



The 8th Information Technology and Quantitative Management
(ITQM 2020 & 2021)

Strategy study to prioritize marketing criteria: an approach in the light of the DEMATEL method

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Abstract

In a company, the marketing department is responsible for finding opportunities to spread the brand. Thus, it is essential to have effective communications and provide unique experiences to consumers. The objective is to attract more customers while retaining them to promote products or services and understand their needs for offering them what they are seeking. For all these, it is necessary to plan a good marketing strategy to reach the expected audience. This article aims to observe some of the main criteria for defining tactics in the area and explore the interrelationships between them through the Decision Making Trial and Evaluation Laboratory (DEMATEL) method. This Multiple Criteria Decision Making (MCDM) model shows the influences exerted by the chosen components and their causal relationships, providing the understanding of a scenario in which the prioritization of some factors is fundamental for future actions. In this way, this study focuses on reviewing the literature, showing data about publications on this topic, and applying the method. It concludes that market trends have a considerable influence on relevant business criteria - target audience, products/services, competitors, investments; and that all these elements cause a significant impact on the system.

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Peer-review under responsibility of the scientific committee of the The 8th International Conference on Information Technology and Quantitative Management (ITQM 2020 & 2021)

Keywords: Multiple Criteria Decision Making (MCDM); Marketing; DEMATEL.

1. Introduction

Marketing enables interaction between companies and customers by delivering a valuable product or service that satisfies consumers' needs, creating a profitable relationship for both sides. So, it is necessary to understand the business scenario and the target audience to prepare effective communications [1, 2].

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Besides promoting products/services, a good marketing strategy stimulates customers' curiosity, makes them interested, retains them, and makes them great advertisers, adding more value to the brand. The opposite can disqualify the business with unfavorable opinions and experiences, causing disinterest and loss of customers, which affects the development [3, 4].

Therefore, it is essential to structure the system to create the best opportunities and ensure successful marketing actions. To this end, Multiple-Criteria Decision-Making (MCDM) models can assist in understanding the context, seeking better perceptions of the relationship between elements in a given situation. The Decision Making Trial and Evaluation Laboratory (DEMATEL) method analyzes the cause-and-effect relationships between defined criteria, observing the influence of one component on another through pairwise comparisons [5].

In this way, this article aims to make a literature review on the topics in focus and propose an approach in the light of the DEMATEL method to understand the relationships between relevant criteria related to the definition of marketing strategies.

2. Literature review

To analyze the publications related to the main themes of this study, searches were carried out on the Scopus database in December 2020, without any filter of publishing date or document type. The Webibliomining model, proposed by [6], was considered to support this analysis. At the first moment, the technique was used to find documents that had some applications of MCDM methods in marketing, with the following search: TITLE-ABS-KEY ("marketing" AND ("MCDM" OR "multicriteria")). It found 283 documents, as in Table 1.

Table 1. Results of the research on Scopus database.

Document type	Number of documents (%)
Article	206 (72.8%)
Conference Paper	62 (21.9%)
Book Chapter	6 (2.1%)
Review	6 (2.1%)
Conference Review	2 (0.7%)
Book	1 (0.4%)
Total	283 (100%)

At the second moment, another search was done to refine the previous results and find specific works using the DEMATEL method, as it follows: TITLE-ABS-KEY ("marketing" AND ("MCDM" OR "multicriteria") AND "DEMATEL"). These outcomes developed the bibliometric study, which is relevant to portray the scientific scenario, according to [7]. The VOSViewer software helped with the creation of maps that enabled the analysis and exploitation of the cluster of authors and keywords [8]. The research resulted in 36 documents (Table 2). It was possible to see the distribution of publications per year (Figure 1), which started in 2010 with 3 documents and in 2012 achieved the maximum quantity of 7. Then, the maximum published on the Scopus database was 5 documents.

Table 2. Documents by type.

