

## Tenth International Conference on Information Technology and Quantitative Management (ITQM 2023)

### Application of Prospective Scenarios in Tourism Company

Pedro Soares Souza <sup>a\*</sup>, Hudson Hubner <sup>a</sup>, Carlos Francisco Simões <sup>a</sup>,  
Marcos dos Santos <sup>b</sup>, Adilson Vilarinho Terra <sup>a</sup>, Miguel Ângelo Lellis Moreira <sup>a</sup>,  
Claudio de Souza Rocha Junior <sup>a</sup>, Victória da Silva Braga <sup>a</sup>,

<sup>a</sup> Fluminense Federal University, Niterói, RJ 24210-240, Brazil

<sup>b</sup> Military Institute of Engineering, Urca, RJ 22290-270, Brazil

---

#### Abstract

The Covid-19 pandemic has spread around the world rapidly, generating economic shocks with a pace and intensity above those seen in previous crises. Faced with this pandemic scenario, several sectors of the economy such as tourism, health, and transport have been seriously affected. The present study deals with the tourism sector, which has been seriously affected by various restrictions on passenger transport, the end of the free movement of people between countries, and the insecurity of travelers. The Momentum method was used to prospect scenarios in a company in the tourism sector so that the results help it in the challenge of effectively dealing with the uncertainties about the coming years. From the data collected, three possible future scenarios were created, which can support the development of action plans and help the company's decision-makers to prepare for the worst-case scenario and maximize the use of the best of the structured scenarios.

© 2023 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0>)

Peer-review under responsibility of the scientific committee of the Tenth International Conference on Information Technology and Quantitative Management

Keywords: Scenarios, Prospecting, Tourism.

---

#### 1. Introduction

The pandemic of the novel coronavirus, which is characterized by a severe acute respiratory syndrome with major transmission happening through the air, had its outbreak in December 2019 in the city of Wuhan, Hubei province, China, and quickly spread around the world [1]. To contain its spread, governments have adopted a series of measures, such as the closure of shops, telework, and especially social distancing, which has had a great impact on the tourism area [2–4]. In his study, Roubini [5] concludes that the ravages of the 2008 crisis accumulated in 3 years are close to that seen in 3 weeks during the pandemic of the novel coronavirus.

---

\* Corresponding author.

E-mail address: [pedrosoaressouza@id.uff.br](mailto:pedrosoaressouza@id.uff.br)

Faced with this pandemic scenario, several sectors of the economy such as tourism, health and transport have been seriously affected. The present study is focused on the tourism sector which has been seriously affected by several restrictions on passenger transport.

Thus, the present study takes advantage of the Momentum method for prospecting scenarios of a company in the tourism sector in an attempt to enable the creation of a specific action plan for each scenario formulated and thus provide an effective confrontation against the uncertainties about the coming years.[6]

The present work presents the following structure: in Section 2, a theoretical framework is presented based on the literature review on Prospective Scenarios and more specifically the Momentum Method. Section 3 presents the steps of the research methodology. Section 4 presents the case study and the application of the Momentum method for the creation of three possible scenarios. Finally, Section 5 presents the conclusions obtained through the application of the method and the results achieved.

## 2. Prospective Scenarios

Almeida [7] defines scenarios as a means of discussing and learning about the main decisions and priorities of an organization.

For Schoemaker [8] scenario planning tries to compensate for two errors in decision-making: unpredictability and overprediction of changes. Scenarios should describe generically different futures rather than variations on a theme [9]. Almeida [10] suggests that scenarios are important means for understanding and searching for new trends, in addition to recommending the use of alternative scenarios as a form of sensitivity analysis. Jardim [11] explains that the application of scenario methodology makes it possible to generate possible futures, providing a forward view for decisions in various areas, such as investments, competitive intelligence, new products, markets, etc. Drumond [12] states that there is no single method for the development of scenarios, but a multitude of methods that enable their construction, some simpler and others more elaborate [13]. Drumond [14] state that there is a consensus that the method should be applied only in an approach that contains the following steps: systems analysis, retrospective analysis, actors' strategies, and scenario development. Ahmadi, Kahnali, Biabani, and Baneshi [15] used Scenarios to identify the main factors affecting the tourism industry in a province of Iran [16].

### 2.2 Momentum Method

According to Costa [17], there are several methodologies to support the construction of scenarios and their integration into the strategic decision-making of companies that can be identified in the literature. Each methodology has different characteristics and approaches, so it is of interest that the best practices of each methodology are unified into one [18–20].

