Managing operators in an Industrial Unit by Competences

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Abstract

This paper aims to obtain a Performance Evaluation Model to support the decision maker of a multinational pharmaceutical company in making decisions regarding the career progression of its employees, and training needs, considering the competencies of these employees, and their respective skills and attitudes On the Job for the development of projects.

This research applies knowledge of Multicriteria Analysis for Decision Support, and the MACBETH methodology, to build a model that allows greater transparency, clarity, and simplicity in performance evaluation, identifying specific and appropriate criteria, and the respective forms of measurement.

With this case study it became possible to identify the On the Job technical and behavioural competences necessary to perform certain jobs, to establish minimum profiles and desirable profiles to be attributed to each job, to create an Employee Performance Evaluation Model by competences, to assign each employee to each job and to identify opportunities to improve employee training. The performance evaluation model proposed in this work constitutes a significant contribution to a more efficient planning of improvement actions in human resources management, through its competencies for each of the employee profiles.

Keywords: Performance Evaluation; Competency Management; Decision Support Models; MACBETH Method; Weighting; Resource Allocation.

1. Introduction

Managing people in a corporate environment at a time, when customer focus is one of the main purposes of organizations with the external environment, is not a simple task.

Currently the human capital of companies is considered determinant, and the measurement of their knowledge constitutes an emerging need in the strategic management of human resources. Therefore, experts in the field continuously develop new forms and management models more efficient.

Many studies describe practices and management styles of people that lead to the training of satisfied and productive employees in an organization, however, there are few who apply the comparative analysis of knowledge between individual elements as well as the measurement of the contribution of employee performance.

Faced with this evaluation dilemma, several authors claim that techniques such as *competencies management* and *performance management* are

two complementary management theories, which will contribute to the constitution of work objectification processes, among them: mechanisms of social control of workers and maintenance of hierarchical structures of power in organizations.

According to [1] *Performance Management* considers as an indispensable condition the existence of an alignment between the performance of the employees of an organization and the objectives outlined, as well as the values adjusted to the mission and strategy of the organization.

Competencies Management, on the other hand, is an instrument for the development of knowledge considered important for the success of the organization, which suggests that strategic management of human resources contributes to generate sustainable competitive advantage. [2]

Therefore, evaluating means comparing the results achieved with those expected. Which presupposes not only the comparison between what is expected of the individual in terms of achievement (the result) and its effective performance (the realized), but also the existence of a monitoring mechanism that allows correcting deviations in order to ensure that the execution corresponds to the previously outlined. [3]

This article is inserted in the context of *evaluation models of performance of employees by competencies* considering the degree of skill and attitudes of people when developing functions.

After identifying organizational objectives and determining a number and level of competencies, the research question emerged: "- What is the position of competency x in the given profile y?".

To answer the research question, seeking differentiation from other methods, the proposed model seeks to translate in quantitative terms the performance and competencies of individuals, seeking the value of their contribution.

Only through measurement is it possible to analyse in each profile if the competencies are insufficient, allowing to identify opportunities for improvement, through development plans with contribution of training sessions.

2. Literature Review

In addition to the understanding of the existing perspectives on *People Management*, consequent *Dimensions of Human Skills*, *Decision Making Process* and *Performance Evaluation*, a literature review was carried out that analyses previously published works.

The research was carried out fundamentally from *B-on* with keywords like *competencies management*; *multi-criteria decision support methodologies* and *performance evaluation*, published in English from 2017 to June 2022, categorized as review or article in a journal. As a criteria for selecting these results, those that did not specifically address the management of people or multicriteria methodologies to support the decision were excluded, resulting in the literature review a final set of 42 reviews.

Despite the filtering carried out through the years of publications, the existing results on the subject are mostly publications between the years 2012 and 2015.

The stagnation on the subject over time reflects the need to raise awareness among the academic community for the development of this type of content and has a distinct vision for the future. Reducing this gap is essential, given that multi-criteria models are tools of great value for decision-making, since they ensure the evaluation and adoption of context-appropriate development strategies.