Document type	Number of documents (%)
Article	25 (69.4%)
Conference Paper	10 (27.8%)
Book	1 (2.8%)
Total	36 (100%)

Figure 2 demonstrated the number of documents by the 5 authors with more records in decreasing order. It was possible to notice that Tzeng, G. H. is in 16 of the 36 documents found, which represented an author with great importance on the publications of the themes described above.

Then, the VOSViewer software provided the authors' relationship network to visualize more clearly the existing clusters and in which they were inserted (Figure 3). The relevance per year was also observed to help find

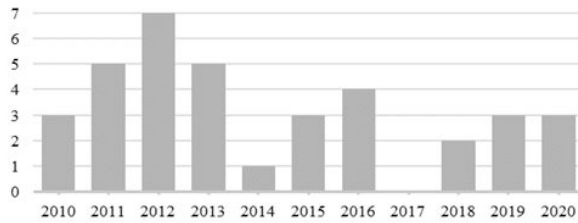


Fig. 1. Distribution of records by year of publication.

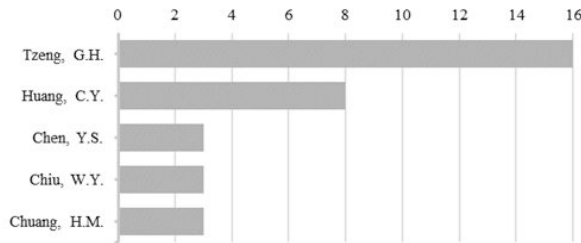


Fig. 2. Documents by author.

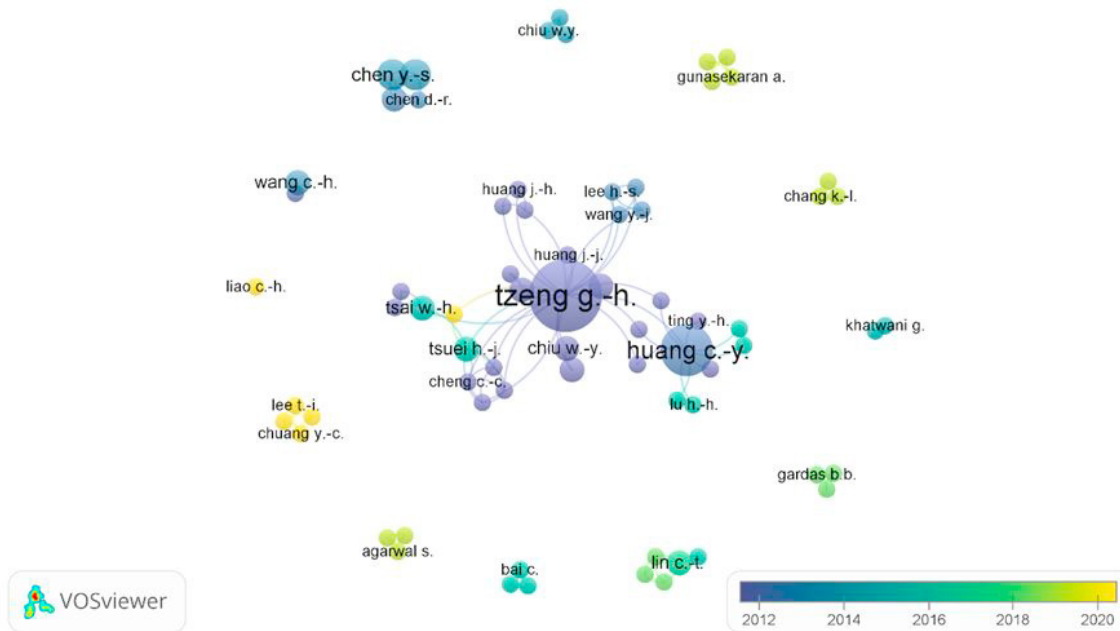


Fig. 3. Author's relationship network.

recent works by these authors. It was detected 20 clusters, and not all of them were connected. The most powerful was the one in the middle with 24 links and total link strength of 32.