The Momentum method - a Unified Method of Prospective Strategic Planning - proposed by Gomes and Costa [21], is a model that seeks to associate the various techniques of scenario planning, inserting the vision of prospective scenarios in the methods of multicriteria decision aid [22, 23]. According to Maêda [24], the moment method proposes a hybrid approach [25], seeking to unify the concepts presented in various methods of prospecting established scenarios present in the literature. The method approach is structured in thirteen steps:

1. Overview of the system;
2. Mapping of relevant actors;
3. Identification of variables;
4. SWOT analysis of the system;
5. Elicitation of uncertainties;
6. Selection of relevant variables;
7. Definition of key indicators;
8. Design of prospective scenarios;
9. Definition of criteria;
10. Survey of alternatives;
11. Define the importance (weight) of each criterion in all scenarios;
12. Evaluate the alternatives from the point of view of each criterion. This should be done for all criteria and all scenarios;
13. Application of the algorithm on the collected data.[26]

Momentum has already had its application in several areas. For example in the area of Corporate Social Responsibility, by Vieira, Gomes, and Braga [27], in Navy Warship selection [28] and among several other areas.

### 3. Methodology

This work can be classified as being of an applied nature because it seeks to generate new knowledge through the practical application of the Momentum method. As for the research procedure, the work is characterized by a case study, using multiple data sources and having as the unit of analysis the tourism company CVC S.A., focusing on scenario planning [17].

After the definition of the research theme, a theoretical foundation was carried out, focused on studies of prospective scenarios, in particular, the Momentum method. For the execution of this method, the first nine steps of the fourteen already described in Section 2 of the Literature Review were followed [29].

Given this understanding, some possible uncertainties affecting the system were evaluated. Within these uncertainties, some variables were covered for a correlation study of their impacts between themselves and their dependencies. Indicators were associated to measure these variables, as well as the survey of the history of these indicators. After these analyses, three possible scenarios were created, for which the variables could change in the future.

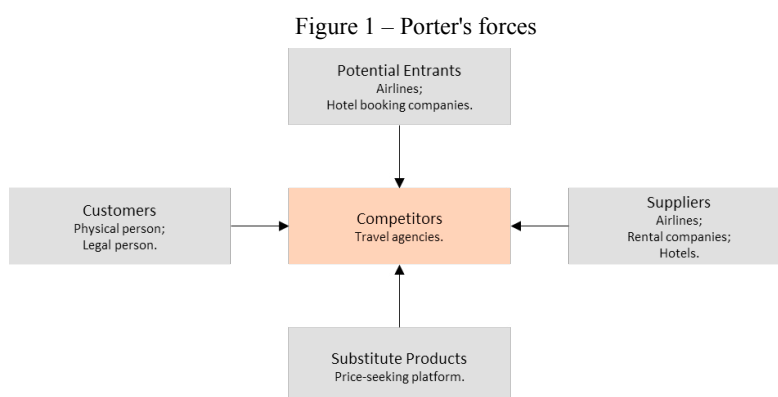
### 4. Case Study

CVC Brasil Operadora e Agência de Viagens S.A. is the largest Brazilian tourist travel company. Among the main actions of the company is the sale of travel packages to different audiences and national and international destinations. The company operates in several Brazilian states and, in Latin America, is classified as the largest travel agency. CVC works with a focus on making tourism accessible to all people and thus offers services and services with fair prices and special payment terms.

In addition to area passages, the Company also offers sea passages to national and international destinations. The main services that the CVC franchise offers to the public include: Airline tickets; Accommodation in hotels and resorts; Car rental; Travel packages; Tickets / Travel voucher (gift card); Cruises.

The company has more than 1,400 franchises spread throughout Brazil, being one of the largest franchisors in the country. The services offered by CVC include more than a thousand national and international destinations, where the company provides support to customers from the moment of purchase of the packages until the course of the trips.

For system analysis, the methodology of Porter's 5 Forces, described in Figure 1, was used as an aid.



As far as competition is concerned, other companies work as travel agencies offering services similar to CVC.

The main target audience, that is, customers, can be divided into individuals and companies that close travel packages or even partnerships for events, for example.

The main suppliers of the system, are the companies that will offer tourism services contracted by customers through CVC, so we have hotels, inns, car rental companies, etc. Other alternative means, which can be understood as substitute products, are the price search platforms that search for prices of airline tickets, lodging, and car rental, among others, so that the traveler books all on his own instead of resorting to travel agencies for this service [30].

