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# MDE-S: A case study of the Health Company Diagnostic Method applied in three health units

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**Abstract.** The objective of this study was to evaluate the degree of organizational maturity in three Emergency Care Units (a.k.a. UPA in Brazilian acronym) in a city in the interior of the state of São Paulo - Brazil, with the following fundamental criteria observed: the utility, feasibility, and specialized technical knowledge of the health unit contextualized in this study. The method used was the Health Company Diagnostic Method (MDE-S), which is an approach to study and qualify the level and organizational maturity, that has the fundamental characteristic of providing a cycle of continuous improvement in the company. Among the most relevant results, the study demonstrated, in comparison with a study conducted in Basic Health Units in the interior of the state of Rio de Janeiro, an existent lack of knowledge in health management tools and basic administration fundamentals of the evaluated units. Finally, the study recommends that a strategic system be created for the management and deployment of goals and guidelines, based on Hoshin Kanri. It is considered that, despite the challenges that will certainly occur, this small-scale and well-developed diagnostic system will certainly be useful and may become an important step towards a continuous practice of efficient management in the investigated health unit.

**Keywords:** Maturity · MDE-S · Lean healthcare · Lean hospital

## 1 Introduction

The current scenario of organizations requires that they remain competitive throughout their existence. For Bhagat et al. [1], the reduction of barriers to negotiation between countries imposed by globalization, the use of labor from different countries, administration of a large amount of unstructured data, and the focus on the development of skills for customer satisfaction are imperative

issues for companies to continue to exist. According to Salomão [4], a survey carried out by the Datafolha institute at the request of the Brazilian Federal Council of Medicine (CFM) points out that 93% of Brazilians evaluate public and private health services as terrible, bad, or regular. Among the Public Health System (PHS) which in Portuguese means Unified Health System (SUS), the users, 87% declared themselves dissatisfied with the services offered, according to IBGE [3], in 2015, the final consumption of health goods and services in Brazil were R\$ 546 billion (9.1% of Gross Domestic Product - GDP). Of this total, R\$ 231 billion (3.9% of GDP) corresponded to government consumption expenditures and R\$ 315 billion (5.2% of GDP), expenses of families, and non-profit institutions in service of families. According to Calado et al. [2], companies are at different levels of maturity. The application of lean methods and tools is structured according to the principles and adequacy of the reality of each company. Some actions and programs are not very sustainable because they are out of alignment with strategic decisions. Therefore, with a diagnosis and alignment of goals and guidelines and the proper choice of Lean tools and methods application, a transformation of the production system can be achieved with considerable improvements.

## 2 Method

The method used in this work is based on the MDE- (from Portuguese acronym for Health Company Diagnostic Method), which is a method for studying and qualifying the level and maturity of the company, where the results are observed and evaluated, through the application of a set of methods and tools according to the Lean approach. The MDE-S implies gathering and systematizing information related to different aspects of business management that are not always known to everyone and normally a lot of information is not expressed and used in decision making [2]. The MDE-S, Figure 1, consists of three main axes: Application of the Value Stream Mapping, the Capacity Management Survey, and the Company Diagnostic Survey, emphasizing that self-assessment and the gathering of evidence generate the identification of strengths and weaknesses that translate into possible improvements.

To achieve this study objective, the scope of the assessment was delimited, based on steps 7 to 14 of the MDE-S, except for step 11, in which information was obtained from the health professionals. These data were then categorized and calculated and, after being analyzed, produced the necessary inputs for the formulation of value judgments, presented, finally, in the final considerations and recommendations.

The MDE-S has already been applied to measure the degree of maturity on different occasions. In the central region of Portugal, the MDE-S was applied in a hospital using the Baldrige and LESAT methodology [7] and in three Basic Health Units - (UBS, in the Portuguese acronym) in the state of Rio de Janeiro, by Santos [5].

