to:

- understand representations of concepts in queries and pages and match them to one another (Neural Matching);
- show original content prominently in search results, including original reporting, ahead of sources that merely cite it (Original Content Systems);
- show only the most relevant results to avoid unhelpful duplication (Deduplication Systems);
- understand how combinations of words express different meanings and intent (Bidirectional Encoder Representations from Transformers);
- show fresher content for queries where it is expected (Freshness System);
- ensure that users see original, helpful content written by people for people in search results, rather than content made primarily to gain search engine traffic (Helpful Content System);
- understand how pages link to each other as a way to determine what pages are about and which might be most helpful in response to a query (Link Analysis System and PageRank);

- understand how words are related to concepts (RankBrain);
- better reward high quality reviews, i.e., content that provides insightful analysis and original research (Reviews System);
- deal with content and behaviors that violate Google spam policies (Spam Detection systems) (Google, 2023c).

Although the importance and impact of specific signals on the ranking of websites in the Google index is a business secret, through its documentation, Google (2023b) indicates significant SEO factors and provides recommendations for content optimization and technical optimization. Google especially emphasizes the importance of creating compelling and valuable content, the use of unique and informative meta tags and structured data markup that describe the content of a website to the search engine, optimization of the website structure and navigation elements, image optimization, and content optimization for mobile devices.

2.2 *The influence of SEO factors on SERP positions and traffic*

Most researchers and practitioners have concluded that the vital SEO techniques for improving SERP positions are improving keyword prominence, i.e., by increasing keyword visibility on websites (Mwosa Kivuti, 2018; Krrabaj et al., 2017), and improving the page rank through the quality and quantity of backlinks (Su et al., 2014; O'Neill & Curran, 2011; Giomelakis & Veglis, 2015; Tomasi & Li, 2015; Seyfabad & Fard, 2019; Krrabaj et al., 2017). O'Neill and Curran (2011) stated that SEO has many factors that affect website ranking performance within search engines, such as meta tags, content, link popularity, click popularity, and longevity, which determine a site's ranking. The authors especially emphasized the importance of keywords, relationships, and communication with other websites (backlinks and outbound links). Similarly, Su et al. (2014) revealed that the quality and quantity of backlinks (page rank[1]) are the dominant SEO factor. Ziakis et al. (2019), Zilincan (2015), and Tsuei et al. (2020) determined the positive impact of the appearance of keywords and key phrases in the hostname, main page headings, image descriptions, the path segment of the URL, main content and page meta tags, on the SEO results. By testing the existence and strength of the correlation between individual SEO factors and the website's rank, Ziakis et al. (2019) found that an additional factor for SEO success is domain age. Domain age can significantly impact its ranking by enhancing trust and credibility among website users, whereby domains registered for two years or more are perceived as more reliable than newer domains (Shenoy & Prabhu, 2016). The opposite conclusion was reached by Chakrabortty & Jose (2018), analyzing the relationship between domain age and website traffic, where they determined that the correlation between domain age and monthly page views is insignificant, i.e., that domain age has no significant role in generating page views. Krrabaj et al. (2017) confirmed the importance of link building and keyword optimization and emphasized the importance of content currency.

The influence of page experience on SEO results through mobile-friendly responsive design and page loading speed has been confirmed by Gao et al. (2017), Bartuskova and Krejcar (2015), Mustafa et al. (2015) and Egri and Bayrak (2014). Contrary to those studies, Ziakis et al. (2019), Marszałkowski et al. (2014), and Roumeliotis et al. (2022) found out that the website loading time does not affect the ranking of a website. However, Marszałkowski et al. (2014) found that crawl time measured by Google's indexing robot plays a role in the Google algorithm, although its impact is not big.

Some studies claim that outbound links can significantly influence website authority. Specifically, linking to relevant and authoritative websites positively impacts ranking in search engine results pages (Iqbal et al., 2022; Nath & Ahuja, 2014). While SEO optimization literature suggests that offering valuable information via outbound links enhances trust and credibility on a website (Shenoy & Prabhu, 2016), empirical research validating the extent of this association is still ongoing and remains challenging to determine.

Previous research has confirmed a positive impact of SEO on website traffic, visit duration and user

1 PageRank works by analyzing the links between web pages. It assigns a numerical weight to each page, representing its importance on the web. The underlying idea is that a page is considered more valuable if it is linked by other pages, especially if those pages are important. It was developed by Larry Page and Sergey Brin, the founders of Google, as an algorithm used by Google Search to rank web pages in their search engine results.