According to Costa [31], relevant actors can be defined as organizations or entities that can significantly influence a given system or field of action. Social classes, government, and political institutions are some examples.

The three most influential variables were identified in the Brazilian and international tourism scenario due to the effects of the novel coronavirus pandemic[32]: Combating the Covid-19 Pandemic - Percentage of the Brazilian population vaccinated; Travel Packages - Numbers of travel packages contracted; Federal Development - Revenue for the Ministry of Tourism.

Through the use of a SWOT matrix, it was possible to explore the enterprise, raising its strengths, weaknesses, opportunities, and threats to the project [33]. The analysis is described in Figure 2.

Figure 2 – SWOT Matrix

Forces	Weaknesses
<ul style="list-style-type: none"> <li>- Credibility of the company;</li> <li>- 24-hour consumer support;</li> <li>- Presence of stores in important points commercial;</li> <li>- Offering various forms of payment and installment;</li> <li>- Customer loyalty;</li> <li>- Sales of additional products to customers;</li> <li>- Partnerships with events.</li> </ul>	<ul style="list-style-type: none"> <li>- High cost of operation by physical stores;</li> <li>- There are few offices in countries distinct;</li> <li>- Price of products and services not so competitive.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>- Possible government incentives to encourage post-pandemic tourism;</li> <li>- Advanced vaccination in Brazil.</li> </ul>	<ul style="list-style-type: none"> <li>- Possible decrease in the purchase of packages travel in the coming years;</li> <li>- Platforms that assist travel bookings by own account;</li> <li>- New variants prolonging the pandemic;</li> <li>- New pandemic;</li> <li>- New competitors;</li> <li>- Cyber attacks;</li> <li>- Low economic performance of the country.</li> </ul>

Considering the current scenario, characterized by a sense of recovery of the global economy and good progress in vaccination in Brazil, it is expected that there will be a resumption of tourism along with the opening of the borders of the countries to Brazilian travelers.[34] Thus, the following uncertainties were identified: I1: Progression of vaccination against Covid-19 in the Brazilian population; I2: Stabilization of vaccination against Covid-19 in the Brazilian population; I3: Stagnation of vaccination against Covid-19 in the Brazilian population; I4: Growth in the number of packages contracted; I5: Stabilization of the number of contracted packages; I6: Decrease in the number of contracted packages; I7: Growth of federal investments; I8: Stabilization of federal investments; I9: Decrease in federal investments.[35]

Eight variables were identified: V1 - Rate of fully vaccinated Brazilians; V2 - Contracted travel packages; V3 - Annual net revenue; V4 - Annual revenue of the Ministry of Tourism; V5 - Rate of change of Gross Domestic Product (GDP); V6 - Dollar exchange rate; V7 - Unemployment rate; V8 - Weekly moving average of COVID-19 deaths.

After identifying the variables, the matrix of crossed impacts was structured. The comparison was made in pairs and the scale presented in Table 2 was used. This evaluation allows us to observe the impact and the dependency relationship that one variable has on the other, identifying at the end, the most relevant ones in the system as structured in Table 1.

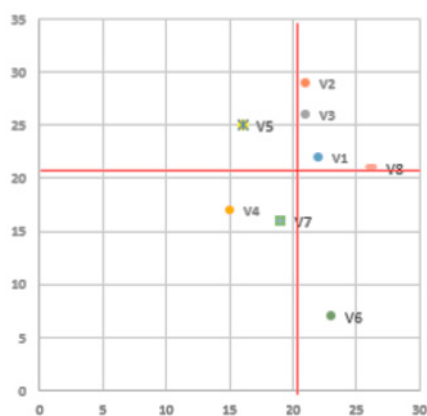
Table 1 – Cross-impact matrix

	V1	V2	V3	V4	V5	V6	V7	V8	Total
V1		5	5	2	3	0	2	5	22
V2	5		5	2	3	2	2	2	21
V3	4	5		3	3	1	2	3	21
V4	3	3	2		2	0	3	2	15
V5	1	4	2	2		3	2	2	16
V6	2	4	4	3	5		3	2	23
V7	2	3	3	1	5	0		5	19
V8	5	5	5	4	4	1	2		26
Total	22	29	26	17	25	7	16	21	

Table 1 presents the pairwise scores of the variables studied in the article. Thus, it was possible to analyze how much each variable impacts the modeled system and how much it is impacted by the set of other variables. The sum of the values of the columns establishes the impact and the sum of the rows, the dependency. The greater the degree of impact of a variable, the more it will affect the probabilities of occurrence or not of the others. And the higher its degree of dependence, the more its probability of occurrence will be influenced by others[36].

