PARTICIPATIVE MULTIPLE CRITERIA APPROACH FOR DIGITAL INFLUENCERS CHOICE

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Abstract: Social networks play an essential role in consumers' decision-making. In this sense, digital influencers are tools for better reaching the marketing objectives of an organization. However, choosing the digital influencer that better represents the company's image is a challenge for marketing departments. This type of decision is currently made intuitively and unstructured. This research proposes a participatory approach to support the selection of digital influencers in marketing planning. The methodology is structured in five phases: (i) setting out a list of hypothetical potential digital influencers, (ii) defining the criteria to assess the potential digital influencers, (iii) assessing the performance of the potential digital influencers in each criterion, (iv) aggregating the results to obtain the ideal portfolio and (v) analysis of the method results and influencer choice. The approach was tested and validated in a tourism company in Brazil. As a result, the potential digital influencers named were chosen in the proposed method.

Keywords: Digital influencers; multicriteria approach; digital marketing; decision making; marketing planning.

1 Introduction

Communication strategies used by companies' marketing departments were redesigned due to information and communication technologies (ICTs) evolution (Ancillai, Terho, Cardinali, & Pascucci, 2019). As a result, the interpersonal interaction process becomes more dynamic, and the access to information is easier and faster, promoting high agility and volume when sending/receiving messages to an increasing number of recipients. Thus, the new digital communication era revolutionized traditional advertising, and the Internet constitutes a new form of language (Boix & Boluda, 2016).

Social networks are virtual environments that connect people with similar interests, visions and hobbies around the world (Sin, Nor, & Al-Agaga, 2012). Social networks are defined as a type of relationship in cyberspace, considered a favorable environment for sharing and receiving information,

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becoming one of the most effective communication strategies through the Internet (Whiting & Williams, 2013).

Considering the changes in people's behavior caused by ICTs, companies modified their strategies for advertising and selling products. Consumers claim instantaneous information, presented through clear and accessible language (Ortín & Ruiz, 2018), is characteristic of social networks.

Social networks can expand companies' virtual communication platforms, supporting the creation and maintenance of structures favoring relationships activities and business-to-business (B2B) networks. Entrepreneurial companies use social networks to develop new and existing B2B relationships, proving that social media platforms substantially impact the relationship between businesses and the development of company networks (Drummond, McGrath, & O'Toole, 2018).

Among social networks, Instagram was created at the end of the 2000s and is very popular in Brazil and worldwide. In 2011, this network had about 10 million users (Moreira, Oliveira, & Gomes, 2013) and in 2018, the number of active accounts reached 1 billion (EXAME, 2019), transforming this network into a mass communication environment. Company immersion in this environment is critical since Instagram presents a suitable location for services and products dissemination and offers greater effectiveness in communication with customers (LIRA & ARAÚJO, 2015).

Social networks play an essential role in the decision-making of their users, influencing purchase decisions (IOANĂS and STOICA, 2014). Therefore, companies need to adapt their marketing policies to this reality, especially regarding the potential of using niche marketing to communicate specific products and services.

According to a survey conducted by PricewaterhouseCoopers (PwC, 2016), in 2015, 77% of Brazilian consumers were digitally influenced by purchase decisions. It appears that virtual environments are no longer merely social relationship networks but also play a role as market environments, where products and services are exposed and negotiated, generating new opportunities for organizational marketing (Herring, Scheidt, Bonus, & Wright, 2004).

In essence, Uzunoğlu & Misci Kip (2014) define social networks as a new brand communication environment. The social phenomenon caused by ICTs creates a novel requirement for companies: rely on digital influencers' support (bloggers, artists, YouTubers) for improving sales and communication strategies focused on their target audience (Boix & Boluda, 2016). Thus, companies started to look at social networks as strategic marketing actions, influencing consumer choice (Hanna, Rohm, & Crittenden, 2011).

This phenomenon is characterized when digital influencers use a social network to extend their blogs, adapting their content to this type of digital media. Uzunoğlu & Misci Kip (2014) verify in their research the power of bloggers to influence their connected network. Considering the covid-19 context, Spark (2020) indicates that digital influencers have taken advantage of the pandemic to expand their

publications, reinforcing the relevance of digital influencers as communication vehicles and their responsibility to communicate qualified information to an audience. Squid (2020) shows that user engagement on Instagram has increased with the disease's arrival.

