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ARTICLES

ASSIGNING PRIORITIES FOR RAW MATERIAL OF A LARGE PET FOOD PRODUCER IN THE CONTEXT OF SUPPLY DISRUPTION

Rebeca Correa Lima Costa Carvalho[1*], Lucia Reis Peixoto Roselli[2] and José Rui Figueira[3]

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ABSTRACT. The COVID-19 pandemic has affected everyday life in societies around the world. One of the most severe consequences has been the social isolation imposed by this extremely contagious disease. In this context, many people began looking for a pet for the first time. In Brazil, for instance, the pet sector increased its financial returns in 2020. In addition, companies that produce pet foods have experienced problems with the supply of materials. Supply chain disruption is a problem faced by many different organizations during this time of crisis. This study, therefore, investigated the supply of raw materials stored in the silos and tanks of a large company. This company have operations in 80 countries across the world and produces different products, including pet food. Thirteen raw materials used to produce pet food were considered. In addition, eight criteria of the company's supply process were identified and explored. Moreover, the Flexible and Interactive Tradeoff (FITradeoff) method, which is a Multiple Criteria Decision Making/Aiding (MCDM/A) method, was applied to rank the raw materials based on supply difficulty. In terms of supply criticality, the order of materials was established from less critical to most critical. These results can be used by companies to better plan the receipt of these materials to reduce the risk of supply chain-related disruptions and propose better ways to distribute activities between planners to help them in their daily management.

Keywords: FITradeoff method, Multiple-Criteria Decision Making/Aiding (MCDM/A), pet food production, supply chain disruption, COVID-19.

1 INTRODUCTION

During the COVID-19 pandemic, social distancing had a major impact on people's mental health. According to research conducted by Ipsos with over 23,000 respondents from 28 countries, Brazil

*Corresponding author

[1]CDSID - Center for Decision Systems and Information Development, Universidade Federal de Pernambuco, Av. Acadêmico Hélio Ramos, s/n, Cidade Universitária, 50740-530 Recife, PE, Brazil – E-mail: rebecaclccarvalho@hotmail.com http://orcid.org/0000-0001-5137-2339

[2]CDSID - Center for Decision Systems and Information Development, Universidade Federal de Pernambuco, Av. Acadêmico Hélio Ramos, s/n, Cidade Universitária, 50740-530 Recife, PE, Brazil – E-mail: lrpr@cdsid.orgr http://orcid.org/0000-0001-6930-0552

[3]CEG-IST, Instituto Superior Técnico, Universidade de Lisboa, Lisboa, Portugal – E-mail: figueira@tecnico.ulisboa.pt http://orcid.org/0000-0001-9822-1167

had the worst performance: 50% of respondents said they experienced loneliness “often,” “usually,” or “always.” Related survey by Fiocruz (2020) showed that in Brazil and Spain, 47.3% of essential services workers also experienced symptoms of depression and anxiety during the pandemic. In this context, many people began looking for a pet for the first time. In Brazil, an NGO and a shelter, both located in São Paulo, reported a rise of 400% and 300%, respectively, in the search for dogs and cats (CNN 2020; Exame 2021). Moreover, people who already had pets increased their spending on pet-related products.

According to the Brazilian Association of Pets’ Products Industries (ABINPET, 2021), there are over 140 million such animals in the country, of which 55 million are dogs, and 25 million are cats. In addition, the Brazilian Pet Institute reported that the sector grew 13.5% between 2019 and 2020, reaching revenues above R$40 billion, even during a period of 4% GDP retraction. With this growth, Brazil became the second largest pet market in the world.

Despite the spike in demand in the pet industry, many companies, including suppliers, suffered from COVID-19-related impacts, which affected the supply chain in significant ways (Kovacs & Sigala 2020; Sodhi & Tang 2020). Several slaughterhouses, for example, which are largely responsible for the supply of animal proteins used to manufacture pet food, were closed due to the increase in cases of contamination by COVID-19 among employees.

Therefore, this paper investigates the raw material prioritization to provide recommendations to minimize the impacts and enable the continuity of operations of a large company in the pet food industry, based on a criticality analysis of raw materials stored in silos and tanks. In this study, thirteen raw materials were evaluated against eight criteria, some of them related to classical objectives of manufacturing strategies (Roselli & de Almeida, 2021). The FITradeoff method for ranking problematic (Frej et al., 2019) was applied. As a result, the order of raw materials based on supply difficulty was obtained.

This paper is organized as follows. Section 2 presents the background based on studies of supplier selection and problem prioritization associated with the COVID-19 pandemic. Section 3 presents the FITradeoff method. Section 4 describes the decision problem faced by a large pet food-producing company. Section 5 presents the application of the FITradeoff method to obtain the ranking of raw materials. Finally, Section 6 presents conclusions and directions for future studies.

2 LITERATURE REVIEW

The supplier selection problem is a well-known example of a MCDM/A problem (Belton & Stewart 2002; Figueira et al. 2005; de Almeida et al. 2015). Many studies have investigated suppliers’ selection problems, using different multi-criteria methods (Barla 2003; Xia & Wu 2007; Chai et al. 2013; Frej et al. 2017; Santos et al. 2020).

Specifically, the FITradeoff method has been used to solve supplier selection problems. In Frej et al. (2017), the FITradeoff for the choice problematic was used to identify the best supplier for a food industry. In Santos et al. (2020), this method was applied to rank the suppliers of Wholesaler and Retailer Company.