After the evaluation by the Cross Impact Matrix, the results were plotted in the Cartesian graph presented in Figure 3.

Figure 3 - Graph with the relationships between the variables



After plotting the points, the lines that correspond to the mean of the maximum and minimum scores obtained were drawn, distributing the variables in four quadrants: Upper right quadrant: variables with greater impact and greater dependence; Lower right quadrant: variables with high dependence, but low impact; Upper left quadrant: variables with high impact but low dependence; Lower left quadrant: variables with low impact and low dependence, therefore, have little relevance.

The variables V1, V2, V3, and V8 together present the greatest impacts and dependencies observed, being selected to compose the basis for the analysis of the three scenarios for CVC.

From the analysis of the variables, their impacts, dependency relationships, and the political and economic context of the company, the morphological analysis technique was used to characterize three possible scenarios for the tourism company CVC S.A. In this stage, the historical data, contained in Table 2, of the last five years of each of the selected variables were considered, except for vaccination and the moving average of deaths, which had a horizon of 2 years.

Table 2 – History of variables

	Rate of the fully vaccinated population	Confirmed reservations (R\$ million)	Annual net revenue (R\$ million)	Moving average of COVID-19 deaths
Minimum value	0%	6,3	209,2	0
Average value	21,6%	10,8	379,84	832,55
Maximum value	51,2%	15,4	517,4	3.119

Considering that the study was conducted using 3 scenarios "To Infinity and Beyond" (Optimistic), "Cruise Flight" (Trend), and "Stranded Ship" (Pessimistic), the information collected in Table 4 was allocated in each of the 3 scenarios:

The "Stranded Ship" scenario is characterized by the maintenance of critical indices affected by the pandemic, with the moving average of Covid-19 deaths remaining above 3,119, a stagnant vaccinated population rate below 51.2%, and an economic scenario pressuring annual net revenue below R\$ 379,840,000.00 and confirmed reserves below R\$ 10,800,000.00. This scenario would make it difficult for the company to resume billing, as travel restrictions and social distancing would likely cause customers to cancel or postpone their travel plans.

The "Cruise Flight" scenario shows an improvement in Covid-19 death rates in Brazil, with the moving average ranging from zero to 3,119 deaths. In addition to the vaccination rate reaching more than 51.2% of the population, together with values of confirmed reserves ranging between R \$ 10,800,000.00 and R \$ 15,400,000.00. Company with a result of Annual Net Revenue of the company ranging between R \$ 379,840,000.00 and R \$ 517,400,000.00. In this trend scenario, it is possible to highlight that the Tourism sector will recover slowly and gradually, causing customers to confirm their reservations and the demand for cruises and national and international travel to grow, since more travel destinations would be more viable and the possible fear caused by the pandemic would be less thus enabling more business for the company.

The optimistic scenario, "To Infinity and Beyond," is characterized by a death rate equal to zero from Covid-19 and with more than 51.2% of the population vaccinated. In the financial aspect, CVC would reach more than R\$ 517,400,000.00 in annual net revenue and R\$ 15,400,000.00 in confirmed reserves. This scenario is characterized by the possible end of the pandemic and the emergence of any other type of variant. Therefore, any kind of social distancing would not be recommended, allowing customers to travel to any destination without any restrictions or fears of contamination by the virus. With this, it can be inferred that a possible pent-up demand would thus present itself generating more business and profits for the company. In addition to a possible improvement in the country's economy, causing the Government to invest more in promoting domestic and foreign tourism.

## 5. Final Discussions

From this study, it was possible to bring greater knowledge to the tourism company CVC S.A. about which are the variables that can most impact its business in a 5-year horizon, because the approach by the Momentum method allowed the structuring and analysis of the variables and uncertainties observed in the construction of the prospective scenarios of tourism and its business amid the socioeconomic instability experienced in the current period of the country and the world by the Covid-19 pandemic.

The study based on the data collected allowed the creation of three possible future scenarios, which can support the creation of action plans and help the company's decision-makers to prevent the worst-case scenario and maximize the use of the best scenario. The methodology applied here can be a proposal for strategic-prospective planning for this sector.

