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Evaluating and Ranking Digital Stores' Suppliers using TOPKOR Method

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ABSTRACT

Due to the expansion of cyberspace in the context of internet use and public access to this platform, many stores try to use the online sales platform to eliminate geographical zones restrictions and the number of intermediaries. This approach has many other advantages such as reducing completed costs, lower shipping costs and faster speed of product delivery, etc. Proper evaluation and suppliers ranking plays an important role in increasing the productivity of these types of stores. This research provides an approach to evaluate and rank suppliers in digital stores using a combination of two multi-criteria decision-making (MCDM) techniques called Analysis Hierarchy Process (AHP) and TOPKOR. First, the effective criteria in evaluation and the ranking of suppliers in digital stores are identified and their weights are determined using AHP technique. Then, the score of each supplier in each criterion is determined. Finally, the suppliers are ranked based on TOPKOR technique. The results not only show the final rank of suppliers but also identified 8 criteria for evaluation and ranking the suppliers. Moreover, the results show the criteria of support, easy access and flexibility are the most important in evaluating and ranking digital stores' suppliers, respectively.

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NOMENCLATURE

A	Pairwise comparison matrix (AHP)	V_{ij}	Normalized weight matrix
a_{ij}^{*}	Normalized in the verses of the matrix of pairwise comparisons	PIS_j	The positive ideal solution in criterion j
W_i	The final weight of each criterion	NIS_j	The negative ideal solution in criterion j
X	Decision matrix	Q_i	VIKOR index
n_{ij}	Normalized in the verses of the decision matrix	CC_i	Final proximity index

1. INTRODUCTION

Online stores can be considered as one of the most important strategic points for business growth. There are several factors for the decision-maker to consider when evaluating and ranking online store suppliers. Nowadays, the need for online stores is increasing. Various factors in the evaluation and ranking of online store suppliers are effective and it can be considered as a multi-criteria decision problem. Multi-criteria decision making is considered as the most important branch of operational research; because, it involves complex decisions of people's lives. There are several multi-criteria decision models. Researchers by considering current problems and criteria, use decision-making techniques. Analytical Hierarchy Process with multi-criteria decision model which has been introduced by Saaty [1] is one of the most powerful methods for calculating the weight of criteria and sub-criteria. Weight criteria and sub-criteria are calculated by the pairwise comparison matrix. Uncertainty is not considered in the main model of the analytical hierarchy process, also several researchers have integrated the fuzzy model with an analytical hierarchy process to reduce inaccuracies in decision making.

The model is also widely used in a variety of fields including engineering, economics and operations management. Factors such as environmental and social factors to choose the source of supply for online businesses and economics and building a long-term

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relationship with it is crucial to maintain a competitive advantage. For example, the environmental criterion is one of the considered factors by societies and governments that has been highly emphasized and for this criterion, there are many programs for companies, such as the use of environmentally-friendly and degradable materials, the design of environmental products and pollution monitoring in production processes [2, 3].

However, an organization's environmental performance depends not only on its sustainable behaviors but also on its suppliers and how they work. Consequently, choosing a good supplier that meets these criteria in the supply chain is a top priority for companies. In the current study, this research provides a method for evaluating and ranking suppliers in digital stores. First, effective criteria in evaluating and ranking suppliers in digital stores are identified and the score of each supplier is determined in each criterion. Then a hybrid approach by combining of two multi-criteria decision-making (MCDM) techniques called Analysis Hierarchy Process (AHP) and TOPKOR are provided for ranking suppliers.

The main research question of this research is as follow:

How the digital stores' suppliers are ranked using a combination of AHP and TOPKOR techniques?

The research sub questions are as follows:

What criteria should be used to rank digital stores' suppliers?

What is the weight of each used criterion?

What is the score of each alternative in each criterion?