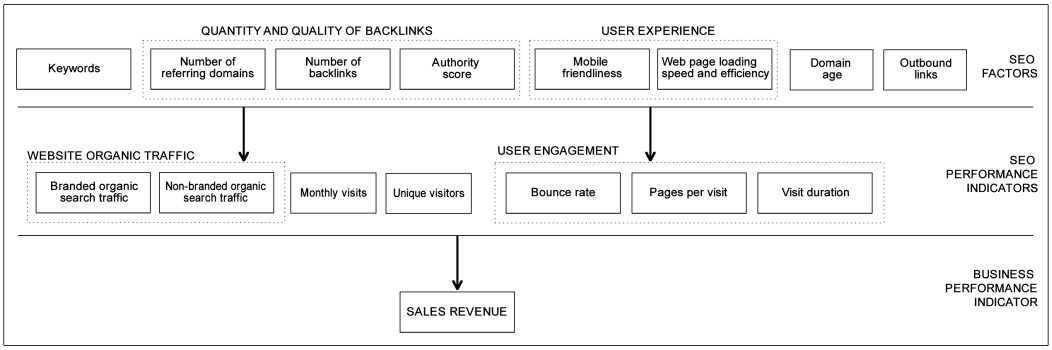
engagement (Giomelakis & Veglis, 2015; Baye et al., 2016; Tomasi & Li, 2015; Roumeliotis et al., 2022).

As visit duration and user engagement increase the probability of making a sale (Bhatnagar & Ghose, 2004.; Lee et al., 2011), through this influence, SEO also indirectly affects conversions and sales revenue (Roumeliotis et al., 2022; Sinaga et al., 2024; Tomasi & Li, 2015). A positive impact of SEO practice is not only limited to increasing traffic and sales revenue but also on other marketing variables like market share, brand equity, product awareness, purchase persuasion, consumer insights and business growth (Bhandari & Bansal, 2018; Sinaga et al., 2024).

Giomelakis and Veglis (2015) investigated the extent to which SEO factors influence website traffic. They researched 30 media websites in Greece, and the results showed that the websites with the most visits used SEO. It was established that there is a significant correlation between website visits and various SEO factors, such as backlinks, a bounce rate, and link exchange practice. Baye et al. (2016) found that the quality and brand awareness of a site increase organic clicks through the better position of higher-quality e-commerce websites on search results pages. The authors realized that a firm not appearing on the first five search results pages receives 90% fewer clicks for a given search term. Tomasi and Li (2015) investigated the impact of SEO initiatives on the performance of three SMEs in Maryland. They found that SEO leads to an increase in the number of visitors to the site, an increase in the average time duration of users visiting the site, and increased user engagement. Sinaga et al. (2024) came to similar findings in the e-commerce industry in Indonesia, establishing the positive impact of SEO on business growth. Roumeliotis et al. (2022) analyzed the applied SEO techniques (optimization of meta tags, titles, use of SEO-friendly URL, use of structured data, responsiveness) and SEO metrics (domain authority, organic keywords, website speed, and backlinks) on 243 websites of airline carriers and their impact on website traffic. They concluded that SEO techniques and metrics correlate significantly with website traffic, increasing airline conversions and bookings. A particularly significant and strong relationship was established for backlinks and keywords. Seyfabad and Fard (2019) investigated how SEO metrics can affect the ranking of university websites. The results showed that metrics like backlinks, PageRank, link quality, the number of indexed pages, the number of referring domains and IPs, and the authority of page and domain significantly affect the website's visibility. Therefore, the authors conclude that universities can improve their ranking on the Webometrics list with on-page optimization and off-page optimization.

Figure 1 shows the connection between SEO factors, SEO performance indicators, and sales revenue based on the literature review.

Figure 1 Connection between SEO factors, SEO performance indicators and sales revenue



Source: Author

3. Method

Empirical research for this paper was conducted on the population of e-commerce websites in Bosnia and Herzegovina that sell consumer electronics (computers and computer equipment, smartphones, and TV sets). A Google search using the keywords in

the Bosnian language, "computer sale", "smartphone sale", and "TV sets sale", identified a total of 50 online shops in Bosnia and Herzegovina that sell the aforementioned products. Three online shops, which were found to belong to large retail chains in Bosnia and Herzegovina, were excluded from the sample. The remaining 47 e-commerce websites were analyzed with several online tools to collect data on individual SEO factors and SEO performance indicators.

Reliable quantitative data are imperative for effectively investigating and analyzing specific variables. That is why a significant number of researchers opt to employ external tools to obtain essential information, such as metrics like unique visitor count, bounce rate, link volume, and domain authority, among others—metrics that Google itself does not furnish directly (Reyes-Lillo et al., 2023).

The list of analyzed SEO factors, SEO performance indicators and the names of the services used to collect data are listed in Table 1 and Table 2.

One of the analyzed SEO factors is the domain authority score. Domain authority is a prominent metric frequently utilized within professional contexts that has garnered considerable attention within academic scholarship, as evidenced by studies conducted by Vyas (2019), Urosa-Barreto (2020), Nagpal and Petersen (2021), and Ganguly (2022).

Moz, Semrush, and Ahrefs are prominent SEO analytics companies providing valuable insights into domain authority scores. The domain authority values supplied by Moz (Domain Authority), SemRush (Authority Score), and Ahrefs (Domain Rating) can be considered reliable (Reyes-Lillo et al., 2023). We decided to use the SemRush indicator (Authority Score), which is based on multiple factors of trustworthiness and authority, including the quality and quantity of site's backlinks, organic search traffic, and indicators of manipulation or spam in the link profile (Reyes-Lillo et al., 2023; SemRush, 2023b). Varangouli (2020) explains that the authority score is assessed using a logarithmic scale ranging from 0 to 100, where higher scores are associated with increased traffic and improved rankings.

