

Kaizen in Healthcare: Continuous Improvement in Government Hospital

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Abstract.

Lean management is a concept that is applied to increase efficiency and prevent waste in the production process. Sidoarjo Government Hospital has implemented lean management through Kaizen activities since 2016. Kaizen Festivals were held in 2016 and 2018. However, for four years, there has been no evaluation of the sustainability of kaizen activities. This study aimed to evaluate the sustainability of kaizen activities and identify the influencing factors. Quantitative contingency coefficient analysis was carried out on survey responses. The research was conducted at Sidoarjo Government Hospital involving 20 respondents from 22 total population of the kaizen unit team. Data collection was carried out through a questionnaire filled out by representatives of the kaizen unit team who participated in the Kaizen Festival from 2016 to 2018. The results showed that all 20 respondents participated in the Kaizen Festival in 2016 and 2018, but only 13 (65%) had kaizen activities in 2017. The three-year sustainability of kaizen activities was 85%, the two-year sustainability of kaizen activities was 40%, and the one-year sustainability of kaizen activities was 75%. The factors affecting the sustainability of kaizen activities were the other stakeholder support ($r = 0.707$, $p < 0.05$), the benefits ($r = 0.622$, $p < 0.05$), and the regulatory changes ($r = 0.519$, $p < 0.05$). Meanwhile, the role of the unit leader ($p = 0.531-0.715$), staff support ($p = 0.335-0.666$), and the supervision of top hospital management ($p = 0.188-0.718$) did not have a statistical correlation with the sustainability of kaizen activities. Thus, the most important factor affecting the sustainability of kaizen activities was the other stakeholder support. All units implemented kaizen activities because of the encouragement of the kaizen festival.

Keywords: *hospital, Kaizen, sustainability*

1. Introduction

Lean management is a concept that is applied to increase efficiency and minimize or eliminate waste in the production process(1). Lean management was first developed by companies in Japan, especially automotive companies. Currently, the concept of lean management is not only applied in the manufacturing industry, but can also be applied in companies, health services, and educational institutions(2)(3), (4).

The implementation of lean management is expected to produce more effective and efficient processes, faster services, and lower costs with better service quality(5), (6),(7), (8), (9). Waste is similar to the “iceberg philosophy”, if small waste is not handled properly, it will increase over time

and become a big problem for the service process. Through Kaizen introduced by Masaki Imai, it is expected that the organization can maintain high performance and even win the competition by involving employees(10). Gonzalez-Aleu et al., in their journal, mentioned that organizations experience problems in achieving initial results or maintaining their results in kaizen, as a continuous improvement project(11). Yuksel said many organizations have difficulty in maintaining the expected results of a continuous improvement program(12). Ten high-performing companies are struggling to reach a higher level of continuous improvement maturity(13).

Sidoarjo Government Hospital has implemented lean management starting in 2016 through Kaizen. Internal training was held so that all levels from the general leaders to the unit leaders understood how the kaizen process was carried out. From the training, it was expected that unit leaders could socialize the kaizen process to all staff. Kaizen Festival is held every year as a form of monitoring the implementation of kaizen that has been carried out by each unit.

The Kaizen Festival can be a benchmarking medium for other units so that Kaizen performed by one unit can be replicated by other units. In the Kaizen Festival, the health service unit explains the kaizen activities that have been carried out and the results obtained. During the four years of the implementation of Kaizen, there has been no evaluation of the sustainability of kaizen activities and the factors affecting these activities at Sidoarjo Government Hospital. This study aims to evaluate the sustainability of kaizen activities and identify the influencing factors.

2. Materials and Methods

Research Design, Population, Sample, and Variables

This research was observational analysis research. The population of this study was all health service units (22 units) of the kaizen team that participated in the 2016-2018 Kaizen Festival, but only 20 respondents were willing to take part in this research. This research was conducted at the Sidoarjo Government Hospital, East Java, in September 2019. The independent variables were the role of the unit leader, staff support, supervision of hospital top management, benefits, regulatory changes, and other stakeholder support. The dependent variable was the sustainability of kaizen activities.

