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# Evaluating the Performance of Iranian Websites: A Ranking Analysis Using Decision-Making Methods in R

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## Abstract

This research project employs decision-making methods within the R programming language to conduct a thorough assessment and ranking of 40 Iranian websites. The study draws upon data sourced from reputable platforms, namely Alexa.com, SimilarWeb.com, and Google. Metrics encompassing website statistics and related measurements, including Daily Time on Site, Daily Pageviews per Visitor, Percentage of Traffic from Search, Total Sites Linking In, and Bounce Rate, will be systematically analyzed.

Our objective is to offer nuanced insights into the determinants of online success for Iranian websites. By integrating decision-making techniques into the R framework, this study not only contributes to the realm of web analytics but also showcases the adaptability of R for robust data-driven research methodologies. The findings are anticipated to provide valuable scientific perspectives on the factors influencing website quality and ranking in the Iranian context.



Key words: Iranian Websites, Decision-Making Methods, R Programming Language, Website Ranking, Web Analytics, Website Metrics

## Introduction

The digital world is a battleground for visibility and relevance where websites constantly compete for users' attention. In this dynamic online landscape, specifically within the Iranian digital ecosystem, understanding what drives website performance is crucial for businesses and content creators. This need underscores the importance of assessing website success through thoughtful analysis and robust methodologies.

This article endeavors to illuminate the factors contributing to the performance of Iranian websites by employing a range of decision-making methods within the versatile R programming language. By harnessing the analytical power of R, this research taps into a rich vein of web data, extracting actionable insights from various performance metrics.

The integration of decision-making techniques with R's capacity for data analysis provides a novel approach to rank and evaluate 40 prominent Iranian websites. Drawing from acclaimed sources such as Alexa.com, SimilarWeb.com, and Google, the study meticulously sifts through indicators such as daily engagement and traffic sources, translating complex datasets into a clear index of website achievement.

The insights from this ranking analysis not only deepen our understanding of the digital footprint of Iranian websites but also demonstrate the potential of R as a tool for sophisticated decision-making. Through this exploration, we aim to offer stakeholders a detailed scientific perspective on the metrics that dictate online success, framed within the unique Iranian digital context. The findings are poised to offer a wealth of knowledge to webmasters, digital marketers, and policymakers looking to chart a course toward improved online presence and performance.

## Dataset

In this research, our dataset is comprised of an array of finely-tuned metrics designed to unveil the inner workings of website performance among Iranian online platforms. Each column within our dataset represents a key indicator, serving as a beacon to guide our analysis:

- Daily Time on Site:

  This metric reveals the average duration each visitor spends on a website on a daily basis. It is a powerful indicator of user engagement and content relevance, providing insight into how captivating and value-adding the website is to its audience.

- Daily Pageviews per Visitor:

  It quantifies the average number of pages a visitor explores during their daily visit. A higher number typically signifies a compelling site structure and content that successfully encourages deeper interaction and exploration by visitors.

- Percentage of Traffic from Search (% of Traffic from Search):

This percentage reflects the proportion of a website's traffic that comes from search engines, acting as a gauge for how well the site is optimized for search and how reliant it is on search engines to attract visitors.

- Total Sites Linking In:

  This figure accounts for the number of external sites that link back to the website in question. It is often interpreted as trust or endorsement, factoring prominently in search engine rankings and serving as a testament to the site's authority and popularity.

- Bounce Rate %:

  Bounce Rate is articulated as a percentage representing the ratio of single-page visits to total visits. Essentially, it assesses the frequency with which visitors view only one page before leaving the site, indicating whether the first impression encouraged further interaction or led to visitor drop-off.

Each of these data points are pillars that uphold the overall analysis, providing a multifaceted perspective on the user experience and operational success of Iranian websites. These metrics create a composite snapshot of website efficacy, feeding into decision-making processes and subsequent ranking in our study.

## Methodology

In the methodological core of our study, we employ Multiple Criteria Decision-Making (MCDM) techniques to adjudicate on the performance of Iranian websites. These methods are integral for distilling complex array of criteria into a coherent evaluation and ranking system. The algorithms programmed into our custom-made R package are:

**VIKOR (VlseKriterijumska Optimizacija I Kompromisno Resenje):**
This MCDM method is used to identify a solution that is closest to the ideal while also maintaining the balance among conflicting criteria. It's particularly useful when decision-makers need to reach a compromise solution in a short time.