This work aims to contribute to the literature through the development of a *Performance Evaluation Model* that serves as a tool to support decision-makers at the tactical-operational decision level. Towards this, the understanding of the problem is established from the importance of the industry's point of view.

To achieve the goal, the review was fundamentally divided into two parts: initially with the concept and some characteristics of Human Resources Management among them, *Performance Management* and *Competencies Management* and in the second moment, addresses the intervention instrument the Multi-Criteria Method of Decision Support, MACBETH.

2.1. Current *Performance Management* and *Competencies Management* in the organizations

The concern of organizations to have individuals qualified for the efficient performance of a given function is not recent. In this context, over time theories have been developed that propose the need to associate the performance and competencies of the organization with those of its collaborators, so it is possible to observe conceptual similarities between competence and performance.

Performance Management claims that performance at work is the result of not only the competencies inherent to the individual, but also organizational attributes. Already, the *Competency Management* technique argues that individual competence combined with other resources gives rise to and sustains organizational competence. [4]

The need to associate individual competencies with performance, makes both *Performance Management* and *Competencies Management* inserted in a context of strategic management of human resources. Understood as the function to attract, develop, and maintain the necessary personnel to achieve the objectives using resource systems consistent with each other and consistent with the organization's system.

In this respect, it is noted that the processes inherent in the two techniques often overlap and are complementary. For example, in *Competencies Management* it is necessary to employ some performance evaluation mechanism that allows the company to identify gaps of competencies, both at the individual and organizational levels, therefore, the identification of skills development needs happens through *Performance Management*.

Another aspect that deserves to be considered is the possibility of *Performance Management* and *Competencies Management* contributing to the constitution of work objectification processes. In this case, the objectification refers to the process of translating, in quantitative terms, the performance and competencies of the individuals, to estimate the value of their contribution to achieve the desired organizational objectives.

Although performance evaluation mechanisms have been used to control workers since antiquity, it was with the emergence of large industries that the evaluation of human performance gained greater significance. [5] Thus, recent theories such as the formulation of performance evaluation models allied to competencies, should combine the following steps: definition of organizational objectives by position; creation of the performance evaluation system; feedback and results of the evaluation carried out in such a way that the performance aspects to be improved are continuously and constructively transmitted. [6]

At the divisional level or by department in organizations, the interest falls on the objectives and goals of each unit of the company, aiming at organizational effectiveness. At group level, the evaluation focuses on projects and work processes, i.e., on teams. Finally, at the individual level, the object to be evaluated is the result of the individual's work, and of his behaviour in the work environment.

The learning to formulate a good *Performance Management* and competencies resulting from it, also fell on the theme *Operations Management*. This is because the analysis of daily operations, reflection on the ways and methods of work, and speculation of adversity are factors that create the conditions for capturing ideas, knowledge and defining principles for identifying future needs.

Despite some limitations that these processes may encounter, organizations can take these current theories as opportunities for organizational success. It is essential that each one knows its importance within a company, so that the involvement of all in the process promotes collective achievements.

To answer the research question and inserted in the context of Human Resources Management, the Multi-Criteria Method of Decision Support, MACBETH was adopted with a view to achieving greater transparency, clarity and simplicity in the evaluations and obtaining accurate numerical data.

Prominent researchers and widely cited in the literature as [7] adopted the same premises mentioned above in the process of building their models.

2.2 Multi-Criteria Analysis, Method of Decision Support MACBETH

A quantitative assessment by a decision-maker can be a complicated or even impossible process if the decision-maker does not have the ability to quantitatively distinguish all options in all criteria, as well as the distribution of weights by the criteria. [8]

In 1994 it was developed by *Carlos Bana e Costa* and *Jean Claude Vansnick*, the *Measuring Attractiveness by a Categorical Based Evaluation Technique* – MACBETH. This is an interactive method commonly used through a software (M-MACBETH), which measures the decision-maker's preference over a set of alternatives and helps him to quantify the relative attractiveness of each of them, transforming qualitative evaluations into quantitative ones. [9]

MACBETH analyses two actions at a time, making the process simpler and more natural. For this reason, it has been widely used in several areas of study.