2. LITERATURE REVIEW

These days in digital age, the way we choose and understand the structures of online businesses has changed. Retail section in recent years has seen significant changes and continues to grow at an unprecedented rate [4]. Therefore, the nature of retail the tradition has shifted to online retail. As a result of the emergence of online retail from the early twentieth century by the emergence of international big brands such as, M&H, Mango and ZARA, which have started online retail, has become popular. More of the growth of this industry is in developed countries, but developing countries are also accepting this with respect to time. About two-thirds of EU countries buy their clothes online and the amount of revenue generated by this industry to is worth $17 billion [5]. Total sales related to the global garment industry are estimated to be approximately $680 billion. As a result, one can see how important the online retail industry can be. On the other hand, with the development of the internet in most countries of the world, the platform for using this industry is provided. For example, e-commerce in India has been known as the fastest and the most attractive method for trading in recent years, India's e-commerce market has increased to 60 billion US dollars by 2019 and by 2026, it will increase to 200 billion US dollars [6]. However, if the right suppliers are not selected in this industry, it will have a very negative impact on the amount of income. Therefore, choosing the right supplier in e-commerce and online retail is very important [7].

On the other hand, the safer and the more attractive the structure is, the more popular the online store becomes. Shopping in an online store makes the experience special because there are many choices without having to enter a physical space and go from place to place, there will be something for you that adds to the appeal of the purchase.

Because online stores function in choosing locations similar to chain stores and here are the famous stores compared to other malls because of the less tax and no other additional costs to pay, the more possibility of being able to offer more discounts and convenient packages to the customer. Also, most people associate the price of a product with its quality, and that makes them have negative comments about products in online stores. Because there are many shopping malls with similar products, choosing to buy one has become a new challenge [8]. Universal design for these cases is designed in a way which is available to all people [9]. Research is limited in this area because studies on these specific sections of the community have not been done [10, 11]. Previous important features such as parking capacity and area size are now under the influence of the environmental criteria, design aesthetics and ergonomics, with studies proving recent impact criteria have a stronger effect on customer satisfaction [12]. Ergonomic and aesthetic factors such as interior design provide more entertainment and comfort to customers [13]. Environmental criteria such as access to facilities, noise pollution, air pollution and traffic jams also plays a key role in the attractiveness of buying a market for its potential customers [14]. Of course, the choice of location is an important factor. It is necessary to identify, evaluate and select from the available options. This process is influenced by qualitative criteria, such as quantitative related and supporting industries, proximity to the raw material market, infrastructure conditions, market size and demand, capital costs, natural conditions and human resources [15, 16]. Hence, it seems that choosing a place for a mall is an important factor that determines the success of the business.

2. 1. MCDM Technique Liu, Quan, Li and Wang [17] also wrote a new decision model and alternative method of queuing 6 multi-criteria for selecting a sustainable supplier by combining the best and worst methods at a valuable time interval. Also, Kaushik, Khare, Boardman and Cano [18] examined the factors

that motivate consumers to buy online fashion retailers and these factors were evaluated using the analytical hierarchy process method. Sánchez-Lozano, Teruel-Solano, Soto-Elvira and García-Cascales [19] in their research which was based on a geographic information system (GIS) and they used multi-criteria decision-making methods the optimal choice of solar power plants. They calculate the weight of these criteria using the analysis process Hierarchical (AHP) and TOPSIS method to evaluate the criteria. Konstantinos, Georgios and Garyfalos [20] Used the combined AHP method and Geographic Information System (GIS) to determine the most appropriate sites used to install wind farms and then the TOPSIS method to rank the construction sites of wind farms. Sedady and Beheshtinia [21] described a new method for prioritizing the construction of renewable power plants which their evaluating factors are: technical factors, economic, social, political and environmental criteria, each of which includes five sub-criteria, and using Hierarchical analysis method and a new method called TOPKOR to prioritize places.