**WASPAS (Weighted Aggregated Sum Product ASsessment):**
WASPAS combines weighted sum and weighted product models, taking into account both the additive and multiplicative properties of the criteria. This leads to a better reflection of the trade-offs between different criteria in the final ranking.

**Linear TOPSIS (Technique for Order Preference by Similarity to Ideal Solution):**
TOPSIS assesses the geometric distance of each alternative to the ideal (best) and negative-ideal (worst) solutions, simultaneously. It's linear in nature, considering criteria as proportionally contributive, offering a straightforward ranking based on relative closeness to this ideal point.

To accompany the implementation of these methods, our R package encompasses the necessary functions for normalizing the dataset, thereby ensuring each metric is equally weighted and

comparable. Also, it includes an algorithm to calculate the weights of each criterion based on the Shannon entropy method—an approach that measures the information richness in the data, leading to weights that reflect the relative importance and variability of each criterion in the context of the overall dataset.

# Result

In this section, the result obtained from the models will be shown and each of them will be discussed.

## Criteria Weights

The evaluation of website performance using Multi-Criteria Decision-Making (MCDM) methods hinges on the concept of criteria weighting. Weights derived via the Shannon Entropy method reflect the varying degrees of informational value provided by each performance metric. These weights are pivotal in constructing a reliable ranking outcome, informing the decision-making process with nuanced precision. The calculated weights for our study are shown in table 1.

**Table 1.** The weight of each criterion.

| Criterion | Weight |
|---|---|
| Daily Time on Site | 0.09374175 |
| Daily pageviews per Visitors | 0.08779813 |
| % of Traffic From Search | 0.10125438 |
| Total Sites Linking In | 0.67011022 |
| Bounce Rate % | 0.04709552 |

- Daily Time on Site: With a weight of 0.09374175, this metric assesses visitor engagement depth, where greater values indicate more extensive user interaction with the site's content.
- Daily Pageviews per Visitor: Assigned a weight of 0.08779813, this criterion helps measure the breadth of visitor engagement, with higher numbers reflecting an increased consumption of page content per visit.
- % of Traffic From Search: Bearing a weight of 0.10125438, this metric is indicative of how effectively the website attracts visitors from search engines, a vital component of web visibility.
- Total Sites Linking In: The most heavily weighted at 0.67011022, this factor is a strong indicator of the site's authority and popularity on the web, with more backlinks often correllating with greater credibility and higher search engine rankings.
- Bounce Rate %: This is the only criterion with a negative nature, assigned a weight of 0.04709552, and it should be minimized for better performance. A lower bounce rate is preferred, signifying that visitors find the website engaging enough to continue browsing beyond the entry page.