In other words, it is a method of weighting criteria which requires qualitative judgments to

help a decision-maker quantify the attractiveness relationships between alternatives. So, it transforms ordinal information into cardinal information through the application of a semantic inquiry technique.

In addition to being possible to establish an ordering between the various options, it is also possible to measure how many times a particular option is preferable (or not) to the other option.

Ensuring the consistency of value judgments, the algorithm boils down to solving a linear programming problem. This procedure is applied repeatedly until the value functions of each descriptor belonging to each criteria are obtained. [10]

Next, an overall score is calculated for each option based on the *Additive Aggregation Model* presented in equation x:

$$V(a) = \sum x\,n\,i{=}1\ ivi\ (a)\ com \sum x\,n\,i{=}1\ i = 1;\ e\ xi > 0;$$

$$e\ vi\,(goodi) = 100\ vi\,(neutrali) = 0$$

Where:

V(a) is the overall value of option *a*; *xi* is the weight of criteria *I*; *vi* represents the degree of performance of option *a* in criteria *i*.

It should be noted that *vi (goodi)* and *vi (neutrali)* are included to facilitate cognitive comparations in judgments designed by decision makers. Subsequently the scale obtained is discussed with the decision-makers to find out if it effectively represents their judgments and should be readjusted if necessary.

In summary, MACBETH's focus is the interaction between the agents and the decision facilitator. Methodologically, the MACBETH approach can be presented as the sequence of the following phases:

Phase I - Structuring of the model, takes place before the submission of proposals and integrates:

1. Characterisation of the decision context.

2. Identification of the criteria of alternatives relevant to the decision problem, i.e., mandatory requirements that each alternative must comply with to be accepted.

3. Construction of a performance descriptor for each criteria, based on indicators, and characteristics that allow the operationalization of these criteria.

Phase 2 - Weighting of the criteria, which consists of (with assistance of the M-MACBETH software):

1. Partial evaluation in each criteria, through the construction of cardinal value scales based on performance indicators.

2. Determination of the weighting coefficients of each criteria, which operationalize the notion of relative importance of the criteria.

3. Assessment of the impacts on the various criteria.

4. Calculation of the overall value of the alternatives by the *Additive Aggregation Model*.

The MACBETH approach, based on the interaction between different actors with different points of view on the same decision problem, has been particularly useful in the calculation of trade-offs between options, which is why it was chosen to use it in the scope of this dissertation.

3. Formulation and Analysis of the Case Study

This chapter explains all the information provided by the company with the assistance of decision-makers in relation to the case study for the development of the subsequent conceptual model.

3.1. Structuring Phase

The Structuring Phase is the first stage of the Multi-Criteria Method of Decision Support MACBETH and is fundamental to the process being composed by: *structuring of the problem* and *structuring of the model*.

3.1.1. Contextualization and Structuring of the Problem

Regarding contextualization, the case study of this research was developed in a Multinational Pharmaceutical company, whose current business area is mainly focused on *Particle Engineering*: manipulation of physical properties.

The company stands out in the help it provides to the customer bringing new or out-of-patent drugs to the market, ensuring quality excellence, which in turn is increasingly demanding due to singularities required by the customer; the costs involved; resources required to maintain efficiency, among others.

This organization has more than 1300 employees with scope of work related to production and all these human resources require

management. Its industrial production units are available in Portugal, Ireland, and Macau.

With the continuous technological evolution, the company needed to invest in new equipment to meet demand, and for this it would be indispensable to combine the strategic vision with the ability to achieve. Due to this factor, in this business area, there was a problem in the evaluation of employee's performance.

Currently, the evaluation of the profiles delineated by the company corresponding to each position or function is elaborated subjectively by the hierarchical superior of each element.

