

Effects of 5S Methodology for Sustaining Kaizen Activity

– Case Analysis on Standstill Conditions –

Jun Yamaguchi

Department of Computer Science
Tokyo University of Technology, Tokyo, Japan
Tel: (+81) 42-637-2523, Email: yamaguchin@stf.teu.ac.jp

Hirokazu Kono

Graduate School of Business Administration
Keio University, Kanagawa, Japan
Tel: (+81) 45-564-2441, Email: kono@kbs.keio.ac.jp

Abstract. Multiple prior studies stress that continued Kaizen activity is conducive to building and maintaining competitive advantage for manufacturing companies. They are trying to continue Kaizen activity through implementing various methodologies. Meanwhile, these research remains unclear on how to select effective type of Kaizen program and how to utilize the program for successful continuity of Kaizen activity. Based on this understanding, the authors focus on necessity of clarifying how to select, implement and utilize Kaizen methodology for continuous Kaizen activity. In this study, cases where 5S methodology (i.e. a workplace organization program for continuous improvement) is implemented, are selected for detailed analysis. The purpose of this paper is to clarify fundamental features and effects for better implementation of 5S methodology for the purpose of continuous Kaizen activity. The paper first analyzes how to implement 5S activity for evading ‘standstill conditions’ when the result of activity indicates some difficulty in its performance. The paper further analyzes how standstill conditions could be identified and prevented from negative result for management outcomes.

Keywords: 5S methodology; management of Kaizen activity; continuous Kaizen activity; process of Kaizen activity; case study

1. Background and Purpose of Study

1.1 Background of Study

Against the backdrop of ever intensifying competitive conditions and increasing risk of heavy investment for further growth in advanced countries, many manufacturing firms are carrying out Kaizen activity positively as a means to improve their competitiveness (eg. ‘Kojo Kanri (factory management)’, October edition, 2005). Sustainance of Kaizen activity is given importance in practical business, and it is a major challenge for many practitioners, including the top management, to continue Kaizen activity and make it part of their corporate culture (Takahara, 2009). Meanwhile, cases are reported in which the activity’s effectiveness diminishes gradually over time. (eg. Kono, 1998a, 1998b).

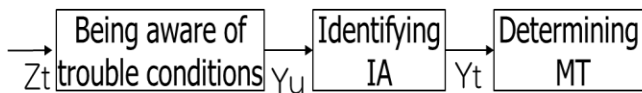
In the prior studies on continuation of Kaizen activity, it is pointed out that *‘However, the process by which this development occurs is not yet fully understood.’* (Jorgensen et al., 2006), *‘these (papers) offer little understanding of how*

failing CI implementations can be redirected, rejuvenated, or revived.’ (Jorgensen et al., 2006), and *‘Many organizations are faced with problems associated with both the implementation and long-term sustainability of their CI programmes. However, the knowledge and research about the long-term development and sustainability of CI is far from exhausted. There are few longitudinal studies of improvement programmes, which analyse CI activities for up to three years.’* (Rapp and Eklund., 2002). That is to say, prior studies have not come up with sufficient suggestions useful for continuing Kaizen activity, and the importance of clarifying the role of management in continuation of such activity has surfaced.

Given such research topic, a research work was conducted in which cases of two companies, where Kaizen activity has been continued over ten years, were analyzed to reveal how they have been successful (Yamaguchi and Kono, 2015). Three points became clear as a result of the research. The first point is that, Kaizen activity is continued when the process is repeated in which combination of specific improvement areas and methods is decided and effects are produced. The

second point is that even in the cases successful in continuing over a long time, as in cases under study, ‘standstill conditions’¹, which can be potential risk in continuing Kaizen activity, occurred multiple times. Examination of where such standstill conditions occurred in the above-mentioned process revealed that there are three time points in Fig. 1-1² (hereafter referred to as points of occurrence of standstill conditions). Based on this understanding, this study suggests that ‘avoiding standstill conditions at different stages --- that is to say, operating the activity smoothly without experiencing standstill conditions, or overcoming standstill conditions when and if they do occur --- is how continuation of such activity should be managed’

Fig. 1-1 : Points of occurrence of standstill conditions



1.2 Problem Awareness of this Study

In reality, investigation into efforts for continued Kaizen activity made by manufacturing firms reveals that, while there are multiple Kaizen methods available, such as TPS (Toyota Production System), QCM (Quality Control Management), TPM (Total Productive Maintenance/Management), Suggestion System and 5S Methodology, those firms introduce various methods independently or adopt some in combination (Sakazume, 2010) or switch from one method to another (Kono, 1998a, 1998b; Nikkei Joho Strategy, 2009 May edition), for promoting or revitalizing their activity.