Certain studies have also addressed problem prioritization. Specifically, during the COVID-19 pandemic, the application of MCDM/A methods proved to be efficient for supporting difficult decisions when resources were limited.

For instance, during the pandemic, the high number of cases and total occupied beds made it necessary to prioritize patients for hospitalization. Given this scenario, De Nardo et al. (2020) used an MCDM/A method to assist in patient assessment. In the study, eleven (11) criteria were considered, and to collect more preferential information, questionnaires were evaluated by different physicians working in different areas in northern Italy.

In the same view, Frej et al. (2021) used an approach based on the Multi-Attribute Utility Theory (MAUT - Keeney & Raiffa, 1976) to solve a portfolio problem related to the allocation of patients to Intensive Care Unit (ICU) beds. For this purpose, the probability of patient survival in and out of the ICU was obtained and used, based on the physician's experience and judgment. To reduce the uncertainty of this information, which is highly subjective, and to make doctors more comfortable, the information was provided orally by professionals and converted by software to probability values. Thus, Frej et al. (2021) concluded that the proposed approach had the potential to support critical decision making in a structured and rational way.

Regarding public safety, Basilio et al. (2020) conducted a study using PROMETHEE II to prioritize strategies that would more effectively reduce crime occurrence rates for a specific location. For this purpose, 14 strategies were evaluated in 18 criteria. A consequences matrix was constructed based on the expertise of 354 specialists in public safety.

The literature describes cases of application of the prioritization of elements during crises, using MCDM/A methods. Therefore, this study aimed to strengthen the research in this area by presenting the prioritization of raw materials in terms of ease of supply, based on the FITradeoff method for the ranking problematic.

3 FITRADEOFF METHOD

To support raw material prioritization, the FITradeoff method (de Almeida et al. 2016; de Almeida et al. 2021) was applied in this study. This method is an MCDM/A method based on the Multi-Attribute Value Theory (MAVT; Keeney and Raiffa, 1976).

The FITradeoff method is used to elicit criteria scaling context based on the preferences of decision-makers (DMs). FITradeoff can be applied to different types of decision problems including choice (de Almeida et al. 2016), ranking (Frej et al. 2019), sorting (Kang et al. 2020), and portfolio (Frej et al. 2021) problems. In literature, several applications have been used the FITradeoff method (Pergher et al. 2020; Camilo et al. 2020; Fossile et al. 2020; Kang et al. 2018; de Macedo et al. 2018; Carrilo et al. 2018; Frej et al. 2017).

However, the FITradeoff method can only be applied if DMs present a compensatory rationality for the problem consequences (Roy, 1996). In some cases, DMs do not present a compensatory rationality. Thus, in these situations, they should use ELECTRE or PROMETHEE methods (Brans 1982; Roy 1996; Figueira et al. 2016).

The FITradeoff method is based on the Tradeoff procedure (Keeney and Raiffa, 1976). However, this method uses partial information expressed by DMs. In other words, using the FITradeoff method, indifference statements are not required during the elicitation process. Instead, DMs need only express a strict preference between a pair of consequences in elicitation by decomposition. Moreover, the FITradeoff method combines two paradigms for preference modelling: elicitation by decomposition and holistic evaluation (de Almeida et al. 2021).

Elicitation by decomposition is conducted in the consequence space and holistic evaluation in the alternative space. Here, the holistic evaluation presented in the FITradeoff method does not consider the disaggregation approach (Jacquet-Lagreze and Siskos 1982; Siskos et al. 2014, 2016). In the FITradeoff method, holistic evaluation can be used to insert preferential information in a mathematical model or to finalize the decision process. In other words, DMs evaluate alternatives performances supported by graphical visualization (bar graph, spider graph, bubble graph) and tabular visualization. Thus, they can express dominance relations between these alternatives (Roselli et al. 2019; Roselli & de Almeida 2020; Roselli & de Almeida 2021a; Roselli et al. 2021b).

In this context, using the FITradeoff method, DMs can conduct the preference modelling considering the paradigms that they judge to be the most appropriate to express their preferences. Hence, during the decision process, DMs answer questions concerning the comparison of problem consequences or alternatives. For each question answered, an inequality is generated, which is included in a Linear Programming Problem (LPP). The LPP model is illustrated by Equations (1-6).

$$V\left(A_j\right) = \sum_{i=1}^{n} k_i v_i\left(x_{ij}\right) \tag{1}$$

$$k_i > k_{i+1} > \ldots > k_n \tag{2}$$

$$k_i v_i\left(x_i\right) > k_{i+1} \tag{3}$$

$$k_i v_i\left(x_{ij}\right) < k_{i+1} \tag{4}$$

$$k_i v_i\left(x_{ij}\right) = k_{i+1} \tag{5}$$

$$\sum_{i=1}^{n} k_i v_i\left(x_{ij}\right) > \sum_{i=1}^{n} k_i v_i\left(x_{iz}\right) \tag{6}$$

In this LLP model, in Equation (1), the global value of alternatives is compared to construct the ranking. The first inequality represented in (2) is obtained after the ranking of scaling constants. This is the first preferential information expressed by DMs. Then, inequalities (3–4) and Equation (5) can be generated during the elicitation by decomposition, i.e., during the pairwise comparison. Finally, the inequality (6) can be obtained during the holistic evaluation for each dominance relation expressed between alternatives. The marginal value function $v_i\left(x_{ij}\right)$ is obtained in the intra-criteria evaluation. The FITradeoff method supports linear or non-linear values function.