A digital influencer can promote products to peers of equal status, social milieu, and friends. However, if the followers serve as an audience for the digital influencer, this is a form of top-down promotion. Top-down promotion is similar to mass media, where the audience behaves passively (Gandolfi, 2016). In this article, the authors use the top-down approach and the direct way of promoting products, which happens when influencers perform product tests, teach how to use a product, or talk about a product. The indirect method is through hidden messages and commercial products.

Organizations presenting digital influencer partnerships give positive feedback on using these platforms, considering that these digital partners efficiently achieve marketing objectives, providing a closer product/service and brand engagement with potential consumers (North, 2016). However, digital partners should be used sparingly, being chosen based on experience, engagement, resonance and professionalism (Miskolci, 2011). As such, considering the selection of a digital influencer can significantly affect the advertised product or service (Gomes & Gomes, 2017).

The intention of a follower to adopt the travel suggestions provided by a blogger depends significantly on the perceptions of the reliability that the blogger transmits in its communication and the quality of the information provided (Magno & Cassia, 2018). Furthermore, the blog's impact on the reader's intention to consume the suggested products is influenced by his involvement with the blog and the content quality (Magno, 2017). In addition, Draganova (2018) identified that consumers consider the physical attractiveness of the digital influencer, experience, reliability and positive association. Finally, the influencer's credibility positive perceptions positively affect the attitude towards the brand, the customer attachment to it and the purchase intentions (Soares, 2018).

The knowledge about the characteristics grating prestige to digital influencers (perceived by their audience) is a critical factor for companies' success in a digital environment. Consumers understand and use a brand or product when an image matches their self-image (Sirgy, 1982); considering an influence by a digital influencer on the consumer also depends on the consumer perception of celebrity about self-image. According to Kapitan & Silvera (2016), factors related to consumer motivation and the environment in which the message is consumed lead to consumer reliance on a particular set of source and message characteristics. The four main factors that influence the credibility of the influencer are:

- Authority in the matter: The credibility of a digital influencer is directly linked to his understanding of the themes he reproduces. Therefore, if the idea is to talk about fashion, for example, it is necessary to study the subject, references, successful cases and, above all, follow the trends.

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This behavior reinforces the concept of "statusfera" presented by Côrrea (2014). He argues that influencers have become a kind of authority from the value and credibility perceived by other consumers through their profiles on virtual social networks.

- Naturally: More and more brands are looking for people who reproduce real life to win over their fans; if their personality and advertising seem to be forced at all times, the credibility and trust of the followers are gone (Medeiros, 2016).

- Periodicity: A successful digital influencer must always be in contact with his audience and must never disappear from his social networks.

- Not buying followers: Assuming that influencers have a fundamental role in the creativity of instigating, through their influence or followers making purchases through digital means through their image, it does not make sense for followers to be bought and fake, as it will not have reversion in the purchase, buying followers is something that affects not only the credibility of a digital influencer but also the brand that hired him.

Companies need to consider appropriate criteria when selecting digital influencers to attain good marketing results to influence potential consumers. Finally, the choice of the "best" –the most aligned – digital influencer for the company is the main challenge for marketing planning. However, even concluding this decision as strategic, there is a lack of research discussing this problem, characterizing a gap that needs to be fulfilled.

Multicriteria decision analysis (MCDA) methods can be a valuable tool for this purpose, given that this type of problem (choice of digital influencers) is characterized by the existence of a set of potential candidates that should be evaluated in different criteria, where the probability of a candidate presenting the best performance in all criteria is reduced. As such, MCDA methods are valuable to solve problems presenting the following characteristics: (i) multidimensional indicators (each indicator is expressed in different units) and (ii) conflicting objectives (it is impossible to maximize performances for all indicators), characteristics that are present in the problem of choosing a digital influencer. Finally, the MCDA approach relies on objectives and the value judgment of decision-makers (Roy, 2005).

