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Lean Healthcare Readiness Evaluation among Staff in Private Hospital

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Abstract. Lean Management in Healthcare Institution shows several benefit based on evidence both clinically and financially. Some hospital in Indonesia already implemented lean management. In order to achieve sustainability of lean implementation, the hospital have to in the ready level to adopted it. This study aimed to evaluate the lean healthcare readiness among staff in private hospital. Thi sstudy used a quantitative study design with population of all employee in Panti rapih Hospital Yogyakarta. Sample of this study were 100 staff in some units that implemented lean healthcare. This study analysis used fuzzy technique from Lean Readiness Framework Instrument. This study showed that based on fuzzy and Euclidean analysis the readiness level of Panti Rapih Hospital in lean healthcare implementation is Close to ready (6.2 out of 7). This status means that the hospital already implemented lean in all aspect and bring to the daily basis work. The employee also put the patient safety and patient value in the first place. Unfortunately, the relationship between the hospital and the supplier did not have a standardization regarding lean implementation to reduce and eliminate waste in the process.

1 Introduction

The implementation of *Lean healthcare* in several countries has successfully resulted in improvements both financially and non-financially. Financial impact, *Lean healthcare* has an impact, namely an efficiency of £3.1 million at the Royal Bolton Hospital UK, an efficiency of \$107,315 at Hartford Hospital USA, and an increase in *cost savings* up to \$11,000 in a clinic in America (1,2). While the non-financial impact, *Lean healthcare* provides *clinical outcomes* such as a 4.9% reduction in mortality rate at Goodhope UK Hospital, *hospital-acquired infections* 90%increased patient satisfaction and increased employee job satisfaction (1,3).

In Indonesia, several hospitals have used the *Lean healthcare* in improving services, for example studies to identify *waste* and value stream mapping of patient flows (4). However, there are still few hospitals that adopt and make *Lean* as an organizational culture as the philosophy of *Lean thinking*. Making *Lean* a culture requires a process that is fully supported from two sides, namely management and all human resources in hospitals (5).

Panti Rapih Hospital Yogyakarta is a type B hospital with a bed capacity of 380. Panti Rapih Hospital Yogyakarta serves general patients and NHI (National health Insurance) patients. Panti Rapih Hospital Yogyakarta is an open hospital and accepts changes with the

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opening of access to customer complaints and suggestions. The customer complaints to the hospital can be seen in table 1.

Table 1. The Frequency of customer Complaint of Panti Rapih Hospital

No	Complaints Category	Years		
		2015	2016	2017
1	Profession	221	178	220
2	Facility	69	63	90
3	System	157	142	184
4	NHI	-	-	58
		447	383	552

Table 1 informs that customer complaints and suggestions have increased in line with JKN patient services since 2017. Customer complaints are related to services in certain professions, health facilities, management, and processes for patients with National Health Insurance. The increase in the number of complaints and suggestions for all categories in 2017 was 44% from the previous year. This indicates the need for managerial changes to make massive improvements. Panti Rapih Hospital needs to make improvements both in terms of human resources, facilities and infrastructure, as well as the overall system in accordance with the values and preferences desired by the patient.

In order to improve service improvement, Panti Rapih Hospital has implemented *Lean Management* since December 2017. The success and sustainability of *Lean* to become a culture cannot be separated from employee perceptions of the implementation of *Lean* (6,7). Research conducted by (8) suggests that perception is a series of processes carried out by individuals and influences the actions to be taken. The perception of employees in the hospital on a program will affect whether or not the program is implemented. For example, employees have a good perception of patient safety, so in carrying out their duties they will always focus on patient safety (8,9). Positive employee perceptions are also needed in the implementation of lean management programs in hospitals. Previous research by (7) suggests that employees' perceptions of lean adoption in hospitals affect the extent to which the success of lean management adoption in the hospital. The failure of *Lean healthcare* can be caused by *Lean* that focuses only on solving short-term problems without thinking about continuous improvement. The failure that occurred in several public hospitals was due to the perception of *Lean* as a tool for *technical fixing*, not a culture of placing *patient value* as the main goal (10). In addition, another factor causing failure is the unpreparedness of the organization in implementing *Lean healthcare*. Readiness to change plays an important role in the success of a change. To increase the potential results and *sustainability* implementation *Lean*, it is necessary to evaluate employee perceptions of *Lean readiness* in the process of implementing *Lean healthcare* at Panti Rapih Hospital, Yogyakarta.