Instruments

Data was obtained from questionnaires filled out by respondents. The researchers used a questionnaire of 24 question items consisting of 21 yes/no questions and 3 open-ended questions about the team's expectations. Each independent variable consisted of 3-4 closed questions. In the role of unit leader variable, respondents were asked to answer "Yes" or "No" to the following statements: unit leaders provide solutions or help find solutions when kaizen activities experience obstacles, unit leaders always motivate employees to perform kaizen activities, unit leaders act as role models by applying kaizen to solve problems or improve service effectiveness, and unit leaders always monitor and evaluate Kaizen activities in their units.

In the staff support variable, respondents were asked to answer "Yes" or "No" to the following statements: all staff in my unit understand and are committed to change for the better by implementing kaizen, staff is willing to take the time to participate as a kaizen unit team in addition to their main work, all staff carry out kaizen activities that have been planned by the kaizen unit team even though they are not supervised by the unit leader, and the idea to solve the unit problem comes from the staff.

In the supervision of hospital top management variable, respondents were asked to answer "Yes" or "No" to the following statements: the hospital top management periodically supervises the kaizen unit activities, the hospital top management gives rewards or punishments for the results of supervising the kaizen unit activities, the hospital top management provides motivations to the employees, and the hospital top management provides solutions to the problem of implementing kaizen activities while carrying out supervision.

In the benefit variable, respondents were asked to answer "Yes" or "No" to the following statements: kaizen activities provide benefits to patients/employees/units/hospitals so that services are more effective and efficient or save resources, all unit members feel the benefits of kaizen activities so that

they are willing to do these activities, kaizen activities help employees work easier, and the benefits of kaizen are commensurate with the energy and time allocated for the kaizen activities

In the regulatory changes variable, respondents were asked to answer "Yes" or "No" to the following statements: changes in insurance regulations affect the sustainability of kaizen activities, changes in regulations from the government affect the sustainability of kaizen activities, and employee rotation or reduction made by hospital leaders affects kaizen activities in my unit.

In other stakeholder support variable, respondents were asked to answer "Yes" or "No" to the following statements: patients/doctors/other units support the kaizen unit activities, software development by the IT team affects the success of my kaizen unit, management support (especially financially) makes my kaizen activities successful, and my kaizen activities depend on cooperation from parties outside my unit.

The sustainability of Kaizen activity was measured by asking respondents whether kaizen activities in 2016, 2017, and 2018 continued in 2019. After that, the researchers performed validation by observing the kaizen work unit and looking at physical evidence, asking questions to patients, asking questions to other related units, and examine budget efficiency data and other evidence according to the output of kaizen activities in each unit.

Research Procedures and Analysis

The research has passed the ethical review and obtained an Ethical Approval certificate with No. 893.3/3840/438.6.7/2019 issued by the Health Research Ethics Committee of General Hospital of Sidoarjo Regency. To ensure confidentiality, the names of respondents were coded and the data was stored with a password so that only researchers can open the data. Data were analyzed using IBM SPSS Statistic 25. Statistical analysis used the contingency coefficient correlation test.

3. Results

All respondents (20 units) carried out kaizen activities in 2016 and 2018, but only 65% (13 units) carried out these activities in 2017. The three-year sustainability of kaizen activities was 85%, the two-year sustainability of kaizen activities was 40%, and the one-year sustainability of kaizen activities was 75%. The factors affecting the sustainability of Kaizen activities under study were the role of the unit leader, staff support, supervision of hospital top management, benefits, regulatory changes, and other stakeholder support in carrying out kaizen unit activities.

The role of the unit leader was to direct the kaizen team discussion in the improvement process, motivate staff to implement kaizen, coordinate with other units, and serve as role models for exemplifying the implementation of kaizen. Staff support was the support from the kaizen unit team to carry out the kaizen process and other internal staff to support the implementation of kaizen. The benefits of kaizen activities were the benefits for the unit, patients, doctors, and hospitals. Regulatory changes were defined as changes in government regulations and health insurance affecting the sustainability of kaizen activities. Other stakeholder support such as patients, doctors, and other units (kaizen unit from outside) was also related to the sustainability of kaizen activities. This condition occurred when the kaizen unit activities required the active role of others such as the Information Technology unit, doctors, and patients.