There is some research investigating the phenomenon of online marketing and its influence on sales growth (Aragão, Farias, Mota, & Freitas, 2016); (Moreira et al., 2013). They confirm the power of digital authorities in choosing products and services by their followers. However, few of these studies discuss the decision-making process involved in digital influencers selection, being conducted empirically, even if the result of this process presents the high potential to attain good/bad sales targets, considering the digital influencer capacity to influence potential consumers, characterizing a scientific gap that this study intends to discuss. The research carried out by Gandhi & Muruganantham (2015)

proposed a research framework to estimate the influencers in a social media site using MCDA. Comparisons were made to evaluate the performance of MCDM methods, in which TOPSIS outperforms other approaches. Rai, Agouti, Machkour and Antari (2020) also propose using the TOPSIS method to identify potential influences in a social network. In turn, Shanmugam & Padmanaban (2021) presented a brand ambassador selection tool that uses a logistic regression classification model to quantify the personality dimensions for which the tweets of the brand and the ambassadors are used as input. So, the MCDA approach with Analytical Hierarchical Processing (AHP) was used to find the best-suited ambassador for a brand. Then, it is observed that few studies were carried out proposing framework solutions for selecting digital influencers. These do not bring a participatory approach or help choose the portfolio of digital influencers that should be selected.

Thus, this research proposes a participatory approach to support the selection of digital influencers. The proposed model establishes a portfolio of influencers by using the PROMETHEE V method and was validated in a tourism company in the Brazilian context.

2 Methodology

The research method follows five steps: (i) setting out a list of hypothetical influencers, (ii) defining the criteria to assess the influencers, (iii) assessing the performance of the influencers in each criterion, (iv) aggregating the results to obtain the ideal portfolio, and (v) analysis of the method results and influencer choice. Figure 1 illustrates the steps and activities expected for the approach developed by this research.

Figure 1

Research method
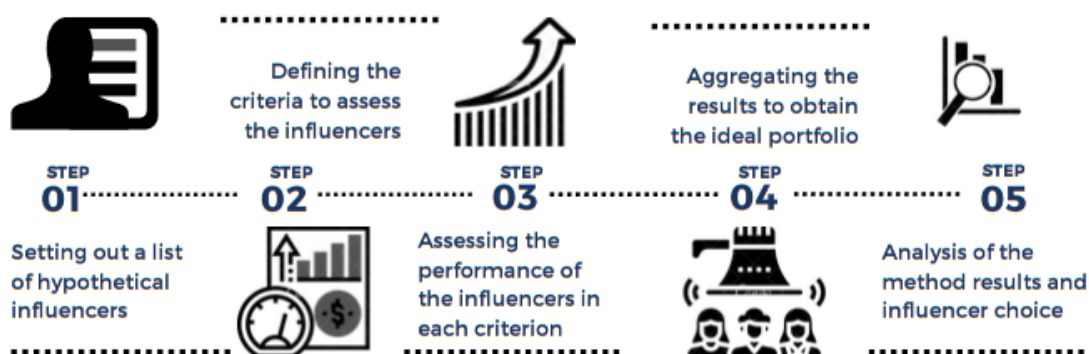
The first step involves selecting potential digital influencers and defining the set of digital influencers that will be considered potential candidates. This process includes the definition of filters to be applied to all digital influencers to establish the number of possible digital influencers considered in

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the decision-making process: the influencers that integrate this set meet a series of minimum requirements to be considered part of the set of potential digital influencers.

The second step aims to define the evaluation criteria through a standard questionnaire applied to decision-makers. The questionnaire used is presented as supplementary information for this paper. It is generic and can be used by different companies to define the criteria considered in the analysis. The questionnaire supports decision-makers in the elicitation process.

The weights are defined for the criteria and sub-criteria in the third step. The weights were established considering the results of the questionnaire presented as supplementary information in this paper, developed based on the method proposed by Edward and Barron (1994). It can be replicated in other companies and areas that aim to use the method. The decision-maker(s) should be consulted for elicitation of preferences through the following sequence of questions:

I. Which criterion would be the most important? - This criterion is assigned a value of 100 (one hundred) points, called criterion "X".

II. What is the second most crucial criterion, called "Y"?

III. The following question should define the weight of this second criterion: "Given that criterion X weights 100, what weight would you assign to criterion Y?". This process should be carried out until all criteria have been compared to the most crucial criterion, criterion "X".

IV. The values obtained are normalized, resulting in values between 0 and 1, indicating the weight value of each criterion considered by the analysis.

The fourth stage includes the performance matrix establishment, where the performances of each digital influencer at each criterion considered in the selection process are presented. The data for the matrix construction must be consulted from reliable and adequate sources. These sources can vary according to the case study and the criteria included in step 3. The information collected up to step three is the data used to implement this phase.

Thus, in step four, based on the data presented in the performance matrix, an ideal portfolio of influencers is established, according to the criteria and restrictions set by decision-makers.

