RANKING DE MARKETING DIGITAL: UN ANÁLISIS CON EL OPERADOR OWA

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RESUMEN
El objetivo de este trabajo es clasificar las estrategias de marketing digital de una empresa mexicana mediante el operador promedio ponderado ordenado (OWA). La aplicación de esta técnica permite crear un ordenamiento decreciente de las campañas de acuerdo a un vector de ponderación. Entre los hallazgos resalta el hecho de que A_3 es la táctica con los niveles de rendimiento más alto. Por su parte, A_1 resultó ser la opción con la valoración más baja según el desempeño de sus criterios. Sin duda, esta información puede ser una ventaja para los gestores de la mercadotecnia porque le permiten tomar mejores decisiones en función de la asignación de sus recursos ya que, con este instrumento de lógica difusa es posible identificar las áreas de oportunidad, pero también aquellos espacios que se les debe prestar mayor atención. Por último, los resultados también demuestran la aplicación del operador OWA para ordenar los planes de mercadotecnia digital de una empresa de accesorios para celular.

Palabras Clave: Marketing digital, Operador OWA, Gestores de mercadotecnia, Lógica difusa.
Códigos JEL: M300, M310, C600.

DIGITAL MARKETING RANKING: AN ANALYSIS WITH THE OWA OPERATOR

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ABSTRACT
The objective of this work is to classify the digital marketing strategies of a Mexican company using the ordered weighted average (OWA) operator. The application of this technique allows for the creation of a decreasing ordering of the campaigns according to a weighting vector. Among the findings, the fact that A_3 is the tactic with the highest performance levels stands out. On the other hand, A_1 turned out to be the option with the lowest rating according to the performance of its criteria. Without a doubt, this information can be an advantage for marketing managers because it allows them to make better decisions based on the allocation of their resources since, with this fuzzy logic instrument, it is possible to identify the areas of opportunity, but also those spaces that should be given more attention. Finally, the results also demonstrate the application of the OWA operator to order the digital marketing plans of a cell phone accessories company.

Keywords: Digital marketing, OWA operator, Marketing managers, Fuzzy logic.
JEL Codes: M300, M310, C600.

1 INTRODUCTION

As Aly (2022) points out, the use of technology, particularly the Internet, has changed the way people communicate. But it has also transformed the way marketing strategies are designed, moving from traditional capabilities to more digitalized ones so that companies can differentiate themselves from their competitors (Saura, Palacios-Marqués and Ribeiro-Soriano, 2021; Baum, Spann, Füller and Thürridl, 2019; Caputo, Fiorentino & Garzella, 2019). In the words of Napawut and Siripipatthanakul (2022), this new trend has a favorable impact on organizations because it allows them to reach a larger audience, boost sales and foster customer loyalty.

Hence, Erdmann and Ponzoa (2021) argue that the digitalization of marketing has been widely explored from various perspectives ranging from its conceptualization to performance evaluation. Undoubtedly, this way of carrying out marketing actions has caught the attention of many researchers (Dimitrios, Ioannis, Angelos, & Nikolaos, 2023). However, empirical studies are still scarce (Erdmann and Ponzoa, 2021). In addition, Trung and Thanh (2022) point out that the evaluation of digital marketing is complex because it covers many criteria and there is no consensus on the metrics that should be used.

In this sense, to address these limitations and expand the scarce existing literature, this work aims to classify the digital marketing strategies of a Mexican company using the OWA operator. The application of this technique made it possible to create a decreasing ordering of the campaigns according to a weighting vector. On the other hand, to achieve the research purpose, it was decided to use the approach presented by Huesca-Gastélum, Tirado-Gálvez, Delgadillo-Aguirre, León-Castro and Cuén-Díaz (2024), as well as the framework proposed by Saura *et al.*, (2017) because they are the best alternatives to classify the digital marketing strategies of companies, but also because they are one of the most popular studies.

Finally, this article begins with a theoretical reflection on the classification of digital marketing. Then, the definition of the OWA operator is presented. In the next section, the application of this fuzzy logic technique to classify the created digital marketing campaigns is shown. Finally, the most substantive conclusions are indicated, as well as the future lines of research and the references that were used during the writing of this document.

2 A LITERATURE REVIEW ON DIGITAL MARKETING CLASSIFICATION

Improving digital marketing decisions requires instruments that measure the performance of the designed strategies, but also indicators that are grouped into different criteria. For these reasons, academics and marketing managers around the world are increasingly interested in formulating techniques for their measurement (Saura *et al.*, 2017).