Data on the number of employees and income in 2022 for every company were collected through the web portal of the Financial Information Agency of the Federation of Bosnia and Herzegovina[2]. Statistical data processing, descriptive statistical analysis, and path analysis were performed using R statistical software.

Table 1 SEO factors and data sources

SEO factor	Description	Source
Mobile and Desk performance score	Performance score measures the speed and efficiency of loading a website. Google prioritizes websites with high speed because it improves user experience. The performance score is a weighted average of metric scores, and the weight of each metric is a representation of the user's perception of performance. Metrics included in the calculation are First Contentful Paint (FCP), Speed Index (SI), Largest Contentful Paint (LCP), Time to Interactive (TTI), Total Blocking Time (TBT), and Cumulative Layout Shift (CLS).	Google PageSpeed Insights
Largest Contentful Paint (LCP)	Measures loading performance. To provide a good user experience, LCP should occur within 2.5 seconds after the page first starts loading (Walton & Pollard, 2019).	Google PageSpeed Insights
First Input Delay (FID)	Measures *interactivity*. To provide a good user experience, pages should have an FID of **100 milliseconds** or less (Walton, 2019).	Google PageSpeed Insights
Cumulative Layout Shift (CLS)	The user-centric metric for measuring visual stability because it helps quantify how often users experience unexpected layout shifts. To provide a good user experience, pages should maintain a CLS of 0.1. or less (Mihajlija & Walton, 2019).	Google PageSpeed Insights

2 https://fia.ba/en

SEO factor	Description	Source
Authority Score	This is a metric for the overall quality of a website or webpage. The higher the score, the more weight domain or webpage outbound links to another site could have.	SemRush
Backlinks	The number of links from other websites to a specific website.	SemRush
Keywords	The number of keywords bringing users to an analyzed domain via Google's top 100 organic search results.	SemRush
Referring domains	The number of referring domains with at least one link points to an analyzed domain/URL.	SemRush
Outbound domains	The total number of domains the analyzed domain or URL points to.	SemRush
Domain age	Calculated domain age in days as of 25 September 2023.	https://nic.ba https://who.is/
Mobile-friendliness score	A categorical variable indicating whether the website is optimized for mobile device use (0=No, 1=Yes).	https://search.google.com/test/mobile-friendly

Source: Author

Table 2 SEO performance indicators and data sources

SEO performance indicator	Description	Source
Bounce Rate	Bounce rate is the percentage of visitors that leave a website after viewing only one page.	SemRush
Pages per visit	An average number of pages visited during one visit.	SemRush
Visit Duration	Average duration of the visit in seconds.	SemRush
Monthly visits	The number of unique visits to a root domain for the last month.	SemRush
Organic search traffic	It estimates organic traffic driven to a domain from Google search results.	SemRush
Branded organic search traffic	The amount of traffic that comes to an analyzed domain from keywords that include the domain's brand name.	SemRush
Non-branded organic search traffic	The amount of traffic that comes to an analyzed domain from non-branded keywords.	SemRush

Source: Author

The research questions in this paper are:

1. What is the share of organic search visits to e-commerce websites that sell consumer electronics in Bosnia and Herzegovina, and what is the ratio of branded vs. non-branded organic visits?
2. What is the state of SEO of e-commerce websites that sell consumer electronics in Bosnia and Herzegovina?
3. Which SEO factors affect e-commerce website traffic and sales revenues in Bosnia and Herzegovina, and to what extent?
4. Which SEO areas should e-commerce websites that sell consumer electronics in Bosnia and Herzegovina improve to achieve better business results?

4. Results and discussion

4.1 Sample profile

The sample consists of 47 e-commerce websites in Bosnia and Herzegovina that sell computers and computer equipment, smartphones, and TV sets. The following tables show the sample profile according to the number of employees, domain age and annual revenue.

Table 3 Profile of the sample according to the number of employees

Company type	Number of employees	N	%
Microenterprise	1-9	20	42.6
Small business	10-49	16	34.0
Medium enterprise	50-249	10	21.3
Large enterprise	> 250	1	2.1

Source: Author

Table 4 Profile of the sample according to the age of the web domain

Domain age	N	%
Up to 1 year	1	2.1
1 – 5 years	7	14.9
5 – 10 years	11	23.4
More than ten years	28	59.6

Source: Author

Table 5 Profile of the sample according to revenue per employee in 2022

N	47
Mean	387,317 BAM
Median	338,426 BAM
Std. Deviation	259,974 BAM
Minimum	60,703 BAM
Maximum	1,166,157 BAM
Percentile - 25	195,489 BAM
Percentile - 50	338,426 BAM
Percentile - 75	504,053 BAM

Source: Author

4.2 Share and structure of organic search visits

Organic search visits to the analyzed e-commerce websites in Bosnia account for an average of 23.6% of the total number of visits, compared to the European average of 27.6% for retail and e-commerce websites, as reported by SemRush (2023a). Out of 47 analyzed websites, 50% have up to 17.1% share of organic search visits, 25% of websites achieve between 17% and 27.5% share of organic search visits, while 25% achieve over 27.5%.