In this paper, the aggregation of the performances took place through the PROMETHEE method. The use of the PROMETHEE method is justified because it is a robust method, developed based on alternatives' outranking relationships, accepting the adoption of quantitative and qualitative criteria simultaneously (Duarte, Gusmão, & Almeida, 2014). Furthermore, the possibility of adopting both types of criteria (quantitative and qualitative) is necessary for this study since decision-makers have indicated criteria with both characteristics.

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It should also be noted that this method presents a non-compensatory characteristic (Araújo, Afrânio Galdino de; Almeida, 2009). Thus, the good performance of an alternative in one criterion does not compensate for a lousy performance in another criterion, which contributes to the chosen alternative having a uniformly satisfactory performance in all criteria and not only excellent performance in one of the criteria and median performances in the others. It is essential for the present paper since it is necessary to ensure that the influencers perform well in all criteria since decision-makers indicated a set of criteria that should be used together.

Finally, the PROMETHEE method is based on pairwise comparisons of alternatives in all criteria, considering the indifference and strict preference thresholds. The aggregated results are the basis for establishing the outranking of one alternative over another. This method proposes a set of preference functions to model the decision-maker's preference systems (Brans, J-P ; Mareschal, 2005), (Le Téno & Mareschal, 1998), (Goumas & Lygerou, 2000) and (Hyde, Maier, & Colby, 2003).

The steps for implementing this method are presented below:

- Step 01 – Define the degree of preference (π) of an alternative an over an alternative b:

$$\pi\,(a,b) = \sum_{j=1}^{k} w_j * P_j(a,b)$$

Where:

$\pi\,(a,b)$: *Overall preference of a over b*
J: *set of criteria*
W_j: *weight used to represent the importance of each criterion j.*
P_j: *Degree of preference of an alternative a over b at a criterion j.* It is defined based on the transformation provided by the preference function chosen among the options proposed by the method.

For the calculation of the preference of "a" over "b" (Pj(a,b)), PROMETHEE uses pre-established preference functions (Brans, J-P ; Mareschal, 2005). Preference thresholds are defined considering decision-makers' value judgments. In this case, the analyst responsible for applying the method explains the functions and preference thresholds to support decision-makers in determining the most appropriate functions for each criterion and the preference thresholds.

- Step 02 – Calculate net flow:
    - Positive Flow: $\phi^+(a) = \frac{1}{n-1}\sum_{b\epsilon A} \pi\,(a,b)$
    - Negative Flow: $\phi^-(a) = \frac{1}{n-1}\sum_{b\epsilon A} \pi\,(b,a)$
    - Net flow: $\phi(a) = \phi^+(a) - \phi^-(a)$

Where:

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a) Positive flow (Φ+): Indicates the strength of the alternative, that means how much that alternative outranks the others globally, in all the criteria;

b) Negative flow (Φ-): Indicates the weakness of the alternative, that means how much that alternative is outranked by the others globally, in all the criteria;

c) Net flow, or flow balance (Φ): Indicates the overall result of the alternative, is calculated by subtracting the positive flow from the negative flow, indicating how much the alternative outranks the others and, at the same time, is not outranked.

The net flows are used to establish the ranking; considering the digital influencer's performance in the criteria, the weights of the criteria and the preference functions and their thresholds set by the decision-makers, the ranking of alternatives was established. After this procedure, we performed the second step of the PROMETHEE V method (determination of the portfolio) using the net flows generated to create the ranking.

- Step 03 – Maximize the sum of the net flows in the following linear programming:

$$Max \sum_{i=1}^{n} \Phi_i . x_i$$

Subject to:

$$\sum_{i=1}^{n} c_i . x_i \approx B_r$$

Where:

Φ_i = The net flow of alternative "i";

x_i = Variable associated to alternative "i", which takes the value 1 (one) if the alternative is chosen and the value 0 (zero) otherwise;

c_i = Contribution of alternative "i" to restriction "r";

B_r = Constant value related to constraint "r";

n = Total number of alternatives.

* The parameter represented by " ≈ " can assume the values "=" (equal); " ≥ " (higher or equal) or " ≤ " (less or equal), according to the type of restriction.