2. 2. Sustainability Supply Chain On the other hand, Liou, Chang, Lo and Hsu [22] In a study ranked and evaluated the criteria of green supply chain in the field of electronic services. They ranked and evaluated the criteria by combining the best and worst fuzzy methods with fuzzy TOPSIS. Hsu, Yu, Chang, Liu and Sun [23] in their study, they reduced the destructive effects on the sustainable supply chain in the electronics manufacturing industry. By evaluating the effective criteria using QFD and FMEA methods, they evaluated and ranked the criteria by combining AHP and DEMATEL methods with a gray approach. Zakeri, Yang and Konstantas [24] in their research, they evaluated and ranked suppliers in order to select them correctly in the sustainable supply chain. They used the ARPASS[2] method for ranking and final selection of suppliers.

Karami, Ghasemy Yaghin and Mousazadegan [25] enabled the logistics department to evaluate and systematically select suppliers using quantitative and qualitative decision criteria. They also built a three-step approach to tackle selection problem and evaluation in the industry. Abdel-Basset, Manogaran, Mohamed and Chilamkurti [26] presented a new evaluation function to calculate the weight of options for a better choice in his paper. As well as the selected criteria to increase the quality and service and reduce costs and control time to select the best suppliers. Fanita and Sinaga [27] in their paper provide a framework based on the integrated fuzzy-hierarchical analysis approach for selecting a global supplier that considers sustainability risks from sub-suppliers. Boran, Genç, Kurt and Akay [28] also presented an approach for the problem of selecting a model supplier based on fuzzy decision making with TOPSIS method. Mohammed, Yazdani, Oukil and Gonzalez [29] they examined the impact of environmental, social and economic disturbances on the selection of suppliers in the sustainable supply chain. Using the DEMATEL method, they measured the impact of these disorders on supplier selection and combined the MABAC-OCRA-TOPSIS-VIKOR (MOTV) methods to rank suppliers.

De Boer [30] has worked on procedural rationality issue in supplier selection, in which he provided three innovative methods for selecting supplier selection criteria. Laurentia and Septiani [31] have focused on choosing a place issue YPBM University of Tourism by combining the two methods of cutting point and hierarchical analytical process to investigate that their goal was analyzing the location for the construction of the new campus. Torkayesh, Iranizad, Torkayesh and Basit [32] also examined the methods of selecting suppliers in the online sustainable supply chain. They used a combination of BWM and WASPAS methods to rank suppliers by determining the criteria influencing supplier selection.

Ghorui, Ghosh, Algehyne, Mondal and Saha [33] have worked on hierarchical analysis issue and order prioritization analysis by similarity of the answer to the idea of TOPSIS to choose the place of purchase with fuzzy data. Accordingly, to select the place of purchase from the analysis process, Fuzzy hierarchy and fuzzy analysis were used to prioritize the order by similarity to the ideal answer. The dynasty hierarchy analysis was used to obtain the weight factors and also the fuzzy hierarchical analysis process were used to rank the criteria, and the sub-criteria were used to integrate fuzzy weights. Qu, Zhang, Qu and Xu [34] have worked on selecting a green supplier based on procedure issue with the help of TOPSIS fuzzy approaches. These researches were accompanied by a case study in a Chinese Internet company which was aimed to show the appropriate green chain suppliers based on a framework with the help of fuzzy TOPSIS and ELECTRE. This framework is presented based on green supply chain management. The TOPSIS and ELECTRE approaches were used to rank green chain suppliers and the results of the proposed framework with the obtained ratings, by higher grades and incompatibility was compared with the measurements of the fuzzy electro-method. Shaikh, Memon, Prokop and Kim [35] have worked on a hybrid approach issue based on the hierarchical analysis process and TOPSIS to select the optimal location using spatial data. Štirbanović, Stanujkić, Miljanović and Milanović [36] in their studies on multi-criteria decision-making methods, such as TOPSIS and VIKOR focused that they used these methods to select floating vehicles as a result,

[2] alternatives' stability scores multi-criteria

in this research The AHP and TOPKOR methods have been used to select the right supplier among the 11 available suppliers. Table 1 summarized the researches in the scope of sustainable supplier selection. The innovations of this research are as follows:

- Providing a comprehensive list of criteria in the scope of sustainable supplier selection.
- Employing these criteria to evaluate and rank the digital stores' suppliers
- Using a combination of AHP and TOPKOR methods in sustainable supplier selection scope

3. METHODOLOGY

3. 1. Research Steps To answer the research questions, the following steps are implemented:

Step 1: Determine the effective criteria in evaluating and ranking suppliers in digital stores.