One of these designed tools is the one proposed by Wakjira (2023) who investigated how strategies created by banks improved the success of digital marketing. To achieve this, he used data from banking institutions in Ethiopia and applied regression analysis to see the influence that the independent variable exerts on the dependent variable. The results indicate that devices, media, platforms and technology have a significant impact on the performance of business decisions regarding digital marketing.

A similar study is the one presented by Tariq, Alshurideh, Akour and Al-Hawary (2022) because the authors examined the impact of digitalized capabilities on organizations in the technology sector in the United Arab Emirates. The data were extracted from questionnaires that were administered to managers via email. They then analyzed the responses using structural equation modeling. Their findings include that the greatest impact is the strategic approach and content infrastructure, while the factors with the greatest influence are customer-employee relationships.

Dastane (2020) also analyzed the influence of digital marketing on the purchase intention of Malaysian consumers. Data were collected through snowball sampling to reach a total of 202 e-commerce shoppers who answered a questionnaire, which was examined using structural equations. The results suggest that digital tactics increase the purchase probability of internet users in the Greater Klang Valley of Malaysia.

Similarly, Phiri (2020) examined the influence of digital capabilities on the intermediate markets of small agro-processing companies in Hare, Zimbabwe. To achieve his purpose, the author collected the responses of a stratified sample of 298 managers and studied them using multiple logistic regression. The results indicate that technological innovation and customer attitudes are elements that encourage or inhibit the good performance of the middle markets of public institutions.

On the other hand, Erdmann and Ponzoa (2021) carried out research on the cost-result relationship of digital actions used in the e-commerce of 29 food businesses in the United States and the United Kingdom. The most relevant findings confirm that SEO and SEM techniques offer more benefits at a lower price, where the type of content defines the success of the designed campaigns, as well as the budget that will be allocated for such activities.

Another relevant study is the one presented by Saura *et al.*, (2017), in which a series of indicators extracted from quantitative and qualitative frameworks are presented. The authors analyzed a total of 378 research papers in databases such as Scopus and Web of Science to achieve the design of their model. The most notable results are the fact that the conversion rate, click rate and user type are the items most used by the different researchers.

In contrast, da Silva, da Silva Stertz, Portella, Gomes, Moreira, and dos Santos (2023) evaluated the digital campaigns of a computer products company using the CRITIC-GRA-3N method and considering 3 criteria. This document infers that Facebook is the

platform that offers the best performance levels and, therefore, is the best option to implement digitalized marketing strategies.

Similarly, Karczmarczyk, Jankowski, and Wątróbski (2018) presented a decision support system to determine the performance of campaigns considering multiple criteria and applying the PROMETHEE II technique. Their most revealing data is that coverage, costs, consumer behavior, and duration could be the elements with the most influence on the performance levels of each digitalized decision. Also, the application of this multi-criteria framework to carry out the measurement is demonstrated.

Leung and Mo (2019) did something similar by proposing the Fuzzy-AHP method to classify and select the most effective digital marketing tools. The application of these fuzzy approaches allowed the creation of hierarchical orders of the evaluated alternatives. This translates into a positive impact on decision-making because it saves time when deciding on the most suitable options, but also helps to generate more clients and sales in the different industrial ventures.

Something similar was implemented by Şengül and Eren (2016) when using the Fuzzy AHP and Fuzzy TOPSIS methodologies for the selection of digitalized marketing tools. This research led to the assertion that social networks are the best alternative to broadcast the message to audiences through online media, followed by email advertising and banner promotion, respectively.

Another exploration with the Fuzzy AHP instrument corresponds to the one presented by Wiwatkajornsak and Phuaksaman (2024), who used this framework to identify the key factors in the success of marketing tactics, but also to classify them based on their relative importance. As a result, they obtained that social networks and the relevance of the content are the essential aspects for such assessments, so those in charge of these decisions should pay more attention if they want to improve their evaluations.

For their part, Huesca *et al.*, (2024) also developed a fuzzy logic framework to measure the digital marketing performance of a company that sells cell phone accessories in Mexico. To achieve this, the authors used the OWA operator to evaluate the different campaigns through 10 indicators grouped into 5 criteria. The results pointed to A1 as the best strategy, while A3 was the option with the lowest levels of performance. Without a doubt, this information was useful for the marketing managers of that company because it helped them in the allocation of their resources.

For Mukhsinov and Ergashxodjayeva (2022), the best way to classify and select the campaigns of a textile company in Uzbekistan is through the application of the AHP instrument. Through this tool, the authors were able to show that the Telegram social network is the most effective communication technology to implement digital marketing strategies since it was the one that achieved the best levels in its performance.