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We conducted a semi-structured interview to establish the constraints related to linear programming implemented in step 03. We asked decision-makers how many influencers should compose the portfolio and what restrictions would be appropriate to the model. As a result, the decision-makers defined that there would be two restrictions, which establish that the costs for publication in the feed (constraint 01) and publication in the stories (constraint 02) of the influencers should not exceed the budget provided by the company. Thus, the classic PROMETHEE V was implemented, and the Visual PROMETHEE software was used as ca alculation aid. We also conducted a sensitivity analysis to evaluate if the digital influencers' portfolio changes if the weights increase or decrease by 20%.

Finally, the results were presented to decision-makers, and then they were invited to evaluate the results and choose the alternative they considered most appropriate to the situation. The assumptions, criteria, and weights used are explained again during the meeting. It is also important to reinforce that the method is a decision support tool. As such, it is up to decision-makers, based on the results of the method and other complementary information available, to decide which alternative best meets the company's marketing strategy.

2.4 Case study description

The company studied works in the Brazilian tourism sector. More precisely, it sells travel packages, airplane tickets,and makes hotel reservations, car rentals, and other activities inherent to the tourism sector. It has 14 stores distributed among Rio Grande do Norte state regions. Its marketing department is centralized at a headquarters located in Natal-RN, the state's capital.

To boost its reach and increase its number of customers, the company is implementing the digital marketing department, currently one of the most widely used forms of advertising. The implemented strategies involve using paid social ads through company profiles and hiring digital influencers and bloggers to influence consumers' purchases and encourage them to buy the services offered by the company. However, as identified in the scientific literature about the subject, digital influencers are chosen empirically; no scientific method is used, justifying its use to validate the approach proposed by this research. A portfolio of digital influencers and bloggers will be established through the results obtained through the proposed approach, considering the human subjectivity involved in this process.

The decision-makers directly involved in selecting a digital influencer for the tourism company are the two owners of the company, the marketing manager and the commercial manager, a group of four people who decide as a group. The basic parameters (weights of the criteria) were established

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through the sequential approach (Leyva, JC; Alvarez, 2013). The group of decision-makers should be consensual on criteria definition and respective weights.

3 Results and discussion

3.1. Potential alternatives establishment

Many digital influencers and bloggers present the potential to integrate the group of alternatives. However, not all of them are available, financially viable or in line with its objectives. Thus, the company's decision-makers established four criteria for filtering them to develop the group of potential alternatives:

a) Geographical delineation: the influencer and blogger must act in the Rio Grande do Norte state;
b) Target audience: the influencer and blogger should have frequent posts in the tourism area indicating places and trips for their followers;
c) Diversification of media: the influencer and blogger must have at least a profile on Instagram and own a website for advertising agencies;
d) Profile size: The influencer's profile on Instagram must have at least 30,000 (thirty thousand) followers.

After applying the criteria for potential alternatives, 7 (seven) alternatives in Rio Grande do Norte state meet the minimum requirements. As such, they integrated the set of potential alternatives. Considering confidentiality issues, the potential alternatives were A1, ..., and A7.

3.2. Criteria definition

For criteria definition, the questionnaire presented as supplementary information was applied to decision-makers, identifying the relevant criteria for the company when choosing a digital influencer. Thus, three criteria were established, divided into six sub-criteria, as described in Table 1.

Table1

Criteria for selecting digital influencers for a tourism company

Dimension	Criterion	Code	Description	Max / Min
Cost	Feed posting cost	C1	Monetary value is charged for each post in the news feed of the influencer and blogger. Posts are available indefinitely.	Min
	Stories posting cost	C2	Monetary value is charged for each post in the news feed of the influencer and blogger. Posts are available for a fixed time (24 h).	Min
Degree of exposure	Followers' number	C3	Quantity of followers of the influencer and blogger on Instagram.	Max
	Range	C4	The number of views on the Instagram profile. It is data that is available only to the profile owner. Thus, the candidate must provide this data to be considered by the decision-making process.	Max
Feed organization	Feed organization	C5	The subjective criterion in which decision-makers assign a score between 1 (worst) and 5 (best) for the news feed organization of each influencer and blogger.	Max

3.3. Weights definition

Table 2 presents the weights assigned by decision-makers to criteria established in the previous stage. These weights were defined through the questions raised in the methodology section.

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Table 2

Criteria weights

Criterion	Code	Weight provided by decision-makers	Normalized Value	Percentage Value %
Cost	C1	60	0.1714	17.14
	C2	70	0.20	20.00
Degree of exposure	C3	100	0.2857	28.57
	C4	80	0.2286	22.86
Feed organization	C5	40	0.1142	11.42

Source: Authors, 2019.