The FITradeoff method has been implemented in a Decision Support System (DSS), available on web at http://www.fitradeoff.org. In the next section, the raw material prioritization is obtained using the FITradeoff method. The decision process is illustrated in detail to clarify the application of this method in solving an important problem regarding a pet food industry.

4 PROBLEM DESCRIPTION

A company headquartered in the United States with operations in 80 countries was used as the research case. The company has more than 100 years of history and approximately 115,000 employees. Among the various sectors in which the company operates, the pet food sector is used as the basis for this paper.

Brazil is the third-largest country in terms of pet population, with about 140 million pets. The pet market represents around 0.4% of the Brazilian GDP and had revenues of R$27 billion in 2020, according to ABINPET, of which 75% were related to the pet food sector. With these results and the sector's growth, Brazil has become the seventh-largest market for pet-related products with a 3.9% share of the global revenue, behind the United States, China, United Kingdom, Germany, Japan, and France.

Due to the high growth and opportunities in the sector, several players operate in the market, including both big multinationals and smaller regional companies. Compared with its competitors, the target company has brands that are among the most remembered by consumers, according to the Top-of-Mind survey. In addition, according to a study carried out by CVA Solutions, one brand in the company's portfolio, specializing in high-quality nutrition for dogs and cats, leads the Brand Strength ranking, which is calculated based on the difference between the share of brand attraction and rejection. This brand is also one of the most recommended by veterinarians.

Given the relevance of its various brands, the target company is the market leader in certain subcategories of the pet nutrition sector, reaching, in some of them, above 60% of the market share.

Despite the rise in demand for pet-related products during the COVID-19 pandemic and the growth of the sector, many other sectors, companies, and industries, including suppliers, have suffered from the pandemic's impact, which affected the supply chain.

As a result, in a scenario of demand growth and supply difficulties, organization analysts experienced an increase in pressure and daily workload. Therefore, prioritizing raw materials and understanding the criticality of each material plays a fundamental role in directing efforts, especially in inventory management, to achieve better supply results and, consequently, a lower risk of disruptions in the production process.

In this context, the main objective of this decision problem was to support the work of planning analysts during the supply crisis by ranking the raw materials utilized in the pet food production process, specifically those stored in silos and tanks, according to their ease of supply. The main objective was divided into four sub-objectives: to reduce costs, increase production flexibility, have a better reaction capacity, and reduce analysts' workload. In addition, to measure these objectives, eight criteria were defined, as shown in Figure 1.

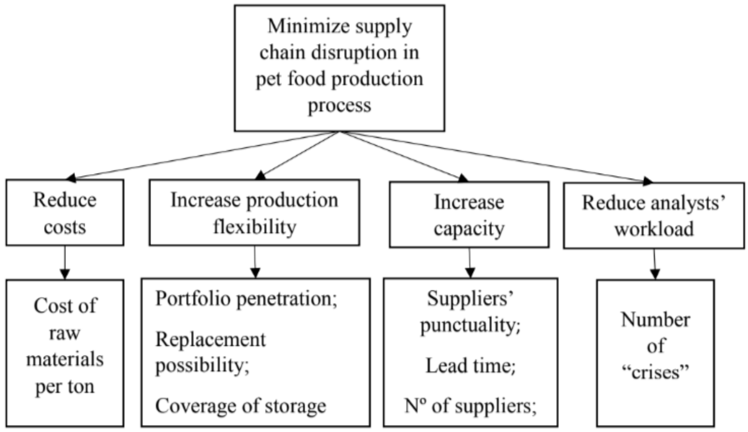

Figure 1 – Problem objectives and criteria.

Some of these criteria are related to classical objectives of manufacturing (and operations) strategies, such as lead time, coverage of storage capacity, and suppliers' punctuality (Hill 1993; Hill 2000, Slack & Lewis 2002). These criteria present different preference directions and units, as shown in Table 1. To calculate the suppliers' punctuality criterion, all delivered loads of a certain raw material were evaluated based on a comparison between the scheduled date and the delivery date. If the load arrived before or on the scheduled date, it received a score of 100%; otherwise, it received a score of 0%. Finally, all received loads were evaluated together, and the performance of the suppliers of each raw material was the average of the scores for each load of that raw material.

Thirteen raw materials used for petfood production were evaluated in this problem, as shown in Table 2. Considering the alternatives and criteria, a consequence matrix was built for the consequence value of each raw material for every criterion, as shown in Table 3.

Table 1 – Criteria descriptions.

Criterion	Pref directio	Unit of measure	Description
C1: Portfolio penetration	Minimize	Percentage	Percentage of products composed of a certain raw material
C2 Suppliers' punctuality	Maximize	Percentage	Average performance of suppliers of a given raw material in relation to punctuality, considering the scheduled date vs. the delivery date
C3 Replacement possibility	Maximize	Percentage	Percentage of recipes in which a certain raw material can be replaced.
C4 Coverage of storage capacity	Maximize	Days	Inventory coverage in days, considering total capacity and average consumption
C5 Lead time	Minimize	Days	Average time agreed with suppliers of a given raw material from request to load delivery
C6 Number of suppliers	Maximize	Quantity	Number of suppliers contracted to deliver a given raw material
C7 Number of "crises"	Minimize	Quantity	Indicator monitored by the company of how many times a certain raw material suffered a crisis, with "crisis" being defined as having a silo with a projection of less than 50% and with no recovery in the short term
C8 Cost/ton	Minimize	Real (R$)	Purchase price of the raw material

Table 2 – Alternatives' descriptions.