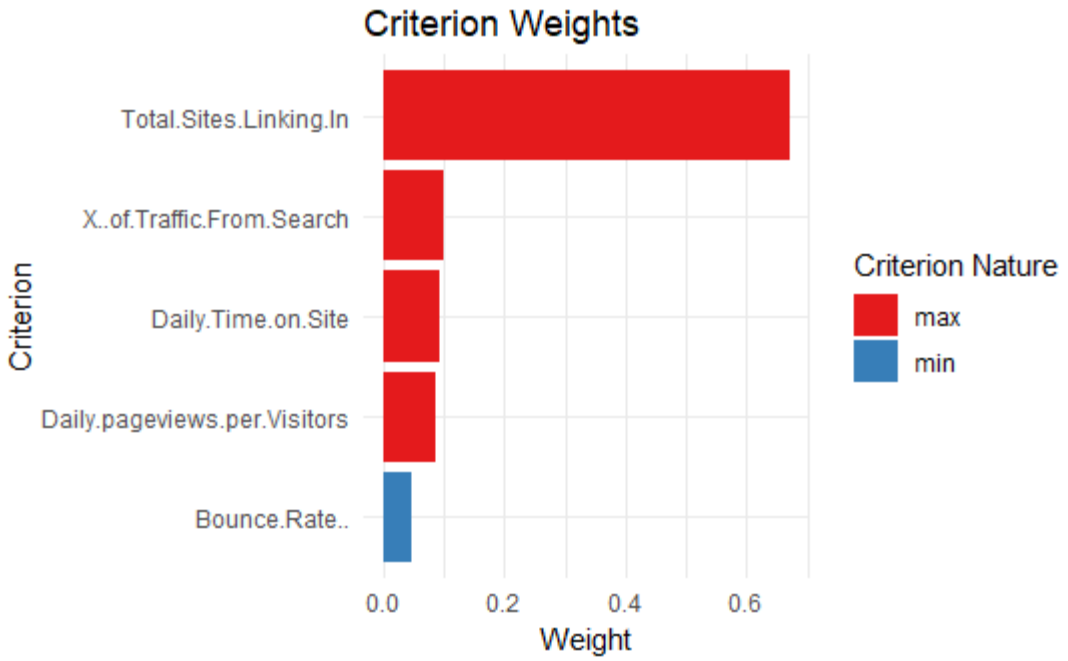


**Fig 1.** Criterion Weights for Website Performance Evaluation

The weights underscore the relative importance of each website performance metric in the analyzed context. The standout weight assigned to 'Total Sites Linking In' accentuates its crucial role in determining a website's rank, highlighting the power of referrals and network-based trust. Simultaneously, the minimization of the Bounce Rate as a negative criterion clarifies that lower rates of single-page sessions correlate with a higher level of user engagement, counterbalancing the otherwise positive nature of the weighted criteria.

In preparing the results, the specific nature of Bounce Rate as a negative criterion is instrumental. It reminds the reader that while the statistical significance of each weight is unbiased, the desirability of the metrics can differ: high for all but the Bounce Rate, where lower percentages imply superior site performance.

## Ranking

In this section, we present a systematic representation of the outputs yielded by the application of multiple Multi-Criteria Decision-Making (MCDM) methodologies. Each MCDM approach (VIKOR, WASPAS, and Linear TOPSIS) provides a distinct perspective on the performance of the evaluated websites, thus necessitating a discrete depiction of the rankings. The forthcoming tables articulate the hierarchies ascertained through each technique, offering an explicit comparative framework that complements the analytical narrative. The stringent ranking format encapsulated herein allows for a comprehensive assimilation of the disparate methodologies' conclusions, fostering a more granular understanding of the multi-dimensional assessment executed in our study.

## VIKOR

The VIKOR model prioritizes compromise, ranking alternatives based on their proximity to the ideal solution across all criteria. ‘S’ represents the utility measure, ‘R’ captures the regret measure, and ‘Q’ denotes the compromise ranking. The final ‘Ranking’ column assigns each website a position reflective of its ‘Q’ value, with a lower ‘Q’ indicating a superior rank. Table 2. shows the top 5 alternatives ranked with VIKOR model.

**Table 2.** Top 5 Websites by VIKOR

| Website | S | R | Q | Ranking |
|---|---|---|---|---|
| Aparat.com | -13.72945654 | 0.1202819 | -6.8045873 | 1 |
| Namnak.com | 2.31839332 | 0.3071234 | 1.3127583 | 2 |
| Bankmellat.ir | 4.1035877 | 0.3288093 | 2.2161985 | 3 |
| Borna.news | 4.43925859 | 0.3285057 | 2.3838822 | 4 |
| Ikco.ir | 4.37868695 | 0.3331142 | 2.3559006 | 5 |