Thus, in cases where it is necessary to determine the skills necessary for a given function, it is not possible to assess and monitor the status of those competences in each employee. Therefore, there is no definition of concrete and exact profile levels, with "each case being a case".

To evaluate the performance of employees, allows to create conditions for each one to maximize their interests, and once the individual interests adjusted to the organization's strategy are achieved, they will represent the collective interests of the organization itself.

As a result, the need to build a model that evaluates the competencies of employees who are at the service of the company emerges. The model needs to clarify what is expected in each profile with given skills and attitudes (specific, measurable, achievable, relevant, and challenging objectives), and enable a clear and transparent analysis of decision-making support that allows visualizing the consequences of their decision-making in the context evaluated. Having contextualized the problem, the identification of the system of actors according to table x was followed.

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Table 1. System of actors

Actors	Description
Enabler	Abstract author
Final Decision-Maker	Particle Engineering Process Engineer
Actors	Senior Specialist in Learning and Development
	Production manager
	St's Process Engineer
	Member of Operational Excellence
	Operations Planning Member

Based on the information acquired so far, the facilitator together with the final decision-maker official established the title *Management of operators of an industrial unit by competencies* for the problem analyzed based on the concept of Multi-Criteria Analysis, Method of Decision Support MACBETH Decision, with a view to achieving greater simplicity in evaluations and obtaining objective numerical data.

Due to the breadth of the company, for the construction of the model the scope was limited only to positions of operators of the production of a team in key *Particle Engineering* (sample of 12 employees).

3.1.2. Model Structuring

The model structuring phase aimed to identify and discuss the aspects considered by the actors as important to evaluate.

The case study company presents to the position of Operators a structure of three levels, also called Career Levels that are: *Associate Operator, Operator* and *Senior Operator*, described in table 2.

Table 2. Description of *Career Level*

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Associate Operator	**Operator**	**Senior Operator**
Newly hired operator, with minimum desirable contribution to meet demand.	Operator with about 3 years of experience, with some skills required by the function and with results considered good.	Operator with extensive experience and know-how in the area, with most of the skills and attitudes imposed at this level,and with some excellent results. This alternative also includes knowledge of management and leadership before other employees.

Considering this information, the first step towards the structuring of the model focused on the establishment of minimum and maximum profiles, also referred to as model *boundaries*, corresponding to each career level of the position of production operators.

The use of *reference/border* alternatives allows the final decision-maker of the case study to diagnose the analysed problem and build knowledge about critical performance, to ensure the standardization and monitoring of curricula and identify aspects that need to be strengthened, such as training needs in each doctrine.

Then, for this stage of model structuring, the group was identified and agreed on which aspects (criteria) were relevant, played by production operators regardless of their position (cross-cutting skills), which should be part of the profiles of the options/sample to be evaluated.

Throughout the discussion between decision-making actors, it was possible to verify the

application of assumptions such as: completeness, cohesion, and non-redundancy for determining aspects.

For example: the group members revealed the existence of common and similar concerns between concepts regarding the problem, this procedure allowed the facilitator to group aspects by areas of attention, i.e., subsets of related or similar aspects.

Based on the literature review, the classification of individual competencies is subdivided into: *Knowledge*, *Skills*, and *Attitudes*, two major areas were easily established on which the performance of operator profiles should be evaluated on the job, were: *Skills* and *Attitudes*, in which each of them encompasses multiple aspects.

These aspects were structured in *tree form*, as shown in Figure 1, and from among them were selected the twenty-two evaluation criteria.