Step 2: Determine the weight of the criteria using the AHP method. The steps of the AHP method are as follows:

Step 2.1: Form a matrix of pairwise comparisons: If n criteria exist and the numerical equivalent of the two

TABLE 1. Summary of effective criteria in determining suppliers

Criteria	Boran, Genç, Kurt and Akay [28]	De Boer [30]	Devi and Wardhana [37]	Abdel-Basset, Manogaran, Mohamed and Chilamkurti	Štirbanović, Stanujkić, Miljanović and Milanović	Qu, Zhang, Qu and Xu [34]	Shaikh, Memon, Prokop and Kim [35]	Ghorui, Ghosh, Algehyne, Mondal [33]	Torkayesh, Iranizad, Torkayesh and Basit [32]	Laurentia and Septiani [31]	Karami, Ghasemy Yaghin and Mousazadegan [25]	Liou, Chang, Lo and Hsu [22].	Mohammed, Yazdani, Oukil and Gonzalez [29]	Hsu, Yu, Chang, Liu [23]	Zakeri, Yang and Konstantas [24]	The number of repetitions
Economical	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓	11
Environmental		✓	✓	✓			✓		✓	✓	✓	✓	✓			9
Social		✓	✓						✓		✓	✓	✓		✓	7
Quality	✓		✓	✓	✓							✓	✓			6
Competitors			✓			✓								✓		3
Easy availability					✓	✓		✓	✓	✓			✓	✓	✓	8
Supported		✓		✓	✓	✓	✓									5
Geographical location	✓			✓					✓					✓	✓	5

Criteria	Qu, Zhang, Qu and Xu [34]	Shaikh, Memon, Prokop and [illegible]	Ghorui, Ghosh, Algehyne, [illegible]	Laurentia and Septiani [31]	De Boer [30]	Boran, Genç, Kurt and Akay	Devi and Wardhana [37]	Abdel-Basset, Manogaran, Mohamed and Chilamkurti	Karami, Ghasemy Yaghin and Mousazadegan [25]	Štirbanović, Stanujkić, Miljanović and Milanović [36]	Liou, Chang, Lo and Hsu [22].	Hsu, Yu, Chang, Liu [23]	Zakeri, Yang and Konstantas [24]	Mohammed, Yazdani, Oukil and Gonzalez [29]	Torkayesh, Iranizad, Torkayesh and Basit [32]	The number of repetitions
Economical			✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	11
Environmental		✓		✓	✓		✓	✓	✓		✓			✓	✓	9
Social					✓		✓		✓		✓		✓	✓	✓	7
Quality						✓	✓	✓		✓	✓			✓		6
Competitors	✓						✓					✓				3
Easy availability	✓		✓	✓						✓		✓	✓	✓	✓	8
Supported	✓	✓			✓			✓		✓						5
Geographical location						✓		✓				✓	✓		✓	5

criteria comparison i and j are shown with a_{ij}, Then the pairwise comparison matrix of a matrix $\boldsymbol{n} \times \boldsymbol{n}$ in relation (1) is shown:

$$A = [a_{ij}] . a_{ij} = \frac{1}{a_{ij}} \quad . i.j = 1.2. \ldots . n \tag{1}$$

Step 2.2: Using Equation (2), the matrix comparison is normalized. a_{ij}^{*} is the normalized value of the parameter a_{ij}.

$$a_{ij}^{*} = a_{ij} / \sum_{i=1}^{n} a_{ij} \tag{2}$$

Step 2.3: The final weight of each criterion is obtained from the following Equation (3). W_i is the final weight of the criteria i.