Finally, Zamsuri, Syafitri and Pane (2021) evaluated the information security awareness in the digital marketing of 17 small companies in Indonesia. To do this, they designed a multi-criteria analysis approach, which allowed these private institutions to be

evaluated through around 42 indicators. The findings provide evidence that 80% of companies are aware of the security they offer through the information they share on their technological platforms. In addition, they highlight K15, A12 and B2 as the criteria with the greatest influence on the measurement.

In conclusion, to achieve the purpose of this document, it was decided to use the approach presented by Huesca-Gastélum *et al.*, (2024), as well as the framework proposed by Saura *et al.*, (2017) because they are the best alternatives to classify the digital marketing strategies of companies, but also because it is one of the most popular studies. Likewise, a fuzzy logic technique will be used, particularly the OWA operator, because it is an ideal technique to classify and order campaigns according to their marketing and digital capacity.

3 THE ORDERED WEIGHTED AVERAGE OPERATOR

The OWA operator is an instrument introduced by Yager (1988) and its main characteristic is that it can create decreasing orderings of the alternatives based on weighting vectors. Its definition is as follows.

An OWA operator with dimension n is shaped as $OWA: R^n \rightarrow R$ and is associated with a weight vector W of that dimension n, so, $w_i = \in [0,1]$ and $\sum_{i=1}^{n} w_i = 1$, according to the formula:

$$OWA(a_1, a_2, \dots, a_n) = \sum_{j=1}^{n} w_j b_j, \quad (1)$$

where b_j is the jth largest of a_i. Likewise, as expressed by Amalia and Alita (2023), this operator allows decisions to be made according to:

→ Optimistic criterion. The most convenient scenario is presented so that the decision-maker selects the alternative with the most beneficial results. This criterion is calculated with the maximum value and is defined with the formula:

$$Decision = Max\{E_i\} = Max[Max\{Max\{a_j\}] \quad (2)$$

→ Pessimistic or Wald criterion. Here the decision-maker selects the alternative with high levels of security, that is, chooses the most convenient among the least beneficial. This instrument is called Max-Min and is presented as follows:

$$Decision = Max\{E_i\} = Max[Min\{a_j\}] \quad (3)$$

→ Hurwicz criterion. With this framework, the decision-maker points out the most favorable and the least favorable value as the best and worst alternative, and with that, chooses the option with the highest favorable outcomes. Its formula is:

$$Decision = Max\{E_j\} = Max[\alpha Max\{a_j\} + (1-\alpha) Min\{a_j\}] \quad (4)$$

where $\alpha + (1-\alpha) = 1$.

→ Laplace criterion. Here the different scenarios have the same probability of being chosen, but only if there are no opposite results, since it is based on the principle of insufficient reason. Its formula is defined as:

$$Decision = Max\{E_j\} = Max[(1/n)\sum_{j=1}^{n} a_j] \quad (5)$$

Since there are different possibilities in assigning weights with respect to these four criteria, the opinions of the decision-maker must be obtained in order to choose the best criterion in the weighting vectors. Consequently, it can be determined which of the four criteria should be used to create the different scenarios.

4 CLASSIFICATION OF THE DIGITAL MARKETING STRATEGIES OF A MEXICAN COMPANY WITH THE OWA OPERATOR

To classify the digital marketing strategies of a Mexican company using the OWA operator, the following steps must be taken:

Step 1. The classification begins with the elements that will be used. In this document, 10 indicators grouped into 5 criteria will be used. The reagents in question were extracted from the theoretical framework and a column was added to indicate whether higher is better (H) or lower is better (L). The information is presented in Table 1.

Table 1. Indicators for classifying digital marketing strategies.

Identifier	Description	Category	H or L
COR	Conversion rate	Criteria	
ANC	Average number of conversions per click	Indicator	H
ACC	Average number of conversions per click per purchase activity performed	Indicator	H
TOU	Type of user	Criteria	
TNN	Total number of new users	Indicator	H
TNR	Total number of returning users	Indicator	H
CRA	Click rate	Criteria	
ACA	Average cost per action/click	Indicator	L
AVC	Average cost of acquisition per customer	Indicator	L
ROI	Return of investment	Criteria	
PPI	Percentage of profit for investment	Indicator	H
CLF	Customer lifetime value	Indicator	H
KEY	Keywords	Criteria	
NUK	New users by keyword	Indicator	H
SPK	Site position by keyword in search engines	Indicator	H

Source: own elaboration.