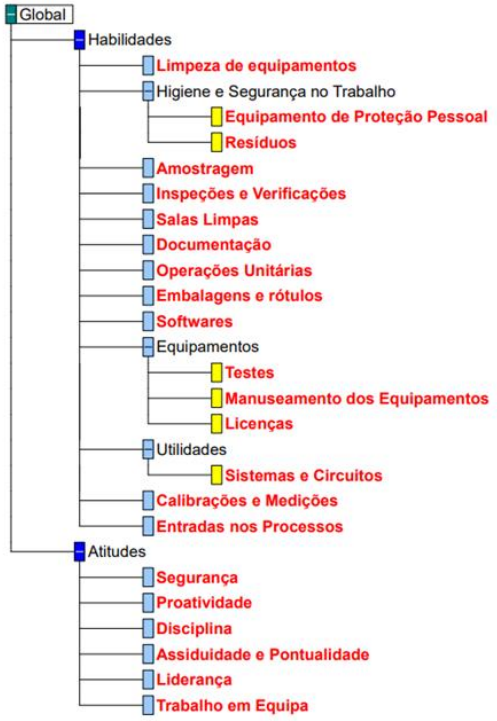


Figure 1. Tree Form of M-MACBETH with the twenty-two evaluation criteria selected

Once the criteria of the model were defined, the operationalization phase of these criteria was followed.

To operationalize them, each of them was associated with a performance descriptor, that is, an ordered set of quantitative or qualitative performance levels that allows evaluating the hypotheses in the option in question. It is a process that seeks to deepen the understanding of each concept identified to extract as much information from the decision-taker as possible.

For this information collection, some key questions are suggested such as: " - What is the importance of the concept?"

Table 3 shows the descriptor constructed for the "*Leadership*" criteria.

In each defined descriptor, a "good" level of performance and a "neutral" level of performance were identified. These two references serve to decide about the intrinsic value of each candidate evaluated by the model.

In the constructed model all descriptors had a qualitative character since they derive from semantic expressions of the decision makers.

Table 3. Descriptor for the Leadership criteria

Area	Criteria	Qualitative Formulation	Qualitative Formulation (abbreviated)	Reference levels
Attitude	*Leadership*	Always get collaboration between people and guide them through your tasks	Always	
		Induces collaboration between people often	Frequently	**Level + (Good)**
		Sometimes it induces collaboration between people	Sometimes	**Level 0 (Neutral)**
		Rarely intervenes to induce collaboration between people	Rarely	

With the construction of the descriptors, ordinal scales are obtained that serve as the next phase the evaluation of the selected alternatives, considering the properties of the context that operationalize the strategic objectives.

3.2. Evaluation

Once Structuring phase is complete, follows the next phase of the model the Evaluation, being composed of the steps: *identification of the alternatives* to be evaluated; construction of *value functions*; determination of *weights and measurement of the attractiveness* of the options.

3.2.1. Identification of the alternatives

In this study, although the team consisted of sixteen elements only a sample of twelve operators was considered, due to the information of the remaining four not being updated in the organization's computer system.

To perform the *On the Job* analysis of the *Skills* and *Attitudes* of the operators to be evaluated, the facilitator of the research followed the teams for two weeks in their day-to-day and pointed out in an *Excel* table the level of the performance descriptor of each operator in each criteria, transposing this data to the M-MACBETH program.

3.2.2. Building Value Functions

The stage of constructing *value functions* according to the MACBETH methodology consists initially of asking the decision-maker(s) to order in descending order of attractiveness the x performance levels of a given descriptor. After this ordering, the decision-maker(s) are asked to qualitatively express the differences in attractiveness between pairs of performance levels of the descriptors developed in each criteria, according to seven semantic categories of the M-MACBETH software.