Finally, we can declare that the study fulfills its initial objective of using the available information about the company and the current context to apply the perspective in a large tourism company and opens the door to studies that predict the application of all the steps of the Momentum method. Thus, it is suggested to conduct further studies with the application of all the steps of Momentum combined with multicriteria methods.

## References

- McKibbin, W., Fernando, R.: The Global Macroeconomic Impacts of COVID-19: Seven Scenarios. *Asian Economic Papers*. 20, 1–30 (2021). [https://doi.org/10.1162/asep\\_a\\_00796](https://doi.org/10.1162/asep_a_00796)
- Kawashima, T., Nomura, S., Tanoue, Y., Yoneoka, D., Eguchi, A., Shi, S., Miyata, H.: The relationship between fever rate and telework implementation as a social distancing measure against the COVID-19 pandemic in Japan. *Public Health*. 192, 12–14 (2021)
- Moreira, M.Â.L., Gomes, C.F.S., dos Santos, M., do Carmo Silva, M., Araujo, J.V.G.A.: PROMETHEE-SAPEVO-M1 a Hybrid Modeling Proposal: Multicriteria Evaluation of Drones for Use in Naval Warfare. In: *Springer Proceedings in Mathematics & Statistics*. pp. 381–393. Springer, Cham (2020)
- Maêda, S.M. do N., Costa, I.P. de A., Castro Junior, M.A.P. de, Fávero, L.P., Costa, A.P. de A., Corriça, J.V. de P., Gomes, C.F.S., Santos, M. dos: Multi-criteria analysis applied to aircraft selection by Brazilian Navy. *Production*. 31, (2021). <https://doi.org/10.1590/0103-6513.20210011>
- Roubini, N.: Coronavirus pandemic has delivered the fastest, deepest economic shock in history. *The guardian*. 25, (2020)
- Costa, I.P. de A., Moreira, M.Â.L., Costa, A.P. de A., Teixeira, L.F.H. de S. de B., Gomes, C.F.S., Santos, M. Dos: Strategic Study for Managing the Portfolio of IT Courses Offered by a Corporate Training Company: An Approach in the Light of the ELECTRE-MOR Multicriteria Hybrid Method. *International Journal of Information Technology & Decision Making*. 1–29 (2021). <https://doi.org/10.1142/S0219622021500565>
- de Almeida, I.D.P., de Araújo Costa, I.P., de Araújo Costa, A.P., de Pina Corriça, J.V., Lellis Moreira, M.Â., Simões Gomes, C.F., dos Santos, M.: A multicriteria decision-making approach to classify military bases for the Brazilian Navy. *Procedia Computer Science*. 199, 79–86 (2022). <https://doi.org/10.1016/j.procs.2022.01.198>
- Schoemaker, P.J.H.: Scenario planning: a tool for strategic thinking. *Sloan management review*. 36, 25–50 (1995)
- Santos, M. dos, Costa, I.P. de A., Gomes, C.F.S.: MULTICRITERIA DECISION-MAKING IN THE SELECTION OF WARSHIPS: A NEW APPROACH TO THE AHP METHOD. *International Journal of the Analytic Hierarchy Process*. 13, (2021). <https://doi.org/10.13033/ijahp.v13i1.833>
- de Almeida, I.D.P., Corriça, J.V. de P., Costa, A.P. de A., Costa, I.P. de A., Maêda, S.M. do N., Gomes, C.F.S., dos Santos, M.: Study of the Location of a Second Fleet for the Brazilian Navy: Structuring and Mathematical Modeling Using SAPEVO-M and VIKOR Methods. In: *International Conference of Production Research–Americas*. pp. 113–124. Springer (2021)
- Jardim, R., dos Santos, M., Neto, E., Muradas, F.M., Santiago, B., Moreira, M.: Design of a framework of military defense system for governance of geoinformation. *Procedia Computer Science*. 199, 174–181 (2022). <https://doi.org/10.1016/j.procs.2022.01.022>