$$W_i = \sum_{i=1}^{n} \frac{a_{ij}^{*}}{n} \qquad i.j = 1.2. \ldots . n \tag{3}$$

Step 3: Determine the candidate points (Alternatives).
Step 4: Determine the decision matrix
Step 5: Rank the alternatives using TOPKOR method

TOPKOR method is a combination of two different multi-criteria decision-making methods called TOPSIS and VIKOR. In TOPSIS method, a good alternative is one that its total distance from the positive ideal solution (PIS) is low and its total distance from the negative ideal solution (NIS) is high. But in VIKOR method, a good alternative is one that its total distance from PIS (utility index) and its maximum distance from PIS in each criterion (regret) are low. It means, TOPSIS neglects the distance of each alternative from PIS in each criterion while VIKOR neglects the total distance from NIS.

TOPKOR method tries to integrate both mentioned methods. In TOPKOR, a good alternative is one that its total distance from PIS and its maximum distance from PIS in each criterion are low and simultaneously its total distance from NIS is high.

The steps of this method are as follows:

Step 1: Consider the X as decision matrix in which x_{ij} is the score of alternative i in criterion j. Additionally, consider W_i is the weight of criterion j. Also, n is the number of criteria and m is the number of alternatives.

$$X = [x_{ij}]_{m \times n} = \begin{matrix} \\ A_1 \\ \vdots \\ A_m \end{matrix} \begin{matrix} \begin{matrix} C_1 & \cdots & C_n \end{matrix} \\ \begin{bmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{n1} & \cdots & x_{mn} \end{bmatrix} \end{matrix} \tag{4}$$

Step 2: Obtain the normalized decision matrix using Equation (5), where n_{ij} is the normalized value of x_{ij} .

$$n_{ij} = x_{ij} / \sum_{i=1}^{m} x_{ij}^{2} \qquad \forall\, i.j \tag{5}$$

Step 3: Form the normalized weighted decision matrix using Equation (6).

$$V_{ij} = x_{ij} \times w_{ij} \qquad \forall\, i.j \tag{6}$$

Step 4: Using Equations (7) and (8), obtain PIS and NIS.

$$PIS_j = \underset{i}{\text{Max}}\, v_{ij} \quad and \quad NIS_j = \underset{i}{\text{Min}}\, v_{ij} \quad if\ j \in B \tag{7}$$

$$PIS_j = \underset{i}{Min}\, v_{ij} \ and \ NIS_j = \underset{i}{Max}\, v_{ij} \ if\ j \in C \tag{8}$$

B is the type of profit and C is the type of cost.

Step 5: Calculate the distance of each alternative from PIS and NIS.

$$d_i^{-} = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - NIS_j\right)^2} \quad i = 1. \ldots . m \tag{9}$$

$$d_i^{+} = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - PIS_j\right)^2} \quad i = 1. \ldots . m \tag{10}$$

d_i^{+} and d_i^{-} the sum of the distance from PIS and NIS, respectively.

Step 6: Find the maximum distance between each alternative from PIS in each criterion. This parameter in the VIKOR method is called the regret index and is denoted by R.

$$R_i = \underset{j}{\text{Max}}\, d\left(v_{ij}.PIS_j\right). \ i = 1.2. \ldots . m \ \Big| \quad d\left(v_{ij}.PIS_j\right) = \left|PIS_j = v_{ij}\right| \tag{11}$$

Step 7: Obtain the VIKOR index (Q_i) from Equation (12).

$$Q_i = v \times \left[\frac{d_i^{+} - DMIN_i^{+}}{DMAX_i^{+} - DMIN_i^{+}}\right] + (1 - v) \times \left[\frac{R_i - RMIN_i}{RMAX_i - RMIN_i}\right] \tag{12}$$

In Equation (12), $DMIN_i^{+} = min_i d_i^{+} . DMAX_i^{+} = max_i d_i^{+} . RMIN_i = min_i R_i^{-} . RMAX = max_i R_i^{-}$. Also, v is a parameter that its value is between 0 and 1 and represents the relative importance of total distance from PIS against regret index. In this research, the value of this parameter is considered 0.5.