These qualitative judgments expressed are introduced in M-MACBETH in the matrix of judgments. Once the consistency of the judgments in question has been verified, the software proposes a numerical scale compatible with the absolute judgments of the decision-maker, and each performance level is assigned a score/value. [11]

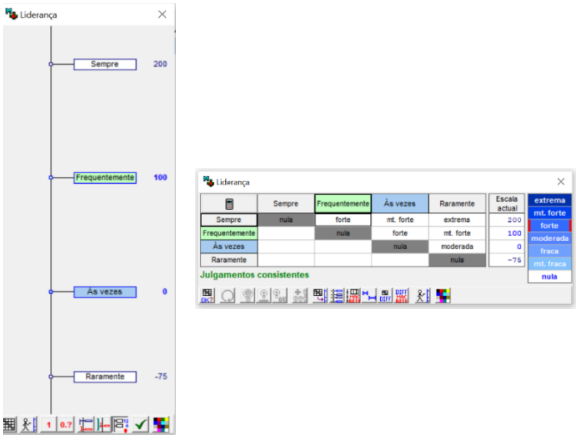
In this study, the final decision-maker was asked to evaluate qualitatively according to their preferences and degree of intensity, through the seven semantic categories mentioned, the difference in attractiveness between performance levels to fill the MACBETH *matrix of judgments*.

An example of an issue through which the facilitator confronted the decision-maker was: - *In the Leadership criteria, what is the difference in attractiveness between the option at the good level (line "Frequently", marked with green background) and the option that is at the neutral level (column "Sometimes", marked with blue background)?* To which the decision-maker replied *strong*.

Through this type of questions, the *matrix of judgments* corresponding to each of the criteria was filled out.

Figure 2 shows the *matrix of qualitative judgments* made by the decision-maker with the respective value function determined by the M-MACBETH software for the *Leadership* criteria.

Figure 2. Matrix of qualitative judgments and respective value function for Leadership criteria, determined by M-MACBETH



Obtaining scale *or value function* in each of the criteria allows to convert performance into value, allowing to measure the attractiveness (and its incremental benefit) of the action at this level.

3.2.3. Determination of Weights

To obtain an overall evaluation and to know the best performance evaluation observed, considering all the criteria (competencies) involved in the model, once the *value functions* for each of the criteria were determined the weights of the criteria could be determined.

The weighting coefficients of the criteria were determined by applying MACBETH based on the two-on-two comparison of 22 fictitious alternatives defined based on the reference levels.

For such a procedure, the decision-maker was asked to order according to his attractiveness, that is, the swing of moving from the neutral level to the good level of the respective fictitious alternative introduced.

An example of the issues applied to the decision-maker for ordering swings according to their attractiveness, throughout this step was: - *If you could only change the performance of the alternative considered in one of the criteria by changing it from the neutral level to the good level, what criteria would you choose?*

Thus, it was possible to identify the most important swing.

In a second phase, the decision-maker issued qualitative judgments concerning the swings considered. For this purpose, the *bottom-up hierarchical weighting* was used, i.e., the judgments were introduced in the hierarchical position desired by the final decision-maker in ascending order (from right to left) of attractiveness.

Once the consistency of the judgments in question has been verified, the software proposes a weight allocated to each criteria and its weighting nodes, associated with the objectives of the problem.

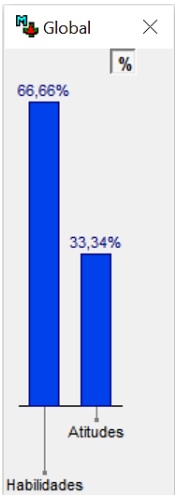


Figure 3 shows that in this study the gain from neutral to good (swing) related to the minimization of structural risk *Skills* will be the main concern of the final decision-maker when applied to an *On the Job* profile in operators. Presenting a weight of 66.66%, i.e., has greater impact when applied to the evaluation of profiles.

Figure 3. Weights in Percentage of *Skills* and *Attitudes*

3.2.4. Options Scores

The weighting procedure of the global scores exported by M-MACBETH of a P_i action with a performance profile $(x_1, \ldots, x_n)$ is based on the formulations of the *Additive Value Model*.

The software M-MACBETH generates the table of calculated scores, where it is possible to analyse the partial and global scores of the alternatives, as well as the weights associated with each of the criteria.

4. Results

The application of the evaluation model for profiles of twelve operators resulted in the scores shown in Figure 5.