In the following step, the perception of the keywords and their relations with 4 clusters that represented the major themes is shown (Figure 4). The picture indicated the association of the DEMATEL method with other methods established in the literature - the Analytic Network Process (ANP), Fuzzy, and VIKOR. Also, the method was applied in the analysis of some subjects as commerce, sales, marketing strategy, strategic planning, and competition, which provided a good theoretical basis. Also, cluster “decision-making” and “marketing” revealed

interesting topics, such as sustainable development, internet, and behavioral research.

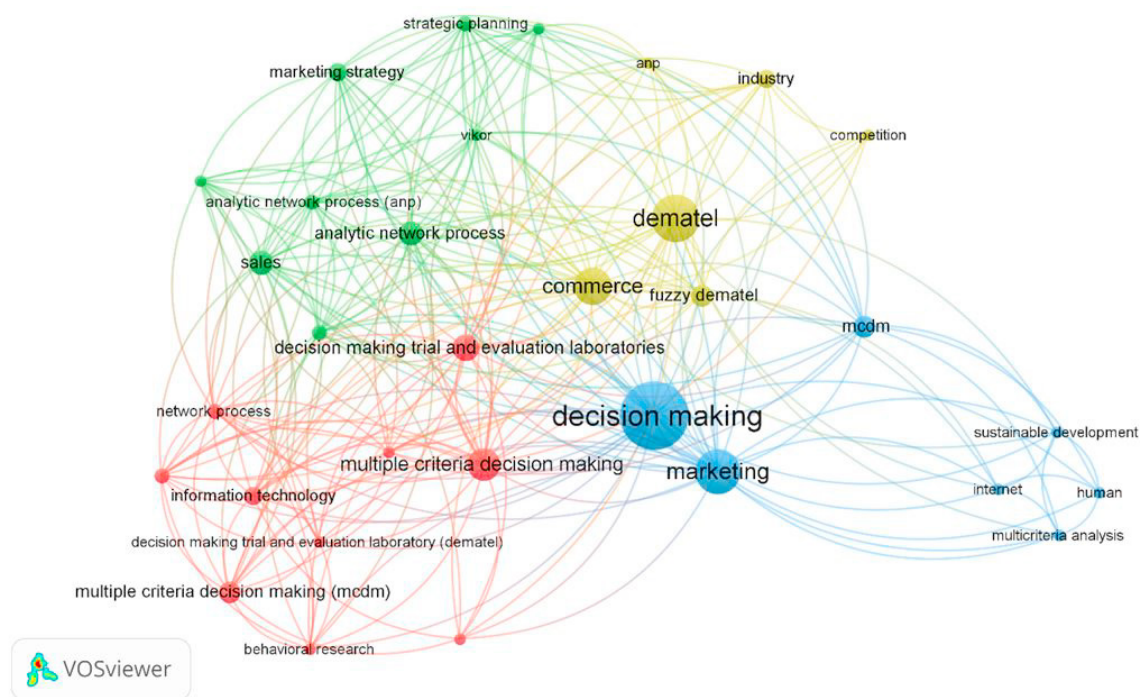


Fig. 4. Keywords.

In this way, this bibliometric study supported the understanding of the literature status on the themes developed. It consolidated important documents that helped in the writing of this scientific paper, referencing many relevant authors and exploring recent publications.

3. DEMATEL method

The decision-making process generally involves a choice between several alternatives, for [9]. To achieve the objective feasible alternatives are selected for evaluation, and they are compared according to criteria, under the influence of attributes [10]. The MCDM methods are very useful to support the decision-making process. They consider value judgments to evaluate alternatives to solve real problems, and not only technical issues, presenting a highly multidisciplinary [11]. These methods are employed to support the decision-making process in several recent complex problems, as presented in [12–17].