Alt	Raw Material	Description
A1	Poultry Meal 60%	Product resulting from cooking, pressing, and grinding poultry viscera.
A2	Poultry Viscera Meal	Product resulting from cooking, pressing, and grinding poultry viscera. It has less strict specifications than 60% poultry meal.
A3	Meat & Bone Meal	Produced from bone and tissue ground, cooked, pressed for fat extraction, and ground again, all after complete deboning of the carcass.
A4	Feather Meal	Product resulting from the cooking, under pressure, of clean, non-decomposed feathers obtained from the slaughter of birds.
A5	DL68	Liquid palatalize. Used to increase the attractiveness of dog food.
A6	Chicken Oil	Product obtained from animal tissues in the restitution of extraction processes.
A7	Soybean Pasta Mix	Used as a source of vegetable protein.
A8	Maize Bran	Subproduct of flour made from corn processing.
A9	Maize Gluten	Obtained after processing starch and corn germ. High protein content.
A10	Maize Whole	Corn in grain.
A11	Sorghum Whole	Sorghum in grain.
A12	Rice Broken	Rice subproduct. Formed by defective grains.
A13	Caramel Color Liquid	Natural dye used to give the food a caramel color.

Table 3 – Consequence matrix.

Alternatives/ criteria	**C1 Portfolio penetration**	**C2 Suppliers' punctuality**	**C3 Replacement possibility**	**C4 Coverage of storage capacity**	**C5 Lead time**	**C6 Number ofs suppliers**	**C7 Number of "crises"**	**C8 Cost/ ton**
Poultry Meal 60%	44%	77%	55%	12	9	5	4	4.704,31
Poultry Viscera Meal	50%	72%	90%	13	7	2	2	4.320,63
Meat & Bone Meal	100%	70%	50%	8	8	2	9	2.422,50
Feather Meal	31%	72%	65%	17	7	1	1	3.339,20
DL68	50%	100%	25%	9	9	1	0	3.056,67
Chicken Oil	100%	75%	20%	5	11	4	5	6.042,70
Soybean Pasta Mix	88%	88%	45%	7	6	2	6	2.582,63
Maize Bran	44%	73%	70%	7	7	2	3	2.002,50
Maize Gluten	81%	67%	40%	10	7	2	3	5.391,00
Maize Whole	100%	60%	15%	8	5	2	5	1.800,25
Sorghum Whole	31%	61%	85%	5	6	1	4	1.830,83
Rice Broken	12%	100%	10%	74	10	1	1	2.884,60
Caramel Color Liquid	69%	77%	35%	48	40	1	2	2.930,00

In the next section, the decision process using the FITradeoff method is illustrated to clarify the application of this method to solve this important problem in the pet food industry.

5 USING THE FITRADEOFF METHOD TO RANK RAW MATERIAL

In the previous section, the problem was described, and the decision matrix constructed. It was also observed that DMs present a compensatory rationality (Roy 1996). Therefore, the FITradeoff method for the ranking problematic (Frej et al. 2019) was used to support the prioritization of raw materials to minimize the risk of disruptions in the pet food production process.

For intra-criteria evaluation, the DM elicits the value functions. For the criteria Replacement Possibility and Lead Time logarithm functions have been adequate to describe the preferences of the DM. For the other criteria, linear functions have been considered as adequate to describe the preferences of the DM, as discussed in Edwards & Barron (1994).

Continuing the decision process using the FITradeoff DSS, the DM rank the scaling constants, as shown in Equation (7). The scaling constant order is inserted in the LLP described in Section 3. The model runs, and the ranking of raw material updates, presenting two levels, as shown in Figure 2. At this moment, the alternative A12 (Rice Broken) has already been defined as the best alternative. This alternative is the less critical for supply. However, many alternatives are incomparable in position 2. Hence, the DM decides to continue the process, comparing consequences in the elicitation by decomposition.

$$k_{C4} > k_{C5} > k_{C7} > k_{C8} > k_{C2} > k_{C6} > k_{C1} > k_{C3} \tag{7}$$

The first pairwise comparison in the elicitation by decomposition presents: Consequence A, with an intermediate value (39.5 days) in the criterion "Coverage of storage capacity," and Consequence B, with the best value for the criterion "Replacement possibility." For this comparison, the DM prefers Consequence B, as illustrated in Figure 3. This preferential information is repre-

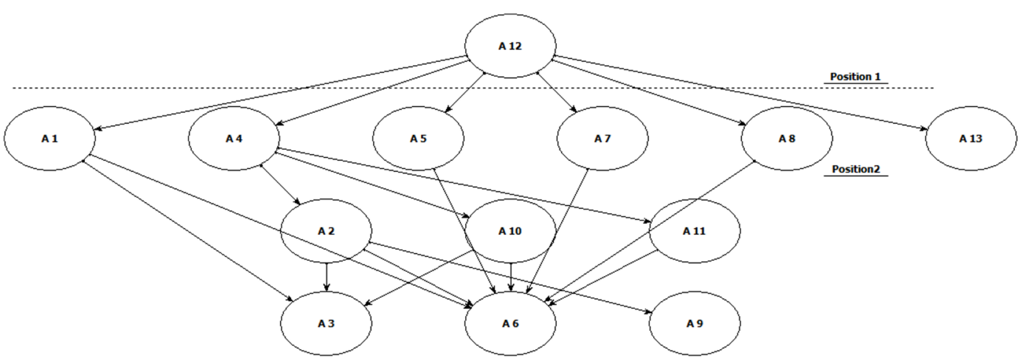

Figure 2 – Hasse diagram with two positions.