The amount of organic search traffic from keywords that include the domain's brand name (branded organic search traffic) is 45.8%, while the share of non-branded organic search traffic is 54.2% (n=46). Out of 46 websites with complete data on the number of branded organic search visits, 25% of websites achieve up to 22.45% of branded organic search visits, and 50% of analyzed websites have more than 48.6% of branded organic search visits in the total number of organic visits.

The results indicate that strengthening brand awareness is a crucial marketing tactic for e-commerce websites in Bosnia and Herzegovina to generate traffic. On average, a quarter of visits to e-commerce websites come from search engines, while the remaining 75% are direct visits or vis-

its from referral links. In addition, 46% of organic visits are branded organic visits, which indicates that through promotional activities strengthening brand awareness accounts for almost half of the organic visits to e-commerce websites.

4.3 Analysis of user experience through SEO factors

Mobile friendliness analysis shows that 93.6% of websites are usable on mobile devices, while 6.4% are not mobile-friendly.

A performance score was measured for each website regarding the speed and efficiency of loading websites as essential elements of the user experience. A score of 90 or above is considered good, 50 to 89 is a score that needs improvement, and below 50 it is considered poor (Google, 2023a). Descriptive analysis shows that the average performance score of the analyzed websites for mobile devices is 38, and for desktop devices it is 67. Additional frequency analysis indicates that 74.5% of the analyzed websites have a poor mobile performance score, and 25.5% have a mobile performance score that needs improvement. Regarding desktop devices, 17% of websites have a poor performance score, 70.2% need improvement, and only 12.8% have a good performance score.

The results tell us that e-commerce websites need to work on improving loading speed and improving user experience. Particular focus must be directed to the factors included in the calculation of the Google metric called Core Web Vitals, which focuses on three aspects of user experience: loading (LCP), interactivity (FID), and visual stability (CLS). Web Vitals is an initiative by Google to provide unified guidance for quality signals essential to delivering a great user experience on the web. Core Web Vitals are the subset of Web Vitals that apply to all web pages, should be measured by all site owners, and will be surfaced across all Google tools (Walton, 2020).

Descriptive statistics for Core Web Vitals metrics are shown in Table 6.

Table 6 Core Web Vitals assessment

Metric	Thresholds	Measured average value
Largest Contentful Paint (LCP) – Mobile	Good (≤ 2.5 s) Needs Improvement (2.5s - 4s) Poor (> 4 s)	3.48s
First Input Delay (FID) – Mobile	Good (≤ 100 ms) Needs improvement (100 ms - 300 ms) Poor (> 300 ms)	38.11 ms
Cumulative Layout Shift (CLS) – Mobile	Good (≤ 0.1) Needs Improvement (0.1 – 0.25) Poor (> 0.25)	0.1362
Largest Contentful Paint (LCP) – Desktop	Good (≤ 2.5 s) Needs Improvement (2.5s - 4s) Poor (> 4 s)	2.77s
First Input Delay (FID) – Desktop	Good (≤ 100 ms) Needs improvement (100 ms - 300 ms) Poor (> 300 ms)	3.81ms
Cumulative Layout Shift (CLS) – Desktop	Good (≤ 0.1) Needs Improvement (0.1 – 0.25) Poor (> 0.25)	0.1340

Source: Author

Based on actual user data for the last 28 days, the Core Web Vitals assessment shows that e-commerce websites should improve user experience regarding loading performance (LCP) and visual stability (CLS) for mobile and desktop devices. In general, optimization of LCP includes optimizing images, removing unnecessary characters from HTML/CSS code, using a faster hosting provider, using a CDN (content delivery network), and techniques for delaying the loading of images un-

til they are needed (Walton & Pollard, 2020). The most common reasons for high CLS are undefined image dimensions, dynamically injected content that causes content to shift down, embeddable widgets such as videos from YouTube, maps from Google Maps, social media posts, and ads with dynamic ad sizing (Osmani & Pollard, 2020). Those are primarily technical issues that e-commerce marketers must know when they plan and develop their websites.

Table 7 Metrics of user behavior on a website

		Bounce rate (%)	Pages per visit	Visit duration in seconds
N	Valid	39	44	42
	Missing	8	3	5
Mean		**61.4**	**2.67**	**508.1**
Median		63.4	2.20	250.50
Std. Deviation		31.05	1.62	649.62
Range		97.61	5.86	2,489
Minimum		2.39	1.00	10
Maximum		100.00	6.86	2,499
Percentiles	25	37.17	1.17	97.00
	50	63.38	2.20	250.50
	75	92.23	3.69	617.75

Source: Author

The analysis shows that the average percentage of visitors who leave an e-commerce website after viewing only one page is 61.4%. This bounce rate is significantly higher than the benchmark bounce rate average for e-commerce and retail websites, which is 20%-45% (CustomMediaLabs, 2023). A high bounce rate is a sign that website content is irrelevant to the searched keyword, that users need help finding the content they are looking for or need help navigating, or that the site offers a poor user experience. Through digital analytics, marketers should gain insight into the bounce rate by different sources of visits (direct visits, organic search visits, referral links) to understand which keywords and phrases the content on the website should be optimized for. With this approach, it is also possible to gain insight into whether a high bounce rate for visits from referral links indicates backlinks of poor quality.