The Decision Making Trial and Evaluation Laboratory (DEMATEL) method was developed by Andre Gabus and Emilio Fontela in 1972 [18]. The objective was to help find better solutions for the world and its widespread problems. The study began by focusing on three research areas: the structure of the world problem; the development of an appropriate method for the analysis of complex world problems; and a review of existing studies and data [19]. The main idea was to build a structural model to represent the cause-and-effect relations between elements and their influence in the system using a scale to score the components through pairwise comparisons. The table and graphic outputs of the method were designed to make clearer the complex relationships in a process [20].

The model comprises some steps that lead to the resolution and final understanding. The first one is to generate the direct relation matrix (X), in which the effect of the element in each row is exerted on the element of each column (Figure 5). For the evaluation between components, a scale from 0 to 4 points is used to assign the grades, where each point is associated with a verbal score (Table 3). If more than one expert is evaluating, the matrix X will be the arithmetic average between the opinions, and it is applied in this study. It is important to realize that the comparison of a criterion with itself gets a score of zero since there is no influence [21].

$$X = \begin{bmatrix} 0 & \dots & x_{n1} \\ \vdots & \ddots & \vdots \\ x_{1n} & \dots & 0 \end{bmatrix}$$

Fig. 5. Direct Relation Matrix (X) - Example.

Table 3. Scale.

Scale	Verbal score
0	No influence
1	Low Influence
2	Medium Influence
3	High Influence
4	Very High Influence

Then, the normalized direct relation matrix (N) is defined. The sum of each row of the matrix is calculated, and each component is divided by k. It represents the highest number among the values of the sum obtained before [22].

An identity matrix (I) is generated first and then, the normalized matrix (N) is subtracted from it. This resulting matrix is inverted, and the normalized matrix is multiplied by it, obtaining the total relation matrix (T) (1).

$$T = N * (I - N)^{-1} \tag{1}$$

The threshold value is obtained by calculating the average of the matrix T values. The elements take zero when their values are less than the threshold, and the others are kept, which represent the most significant relationships.

Next is the sum of rows (D) and columns (R). The D means the total impact that each element has in the set of the components observed. The R represents the total impact received by each element. Then, the values of (D + R) and (D - R) are calculated, and the results are interpreted.

4. Proposed solution

Considering that several factors could influence the decision-making of a good marketing strategy, two marketing experts defined the criteria to be on analysis. The criteria were chosen due to their importance in a scenario where the selection of the target audience had to be accurated depending on the product or service to be offered by a company, its trends, competitors, and the investment required to achieve the objective (Table 4).

Table 4. Criteria.

Criteria
Target Audience
Product/Service
Trends
Competitors
Investments

The “Target Audience” represented people to whom a marketing action was directed. The “Product/Service” represented what was being offered, since this directly interferes with the type of communication to the client. “Trends” represented new consumption habits. The “Competitors”, companies with the same activity. “Investments” represented the application of funds in some action to obtain an expected return. The experts’ opinions were taken, and the direct relation matrix (X) was estimated (Table 5).

Table 5. Direct Relation Matrix.

Criteria	Target Audience	Product/Service	Trends	Competitors	Investments
Target Audience	0	3.5	3	2	3
Product/Service	3	0	2	4	3
Trends	3.5	4	0	2	3.5
Competitors	3	3.5	1	0	1.5
Investments	2.5	2	1.5	3	0

After calculating the normalized matrix, the total relation matrix (T) was obtained (Table 6). The threshold value was equal to 0.999, and it was possible to notice that all the causal relation between “Investments” and other criteria are less than it, what represented meaningless relationships, as it also happened with other comparisons.

Table 6. Total Relation Matrix.