For MDE-S application in the studied units, was developed software for use in web and mobile platforms (tablets and smartphones) called MDE-S 1.0. The

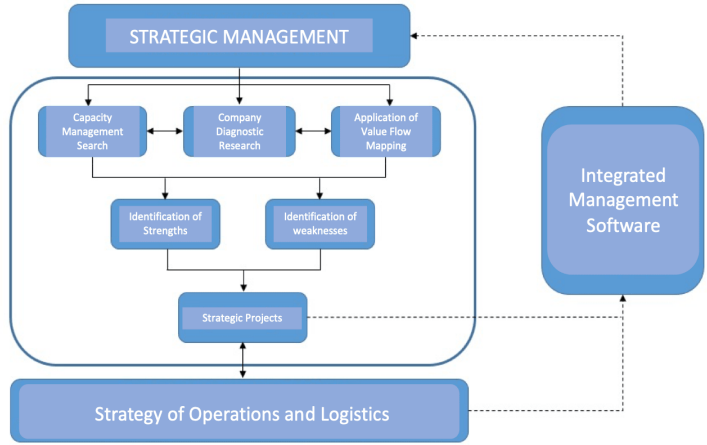


Fig. 1. Health Company Diagnostic Method (MDE-S).

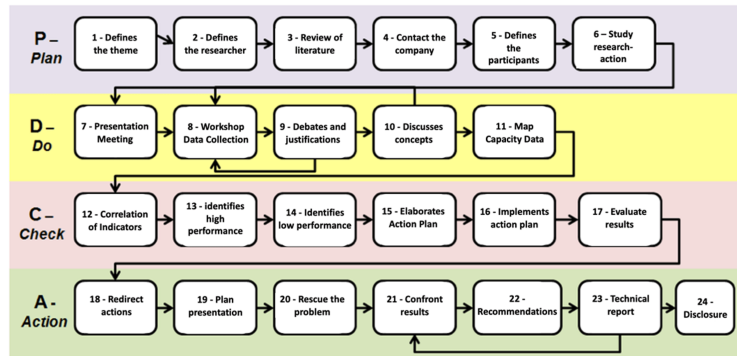


Fig. 2. Structure of the Company Diagnostic Method.

software was based on the combination of two tools: LESAT and the Baldrige Award, which, when combined, make it possible to measure results in terms of the institution’s positioning in practice and performance. In this context, it is relevant to define the concept of practices and performance:

- (a) Practices are the processes implemented in the company/institution to improve business management - that is, they are the management and technological tools implemented in the organization. These include organizational aspects, such as employee involvement and teamwork;
- (b) Performance refers to the measurable results of the processes previously implemented in the organization, such as the volume of material in process, cycle times, and impacts on the business result, such as market share, customer satisfaction level, and employee morale.

### 3 Results and Discussion

This chapter aims to present the results obtained in the study, presenting, simultaneously, the analyzes corresponding to each aspect addressed in it. At this point, it is worth note that all the tables and figures in this chapter are authored by the authors of this study. In this stage of the evaluation, the indicators were verified in eight areas related to the criterion framework presented in the method. These diagnostic areas were analyzed in three Emergency Care Units (UPA, in brazilian acronym) in the city of Guarulhos (São Paulo, Brazil).

To determine a value for practice and performance it was necessary to differentiate a priori the survey topics related to both concepts. After this analysis, it is necessary to calculate the average of both concepts described. The results are presented in percentage numbers for later framing of practices versus performances. To obtain the General Practice and Performance Index of the Unit all PR values were calculated, adding up all the data obtained by the respondent regarding PR and then dividing it by the sum of possible PR scores. The Table 1 below shows a comparison of Practice and Performance of the three units evaluated.

**Table 1.** Average and performance percentage of the units evaluated in São Paulo

Indicators	UPA 1		UPA 2		UPA 3	
	Average (1 a 5)	Performance	Average (1 a 5)	Performance	Average (1 a 5)	Performance
Practices	2,1	41%	3,3	67%	3,3	66%
Performance	2,2	44%	2,7	55%	3,1	61%

The results obtained by each UPA are also presented in the form of a radar graph that allows a more interactive interpretation of the results (Figure 3).

Topics 1 to 7, in Figure 3, concerns the methodology of the Baldrige award. Topic 8 is composed of questions that result from the LESAT methodology. In Figure 3, topics 1 to 6 are composed of questions that intend to measure practices, and topics 7 and 8 relate to performance issues, which allows defining the organization's positioning.

To demonstrate the parameters that the method can compare, it follows the same set of data extracted from the MDE-S in three Basic Health Units – (UBS) located in the state of Rio de Janeiro (Brazil) present in the dissertation “Adoption of Lean practices in the service of public health: an evaluative study”, 2019, shown in Table 2, that unlike the three UPAs in São Paulo, the UBS present in Table 2 were not the object of actions to implement lean management methods in health (Lean Healthcare).