The average number of pages visitors view on a site within a single session is 2.67, which is 45% less than the average for mobile users in the retail industry (4.87) and 51% less than the average for desktop users (5.5) (Contentsquare, 2023). The average visit duration is 8 minutes and 28 seconds, while on 50% of the analyzed websites, the duration is half as long (4 minutes and 21 seconds). Although the average pages per visit can vary depending on several factors, such as the type of e-commerce website, a target audience, and website design and content, marketers should analyze the reasons for lower retention, with particular emphasis on simplicity of navigation, easier finding of related products, personalized recommendations and use of social proof, such as customer reviews and ratings.

4.4 Backlinks, keywords, referring domains, and outbound links

Descriptive statistics for backlinks, keywords, referring domains, outbound links, and authority scores are shown in Table 8. The average number of keywords bringing users to an analyzed e-commerce website via Google's top 100 organic search results is 848. Given several outliers with significantly more backlinks than other websites, the median better represents the average value of backlinks and it is 12,400 links. The average number of referring domains with at least one link pointing to an e-commerce website is 1,841, while the average authority score of the analyzed websites is 18. Outbound links from e-commerce sites signal trustworthiness and relevance to search engines. The average number of outbound domains on the analyzed e-commerce websites is 28.7. Google evaluates the quality of a web page through experience,

expertise, authoritativeness, and trustworthiness (Varangouli, 2020). Linking to other sources can help e-commerce websites to show their expertise. External links can help retailers validate the quality and reliability of their products by referring to product reviews, ratings, testimonials, manufacturer specifications, user manuals, or external resources that explain payment security, privacy policies, and other essential trust factors.

Table 8 Backlinks, keywords, referring domains and outbound domains statistics

		Authority score	Keywords	Backlinks	Referring domains	Outbound domains
N	Valid	47	47	47	47	45
	Missing	0	0	0	0	2
Mean		18.11	848	54678	1841	28.7
Median		17.00	411	12400	1600	15.00
Std. Deviation		8.45	1140	113038	1441	26.6
Range		32	4761	502954	6174	93
Minimum		5	39	46	26	0
Maximum		37	4800	503000	6200	93
Percentiles	25	10.00	185	2800	676	8.00
	50	17.00	411	12400	1600	15.00
	75	25.00	858	46400	2600	51.50

Source: Author

4.5 Technical on-page SEO practice

How e-commerce websites follow best practices for on-page SEO was measured by the PageSpeed Insights SEO score. On a scale of 1-100, this score measures how much a website follows essential search engine optimization advice. A score of 90 or above is considered good. A score of 50 to 89 needs improvement and a score below 50 is considered poor (Google, 2023a).

Table 9 The SEO score of e-commerce websites for mobile and desktop devices

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Mobile SEO	47	31	69	100	88.70	7.99
Desktop SEO	47	30	70	100	88.34	8.41

Source: Author

An average SEO score of 88 indicates that some improvements are necessary for technical on-page SEO optimization (Google, 2023a). Each web page must have an adequate title and meta description, links should be crawlable and have descriptive text, image elements should have descriptive "alt" attributes, the HTTPS protocol is used, the code should be valid, and pages should be optimized for mobile devices.

4.6 Impact of SEO factors on traffic and sales revenue

We have used path analysis to identify the causal relationships between SEO factors and website traffic and between website traffic and company revenue and to quantify the strength of those relationships. First, correlation analysis was conducted between every SEO factor identified through a literature review and the SEO performance indicator presented in Figure 1 to identify the most critical variables and potential causal relationships.

Knowing that the SemRush Authority Score is calculated based on three main facets: Link Power (the quality and quantity of backlinks – referring domains), Organic Traffic (an estimated monthly average of organic traffic) and Spam Factors (indicators of manipulation or spam in the link profile) (SemRush, 2023b), correlation analysis was conducted between backlinks and the Authority Score, referring domains and the Authority Score, and organic search traffic and the Authority Score.

Table 10 Correlation matrix – SEO factors/performance indicators and the Authority Score

		Authority Score
Referring Domains	Pearson Correlation	**.630****
	Sig. (2-tailed)	0
	N	47
Backlinks	Pearson Correlation	**.332***
	Sig. (2-tailed)	0.023
	N	47
Organic Search Traffic	Pearson Correlation	**.714****
	Sig. (2-tailed)	0
	N	47