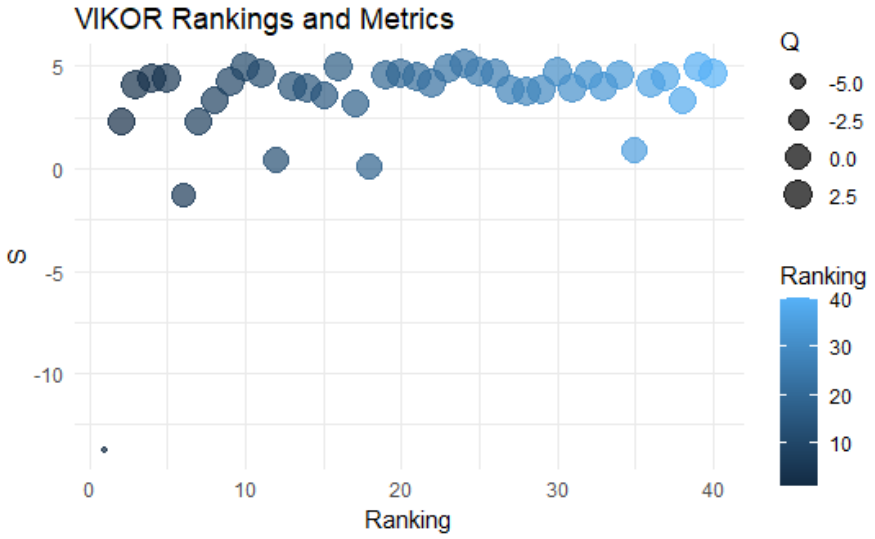


**Fig 2.** VIKOR rankings and metrics

## Linear TOPSIS

The Linear TOPSIS methodology ranks alternatives by their relative closeness to the ideal solution. The table presents the ‘Alternatives’ (websites) alongside their respective ‘R’ values, representing the Euclidean distance from the ideal point. The ‘Ranking’ column determines the order of the websites, with a smaller ‘R’ value indicating a closer proximity to the ideal solution and thus a higher ranking. Table 3 shows the top 5 alternatives ranked with linear TOPSIS model.

**Table 3.** Top 5 websites by linear TOPSIS

| Alternatives | R | Ranking |
|---|---|---|
| Aparat.com | 0.89901663 | 1 |
| Beytoote.com | 0.34072221 | 2 |
| Mehrnews.com | 0.26622336 | 3 |
| Isna.ir | 0.24735309 | 4 |
| Digikala.com | 0.23071465 | 5 |

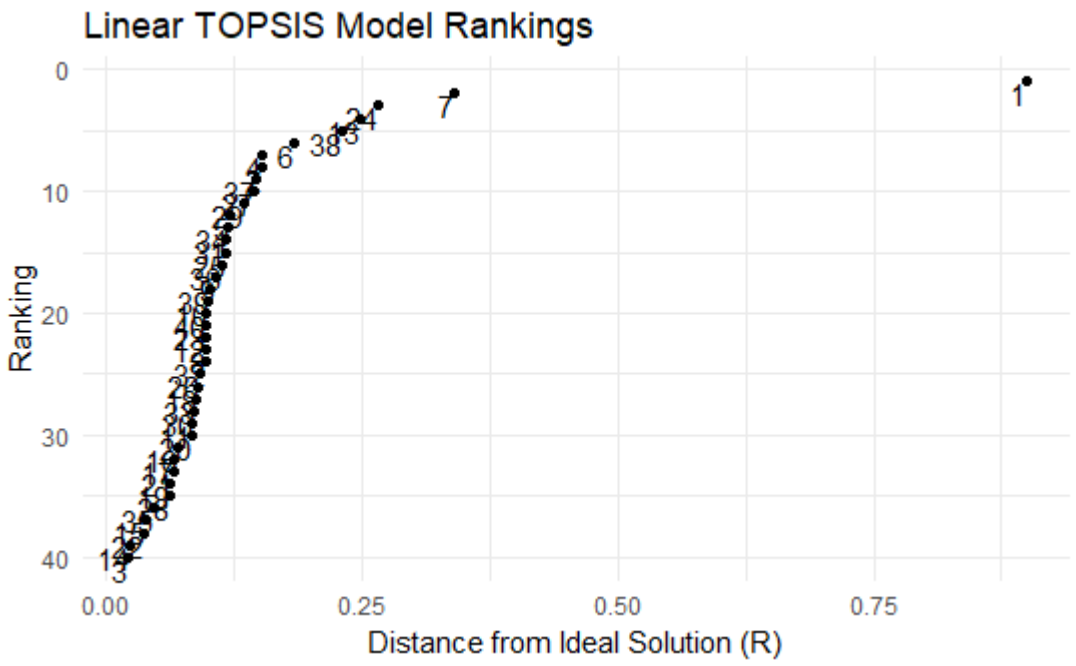


**Fig 3.** Linear TOPSIS model rankings

The scatter plot distinctly exhibits the discrete Euclidean distances, denoted by 'R' values, from the ideal solution for each evaluated alternative, plotted on the abscissa. The ordinate, which inversely corresponds to the rankings, positions the superior alternatives at the upper echelons of the graph. Each datum point is systematically labeled to correlate with the respective alternative it represents, thereby facilitating a straightforward cross-reference.