2 Method

This research uses an explanatory case study research method with a single holistic case study design. The unit of analysis in this research is the *Lean* which is formed and implements *Lean management*. The case study design is suitable to be used to explore problems related to employee perceptions of the implementation of *Lean healthcare* in this study. The population in this study were all employees who were involved in the process of implementing *Lean healthcare* at Panti Rapih Hospital, Yogyakarta. The sampling technique

in this study is a non-probability sample with purposive sampling. This is because the sample incorporated in this study must meet certain criteria so that the answers obtained are representative. The total research subjects for quantitative data were 100 respondents. The inclusion criteria in this study were employees who were directly involved and joined in the lean management implementation team in certain units and employees who had worked at least 6 months in the same unit on lean management implementation. This is done with the aim of the employee understanding the implementation of lean management in his unit. Exclusion criteria in this study were employees who did not understand lean implementation and employees who refused to be participants in the study. This research used LRF instrument (Stakeholder-based Lean readiness framework) to measure how ready an organization is to implement Lean. The LRF instrument assesses two aspects, namely the level of importance and the level of readiness of hospitals in implementing Lean healthcare. This study obtained ethical approval from the Research Ethics Committee of Faculty of Medicine Universitas Gadjah Mada, Yogyakarta, Indonesia (ethical approval number: KE/FK/0496/EC/2019).

3 Result and Discussion

The readiness of Panti Rapih Hospital Yogyakarta in implementing *Lean* management is measured based on the *Lean Readiness Framework* (LRF) by looking at the employee's perception of the level of importance and readiness level on 6 elements and 28 sub-element indicators and analyzed based on fuzzy calculations and *Euclidean* to determine *Healthcare Institution Lean Readiness Index* (HLRI) and analysis of *The Thecnique for Order of Preference by Similarity to Ideal Solution* (TOPSIS) to rank all indicators using these equations:

$$\text{Extent of Readiness of an Element} = \frac{\sum_{j=1}^n (W_j(\cdot)R_j)}{\sum_{j=1}^n W_j} \quad (1)$$

$$d(HLRI, HLR) = \sqrt{\sum_x (U_{HLRI}(x) - U_{HLR}(x))^2} \quad (2)$$

$$CCi = \frac{d_i^-}{d_i^- + d_i^+} \quad (3)$$

The primary data obtained was converted to fuzzy numbers (supplementary data) and calculated using the formula (1) to get the readiness value and readiness level of all indicator elements and sub elements in fuzzy form. Fuzzy form is a set of numbers that have been agreed upon to help provide an objective result of something that cannot be measured mathematically, in this case is perception. Results from the sub element fuzzy is used to determine the average value of readiness for each element (*Average Extent of Readiness*) using the same formula as shown in the table below:

Table 2. Average Extent Readiness

Element	Average Extent Of Readiness			Average Importance Weight			Readiness Level			Readiness Value
LRF 1	5.27	6.27	7.27	0.57	0.71	0.84	3.02	4.47	6.12	4.5
LRF2	5.14	6.14	7.14	0.51	0.67	0.81	2.64	4.09	5.79	4.2
LRF3	4.99	5.99	6.99	0.52	0.67	0.81	2.59	4.00	5.68	4.1
LRF4	5.19	6.19	7.19	0.61	0.74	0.86	3.14	4.60	6.19	4.6
LRF5	5.06	6.06	7.06	0.53	0.68	0.82	2.70	4.14	5.80	4.2
LRF6	5.36	6.36	7.36	0.55	0.70	0.83	2.93	4.42	6.11	4.5
HLRI							5.17	6.17	7.17	6.2

There are six element in LRF instrument, namely leadership and executive team (LRF 1), First line management (LRF 2), Team and Lean sensei (LRF 3), Patient and other customer (LRF 4), Supplier (LRF 5), and Institutional aspect (LRF 6). Leadership and executive team element examine sub elements, they are strategic agenda, Open Structure n and Culture organization, System approac), Lean Position, Know-How, Job Security, and Commitment. First line management element focus on workshop and training, staff knowledge, skill, work culture, respect to other, and resistance to change. The third element, team and lean sensei, focus on expertise, blue print, engangement, and process matrix. Patient and other customer groups element focus on patient empowerment, patient knowledge on lean, and patient participasion. The next element, supplier, focus on supplier participation, work together, and quality of supplier’s products. The last element, institutional aspect, examine evaluation system, past improvement, patient safety and employee safety. The results of the institutional level readiness value of Panti Rapih Hospital Yogyakarta from the six element above is **6.2** with readiness levels of **5.17, 6.17, and 7.17**.