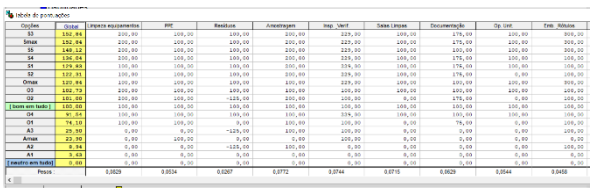


Figure 4. M-MACBETH Software Score Table with *Additive Value Model*

One of the biggest advantages of using M-MACBETH software is that, in addition to allowing a global assessment it allows to analyse and identify where the profile is weak or strong in each criteria. Thus, being able to indicate based on this analysis and with the overall performance value extracted from the critical *On the Job* training needs for each of these employees,

For example, it was observed that the score profile of Operator 2 (O2) shows that this profile although it is good in some criteria has a significantly negative appreciation in the *Waste* criteria.

The model thus identified the profiles of employees who were low from the interval delimited to the *career level*, and those who were in the expected result.

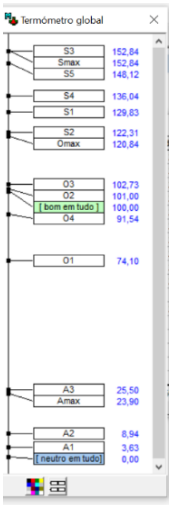


Figure 5. Thermometer with *Global Scores* of the evaluated

4.1. Sensitivity Analyses

Sensitivity Analyses for all criteria were performed for the model validation process.

The sensitivity analyses showed that the ordering obtained hardly undergoes changes between the alternatives compared to decision making process, except for four options that were carefully analysed.

Therefore, it was possible to affirm that the model is considered valid for a correct discrimination of alternatives.

5. Discussion

The built Performance Evaluation Model has high potential to generate opportunities for improvement.

This model is a tool to support the decision-making, for the process evaluation of the performance of the employees of its team and their allocation of resources. Considering, the degree of *skills* and *attitudes On the Job* that is, whenever applicable to the development of projects and being evidenced potential and opportunities for improvement.

Although the model has been proposed based on the area of *Particle Engineering*, its use can be transversal for any department that wishes to obtain the performance evaluation of its employees.

5.1. Suitability in for Future Projects, example

In August 2022 (throughout the multicriteria model construction project), the final decision-maker of the model constructed in this investigation was faced with another challenge of allocating people to new equipment in one of the company's production units, another Spray Dryer (recent area technology).

For this resource allocation problem of a small group of employees, it was not necessary to apply an *additive model* or any more complex procedure (for example, optimization).

So, to make the choice the decision-maker placed used software *Excel*. However, the data (values) filled in the table created correspond to the scores of the *Performance Table* of the proposed model taken from the multicriteria methodology built in MACBETH.

Thus, this new challenge was simpler for the decision-maker to execute, being able to select the operators (end objective) without weaknesses in their profiles in the criteria selected for the execution of the work in this future project.

6. Conclusions

Answered with the fulfilment of the objective of the study: realization and construction of a *performance evaluation model* according to the management of employees' competencies for a Pharmaceutical industry.

For this context, it was adopted the construction of a model with the multi-criteria methodology of decision support that appeared as the most appropriate for possible solution of the problem in question. Since, it will allow the decision-makers the indispensable freedom of choice (decision), based on greater understanding and information in the identification, evaluation, and management of talents.

The MACBETH approach served as an intervention tool for the complexity of the objective's identification process, as well as conflict-of-interest management of stakeholders involved in the problem and in assessing the impact of the decision on the overall outcome.

The work of the case study of this investigation was subdivided into three phases: *Structuring*, *Evaluation* and *Discussion*.

It is important to highlight those discussions between the actors involved in a significant increase in knowledge, providing a global understanding of the problem.

From the MACBETH approach and implementation of the model constructed, with the respective introduction of the data defined in the M-MABETH software it was possible to establish *weights of criteria* and *value functions* from judgments resulting from binary comparison (peer-to-par). Thus, with the M-MACBETH software based on the ordering of criteria and the partial score of the alternatives in each criterion, it became possible to obtain the overall score of each alternative to be evaluated.