Source: Author

Table 11 Correlation matrix – SEO factors and SEO performance indicators

SEO factors	SEO performance indicators >	Organic traffic	Branded organic traffic	Non-branded organic traffic	Monthly visits	Unique visitors	Pages per visit	Avg. visit duration	Bounce rate
Key-words	Pearson Correlation	**.850****	**.904****	**0.012**	**.919****	**.833****	**.372****	**.345***	**-.267***
	Sig. (2-tailed)	0	0	0.469	0	0	0.006	0.013	0.05
	N	47	46	46	43	43	44	42	39
Referring domains	Pearson Correlation	**.558****	**.589****	0.103	**.381***	**.455****	0.249	0.124	**-.346***
	Sig. (2-tailed)	0	0	0.247	0.006	0.001	0.051	0.216	0.016
	N	47	46	46	43	43	44	42	39
Backlinks	Pearson Correlation	.309*	.427**	-0.028	0.153	0.202	0.028	-0.049	-0.132
	Sig. (2-tailed)	0.017	0.002	0.427	0.163	0.097	0.43	0.38	0.211
	N	47	46	46	43	43	44	42	39
Author-ity score	Pearson Correlation	**.714****	**.743****	0.075	**.690****	**.725****	**.403****	**.351***	**-.397****
	Sig. (2-tailed)	0.000	0.000	0.309	0.000	0.000	0.003	0.011	0.006
	N	47	46	46	43	43	44	42	39
Mobile friendli-ness	Pearson Correlation	0.066	0.01	0.048	0.03	0.031	-0.198	0.047	.401**
	Sig. (2-tailed)	0.33	0.474	0.376	0.424	0.422	0.099	0.385	0.006
	N	47	46	46	43	43	44	42	39
Mobile Perfor-mance Score	Pearson Correlation	-0.045	-0.044	0.017	0.002	0.015	-0.093	0.079	0.187
	Sig. (2-tailed)	0.383	0.385	0.454	0.496	0.463	0.274	0.309	0.127
	N	47	46	46	43	43	44	42	39
Desktop Perfor-mance Score	Pearson Correlation	-0.129	-0.07	-0.025	-0.07	-0.139	-0.2	-0.044	0.208
	Sig. (2-tailed)	0.194	0.323	0.434	0.328	0.187	0.096	0.39	0.102
	N	47	46	46	43	43	44	42	39

SEO factors	SEO performance indicators >	Organic traffic	Branded organic traffic	Non-branded organic traffic	Monthly visits	Unique visitors	Pages per visit	Avg. visit duration	Bounce rate
Domain age	Pearson Correlation	0.062	0.149	0.195	0.056	0.093	0.201	0.154	-0.142
	Sig. (2-tailed)	0.339	0.161	0.097	0.362	0.278	0.096	0.164	0.195
	N	47	46	46	43	43	44	42	39
Out-bound domains	Pearson Correlation	0.226	**.293***	0.218	**.289***	**.282***	0.033	0.223	-0.02
	Sig. (2-tailed)	0.068	0.027	0.078	0.032	0.035	0.416	0.08	0.453
	N	47	46	46	43	43	44	42	39

Source: Author

In Tables 10 and 11, bold text and one star indicate significant correlation coefficients at the 0.05 level, and two stars indicate significant correlation coefficients at the 0.01 level.

For the interpretation of the correlation coefficients shown in Tables 10 and 11, we have used a conventional approach to evaluating weak, moderate, strong, and very strong correlations, as shown in Table 12.

Table 12 Example of a conventional approach to interpreting a correlation coefficient

Absolute Magnitude of the Observed Correlation Coefficient	Interpretation
0.00–0.10	Negligible correlation
0.10–0.39	Weak correlation
0.40–0.69	Moderate correlation
0.70–0.89	Strong correlation
0.90–1.00	Very strong correlation

Source: Schober et al. (2018)

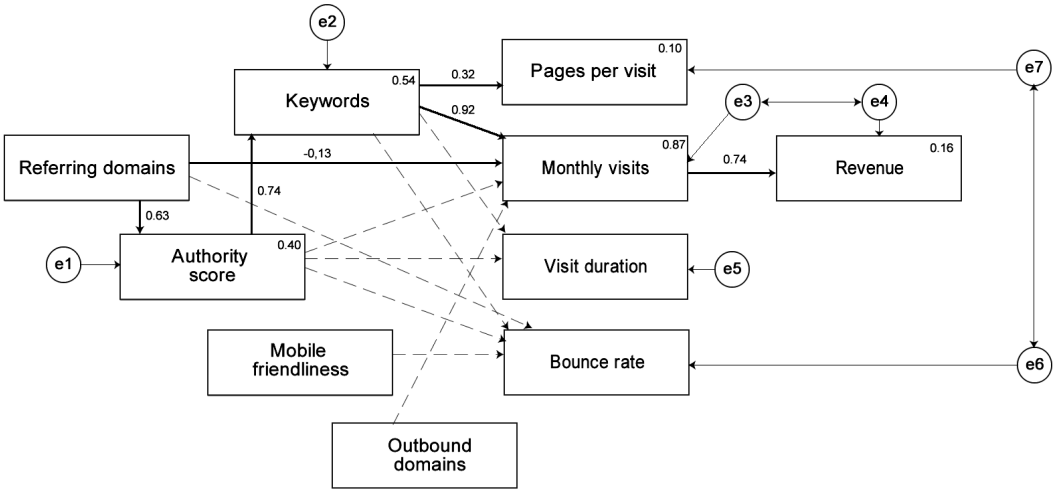
Given that the SemRush Authority Score is a score calculated through multiple factors of trustworthiness and authority, including the number of backlinks/referring domains and their quality (SemRush, 2023b), we decided to use this factor as a mediator, through which the mentioned variables indirectly affect SEO performance. Table 10 shows a significantly strong correlation between organic search traffic and the Authority Score, a moderate correlation between referring domains and the Authority Score, and a weak correlation between backlinks and the Authority Score. As SemRush also takes organic search traffic into Authority Score calculation, we want to highlight that the literature review identified the variables backlinks and referring domains as SEO factors. In contrast, organic search traffic is the SEO performance indicator that measures website visits due to the influence of SEO factors: SEO optimization. In order to satisfy the assumptions for conducting path analysis (Land, 1969), especially the exogeneity principle, organic search traffic, a measure of website visits (a SEO performance indicator similar to monthly visits), was omitted as a predictor variable that affects the authority score. Furthermore, given that the list of SEO performance indicators presented in Table 11 contains several indicators for measuring website traffic (organic search traffic, unique visitors and monthly visits) and that the research was conducted on a relatively small sample of e-commerce websites in Bosnia and Herzegovina, in order to reduce the number of variables in the path model, we decided to use only one website traffic indicator: the number of monthly visits.