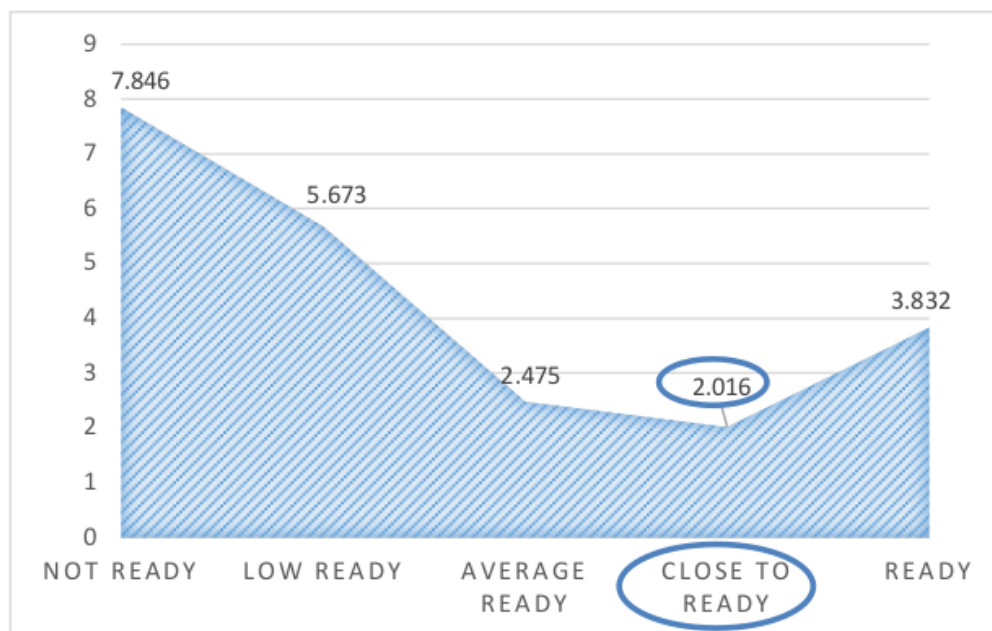
This result then will analysis with *Euclidean* analysis. The euclidean analysis helps to understand the distance between the HLR member set and the HLRI value. In the distance difference found, the lowest value indicates the similarity of meaning between the HLRI value which contains the readiness of health institutions and the linguistic level. While the furthest distance indicates the member set that contains institutional readiness far from the linguistic level displayed.. and the results were obtained as table follow:

Table 3. Institutional Level of Readiness

Linguistic Level	HLR Member Set			D HLRI
Not Ready	1	1	3	7.846
Low ready	1	3	5	5.673
Average Ready	3	5	7	2.475
Close to ready	5	7	9	2.016
Ready	7	9	9	3.832

The calculated HLRI distance from the linguistic level with the determination of the HLR member set. At the linguistic level "close to ready" has the furthest HLRI value of 7.846, this indicates that the perception of employees at the hospital does not (very far) show the "close to ready" phase. ". Furthermore, at the "low ready" linguistic level, it shows HLRI 5,673 this is still considered far because there are values that are closer. So that hospital institutions are

not at the "low ready" level. Furthermore, at the "average ready" and "close to ready" levels, the Euclidean distance is almost close, namely at 2.475 and 2.016. This indicates that the two levels are considered more representative of the actual condition of the hospital's readiness. More specifically, the smallest value is at the "close to ready" level. Meanwhile, at the highest level, namely "ready" the institution has a Euclidean value of 3.832 which means that it is slightly closer to the actual condition. To make it easier to see the distance of each HLR to the ideal solution graphic :



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Figure 1. Level of Readiness Lean Implementation in Pantih Rapih Hospital

Based on the figure 1 it is found that the closest distance on the linguist label for the level of readiness of the Pantih Rapih Hospital is 2,016. This indicates that Pantih Rapih Hospital Yogyakarta has a level of readiness for the implementation of *Lean* management at the level of "close to ready". Stakeholder readiness in implementing *Lean* is one of the determining factors for *Lean* the long-term (11). Of the six elements analyzed, Pantih Rapih Hospital shows that it is at the "close to ready" level. This means that Pantih Rapih Hospital organization as a whole has approached the "close to ready" to implement *Lean* management. The situation and the impact of "close to ready" level can be found in the each element discussion. Each element in LRF that shows the readiness level of Pantih Rapih Yogyakarta is discussed as follows.

LRF 1. The leadership and executive team elements. This element focus on how prepared top management leaders are in facing *Lean* by looking at the structure, strategic agenda, culture, and commitment (12). Top management support becomes important in *Lean*. Without the support of top management *Lean* will not be able to run or even fail. This is because the implementation of *Lean* not only solves technical problems but changes the culture of employees to work more effectively and efficiently. In building this culture, it is necessary to synergize *Lean* with the hospital's strategic agenda, so that *Lean* runs and can be penetrated in all forms of activities in hospitals (12). In addition, the improvements made are often related to changes in the flow, both small and large (involving many units) so that coordination between top management teams is very necessary.