Step 8: Calculate the closeness coefficient for each alternative i (CC_i) using Equation (13). Any alternative with a higher CC_i value is a better alternative.

$$CC_i = \frac{d_i^{-}}{d_i^{-} + Q_i} . \qquad i = 1.2. \ldots . m \tag{13}$$

3. 2. The Used Questionaries Two questionaries are used to perform the research steps. The first questionnaire is related to the pairwise comparisons in AHP technique. In this questionary, the answer of each question is determined by the shown choices in Table 2. The second questionnaire was also used to determine the score of each supplier (alternative) in each criterion (to form a matrix decision) based on the Likert scale has been used (Table 2). Both questionaries are answered by a sample of 10 expert including 5 academics staff and 5 managers with more than 8 years' experience in the digital stores industry. The used questionaries are standard questionaries and their validity is versified. Moreover, the reliability of the first questionary is justified.

TABLE 2. The used linguistic variables in each questioner and their values

First questioner		Second questioner	
1	Very low preference	1	Very little
3	Low preference	2	Low
5	Medium preference	3	Medium
7	High preference	4	High
9	Very high preference	5	Very high

The hierarchical inconsistency ratio with value of 0.06 verifies the reliability of the first questionnaire. Moreover, Cronbach's alpha with the value of 0.88 verifies the reliability of the second questionnaire.

4. RESULTS

Results of the performance of research steps are presented in this section. First, we identify the effective criteria for evaluation and suppliers ranking using subject literature and expert opinions. A list of identified criteria is shown in Table 3. Then, using the first questionnaire and hierarchical analysis, the weight of each effective criteria was calculated and shown in Table 3.

Finally, after identifying 11 suppliers for one item of the products, each supplier's score on each of the criteria (The decision matrix) was determined using the experts' opinions and according to the Likert scale, the results of which are shown in Table 4.

The calculations based the research method according to the criteria and decision matrix (experts' opinion) with TOPKOR method final ranking are shown in Table 5.

TABLE 3. Effective criteria in evaluating and ranking suppliers

Row	The final criterion is selected	Type of criteria	Weight criteria
1	Economical	Profit	0.12043383
2	Supported	Profit	0.20690794
3	Environmental	Cost	0.09808552
4	Work experience	Profit	0.06197201
5	Social	Profit	0.09105958
6	Quality	Profit	0.10985684
7	Easy availability	Profit	0.17477045
8	flexibility	Profit	0.13691384

TABLE 4. Decision matrix

The final matrix of alternative/criteria	Economical	Supported	Environmental	Work experience	Social	Quality	Easy availability	flexibility
Supplier 1	5	5	5	4	4	5	5	2
Supplier 2	4	2	4	1	2	4	4	2
Supplier 3	3	3	3	2	2	1	4	1
Supplier 4	3	4	4	2	3	5	5	2
Supplier 5	5	4	3	2	3	3	3	3
Supplier 6	4	5	5	4	4	5	5	4
Supplier 7	1	1	2	4	5	4	2	5
Supplier 8	2	3	2	5	4	2	5	4
Supplier 9	3	2	5	3	3	3	4	3
Supplier 10	5	2	5	5	1	4	2	3
Supplier 11	3	4	3	3	4	4	2	2

TABLE 5. Ranking of suppliers by TOPKOR method

Suppliers	Distance from PIS	Distance from NIS	Index R	Index CC_i	Rank
1	0.004398	0.010882	0.003092	0.13968	3
2	0.010243	0.005125	0.0088485	0.007004	9
3	0.011217	0.003553	0.0088485	0.004521	11
4	0.007391	0.007783	0.005899	0.019238	6
5	0.007236	0.007403	0.005899	0.018727	7
6	0.003375	0.011096	0.0029495	0.966391	1
7	0.00366	0.013247	0.0029427	0.447672	2
8	0.005128	0.010249	0.0033441	0.076901	5
9	0.007146	0.007079	0.005899	0.01816	8
10	0.012111	0.006184	0.011798	0.006164	10
11	0.0051	0.009869	0.003092	0.084322	4