3.4. Performance matrix establishment

The alternatives' performance data in each criterion were obtained by three different sources: (i) direct data collection with digital influencers; (ii) open data available in the social media for public consultation, and (iii) qualitative evaluation for criteria involving subjectivity. For qualitative evaluation (item iii), the Likert scale was used, in which decision-makers attribute a score between 1 (one) and 5 (five), varying from "total disagreement" to "total agreement" (Júnior & Da Costa, 2014). Considering the feed organization criterion, for example, "5" means "I completely agree" that the feed is well organized and "1" means "I completely disagree" that the feed is organized.

The alternatives' evaluations in a criterion and the respective weights of the criteria were assigned by a set of decision-makers who, after an interaction process, reached a consensus on the score/weight that should be assigned, considering the sequential approach (Leyva, JC; Alvarez, 2013). Although this is not the only possible approach for group decision-making, this approach is justified by the need for all decision-makers to agree with the assigned values since the subsequent use of the method in the company's decision-making process depends on the sponsorship and interest by senior management. The data compilation is presented in Table 3.

Table 3

The alternatives' performance matrix

Criterion	Code	Weight	A1	A2	A3	A4	A5	A6	A7
Cost	C1	17.14 %	150.00	200.00	150.00	300.00	200.00	100.00	150.00
	C2	20.00 %	100.00	100.00	100.00	200.00	80.00	50.00	100.00
Degree of exposure	C3	28.57 %	31,600	66,500	110,000	403,000	80,100	52,000	34,000
	C4	22.86 %	2,000,000	1,600,000	800,000	2,500,000	500,000	1,200,000	1,000,000
Feed organization	C5	11.43 %	4	2	4	2	3	3	4

Table 2 presents the profile of potential alternatives and the performance of each influencer and blogger in each criterion defined by decision-makers. This matrix will be used as input data at the PROMETHEE method.

The first step of the PROMETHEE method defines the type of preference function used in each criterion. Through the analyst support, decision-makers decided to use the V-shape preference function in the criteria "price of the feed post" and "price of the story post", which means that the preference of one alternative over another grows linearly when the difference between them goes from zero to a predetermined value "q", and from that value the preference becomes strict.

For the criteria "number of followers" and "range", the linear type was chosen, for which there is a zone of indifference to preference, ranging from zero to a predetermined value "q", from that value to a second value "p", the function behaves in a similar way to v-shape. Finally, the level function was chosen for the "feed organization" criterion because it is qualitative, and decision-makers want to establish an intermediate degree of preference. The preference functions and reference values are presented in Table 4 for each evaluation criterion.

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Table 4

Parameters used to implement the PROMETHEE decision support method

Parameters				
Criterion	Weights	Thresholds		Preference function
		Q	P	
Feed posting cost	17.14%	55	-	III
Stories posting cost	20.00%	35	-	III
Followers number	28.57%	10,000	20,000	V
Range	22.86%	500,000	1,000,000	V
Feed organization	11.43%	1	2	IV

The flow matrix is presented in table 5, indicating the best-classified alternative, the influencer "A6", whose net flow was calculated as 0.2346.

Table 5

Net flows

'	A1	A2	A3	A4	A5	A6	A7
Φ+	0.2891	0.2471	0.3900	0.4686	0.2981	0.4598	0.1519
Φ-	0.3164	0.3589	0.2250	0.4285	0.3598	0.2252	0.3907
Φ	-0.0273	-0.1117	0.1650	0.0400	-0.0617	0.2346	-0.2388

Then, a rank of alternatives was established, classifying them from first to seventh. Table 6 shows the final result of the case study.

Table 6

Ranking of Influencers

Position	Influencer	Net flow
First	A6	0.2346
Second	A3	0.1650
Third	A4	0.0400
Fourth	A1	-0.0273
Fifth	A5	-0.0617
Sixth	A2	-0.1117
Seventh	A7	-0.2388

Source: Authors, 2019.

The alternative "A6", whose net flow was 0.2346, obtained first place in the ranking. According to Table 3, the A6 influencer presents the lowest cost in the "price per publication feed" criterion. Despite not having a higher number of followers, the influencer has lost to A2, A3, A4 and A5 one million and two hundred thousand impressions. It should be noted that this influencer is one of the options that currently has a contract with the travel agency. Thus, the method corroborated the current choice of the agency.