Correlation analysis did not confirm the existence of any significant correlation between backlinks and SEO performance indicators: monthly visits, pages per visit, visit duration and a bounce rate. The same was determined for the SEO factors of the mobile performance score, the desktop performance score, and domain age, and those factors were excluded from further path analysis.

We started path analysis with an initial model that included five SEO factors (keywords, referring do-

mains, the Authority Score, mobile friendliness and outbound domains) presented in Table 11. Every selected SEO factor has a significant positive correlation with at least one of the SEO performance indicators (monthly visits, pages per visit, visit duration and bounce rate). The initial path model did not have a good model fit, so we improved the model fit based on modification indices by correlating error terms e3-e4 and e6-e7.

Figure 2 Path model



Source: Author

Figure 2 presents a path diagram of the final causal model we developed. Independent and dependent variables are shown in rectangles, and error terms are shown in circles. Above each straight solid line with an arrow there is a standardized regression parameter for that path, and below the upper right corner of each dependent variable there is a squared multiple correlation (the coefficient of determination) for each variable. Solid lines present paths with significant standardized regression parameters, and dashed lines present paths with non-significant standardized regression parameters at $p < 0.05$.

Table 13 shows the expected model fit indicators according to Hu and Bentler (1995) and Joreskog and Sorbom (1982) and the measured indicators of the proposed initial and final models after correlating error terms e3-e4 and e6-e7. The final model shows a good fit for all parameters.

Table 13 Model fit indices

Indices	Expected value	Initial model value	Final model value
X2	> 0.05	0.000	0.566
X2/df	< 3	3.347	0.930
CFI	> 0.90 (0.95 good fit)	0.727	1.000
NFI	> 0.90	0.672	0.915
RMSEA	< 0.10 (0.06 good fit)	0.226	0.000
PCLOSE	> 0.05	0.000	0.707

Source: Author, based on Hu and Bentler (1995) and Joreskog and Sorbom (1982)

The standardized regression coefficient of 0.63 between the number of referring domains and the authority score indicates a moderately strong positive relationship between these two variables. For every

standard deviation increase in the number of referring domains, the authority score tends to increase by 0.63 standard deviations. The coefficient of determination (0.40) suggests that 40% of the variability in the authority score of e-commerce websites can be attributed to the number of domains linking to the website. Correlation analysis presented in Table 10 shows a very weak correlation between backlinks and organic search traffic and the absence of a significant correlation between backlinks and monthly visits. A website with backlinks from a wide range of reputable referring domains will likely be seen as more trustworthy and authoritative by search engines.

Our model indicates that keywords mediate the influence of the authority score on monthly visits. A strong positive relationship between the authority score and keywords, with a standardized coefficient of 0.74, suggests that websites with higher authority scores tend to rank for more keywords. The coefficient of determination of 0.54 means that the authority score explains 54% of the variance in the number of keywords bringing users to the website via Google's top 100 organic search results. E-commerce websites with higher authority scores may rank for more competitive keywords, leading to increased visibility in SERPs and, consequently, more monthly visits. This finding underscores the role of the "authority score" in influencing the domain's organic search visibility. Building and maintaining authority in SEO efforts with a well-optimized set of keywords can substantially impact the number of monthly visits a website receives.

We have confirmed a very strong positive relationship between keywords and monthly visits. The standardized coefficient of 0.92 indicates that websites ranking for a larger number of keywords tend to attract more monthly visits. The coefficient of determination suggests that 87% of the variance in monthly visits is explained by the number of keywords bringing users to the website via Google's top 100 organic search results.

Finally, our model shows a moderately strong positive relationship between e-commerce website monthly visits and company revenue. For every standard deviation increase in monthly visits, there tends to be a 0.74 standard deviation increase in revenue. Furthermore, 16% of the variance in company revenue is explained by e-commerce website monthly visits. Although we expect a higher impact of e-commerce store visits on revenue, there is a logical explanation for these results. Most of the analyzed e-commerce websites in Bosnia and Herzegovina are just one of the sales channels these companies use to sell products and generate income. Through interviews with managers of several companies included in our analysis, we have found that significant sales are realized through traditional stores and specialized online classified websites such as www.olx.ba. The analysis used data on the companies' total revenue, rather than just the sales revenue generated exclusively through the website. Although e-commerce websites can indirectly influence sales in brick-and-mortar stores or through other online channels by providing information to consumers, we see this as one of the limitations of the research that could be avoided in future research through an additional survey of the companies to determine the share of income generated through their e-commerce website.