- Drumond, P., Basílio, M.P., Costa, I.P. de A., Pereira, D.A. de M., Gomes, C.F.S., dos Santos, M.: Multicriteria Analysis in Additive Manufacturing: An ELECTRE-MOR Based Approach. Presented at the October 29 (2021)
- Costa, I.P. de A., Costa, A.P. de A., Sanseverino, A.M., Gomes, C.F.S., Santos, M. dos: BIBLIOMETRIC STUDIES ON MULTICRITERIA DECISION ANALYSIS (MCDA) METHODS APPLIED IN MILITARY PROBLEMS. *Pesquisa Operacional*. 42, (2022). <https://doi.org/10.1590/0101-7438.2022.042.00249414>
- Drumond, P., de Araújo Costa, I.P., Lellis Moreira, M.Â., dos Santos, M., Simões Gomes, C.F., do Nascimento Maêda, S.M.: Strategy study to prioritize marketing criteria: an approach in the light of the DEMATEL method. *Procedia Computer Science*. 199, 448–455 (2022). <https://doi.org/10.1016/j.procs.2022.01.054>
- Ahmadi Kahnali, R., Biabani, H., Baneshi, E.: Scenarios for the future of tourism in Iran (case study: Hormozgan province). *Journal of Policy Research in Tourism, Leisure and Events*. 14, 183–199 (2022)
- Jardim, R.R.-A.J., Santos, M., Neto, E.C. de O., da Silva, E.D., de Barros, F.C.M.M.: Integration of the waterfall model with ISO/IEC/IEEE 29148:2018 for the development of military defense system. *IEEE Latin America Transactions*. 18, 2096–2103 (2020). <https://doi.org/10.1109/TLA.2020.9400437>
- Costa, I.P. de A., Basílio, M.P., Maêda, S.M. do N., Rodrigues, M.V.G., Moreira, M.Â.L., Gomes, C.F.S., dos Santos, M., Santos, M.: Bibliometric Studies on Multi-Criteria Decision Analysis (MCDA) Applied in Personnel Selection. *Frontiers in Artificial Intelligence and Applications*. 341, (2021). <https://doi.org/10.3233/faia210239>
- Nassim Mellem, P.M., de Araújo Costa, I.P., de Araújo Costa, A.P., Lellis Moreira, M.Â., Simões Gomes, C.F., dos Santos, M., de Pina Corriça, J.V.: Prospective scenarios applied in course portfolio management: An approach in light of the Momentum and ELECTRE-MOR methods. *Procedia Computer Science*. 199, 48–55 (2022). <https://doi.org/10.1016/j.procs.2022.01.007>
- Barbosa de Paula, N.O., de Araújo Costa, I.P., Drumond, P., Lellis Moreira, M.Â., Simões Gomes, C.F., dos Santos, M., do Nascimento Maêda, S.M.: Strategic support for the distribution of vaccines against Covid-19 to Brazilian remote areas: A multicriteria approach in the light of the ELECTRE-MOR method. *Procedia Computer Science*. 199, 40–47 (2022). <https://doi.org/10.1016/j.procs.2022.01.006>
- Bremm De Carvalho, E., Ângelo Lellis Moreira, M., Vilarinho Terra, A., Francisco Simões Gomes, C., dos Santos, M.: Proposal of Criteria for Selection of Oil Tank Maintenance Companies at Transpetro Through Multimethodological Approaches. Presented at the (2023)
- Oliveira, A.S., Gomes, C.F.S., Clarkson, C.T., Sanseverino, A.M., Barcelos, M.R.S., Costa, I.P.A., Santos, M.: Multiple Criteria Decision Making and Prospective Scenarios Model for Selection of Companies to Be Incubated. *Algorithms*. 14, 111 (2021). <https://doi.org/10.3390/a14040111>
- Pereira, R.C.A., da Silva Jr, O.S., de Mello Bandeira, R.A., Dos Santos, M., de Souza Rocha Jr, C., Castillo, C.D.S., Gomes, C.F.S., de Moura Pereira, D.A., Muradas, F.M.: Evaluation of smart sensors for subway electric motor escalators through AHP-Gaussian method. *Sensors*. 23, 4131 (2023)