In this case, the agency would like to work with between 1 and 3 influencers for the advertising action. There were the following budget restrictions: a) Sum of the cost of publishing in the stories should not exceed R$ 300.00 and, b) Sum of the cost of publishing in the feed should not exceed R$ 500.00.

Thus, we implement the budget restrictions and generate the digital influence portfolio through Visual PROMETHEE software, which allows us to choose the exact quantity of influencers that will be part of the portfolio or even determine the range of amounts of influencers that may compose the PROMETHEE V portfolio. Table 7 expresses the results generated by the Visual PROMETHEE.

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Table 7

PROMETHEE V result

Influencers	Portfolio result	Stories Price	Feed Price
A1	NO	-	-
A2	NO	-	-
A3	YES	150,00	100,00
A4	NO	-	-
A5	NO	-	-
A6	YES	100,00	50,00
A7	NO	-	-
SUM:	-	250,00	150,00

According to Table 7, the influencers selected to compose the portfolio were A3 and A6, the first and second in the ranking. It is important to note that the portfolio could be comprised of up to three alternatives. However, the programming result established only two alternatives due to the restrictions of the problem. Thus, it is valid to point out that there is no direct relationship between the placement of the influencer in the ranking and the portfolio generated by PROMETHEE V.

The total cost to the "price in stories" criterion corresponds to 50% of the budget since the budget is R$300.00, and the sum of A3 and A5 prices resulted in R$ 150.00. It is worth mentioning that the total cost in the "price on feed" criterion also corresponds to 50% of the total budget available since the value made available by the company was R$ 500.00 and the sum of the price of the chosen influencers resulted in R$ 250.00.

A sensitivity analysis of the weights was conducted for all criteria to evaluate the solution's robustness and stability. Subsequently, an increase and a reduction of each criterion's weight value by 20% of the original value was performed, modifying the weight of a single criterion at a time. Finally, the high weight value difference was compensated proportionally in the weights of the other criteria to maintain the sum of the weights as 100%.

Thus, 10 (ten) new results were generated for the model, five for each criterion increased by 20 % and five for each criterion reduced by 20 %. As a result of the sensitivity analysis, table 8 presents the alternative ranking variation range considering the new scenarios generated.

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Table 8

Alternative ranking variation range

Ranking Position	Range A1	Range A2	Range A3	Range A4	Range A5	Range A6	Range A7
1º							
2º							
3º							
4º							
5º							
6º							
7º							

Among the 10 (ten) new rankings generated, it can be observed that for 7 (seven) of them, the ranking remained unchanged compared to the result generated using the original weights. However, it is possible to observe a repositioning between alternatives in three cases:

I. The increase in the weight value of criterion C3 (followers' number) resulted in the exchange between the alternatives A1 and A5 positions in the ranking, which was previously positioned in fourth and fifth places, respectively. So, there was also an inversion in alternatives A6 and A3 positions, which were previously set in the first and second places, respectively.

II. The reduction in the weight value of criterion C3 (followers' number) resulted in an exchange between the positions of alternatives A4 and A1 in the ranking, which were previously positioned as third and fourth positions, respectively.

III. The criterion C4 weight value reduction resulted in the exchange between the alternatives A1 and A5 positions in the ranking, previously positioned as fourth and fifth positions, respectively.

Increasing and reducing the criteria weight by 20% confirmed the result of the original model in 70% of the cases. In two cases, there was a change of position between two alternatives, and in one case, there was a change in the position of four alternatives. Finally, considering the sensitivity analysis, it is possible to conclude that A6 is stable enough as first place.

Thus, it is valid to point out that the criteria "number of followers" (C3) and "range" (C4), both related to the macro criterion "Degree of exposure", are the criteria that most influenced the result of the method when their weights were changed. Therefore, they are the most critical criteria of the model. It is related to the high weight given by decision-makers to these criteria. Criterion C3 weights 28.57%, and criterion C4 weights 22.86%.

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Therefore, if the stability of the model is to be improved, decision-makers should consider distributing the weights more equally among the criteria, since criterion C3 has a weight 2.5 (two points five) times higher than the criterion with the lowest weight in the model (C5, whose weight is 11.43%).

We also performed sensitivity analysis regarding the composition of the portfolio. As a result, it was verified that the portfolio did not change in any of the scenarios studied, thus proving and corroborating the method's stability.