5. Conclusion

To the best of the author's knowledge, this empirical research represents the first research of this kind on the sample of e-commerce websites in Bosnia and Herzegovina, as well as in the countries of the wider region. We have successfully provided answers to all research questions. The state of SEO optimization of e-commerce websites that sell consumer electronics in Bosnia and Herzegovina was determined. SEO factors with a significant impact on SEO performance indicators and indirectly on the sales revenue were determined. At the same time, clear recommendations were given to managers for the improvement of certain SEO areas.

The average share of organic search visits to analyzed e-commerce websites in Bosnia and Herzegovina is 23.6%, i.e., 4% less than the European average for retail and e-commerce websites (SemRush, 2023a). Branded organic search visits account for, on average, 45.8% of total organic search visits, with 50% of the analyzed websites achieving more than 48.6% of organic search visits thanks to branded organic searches. These data tell us that the most significant number of visits to the analyzed e-commerce websites is due to brand awareness, which affects direct visits and branded organic search visits. At the same time, it is a message to all e-commerce companies that one of the key tactics for increasing the number of website visitors should be investing in promotion to build and strengthen brand recognition.

The state of optimization of e-commerce websites for mobile devices requires significant improvements since 6.4% of websites need to be mobile-friendly optimized, 75.4% have a poor mobile performance score, and the remaining 25.5% have a mobile performance score that needs improvement. In order to positively influence the user experience, all analyzed companies must pay considerable attention to improving the speed and efficiency of loading websites. The results are similar for desktop devices, too, since 70.2% of websites have a performance score that needs improvement, and 17% have a poor performance score. In improving user experience, particular focus must be on technical optimization of web pages to improve the LCP (Largest Contentful Paint) and CLS (Cumulative Layout Shift) metrics.

The analysis of visitor behavior showed that they spend an average of 508 seconds on e-commerce websites, viewing an average of 2.67 pages. The average number of pages viewed per visit, 48% lower than the retail industry average (Contentsquare, 2023), is partly due to a high bounce rate of 61.4%. Companies should analyze the bounce rate according to different sources to determine which content needs to be optimized according to search keywords and which referrals provide low-quality backlinks. User retention should be increased through improved navigation, simplified search methods, offering personalized recommendations, and using social proof such as customer reviews and ratings.

The average number of outbound links on the analyzed websites is 28.7. Having in mind that many practitioners agree that 3-5 outbound links per 1,000 words of content are a good rule of thumb, it is clear that e-commerce websites should provide more links to useful websites, such as manufacturer websites, product information pages, and product reviews or buyer guides. In this way, they can contribute to building expertise, authoritativeness, and trustworthiness - essential features that determine SEO success.

Path analysis determined that the number of referring domains and their quality strongly affect the website authority score. A significant influence of the number of backlinks on SEO performance indicators (traffic and user engagement) has not been proven. This finding implies a managerial recommendation regarding the link-building off-site search engine optimization strategy. From the SEO point of view, it is much more important to have one link from ten different domains than ten links or more from the same domain, assuming that the websites have the same backlink quality. When considering potential link exchange partners, placing the link on only one partner web page, such as the home page, is sufficient.

Furthermore, it was determined that the keywords mediate the authority score impact on the number of monthly visits. The authority score has a significant strong and positive influence (0.74) on the number of keywords bringing users to a website via Google's top 100 organic search results; that is, it positively affects the website's organic search visibility. This finding confirms the claims about the reliability of the SemRush Authority Score for assessing the competitiveness and visibility of a website in search engine results, which should lead to a higher number of monthly visits, which is in line with the claims of Reyes-Lillo et al. (2023).

Finally, visits have a strong positive significant impact (0.74) on the revenue of e-commerce websites, and 16% of the variance in company revenue is explained by e-commerce website monthly visits.

Path analysis did not show a significant influence of website mobile friendliness or page speed on any SEO performance indicator, contrary to the recommendations of Google and the findings of earlier research (Gao et al., 2017; Bartuskova & Krejcar, 2015; Mustafa et al., 2015; Egri & Bayrak, 2014). One possible explanation is that the websites analyzed have similar mobile friendliness scores and speed performance indicators, and there may not be enough variability in the data to detect a significant influence. However, a cross-sectional study on a larger sample should verify this.

We did not find a direct significant impact of the number of outbound domains or domain age on website traffic, contrary to the findings of some earlier research (Iqbal et al., 2022; Nath & Ahuja, 2014). Companies like SemRush are known not to provide enough information about their algorithm and the exact way the authority score is calculated to minimize the possibility of manipulation. Therefore, in future research, it would be desirable to check whether there is a positive significant influence of outbound links and domains, domain age, and mobile and desktop performance scores on the authority score.

Some of the research limitations can also provide ideas for future research. Some recommendations are to use a larger sample, samples of e-commerce companies from other niches, and other tools for collecting analytical data. The model could be improved further by collecting data on sales revenue generated exclusively from the website rather than the total revenue used in this study. Furthermore, the model could be extended by analyzing the impact of social media signals on SEO results.

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