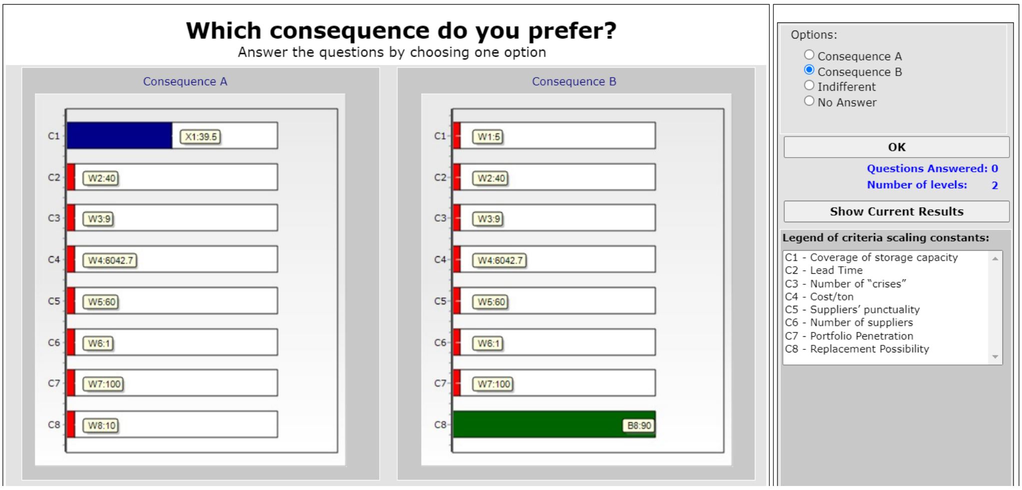

Figure 3 – Comparison of two consequences in elicitation by decomposition.

sented by the inequality (8) and inserted in the LPP model as a new constraint. Then, the ranking of raw material is updated to four levels, as shown in Figure 4.

$$k_{\text{Coverage of storage capacity}} \cdot 0,5 < k_{\text{Replacement Possibility}} \qquad (8)$$

The DM decides to continue expressing preference in the elicitation by decomposition. After more one question, the ranking has been updated to seven positions, as illustrated in Figure 5. Now, the Alternative A6 (Chicken Oil) is defined as the most critical for supply in pet food production. Moreover, the alternative A5 (DL68) has been defined as the second one in the ranking.

On the other hand, in position 3, the alternatives A1, A4, A8 are incomparable. Hence, the DM decides to compare these alternatives in the holistic evaluation. The FITradeoff DSS presents different types of graphical and tabular visualization that can be used by DMs to compare alternatives during the holistic evaluation.

The DM selected the bar graph to use, as illustrated in Figure 6. After evaluating the performance of these alternatives in the graphic, the DM judges that these alternatives present high-performance differences between the criteria, and that it is not simple to define the dominance relations between them in the holistic evaluation. In others, the DM is not confident in the expressed preference and decides to return to the elicitation by decomposition.

Another pair of consequences is compared, as follows. In Consequence A, the DM receives 48.1 days in the criterion "Coverage of storage capacity" and in Consequence B, the DM receives the best value in the criterion "Lead time". For this comparison, the DM prefers Consequence A. Then, the ranking order updates to eight positions.