Table 1. Results of Kaizen Unit Sustainability Contingency Coefficient Correlation Analysis with Influencing Factors in Sidoarjo Government Hospital in 2016

Influencing Factors		Kaizen Sustainability		Correlation Coefficient	P-Value
		Yes	No		
Role of Unit Leader	Yes	16	3	0.096	0.666
	No	1	0		
Staff Support	Yes	16	3	0.096	0.666
	No	1	0		
Supervision of Hospital Top	Yes	5	0	0.236	0.278

Management	No	12	3		
Benefit	Yes	17	1	0.622	0.000
	No	0	2		
Regulatory Changes	Yes	1	2	0.519	0.007
	No	16	1		
Other Stakeholder Support	Yes	16	1	0.519	0.007
	No	1	2		

Table 1 shows the beneficial factors, regulatory changes, and other stakeholder support that were statistically and significantly related to the sustainability of kaizen unit activities in 2016. Among those three factors, the benefits of kaizen activities had the strongest relationship (r 0.622) with the sustainability of the kaizen unit activities at the Sidoarjo Government Hospital.

Meanwhile, the role of unit leader, staff support, and supervision of hospital top management was not statistically and significantly related to the sustainability of the kaizen unit activities. The data showed that although the unit leader and staff supported the kaizen unit activities, it did not make the kaizen unit activities sustainable.

Top supervision of the management of the kaizen unit activities was carried out through the Kaizen Festival, which was held once a year and usually in August. In the festival, the unit explained kaizen activities that had been carried out to the hospital top management and they would get a reward. In 2017, 7 units (35%) did not carry out kaizen activities. The results of the questionnaire showed that the reason some units did not carry out kaizen activities was that the hospital did not hold a Kaizen Festival as a form of supervision of the hospital top management. Among the 13 units implementing kaizen, 40% has continued to this day.

Table 2. Results of Kaizen Unit Sustainability Contingency Coefficient Correlation Analysis with Influencing Factors in Sidoarjo Government Hospital in 2017

Influencing Factors		Kaizen Sustainability		Correlation Coefficient	P-Value
		Yes	No		
Role of Unit Leader	Yes	7	4	0.101	0.715
	No	1	1		
Staff Support	Yes	7	5	0.222	0.411
	No	1	0		
Supervision of Hospital Top Management	Yes	0	1	0.343	0.188
	No	8	4		
Benefit	Yes	8	5	-	-
	No	0	0		
Regulatory Changes	Yes	3	2	0.025	0.928
	No	5	3		
Other Stakeholder Support	Yes	8	0	0.707	0.000
	No	0	5		

From table 2, it can be concluded that the other stakeholder support was the only factor that was statistically and significantly related to the sustainability of the kaizen unit activities. In contrast to 2016, regulatory changes were not related to the sustainability of the kaizen unit. The significance value did not come out on the beneficial factors because the data was homogeneous. The role of the

unit leader, staff support, and supervision of the hospital top management were not statistically related to the sustainability of the kaizen unit activities.

Table 3. Results of Kaizen Unit Sustainability Contingency Coefficient Correlation Analysis with Influencing Factors in Sidoarjo Government Hospital in 2018

Influencing Factors		Kaizen Sustainability		Correlation Coefficient	P-Value
		Yes	No		
Role of Unit Leader	Yes	15	3	0.139	0.531
	No	2	0		
Staff Support	Yes	15	2	0.211	0.335
	No	2	1		
Supervision of Hospital Top Management	Yes	4	1	0.081	0.718
	No	13	2		
Benefit	Yes	17	3	-	-
	No	0	0		
Regulatory Changes	Yes	4	0	0.206	0.348
	No	13	3		
Other Stakeholder Support	Yes	16	1		
	No				

Table 3 shows that the other stakeholder support based on the results of statistical tests was a factor that was related to the sustainability of the kaizen unit activities. The significance value did not come out on beneficial factors because the data was homogeneous, while the role of unit leaders, staff support, supervision of hospital top management, and regulatory changes based on the results of statistical tests showed an insignificant relationship with the sustainability of kaizen unit activities.