Criteria	Target Audience	Product/Service	Trends	Competitors	Investments
Target Audience	0.986	1.262	0.864	1.082	1.107
Product/Service	1.179	1.056	0.807	1.192	1.101
Trends	1.302	1.396	0.748	1.183	1.23
Competitors	0.985	1.064	0.624	0.77	0.845
Investments	0.941	0.966	0.636	0.936	0.719

Then, with the sum of rows (D) and columns (R), it came to the final output (Table 7). The values of (D + R) expressed the impact of each criterion on the system, in which the higher, the more impact it caused; and the values of (D – R) represented the influencing criteria (with a positive degree) and those influenced (with a negative degree).

Table 7. Final output.

Criteria	D	R	D+R	D-R
Target Audience	5.302	5.393	10.695	-0.091
Product/Service	5.336	5.744	11.08	-0.408
Trends	5.859	3.68	9.539	2.18
Competitors	4.288	5.164	9.451	-0.876
Investments	4.198	5.003	9.201	-0.804

The final output shown above enabled the modeling of the cause-effect diagram to represent, in a more visual way, the interrelationships between the elements (Figure 6).

After all these steps, it was possible to interpret the results and analyze relations between the elements within the approached scenario, checking the reasons that base these outputs to support decision-making.

5. Discussion of the results

Considering the previous results, it was possible to understand that in terms of the degree of importance, related to D + R, all the criteria got relatively close scores, but “Product/Service” was ranked in the first place, with a degree of 11.08, and “Target Audience” was in the second place, with 10.695. It showed that each one of them impacts the system. Therefore, these elements cannot be discarded when there is a decision on the tactic to put in place to reach potential customers. Within the same company could have specific sectors of activity. So, products or services to be offered have to supply the needs of each group of consumers.

In terms of the degree of a factor’s influence, related to D – R, the criterion “Trends” was considered to be a causal variable - it influenced all other criteria. “Target Audience”, “Product/Service”, “Competitors”, and

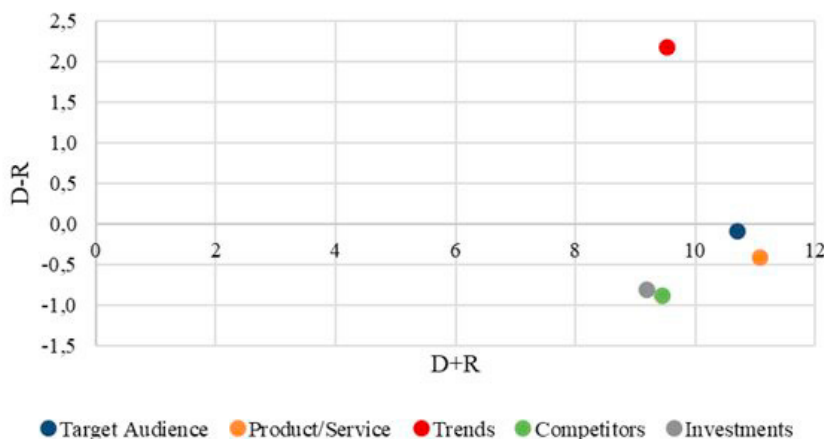


Fig. 6. Cause-effect diagram.

“Investments” were regarded as an effect - they were influenced by others. It means that, in this context, every change in “Trends” will affect the decision about other elements.

6. Conclusion

This article aimed to understand the interrelationships between the marketing criteria “Target Audience”, “Product/Service”, “Trends”, “Competitors”, and “Investment” using the Decision Making Trial and Evaluation Laboratory (DEMATEL) method. It was possible to notice that all these elements impacted the scenario, having “Product/Service” as the first ranked criterion and “Trends” the only component considered to influence the others, so it achieved the goal.

This paper helps in the decision-making of marketing actions. It provides a theoretical material and a practical example of how to apply a model to understand deeply the elements and their causal relations. When deciding about a group, criteria, or elements, it is important to know if they are really necessary and if they add positively to the system.

As a suggestion for future works, some existent marketing actions can be chosen. So, it can be possible to notice if they have relations between them, showing the most important ones and/or the others that are not so relevant. It can indicate an application of the DEMATEL method in a real scenario of decision-making.

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