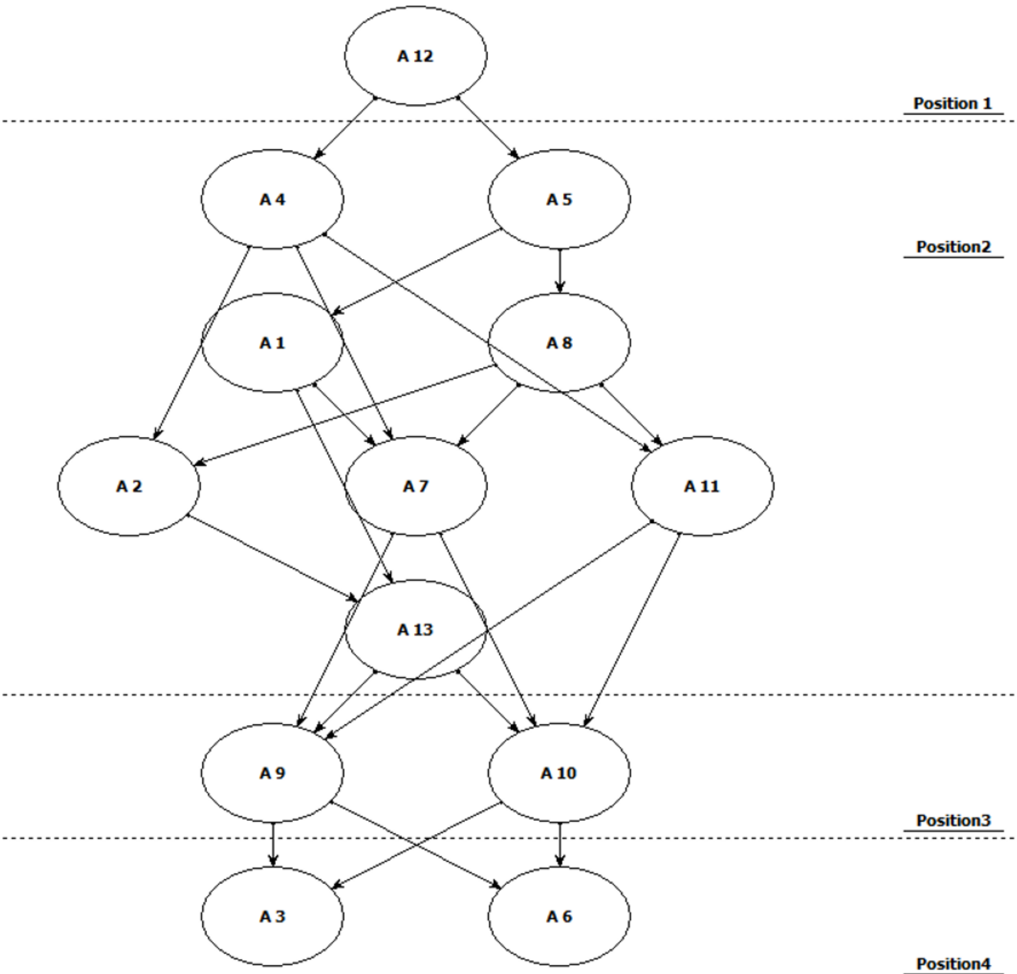

Figure 4 – Hasse diagram with four positions.

The DM continues the decision process by expressing preferences regarding pairs of consequences. Thus, after four more questions are answered, the complete pre-order has now been obtained with ten positions in the ranking. A summary of all the preferential information provided by the DM during this decision process is provided in Table 4.

As a result, Rice Broken is considered the least risky material for supply during the pet food production process. Otherwise, Chicken Oil and Meat & Bone Meal are considered the materials most critical for supply.

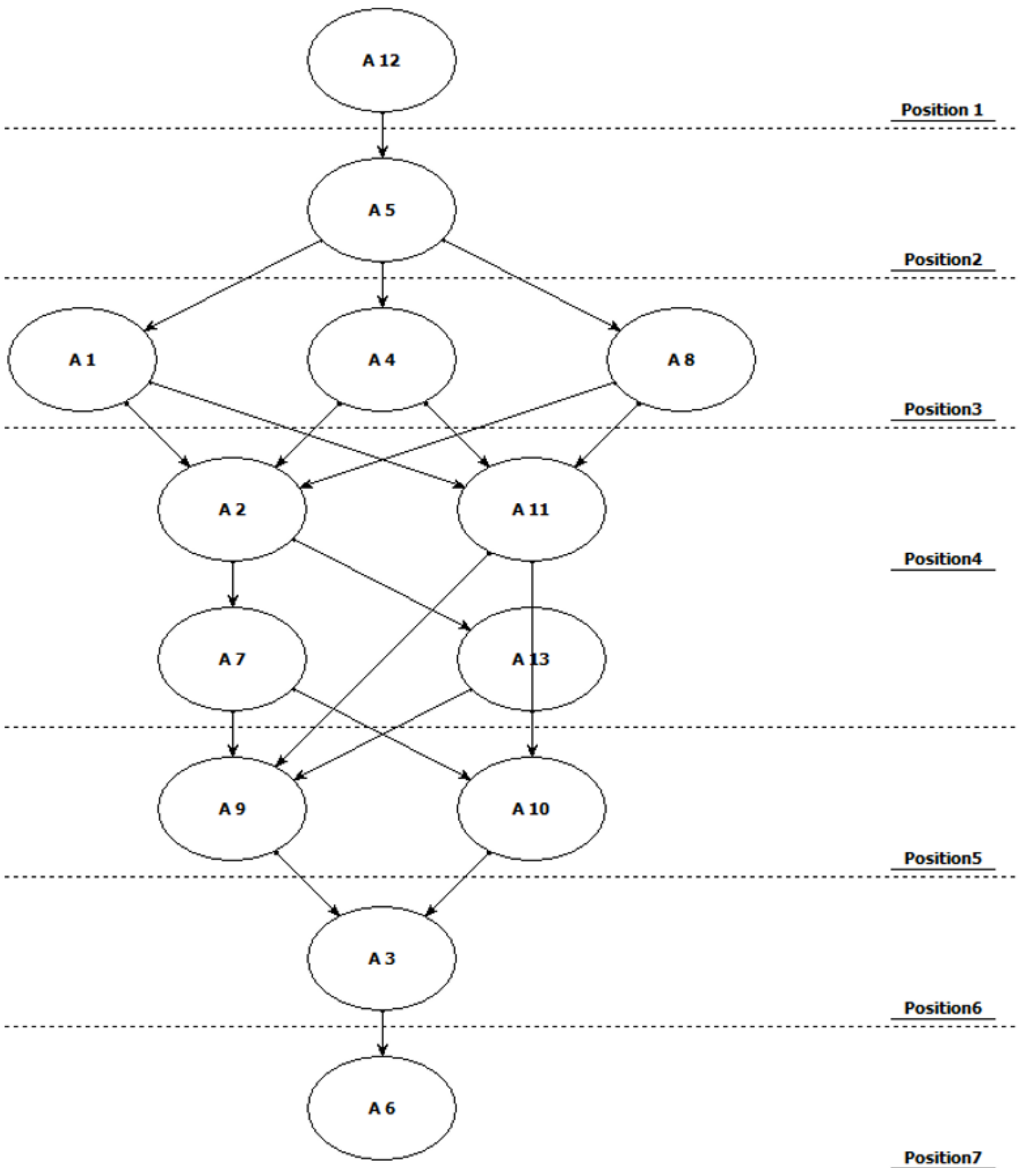

Figure 5 – Hasse diagram with seven positions.