5. CONCLUSION

This research provided a way to evaluate and rank suppliers in digital stores. First, the effective criteria in identifying and ranking suppliers in digital stores were identified and the rating of each supplier in each criterion was determined. Then a hybrid approach with a combination of hierarchy analysis methods and TOPKOR for supplier ranking is presented. As it can be seen, the effectiveness of the criteria is, from big to small, as follows; support, accessibility, flexibility, economic, quality, environmental, social status and finally work experience, which is the result of TOPKOR method calculations, the order of suppliers is shown in Table 5. Suppliers No. 6, 7 and 1 have allocated ranking to themselves first to third, respectively. TOPKOR method is a combination of two different multi-criteria decision-making methods called TOPSIS and VIKOR. In TOPSIS method, a good alternative is one that its total distance from the positive ideal solution (PIS) is low and its total distance from the negative ideal solution (NIS) is high. But in VIKOR method, a good alternative is one that its total distance from PIS (utility index) and its maximum distance from PIS in each criterion (regret) are low. It means, TOPSIS neglects the distance of each alternative from PIS in each criterion while VIKOR neglects the total distance from NIS.

TOPKOR method tries to integrate both mentioned methods. In TOPKOR, a good alternative is one that its total distance from PIS and its maximum distance from PIS in each criterion are low and simultaneously its total distance from NIS is high. It means that TOPKOR have a more comprehensive view than TOPSIS and VIKOR and considered all the three parameters.

Providing other multi-criteria decision-making methods for evaluating and ranking digital store suppliers can be considered as a basis for future research. Also identifying newer criteria about supplier evaluation can be considered as another field for future research.

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Persian Abstract

چکیده

با توجه به گسترش فضای مجازی در بستر استفاده از اینترنت و دسترسی همگانی به این بستر، کمتر از پیش تولید گنندگان و فروشگاه‌ها به صورت مستقیم بازاریابی را انجام می‌دهند، بلکه بیشتر سعی می‌کنند از بستر فروش اینترنتی برای خود استفاده می‌کنند تا حتی الامکان از واسطه ها که در همه‌ی سیستم‌های فروش وجود دارد کاسته شود. این رویکرد مزیت‌های زیاد دیگری نظیر کاهش بهای تمام شده، کاهش هزینه‌های حمل و نقل، سرعت ارسال محصول و غیره دارد. در نتیجه استفاده از فروشگاه‌های دیجیتالی به صورت فزاینده‌ای مورد اسقبال قرار گرفته اند. ارزیابی و رتبه بندی درست تامین کنندگان، نقش مهمی در افزایش بهره‌وری این نوع فروشگاه‌ها دارد. این پژوهش به ارائه روشی جهت ارزیابی و رتبه بندی تامین کنندگان در فروشگاه‌های دیجیتالی می‌پردازد. ابتدا معیارهای موثر در ارزیابی و رتبه بندی تامین کنندگان در فروشگاه‌های دیجیتالی شناسایی شده است و امتیاز هر تامین کننده در هر معیار تعیین می‌گردد. سپس یک رویکرد ترکیبی با تلفیق روش‌های تحلیل سلسله مراتبی و تاپکور جهت رتبه بندی تامین کنندگان ارائه می‌شود. نتایج علاوه بر نشان دادن اولویت تامین کنندگان نشان می‌دهد که معیارهای پشتیبانی، سهولت دسترسی و انعطاف پذیری به ترتیب بیشترین اهمیت را در ارزیابی و رتبه بندی تامین کنندگان فروشگاه‌های دیجیتالی دارند.