Top management support is also related to the priority of the hospital's agenda on a large scale, for example the procurement of information systems. Almost all units at Panti Rapih Hospital need information system assistance for their improvement process and often involve other cross-structural units so that top management intervention is needed.

The second element in the *Lean* (LRF 2) is the first line management team. In addition to support and commitment from top management, first-line management also plays an important role in *Lean* (13,14). *Lean* management is run by all employees. First-line management has a role in interpreting top management's strategic agendas and policies to employees in technical language. Synchronizing understanding of *Lean* and the hospital's long-term goals is important. First-line management is also required to guide, direct, and encourage employees to be ready to make improvements. The extent to which individuals are involved in the team also depends on first-line management (15,16).

In the improvement process, resistance to change will occur in some employees because they are used to a long work rhythm (13,17,18). This is evidenced by HR skills (LRF 2.3) which have the lowest level of readiness compared to others. In this regard, first-line management must also be able to provide insights and approaches that are suitable for the individual. This has also been done in several units at Panti Rapih Hospital, for example in the logistics and finance department. In the logistics section, *Lean* were initially felt very heavy by some employees. This is because the changes made are very large related to the redesign of several warehouses and changes to the flow of several services. However, with the approach taken by first-line management, one of which is placing the employee's work area into one so that it creates a sense of kinship. In the finance department, changes were also made to several services, such as changing the manual system to SI in the process of inpatient discharge and changes in the payment flow through banks. With the changes that mostly depend on the Information System, some employees, especially seniors, will find it difficult. The approach taken by the team leader is to communicate and share with employees who are more adaptable to IT changes and each do the same for more senior employees (1,19).

The third element (LRF 3) is team and lean sensei. Team and *Lean* sensei elements play an important role in helping to enrich the understanding of *Lean* and provide guidance during the implementation of *Lean* management. Workflows, Roadmaps, and other tools that can help during implementation are provided by *Lean* sensei. implementation roadmap *Lean* (LRF 3.2). This is related to documentation and visualization of how *Lean* is run daily, weekly, or monthly. This is in line with the results of the implementation of *Lean* in the field, which even though it has made VSM very well, the visualization has not been done yet.

The fourth element (LRF 4) is patient and other customers. Elements of patients and other customer groups also contribute to the implementation of *Lean* management. *Lean* itself prioritizes patient value so that it has become a must in the process to involve patients. Patients should understand the flow of services well so that they are able to contribute to the patient's health decisions. Although patient involvement in *Lean* was shown with the highest level of readiness (LRF 4.2). However, the patient's understanding indicator (4.3) has a low level of readiness. It is the responsibility of the hospital to empower patients related to the health service process. So that *Lean* management is not only owned by the hospital but can also be felt by patients directly.

LRF 5 examine on supplier element. The supplier element also has a role in the supply logistics process which is very risky to accumulate *waste* if it is not coordinated properly. The collaborative process must be created well in order to get the quality according to the hospital's needs (6,20,21). Several units at Panti Rapih Hospital that collaborate with suppliers, such as the logistics unit for pharmaceutical and general needs and the administrative unit and work relations in managing employee meals. The unit holds regular

meetings with suppliers and renews the MoU in order to obtain service quality in accordance with *Lean* management principles.

The last element (LRF 6) is related to institutional aspects. This element focuses on the measurement systems, reporting, employee safety and previous changes (3,22). Panti Rapih Hospital before the implementation of *Lean* management also made some improvements, but not massively and structured. This shows that there is a match between the objectives of the *Lean* with the previous program. In this element the data measurement and reporting system (LRF 6.1) has a low level of readiness. This is also related to the absence of an information system that supports real time data for all units. In addition, reporting that is not required to make the team report not routinely but only when there are events such as competitions.

The condition above made management need to increase awareness of the importance of the role and cooperation of suppliers in the implementation of lean in hospitals through regular coordination with suppliers by incorporating the lean concept. It is hoped that suppliers will also understand the hospital's goals in implementing lean so that collaboration can be established based on the lean concept. In addition, it is necessary to develop a road map for lean implementation, both short term, medium term, and long term so that the implementation of lean in each unit is directed and the hospital's improvement achievements can be measured effectively and regularly. In the lean team element, it is necessary to conduct training for employees who have never participated in previous lean training (non-team). This aims to improve human resources skills so that all employees at Panti Rapih Hospital are able to implement lean and become champions in hospitals.

4 Conclusion

Employees' perception of *lean readiness* at Panti Rapih Hospital is "*close to ready*". This means that the Panti Rapih Hospital organization has the power to support the implementation of lean management in the future in six aspects (executive management, first line management, patient, team lean, supplier and institution). Employee awareness about the importance of the supplier's role in eliminating *waste* is still low. In addition, awareness to evaluate their own work is still low. Management needs to improve in several focus areas such as in supplier and lean team elements.

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