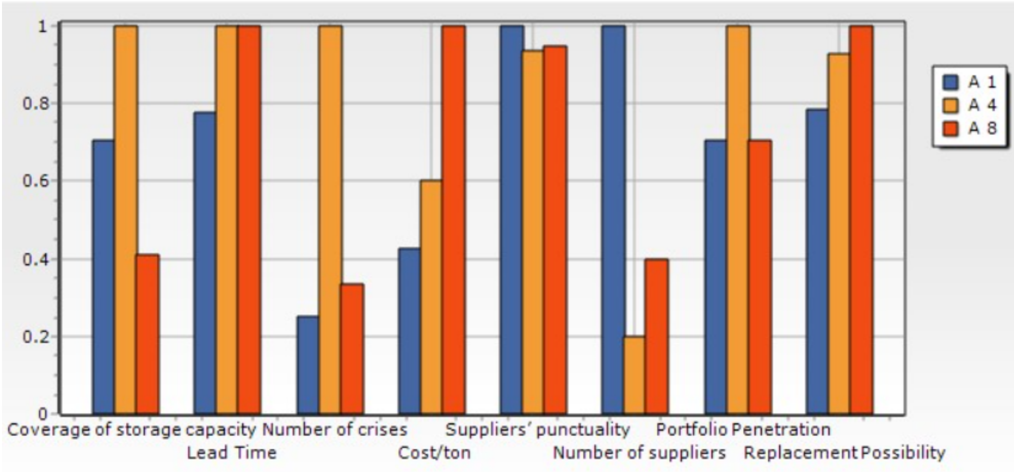

Figure 6 – Comparison of alternatives in the holistic evaluation.

Table 4 – Summary decision questions.

Cycle	Consequence A	Consequence B	Answer	Number of levels	Holistic evaluation
0			Ordering...	2	no
1	39.500 of Coverage of storage capacity	Best of Replacement Possibility (90)	Consequence B	4	no
2	56.750 of Coverage of storage capacity	Best of Lead Time (5)	Consequence A	7	no
3	48.125 of Coverage of storage capacity	Best of Lead Time (5)	Consequence A	8	no
4	6.676 of Lead Time	Best of Number of crises (0)	Consequence B	8	no
5	5.808 of Lead Time	Best of Number of crises (0)	Consequence B	8	no
6	0.900 of Number of crises	Best of Cost/ton (1800.25)	Consequence A	10	no
7	1.350 of Number of crises	Best of Cost/ton (1800.25)	Consequence A	10	no

6 DISCUSSION OF RESULTS

The ranking obtained using the FITradeoff method (Figure 7), is the directly result of this study. In organization routine, this ranking can be used by different departments in order to support their activities. For instance, considering the order of criticality, activities such as: storage levels, supply planning, reports about quality of materials, supplier selection process, production process can be impacted. Moreover, for the department with directly led with supply planning, the