Step 2. For each reagent presented in Table 1, the data of each campaign created by the Mexican company were extracted, which will be labeled as A1, A2 and A3. The information is presented in Table 2.

Table 2. Results of each campaign according to each indicator.

	A1	A2	A3
COR			
ANC	0.75	0.66	0.85
ACC	60.00	55.00	40.00
TOU			
TNN	140.00	53.00	147.00
TNR	4.00	5.00	3.00
CRA			
ACA	0.71	1.79	0.69
AVC	16.67	121.21	30.77
ROI			
PPI	2300.00	175.00	985.71
CLF	5000.00	4800.00	4800.00
KEY			
NUK	3.00	2.00	1.00
SPK	1.00	2.00	4.00

Source: own elaboration.

Because the information has different values, a normalization of the same will be done where 10 is the maximum value and 1 is the lowest value. To do this, the following formulation

a) If the indicator is H the formula is: $9 \times \left(\frac{score-minimum}{maximum-minimum}\right) + 1$

b) If the indicator is L the formula is: $-9 \times \left(\frac{score-minimum}{maximum-minimum}\right) + 10$

The normalized results are presented in Table 3.

Table 3. Normalized results of each campaign.

	A1	A2	A3
COR			
ANC	5.30	1.00	10.00
ACC	10.00	7.75	1.00
TOU			
TNN	9.33	1.00	10.00
TNR	5.50	10.00	1.00
CRA			
ACA	1.17	10.00	1.00
AVC	1.00	10.00	2.21
ROI			
PPI	10.00	1.00	4.43
CLF	10.00	1.00	1.00
KEY			
NUK	10.00	5.50	1.00
SPK	1.00	4.00	10.00

Source: own elaboration.

Step 3. The weights that each criterion will have are indicated here, which can be seen in Table 4.

Table 4. Weights for each criterion.

Criteria	Weight
COR	20%
TOU	15%
CRA	25%
ROI	30%
KEY	10%

Source: own elaboration.

Step 4. The average, weighted average and OWA operator calculations are performed (see Table 5).

Table 5. Digital marketing performance applying different aggregation operators.

Operator	A1	A2	A3
Average	4.87	5.28	5.47
WA	5.32	5.39	5.32
OWA	5.77	6.23	6.35

Source: own elaboration.

As can be seen in Table 5, the results are always that the best campaign is not that simple, as can be seen with the average should be $A_3 > A_2 > A_1$, but when a relative importance to each criterion is given then the ranking is $A_2 > A_1 = A_3$ and when the reordering process of the OWA operator is done then the result is $A_3 > A_2 > A_1$. In this sense, accordingly to the results it can be said that A_3 is the best campaign because in two of the three methods is the one with the highest score but what is important is what does the company wants, because it can be said that with a changing in the relative importance of the weights the ranking can change dramatically. This can be seen as a limitation because there is not a clear answer to which one is better, but at the end, every company can have different ways to analyze their information and because of that put more efforts in some criteria or being one criteria better than others, and with this methodology that scenarios are possible to visualize.

5 CONCLUSIONS

This article presents the classification of the digital marketing strategies of a Mexican company using the ordered weighted average (OWA) operator. This fuzzy logic technique allowed the creation of different decreasing orders of the designed campaigns, but also facilitated the comparison between these rankings generated from different weighting vectors. In other words, the empirical study showed that with the OWA operator it is possible to obtain a hierarchical order of the marketing plans outlined from the relative importance of each criterion.

Among the findings, it stands out the fact that A_3 is the strategy with the highest performance levels. On the other hand, A_1 turned out to be the tactic with the lowest rating according to the performance of its criteria. Consequently, using this tool is an acceptable option for marketing managers, but also for decision makers related to the design, implementation and evaluation of digital marketing campaigns because the information obtained with this analysis allows not only to identify the areas of opportunity, but also helps to recognize those criteria that require greater attention. Therefore, this instrument could be an ally since it facilitates the allocation of resources based on strategies that have better performance.

For future research, it is necessary to apply other more complex operators such as the heavy OWA or the prioritized OWA (León-Castro, Avilés-Ochoa, Merigó, & Gil-Lafuente, 2018; Pérez-Arellano, León-Castro, Avilés-Ochoa, & Merigó, 2019). It is also recommended to combine the OWA operator with multi-criteria methodologies such as the SAW method to contrast the descending rankings generated with both instruments (Huesca-Gastélum & Léon-Santiesteban, 2021). Finally, it is mandatory to carry out a deeper reflection using data from more Mexican companies and even incorporate private sector organizations from the rest of the world.

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