The results obtained by each UBS are also presented in the form of a radar graph that allows a more interactive interpretation of the results (Figure 4).

Figure 4 shows some strengths and weaknesses of the units evaluated. In the Graph, it is explicit that point 8 (regarding the LESAT tool) was not answered



Fig. 3. Results of the eight dimensions analysis by UPA.

Table 2. Average and performance percentage of the units evaluated in Rio de Janeiro

Indicators	UBS 1		UBS 2		UBS 3	
	Average (1 a 5)	Performance	Average (1 a 5)	Performance	Average (1 a 5)	Performance
Practices	2,3	46%	2,4	47%	2,9	59%
Performance	1,7	34%	1,7	33%	2,2	44%



Fig. 4. Results of the eight analysis dimensions by UBS.

by the respondents, with classification note "1" assigned for this topic. It occurs because the units analyzed were not targeted at any Lean transformation before.

For a better perception of the relationship between the organization's position and its ability to answer to the challenges of competitiveness in the market, an analogy with the skill and performance of the boxers was used.

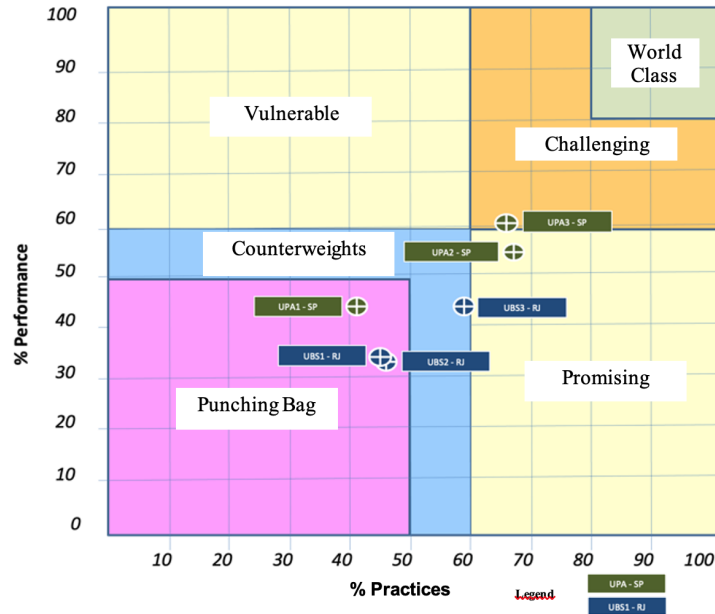


Fig. 5. Boxers' analogy between UPA and UBS.

For the definition of the organizational degree of maturity of the health units contextualized in this study, the classifications defined by Seibel [6] were considered, taking into account the General Indices of Practice and Performance obtained by applying the LESAT x BALDRIGE model. These indices are classified as: (i) Punching Bag; (ii) Counterweights; (iii) Vulnerable; (iv) Promising; (v) Challengers; and (vi) World Class.

In that case, the organizations classified as 'Challenging' or 'World Class' have a High Level of Maturity. Those classified as 'Vulnerable' or 'Promising' have Medium Organizational Maturity levels. Finally, those classified as 'Bag of Punch' or 'Counterweights' have a Low Organizational Maturity index. Figure 5 shows that the level of maturity is higher in UPAs than in UBS. It is worth mentioning that the UPAs surveyed have already undergone Lean Transformation training and assistance.

Figure 6 shows a boxplot that compares the UBS with the UPAs evaluated in the study. The graph shows a characteristic related to the values assigned as scores in the self-diagnosis, showing that the UPAs' results have a smaller range of values once these units have passed by a Lean transformation process.

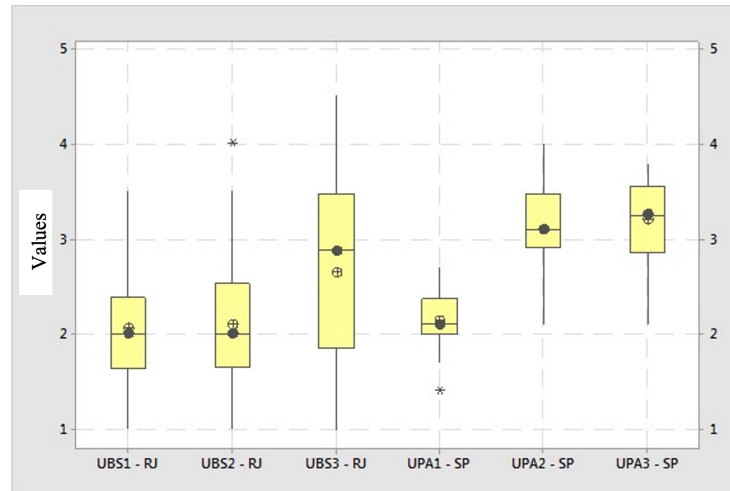


Fig. 6. Comparative Boxplot on Practices and Performance of UPAs and UBS.