WASPAS

The WASPAS evaluation model integrates the Weighted Sum Model (WSM) and the Weighted Product Model (WPM) to determine the overall index 'Q', which synthesizes both approaches. In the corresponding table, 'Alternatives' are displayed alongside their computed 'WSM' and 'WPM' values. 'Q' represents the aggregated measure reflective of both WSM and WPM assessments. The 'Ranking' column then arranges the alternatives in order, with a higher 'Q' signifying a more preferred alternative according to the WASPAS method. Table 4 shows the top 5 alternatives with the WASPAS model.

**Table 4.** Top 5 Alternatives with WASPAS model

| Website | WSM | WPM | Q | Ranking |
|---|---|---|---|---|
| Aparat.com | 0.85230247 | 0.818113508 | 0.83520799 | 1 |
| Namnak.com | 0.35339052 | 0.316786147 | 0.33508833 | 2 |
| Bankmellat.ir | 0.35236055 | 0.276929362 | 0.31464496 | 3 |
| Borna.news | 0.30115491 | 0.292514111 | 0.29683451 | 4 |
| Ikco.ir | 0.2804842 | 0.273394782 | 0.27693949 | 5 |

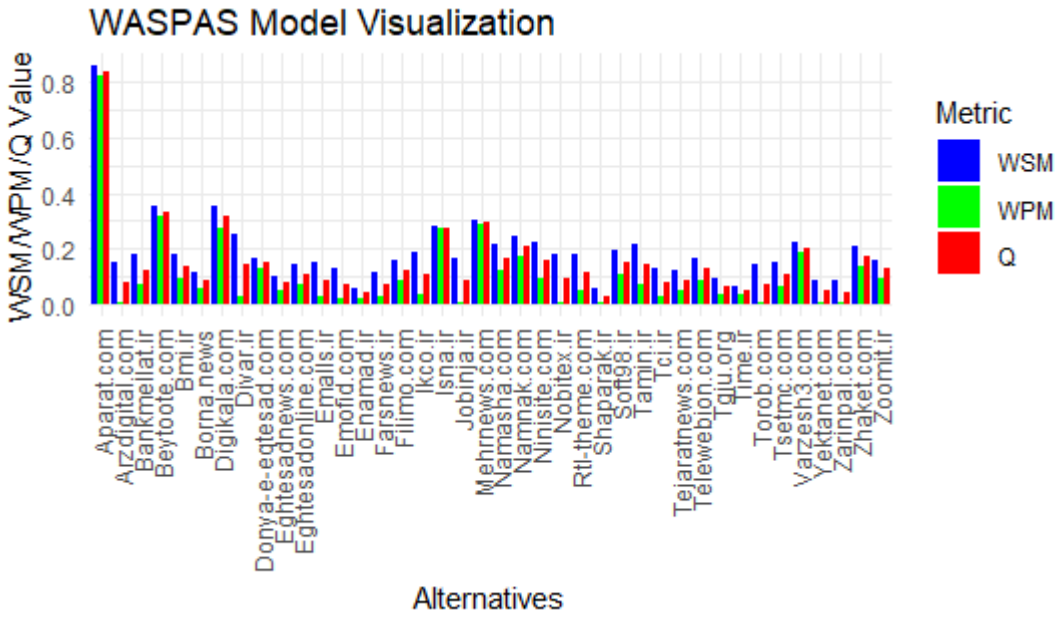


**Fig 4.** WASPAS model output

The plot in Fig 4, portrays a direct comparison of multiple alternatives under consideration, quantified through the Weighted Sum Model (WSM), Weighted Product Model (WPM), and an aggregate 'Q' metric. Each bar signifies the computed value from the respective model for each alternative, facilitating a side-by-side quantitative assessment.

# Concclusion

In the conclusion of this comparative analysis, set within the framework of a scientific research paper, the articulated objective was to rank a compendium of websites according to a pliable yet precise set of predefined evaluative criteria. Methodologically, this objective necessitated the employment of three distinct multi-criteria decision-making models: VIKOR, WASPAS, and linear TOPSIS. Each algorithm, reputable within the gamut of operational research, offers a significantly different approach to the assessment and ranking processes (reflecting unique operational theories and assumptions about decision-making under multiple criteria).