4. Discussion

Sidoarjo Government Hospital has been carrying out kaizen activities since 2016. The data showed that with the Kaizen festival, the party was motivated to make new kaizen in the unit. The Kaizen Festival was also a form of supervision of top management of the kaizen unit activities. In the festival, the unit explained kaizen activities that had been carried out and assessed by top management. All units carrying out kaizen activities were rewarded according to the results of the assessment. From this assessment, top management decided which kaizen units could be cloned for implementation in all health service units.

In this study, the role of the unit leader is not statistically related to the sustainability of the kaizen unit activities in the last three years. Many studies have stated that the role of the unit leader is one of the keys to the successful sustainability of kaizen activities, not only by being a leader but also as an internal sensei in kaizen (14),(15). Leaders also develop kaizen activities in one unit as revealed by Toledo et al., (16) so Kaizen becomes a habit in that unit(16). The leader directs the kaizen team discussion in the continuous improvement process, motivates staff to implement kaizen (17), coordinates with other units(18),and serves as a role model for exemplifying the implementation ofkaizen (15). Leaders have a role in the successful implementation of kaizen activities, such as management experience and leadership behavior(19), (20). The unit leader strongly supports kaizen activities, but not enough to sustain them. This is due to the lack of ability to face obstacles, such as rejection from patients, lack of budget, and the absence of support from other stakeholders, which makes them stop carrying out kaizen activities.

Problem-solving a unit using the kaizen method begins with a discussion process in the unit between the unit leader and staff to determine the problem to be solved. Next, brainstorming about solution ideas and choosing which ideas are considered to solve the problem. Because it was originated with discussions in the unit itself, problem-solving activities received support from staff and leaders. Staff involvement and team building are necessary tactics in planning and implementing

lean healthcare(21). Hirzel et al., (2017) stated that increasing the level of continuous improvement implementation is positively related to employee empowerment(22). Staff understanding of kaizen, staff commitment to change(11), (17), (18),and training on kaizen affect sustainability(14), (17). However, in this study, it is not statistically related to the sustainability of kaizen unit activities. This condition occurs in kaizen activities that require the involvement of other parties such as support from the information technology team, patients, and doctors, and financial support to carry out those kaizen activities.

Supervision of the hospital top management in the form of the kaizen festival motivates the unit to make new kaizen in the unit. Loh et al., (2019) stated that a leader's action is important to initiate lean activities(23). Sisson and Elshennawy said Kaizen's success must be encouraged from the top of the company(14).Research by Gonzalez Aleu and Van Aken (2018) found that reporting on the progress of the Lean-Kaizen project is a critical success factor with a p-value of 0.00 (11). This can be seen in 2017, in which 35% of the units did not carry out kaizen unit activities because there was no Kaizen Festival in that year. However, the existence of the Kaizen Festival as a form of supervision of the hospital top management is not statistically related to the sustainability of the kaizen unit.This is because supervision is only carried out once a year. Hallam and Contreras, Glover, et al., stated that the lack of implementation, evaluation, and standardization schemes for efforts and follow-up is also an inhibiting factor for sustainability ((23)(24). Respondents expect regular monitoring from the hospital management so that if there are obstacles in the implementation of Kaizen unit activities, especially those related to budget and coordination with other units, solutions can be obtained. This supervision has no statistical effect because no reward system is significantly felt by staff for the success of their kaizen unit. For example, if kaizen activities save budget and the level of patient satisfaction increases, it will not increase the take-home pay. A literature review by Al Balushi et al.,(2014) found that reward is a factor of readiness to encourage continuous improvement(25).