## 4 Conclusion

The analysis of the MDE-S allowed elaborating the outline of the entire evaluation. It facilitated a lot in the development of this study showing step-by-step how it should be carried out. The planning phase took the longest, then the data collection phase was delayed a few days due to the collection taking place during the COVID 19 pandemic period, which still did not delay the study progress. In the analysis of the Practices and Performances data, considering the evaluated units, it was found that the Units that have not yet undergone Lean transformation processes (training and on-site assistance in Lean Healthcare) have values and a low level of maturity, besides percentages below 60% for practice and below 60% for performance.

The analysis of the boxers' analogy (Figure 5) helped to bring a quick visualization in which point the UPA was classified in the percentage of practices and performances. It also made it possible to visualize the positioning of the evaluated Unit in a graph. The study showed a lack of knowledge in Lean Healthcare methods and tools, by the managers and employees in Units valued below 60% in the value of Practice and Performance. At this point, it was found that none of these evaluated units has a world-class degree of maturity, that is, 'Elevated'. Two units were located in the maturity classification zone as 'Punching Bag' (UBS1 -RJ, UBS2 - RJ, and UPA1 - SP), and a unit located in the maturity classification zone as 'Counterweight' (UBS3 - RJ), that is, all with maturity degrees classified as 'Low', those that obtained a "Medium" degree were (UPA2 - SP, and UPA3 - SP).

To adopt a new form of management for higher levels of maturity based on Lean principles, it is necessary for the organization, through its workforce,



to accept the change. For this, it is considered the fundamental importance to carry out a process of stimulating motivation concerning this new form of organizational management. It is noteworthy that the entire process of changing the organizational culture needs substantive actions to clarify new goals and that it is desired to achieve and carry out processes to stimulate motivation that leads to the achievement desired. The concept of organizational culture encompasses all practices, habits, principles, and values within an organization. All workforce must understand this culture and share its values. If done properly, the process of understanding and absorbing a relevant change in an organization's culture can positively boost the behavior of its employees about the impacts caused by its implementation.

## 5 Recommendations

A recommendation proposed due this study is the creation of a strategic system for the management and deployment of organizational goals and guidelines. At this point, it is suggested to use a management system based on the so-called Hoshin Kanri because it is considered adequate for the studied context and, also, for having already been used in other contexts, presenting a high-efficiency index.

The second recommendation is the use of the MDE-S before and after training and assistance in Lean Healthcare implementation, that is, during the Lean transformation in Health.

Despite the challenges, the MDE-S is a well-developed diagnostic system and, it can be useful and is the first step to continue good management practices in health facilities. However, in order to adopt this new form of management it is necessary that the organization, through its servers, accept it.

It is noteworthy that the entire process of organizational culture change requires substantive actions to clarify new goals and objectives that one wants to achieve and carrying out processes to encourage motivation that lead to the achievement of what is desired.

The points covered in this article are fully applicable in the units surveyed, where you can comment and/or recommend the following analysis of improvements:

1. Implement a cost reduction strategy combined with the growth strategy through workshops with the management team.
2. Implement the strategic deployment, define goals and objectives for all areas in an integrated and transparent way, if possible with software support.
3. Implement the day-to-day routine management, starting with the work pattern of critical activities and treatment of bottlenecks.
4. Systematize a company's problem-solving method.
5. Implement 5S project and visual management in processes.
6. Develop current and future value stream mapping to guide improvements.
7. Implement autonomous maintenance, leverage TPM, to reduce downtime and involve operational personnel.

8. Develop the multifunctionality matrix.
9. Leverage an ideas plan with direct rewards and leverage the career plan.
10. Develop a training plan for managers and employees to implement Lean Enterprise.

Finally, it should be added that some of the problems founded about performance and operations show the importance of public administration managers becoming more relevant to the development of Lean projects in the health system to promote a culture of continuous improvement centered on care. to the patient, which, in itself, is an important and positive aspect of this work.

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