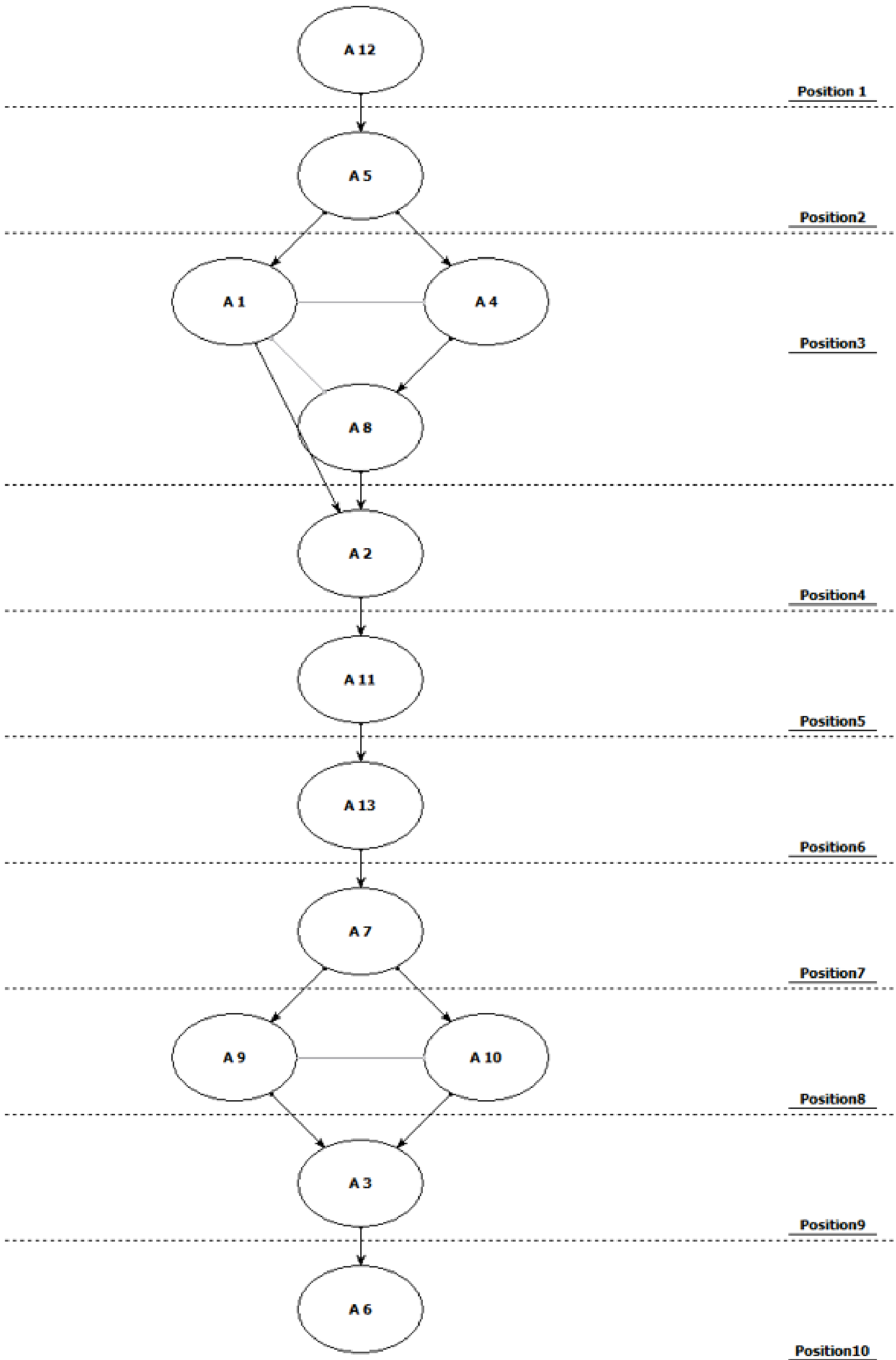

Figure 7 – Hasse diagram, with ten positions.

analysts' activities can be better distributed and structured, paying more attention in materials in the last positions of the ranking and, maybe, increasing the safety stock of those.

In this context, the result showed that Rice Broken is the less risky material in terms of supplying. By analyzing the decision matrix (table 3), it is possible to observe that the Rice Broken presented the best performance in the criteria Coverage of storage capacity, which is the one that presents the highest scale constant. Also, this material presents the best performances in other criteria, such as: Suppliers' punctuality, Number of "crises", and Portfolio Penetration.

Therefore, this material is very stable in terms of supplying, even though it has only one supplier, which has started supplying for the company in the beginning of April of 2021. Despite the short time, a long-term contract was made for the whole year and the supplier was always very transparent and efficient passing information and returning requests, always delivering on time when the supply plan was confirmed. Overall, the good communication performance is a highlight of the supplier and, for sure, increased the trust between both parties. Besides, having quick answer give a better reaction time for the industry to find a solution when a problem happens. However, one recommendation for this company is to find another supplier for Rice Broken in order to support any problem faced by the actual supplier.

On the other hand, for the most critical material (Chicken Oil), even presenting many suppliers, this material presents the worst consequence in the criterion Coverage of storage capacity, against the maximum participation, being used to produce the whole portfolio. Moreover, many crises were observed in the past, involving the supply of this material. Thus, the analysts should be careful in requesting Chicken Oil, since this material is used in large scale to produce pet food, and it presents many supplying problems, being the most critical if some disruption affect the supply-chain.

To test the robustness of this application, a sensitivity analysis has been performed. In this case, simulations had been done in consequences of the decision matrix (10% of variation), for all criteria, expect Portfolio Penetration, Replacement Possibility and Number of "crises", since these criteria generally do not vary.

As result, it is observed that the alternativeA12 (Rice Broken), in the first position in the ranking, stay in this position in 100% of the cases, as highlighted in blue (Figure 8). Against, the alternatives A3 and A6, in the last positions, presented higher variation, (in purple), highlighting that these alternatives can become more safety in terms of supplying if their performance change in some criteria.

As conclusion, the sensitivity analysis showed that the first alternatives in the ranking is really safety in terms of supplying, and the analyst can spend more time in activities related to materials in the last positions of the ranking.

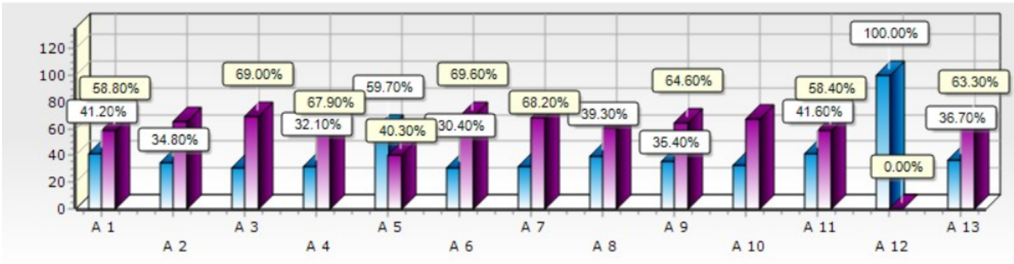

Figure 8 – Sensitivity Analysis.

7 CONCLUSION

The social distancing caused by the COVID-19 pandemic led people to look for pets. On the other hand, companies suffered from the impact of the pandemic, especially with respect to supply chain disruptions that occurred in different sectors.

In pet food production, for example, several slaughterhouses were closed due to cases of contamination by COVID-19. Hence, in this study, the materials used for pet food production in a large US corporation have been investigated according to their difficulty in supplying.

The FITradeoff method for ranking problematic has been applied to support raw material prioritizing. Thus, it was possible to understand the criticality of 13 materials used in pet food production in terms of supply difficulty. Recommendations can also be made to direct efforts in times of crises. For instance, for Chicken Oil and Meat & Bone Meal can be recommended to review the safety stock, for these materials, for example. In summary, the results of this study can support analysts (planners) and help direct their efforts in organizing the daily routine.

For future research, this study can be complemented considering a group decision problem. Moreover, the Value Focus Thinking (VFT) method (Keeney & Raiffa 1992) can be included in order to explore the values of the company in terms of supplying. Using the VFT a better investigation can be done for objectives, criteria and alternatives.

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