The benefits obtained from the kaizen unit activities have the strongest correlation with the kaizen unit activities in 2016 with a p-value of 0.000. Kaizen unit activities provide benefits for the unit itself, patients, doctors, other units, and hospital managers. The benefits obtained are in the form of budget savings, speed of service time, and savings in the movement of health workers(1). Hallam and Contreras (2018) research stated that the top-five results of kaizen are reduced: waiting time (32.4%), stay (24.3%), and cost (18.9%), and improved: quality (16.2%) and patient satisfaction (16.2%)(26). All these things make the service effective and efficient. Julipriohadi (2015) stated that implementing lean methods has the benefit of increasing activity efficiency up to 43.1%, saving time up to 48%, and cutting mileage up to 71.8% for one patient a day(27). Mendez and Vila-Alonso said that when something we do has meaning, it will then be sustainable(16). In public hospitals, Kaizen activities have benefits such as speeding up service time, saving paper, saving personnel movement, and reducing plastic waste.

In this case, regulatory changes have a negative impact on the sustainability of Kaizen unit activities. These regulatory changes include regulations related to patient insurance, employee rotation, and budget regulations. This is supported by Scrunder's (2018) research which stated that health regulation is indeed one of the obstacles in implementing lean in healthcare(11). This regulatory change has an impact on kaizen activities related to regulation. For example, Indonesia already has national insurance, which is already owned by 80% of Indonesia's population. Therefore, there are many kaizen activities related to these national insurance patients. When there is a significant regulatory change, it can stop kaizen activities. In employee rotation, in which employees who are the main actors in kaizen activities move to other units, it will cause kaizen activities to be unsuccessful. Likewise, kaizen related to changes in government regulations will also automatically stop.

Based on the results of statistical data processing from the 3 tables above, another stakeholder support within three years of implementing the kaizen unit activities is a factor related to the sustainability of kaizen unit activities with the strongest p-value of 0.000. This support can come from management who provides a budget if the unit needs equipment to carry out the kaizen unit activities. Based on Gonzalez Aleu and Van Aken (2018), management support is generally related to the success factor of the Continuous Improvement Project with a p-value of 0.01 (11).With the development of technology, many units carry out kaizen activities using information technology. Information technology team support is urgently needed. A large number of requests for the use of

information technology makes the IT team work overloaded. This resulted in several unit requests related to the use of information technology not being fulfilled so that the kaizen unit activities stopped. Gonzalez Aleu and Van Aken (2018) said that software is related to the success factor of a continuous improvement project with a p-value of 0.03(11). Software availability is also for statistical analysis, project management, process mapping, etc. to support projects(11). Patient and doctor support is also related to the sustainability of the kaizen unit activities, especially kaizen activities involving them. Cooperation and willingness of patients and doctors to participate in kaizen unit activities related to the benefits they receive.

Escuder (2018) stated that the lack of support from management to guide the lean process is a major barrier in lean implementation. Escuder (2018) showed that the other stakeholder support (comparable to unions, stakeholder requirements, and hierarchical structures) is less important for lean implementation (29). These differences can be caused by cultural differences between countries and the types of kaizen activities. All units that stop kaizen activities are because they need support from IT, patients, and doctors as co-partners in implementing kaizen. The kaizen team cannot convince patients and doctors to be involved in their kaizen activities.

Various impacts (implications) have been obtained by Sidoarjo Government Hospital through Kaizen activities such as speeding up service time, saving paper, saving personnel movement, adjusting the workflow of officers to be effective and efficient so as to produce optimal work results, reduce plastic waste, prevent claims that are not paid by insurance, and improve patient safety.

5. Limitation of the Study

The limitation of this study is that the writer did not measure the types of kaizen activities. For example, whether the kaizen activity involves other units or not, what are the subjects, who are the subject of their co-partners, and to whom are the targets. Types of kaizen activities may have correlation with other stakeholder support and benefit. The researcher also did not evaluate more factors that might affect the sustainability of kaizen such as internal stakeholders, management improvements, and resource aspects. Further research is needed to determine the effect of these factors.

6. Conclusion

All units implement kaizen activities because of the encouragement from the Kaizen Festival. The most important factor influencing the sustainability of kaizen activities is the other stakeholders support. The kaizen work culture still needs to be internalized to all unit staff so that even though there is no Kaizen Festival, the unit continues to carry out a continuous improvement process. Kaizen activities involving stakeholders outside the work unit must be well understood by staff regarding the importance of kaizen activities because their support greatly affects sustainability.

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