**Table 5.** Total ranking of different models

| Alternatives | Linear TOPSIS | VIKOR | WASPAS |
|---|---|---|---|
| Aparat.com | 1 | 1 | 1 |
| Beytoote.com | 7 | 8 | 7 |
| Digikala.com | 40 | 40 | 24 |
| Mehrnews.com | 14 | 7 | 13 |
| Isna.ir | 12 | 12 | 38 |
| Namnak.com | 6 | 6 | 2 |
| Varzesh3.com | 2 | 2 | 6 |
| Zhaket.com | 26 | 23 | 34 |
| Divar.ir | 21 | 17 | 5 |

| Alternatives | Linear TOPSIS | VIKOR | WASPAS |
|---|---|---|---|
| Namasha.com | 15 | 19 | 27 |
| Ninisite.com | 28 | 29 | 37 |
| Soft98.ir | 17 | 22 | 29 |
| Tamin.ir | 5 | 4 | 12 |
| Donya-e-eqtesad.com | 39 | 39 | 10 |
| Bmi.ir | 38 | 37 | 39 |
| Bankmellat.ir | 34 | 31 | 25 |
| Telewebion.com | 35 | 32 | 30 |
| Zoomit.ir | 27 | 26 | 4 |
| Rtl-theme.com | 33 | 34 | 40 |
| Filimo.com | 22 | 30 | 36 |
| Ikco.ir | 29 | 33 | 20 |
| Nobitex.ir | 36 | 38 | 23 |
| Tsetmc.com | 20 | 21 | 9 |
| Jobinja.ir | 4 | 3 | 18 |
| Eghtesadonline.com | 13 | 15 | 31 |
| Emalls.ir | 32 | 25 | 11 |
| Arzdigital.com | 9 | 10 | 8 |
| Torob.com | 31 | 35 | 32 |
| Tci.ir | 10 | 11 | 28 |
| Farsnews.ir | 19 | 28 | 33 |
| Tejaratnews.com | 24 | 14 | 21 |
| Emofid.com | 25 | 24 | 19 |
| Borna.news | 30 | 27 | 26 |
| Eghtesadnews.com | 8 | 13 | 17 |
| Tgju.org | 37 | 36 | 16 |
| Zarinpal.com | 23 | 16 | 22 |
| Yektanet.com | 11 | 9 | 15 |
| Time.ir | 3 | 5 | 35 |
| Shaparak.ir | 16 | 18 | 14 |
| Enamad.ir | 18 | 20 | 3 |

The VIKOR model addresses the need for compromise in decision-making when dealing with conflicting criteria, thereby providing a solution that best approximates the ideal, while acknowledging the reality of concessions. WASPAS combines the logic of weighted sums and products to produce a holistic ranking that accounts for both the sum of individual attributes and the compounded product of their interactions. Linear TOPSIS posits an alternative appraised in relation to an ideal solution; it ranks alternatives based on their geometric distances from a theoretically optimal point in multi-dimensional space. Through the juxtaposition of results gleaned from these discrete methodologies, our analysis sought not just to juxtapose but also to synthesize insights across different evaluative paradigms.

In analyzing the rankings produced by these models, it becomes apparent that while some websites consistently perform well across all three methodologies, others exhibit a fluctuating performance, thus underscoring the variance in sensitivity and evaluative focus across different models. This disparity not only highlights the importance of multi-modal evaluation for comprehensive website assessment but also points to potential optimization strategies for webmasters seeking to improve their standings in specific areas.

This research paper concludes with the assertion that the multifaceted analysis presented herein offers both an in-depth evaluation of the current state of the subject websites and serves as a beacon guiding future developments. The aggregated data, presented in a comparative table, does more than furnish a simple ranking; it provides strategic insights for continuous improvement and adaptation in the dynamic medium of the internet. Through our rigorous scientific examination, we have laid the groundwork for stakeholders to engage in evidence-based decision-making to refine the user experience, enhance website functionality, and ultimately compete in the ever-evolving digital arena.