This decision support model employs the aggregation operator, which allows the synthesis and structuring of the problem to develop a final recommendation as a result.

The score obtained is the result of a process that allows considering an evaluation of the performance of employees, in this case production operators versus an unstained approach that has been employed in the company in question.

Based on the results obtained from a sample of 12 operator profiles extracted from the model, it was possible to identify for each alternative the weaknesses before each of the evaluation indicators and suggest training needs of the respective employee.

A performance evaluation system should not be seen as a requirement of human resources departments, but rather as a strategic tool for managing the performance of people in organizations. Thus, in the context of operations performance management the designed evaluation model can produce a set of information with strategic purposes between the level of adequacy (result of the evaluation of individual performance) of the *skills* of employees, to the mission of the organization.

Also, it reveals to be a useful procedure with great help in making technical decision-making that allows to have a long-term overall vision.

In short, the knowledge gained in the development of this research paves the way for several hypotheses in future work, namely:

- development of a *model for evaluating organizational performance* specific in other areas, with measurable indicators that provide a diagnosis for the desired organizational success.
- complementation of projects of allocation analysis with the multicriteria methodology of decision support in decision-making contexts of management.

References

[1] Cunha, A., & Silva, L. (2010). Health services accessibility in a city of Northeast Brazil. Article. 26(4):725-37.

[2] Queiroz, L. (2017). Gestão por competências: desafios para a implementação no setor público. Article ISSN: 2175-1897.

[3] A. Lucena and L. Mori, "Uso do Analytic Hierarchy Process (AHP) para Hierarquização de Métodos de Mensuração do Grau de Aplicação da Construção Enxuta," Revista Gestão Industrial, vol. 14, no. 4, pp. 48–69, Oct. 2018, doi: 10.3895/GI.V14N4.7736.

[4] J. Moreira, D. Souza, J. Oliveira, V. Farias, M. Gilda, and P. Esteves, "Gestão do Conhecimento e Memória de Grupo," 2011. Accessed: Oct. 31, 2022. [Online]. Available: https://www.researchgate.net/publication/328281305

[5] K. Legge, "What is human resource management?," Hum Resour Manage, pp. 62–95, 1995, doi: 10.1007/978-1-349-24156-9_3.

[6] H. P. Brandão, "Competências no trabalho: uma análise da produção científica brasileira," Estudos de Psicologia (Natal), vol. 12, no. 2, pp. 149–158, 2007, doi: 10.1590/S1413-294X2007000200007.

[7] Keeney, R. (1992). A Path to Creative Decisionmaking. Book. Publisher : Harvard University Press ISBN-10 : 067493198X (432p.).

[8] Mustajoki, J. (2007). Interactive multi-criteria decision support : new tools and processes for practical applications. Research reports / Helsinki University of Technology, Systems Analysis Laboratory. A, ISSN 0782-2030; 97.

[9] C. A. B. e Costa, L. A. Meza, and M. D. Oliveira, "O MÉTODO MACBETH E APLICAÇÃO NO BRASIL," Engevista, vol. 15, no. 1, pp. 3–27, Jan. 2013, doi: 10.22409/ENGEVISTA.V15I1.484.

[10] M. N. M. Filipe, F. A. F. Ferreira, and S. P. Santos, "A multiple criteria information system for pedagogical evaluation and professional development of teachers," Journal of the Operational Research Society 2015 66:11, vol. 66, no. 11, pp. 1769–1782, Feb. 2015, doi: 10.1057/JORS.2014.129.

[11] C. A. Bana E Costa, J. M. de Corte, and J. C. Vansnick, "On the mathematical foundations of MACBETH," in International Series in Operations Research and Management Science, vol. 233, Springer New York LLC, 2016, pp. 421–463. doi: 10.1007/978-1-4939-3094-4_11/COVER.