23. de Assis, G.S., dos Santos, M., Basilio, M.P.: Use of the WASPAS Method to Select Suitable Helicopters for Aerial Activity Carried Out by the Military Police of the State of Rio de Janeiro. *Axioms*. 12, 77 (2023)
24. Maêda, S.M. do N., Basilio, M.P., Costa, I.P. de A., Moreira, M.Â.L., dos Santos, M., Gomes, C.F.S.: The SAPEVO-M-NC Method. *Frontiers in Artificial Intelligence and Applications*. 341, 89–95 (2021). <https://doi.org/10.3233/faia210235>
25. de Almeida, I.D.P., Hermogenes, L.R. dos S., Costa, I.P. de A., Moreira, M.Â.L., Gomes, C.F.S., dos Santos, M., Costa, D. de O., Gomes, I.J.A.: Assisting in the choice to fill a vacancy to compose the PROANTAR team: Applying VFT and the CRITIC-GRA-3N methodology. *Procedia Computer Science*. 214, 478–486 (2022). <https://doi.org/10.1016/j.procs.2022.11.202>
26. Tenorio, F.M., Santos, M. Dos, Gomes, C.F.S., Araujo, J.D.C., De Almeida, G.P.: THOR 2 Method: An Efficient Instrument in Situations Where There Is Uncertainty or Lack of Data. *IEEE Access*. 9, 161794–161805 (2021). <https://doi.org/10.1109/ACCESS.2021.3132864>
27. Vieira, J.A.M., Gomes, C.F.S., Braga, I.E.: Development of a scenario prospecting model with the use of multicriteria decision aiding: Importance of environmental variables. *Brazilian Journal of Operations & Production Management*. 14, 210–217 (2017)
28. Tenório, F.M., dos Santos, M., Gomes, C.F.S., Araujo, J. de C.: Navy Warship Selection and Multicriteria Analysis: The THOR Method Supporting Decision Making. In: *Springer Proceedings in Mathematics & Statistics*, vol 337. pp. 27–39. Springer, Cham (2020)
29. Santos, N., Rocha Junior, C. de S., Moreira, M.Â.L., Santos, M., Gomes, C.F.S., Costa, I.P. de A.: Strategy Analysis for project portfolio evaluation in a technology consulting company by the hybrid method THOR. *Procedia Computer Science*. 199, 134–141 (2022). <https://doi.org/10.1016/j.procs.2022.01.017>
30. Rocha Junior, C. de S., Lellis Moreira, M.Â., dos Santos, M.: Selection of interns for startups: an approach based on the AHP-TOPSIS-2N method and the 3DM computational platform. *Procedia Computer Science*. 199, 984–991 (2022). <https://doi.org/10.1016/j.procs.2022.01.124>
31. Costa, I.P. de A., Basilio, M.P., Maêda, S.M. do N., Rodrigues, M.V.G., Moreira, M.Â.L., Gomes, C.F.S., dos Santos, M.: Algorithm Selection for Machine Learning Classification: An Application of the MELCHIOR Multicriteria Method. *Frontiers in Artificial Intelligence and Applications*. 341, 154–161 (2021). <https://doi.org/10.3233/FAIA210243>
32. Maêda, S.M. do N., Basilio, M.P., Costa, I.P. de A., Moreira, M.Â.L., dos Santos, M., Gomes, C.F.S., de Almeida, I.D.P., Costa, A.P. de A.: Investments in Times of Pandemics: An Approach by the SAPEVO-M-NC Method. Presented at the October 29 (2021)
33. dos Santos, F.B., dos Santos, M.: Choice of armored vehicles on wheels for the Brazilian Marine Corps using PrOPPAGA. *Procedia Computer Science*. 199, 301–308 (2022). <https://doi.org/10.1016/j.procs.2022.01.037>
34. Maêda, S.M. do N., de Arajo Costa, I.P., Simões Gomes, C.F., dos Santos, M., da Mota, I.S., de Barros Teixeira, L.F.H. de S.: Economic and edaphoclimatic evaluation of Brazilian regions for African mahogany planting - an approach using the SAPEVO-M-NC ordinal method. *Procedia Computer Science*. 199, 323–330 (2022). <https://doi.org/10.1016/j.procs.2022.01.196>
35. Dos Santos, M., Quintal, R.S., Da Paixão, A.C., Gomes, C.F.S.: Simulation of operation of an integrated information for emergency pre-hospital care in rio de janeiro municipality. *Procedia Computer Science*. 55, 931–938 (2015). <https://doi.org/10.1016/j.procs.2015.07.111>
36. Moreira, M.Â.L., Gomes, C.F.S., Santos, M., Basilio, M.P., Costa, I.P. de A., Rocha Junior, C. de S., Jardim, R.R.-A.J.: Evaluation of drones for public security: a multicriteria approach by the PROMETHEE-SAPEVO-M1 systematic. *Procedia Computer Science*. 199, 125–133 (2022). <https://doi.org/10.1016/j.procs.2022.01.016>