3.5 Analysis of results and influencer selection

The result proposed by the PROMETHEE V method presents a portfolio suggestion, considering decision-makers value judgments and the available potential alternatives. Thus, multicriteria methods do not define which alternatives to choose, presenting only one result decision-makers should analyze. Therefore, based on the results of the method and other sources of information deemed relevant, decision-makers were invited to analyze the results obtained through the multicriteria method adopted to decide which is the best choice considering the strategic scope of the company. As a result, decision-makers agreed with the indication presented by the approach, highlighting that the proposed approach offers a structured method able to support decision-making problems related to digital influencer choice. Considering that this case study involved a group of decision-makers, a key aspect is related to group consensus reach on the parameters used by the model.

The result of the method indicated hiring a professional who currently has a partnership with the company, confirming the previous choice of the marketing department. The results also generated a list (ranking) of digital influencers, facilitating the future choice for specific marketing actions planned.

Furthermore, although the case study involves a group decision-making approach with input aggregation, the company's decision-makers needed to reach a consensus on the model's parameters, the possibility of aggregation at the output. If the consensus attempt is not successful, an adaptation can be carried out by applying the PROMETHEE GDSS method. In this way, decision-makers can carry out their assessment independently, even using different criteria, and, subsequently, the results are aggregated.

The PROMETHEE method also allows the consideration of a non-compensatory logic in decision making. This prevents, for example, a digital influencer who has a much larger number of followers but performs poorly on the other criteria from being automatically chosen. Furthermore, the use of preference functions and their thresholds can facilitate the evaluation performed by decision-makers by incorporating aspects of uncertainty in the process. In addition, the freedom to define weights can bring more flexibility to the decision-making process. Finally, regarding the portfolio composition, the PROMETHEE V method provides much freedom for decision-makers in adapting the method to the

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reality of each organization. In this way, the proposed model can support this decision-making process, making it less subjective but, at the same time, bringing the possibility of clearly explaining why a particular choice was made.

It is important to remark that the approach can be adapted to other companies, considering changes in the criteria/weights or filters for choosing the influencers that will be considered as decision alternatives.

4 Conclusion

The choice of a digital influencer is a strategic element for attracting customers to companies, which justifies the need for a structured selection process able to represent the values that the company wishes to associate with its brand and in line with the objectives proposed in the advertising campaign. An error in the choice of this professional may compromise the company's image.

The objective of this research was to structure a participatory approach to support the decision-making process of selecting digital influencers. However, this type of problem is still treated empirically by companies. Thus, the approach developed aims to fulfill this gap based on multicriteria decision support methods. The approach developed was validated for a tourism company case study. The critical problem was choosing a digital blogger and influencer using the criteria set by the company's decision-makers.

We want to point out that the method presented is a generic model that can be adapted for application in different countries and business sectors facing this decision-making problem since the appropriate criteria and weights have been selected, as proposed in the methodology section.

It should be noted that the parameters set for aggregation of performances using the PROMETHEE V method can be used for aggregation using the PROMSORT method for classification of digital influencers, e.g., of relevant or non-relevant influencers. However, threshold profiles must be set for this case.

Finally, this research contributes by developing work for scarce literature in digital influence and its integration with the marketing sector of organizations, offering new perspectives for the choice of opinion leaders for partnerships with companies. The developed approach is helpful for companies carrying out actions with digital influencers, presenting a systematized method for choosing one or more digital influencing partners.

One of the challenges when applying the developed approach is related to the potential alternatives filtering phase, given a large number of bloggers and digital influencers in the region of interest of the study, making the selection and filtering of potential alternatives an arduous task.

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Another difficulty observed in the research was the impossibility of identifying influencers' accounts whose results are generated by "bots", robots that create false accounts and circumvent the system. Thus, profiles that pay for this service may have more followers and interactions in their posts. Accounts with numbers generated by "bots" do not produce accurate results for the company, being necessary to develop a method to identify such practices. It is only possible to estimate through an analysis of the influencer's profile.

We suggest that future research consider the inclusion of tools such as artificial intelligence and data mining to the model presented in this paper to support the company with knowledge about its environment and determine the appropriate influencer for each organization's marketing campaign.

Finally, as a suggestion for future work, we conclude the need to develop a method to apply as a filter in selecting potential alternatives to prevent the selection of alternatives that use results generated by "bots" in their profiles. The suggested research may also be conducted in an interdisciplinary way with academics in information technology to ascertain if there is a computational method for identifying profiles that use "bots" to leverage their numbers.

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