This situation led authors to consider that it is necessary to clarify what kind of characteristics individual methods have and how activity should be managed for having them contribute to the activity. More specifically, this involves investigation of how characteristics of methods are useful in avoiding occurrence of standstill conditions at different stages (Fig. 1-1).

This is the first study conducted based on the above-mentioned problem awareness, with a focus on 5S activity. The reason why 5S activity was taken up first, of all the methods available, is it is regarded as most important methods by manufacturers to the extent of the following comments: the largest number of companies employ this method together with visualization (Sakazume, 2010); ‘5S provides the

foundation for all management improvement activities of companies (edited by Central Japan Industries Association, 2015); and ‘Basis of manufacturing lies with thoroughgoing implementation of 5S’ (Kojo Kanri, 2010 January edition).

This is how this study was started.

2. Methodology of Study

2.1 Definition of Terms

At the start of the study, three terms, i.e. ‘Kaizen activity’, ‘continuation’, and ‘standstill conditions’, were defined.

First of all, the term ‘Kaizen activity’ refers to all kinds of activity for improvement, not just limited to any specific activity, such as TQC or TPM. It is because it is quite common for manufacturing firms to use combination of multiple forms of Kaizen activity as they continue their effort. While referring to Boer et al. (2000), the term ‘Kaizen activity’ was defined as ‘a systematic³ process which is company-wide, progressive, well planned and organized for the purpose of improving competitive indices of operations, i.e. Q (quality), C (cost), D (delivery) and F (flexibility).’

As regards ‘continuation’, the term is defined as ‘to maintain the process of evolution of Kaizen beyond the general term of personnel in charge and management in their office (around three to five years)’. It is because, for the long-term sustenance of Kaizen activity, the basic requirement is not for such activity to be disrupted or suspended even though promoters or managers may change.

The last term ‘standstill conditions’ is defined as ‘the condition where more than a certain time has passed without the presence of teams/groups who carry out effective activity for promotion of Kaizen activity and for bringing out results’ (Yamaguchi and Kono, 2015). Elapse of time of ‘more than a certain period of time’ refers to either an excess of one month, or when it took some time for progress of activity, as expressed subjectively in interview records, etc., such as ‘at long last (regarding progress)’ or ‘at the end of consideration for a long time’.

2.2 Purpose of Study

The study was conducted for the purpose of clarifying to what extent 5S methodology may contribute to the continuation of Kaizen activity or if it does not, why it is so, and what are prerequisites for contribution. There are three specific purposes as described below.

¹ The term ‘standstill conditions’ is defined as ‘the condition where more than a certain time has passed without the presence of teams/groups who carry out effective activity for promotion of Kaizen activity and for bringing out results’. Details are discussed in 2.1.

² They correspond to arrows shown above Zt, Yu, and Yt in Fig. 1-1.

³ The word ‘systematic’ is used in the definition to mean ‘the state of mutual functions coordinating with each other’.

The first purpose is, after collecting many 5S activity cases, to organize their contents and effects. So-called '5S activity' covers quite a wide spectrum, and it differs in content from company to company. That is why the content of 5S activity in every case was identified together with the effects.

The second purpose of this study is to reveal how 5S activity contributed to the avoidance of standstill conditions in each case. Contents and effects of 5S activity identified in different cases were analyzed to find out in what ways 5S activity was useful in avoiding standstill conditions at three stages of their occurrence. Here, 'avoidance of standstill conditions' refers to both 'smooth progress of activity without occurrence of standstill conditions' and 'overcoming standstill conditions'. The analysis was carried out with an expectation of what type of 5S activity may give what effects at which stage(s) in avoiding standstill conditions.

The last purpose of this study is to clarify prerequisites for 5S methodology to be effective in avoiding standstill conditions, as well as limitations of 5S methodology in continuing Kaizen activity. The former is to present what should be done by the management for 5S activity to contribute to avoidance of standstill conditions. As for the latter, areas where 5S activity fails to bring about effect in avoidance of standstill conditions are identified, as well as to present management activity to make up for those areas.

This study is expected to bring value to both practical business and research. In the areas of business practices, companies which are engaged or plan to be engaged in 5S activity may obtain knowledge about what they can expect and what they cannot from 5S activity in continuing Kaizen activity, and get insight into desirable management. In the areas of research, this study organizes benefits and limitations of 5S activity from the viewpoint of continuation of Kaizen activity. The result, when combined with results of similar study on other improvement methods scheduled to be conducted in near future, will produce the value of systematic organization of benefits and limitations of improvement methods. Organized knowledge thus obtained is expected to present suggestions useful in selection and combined use of improvement methods.

2.3 Subjects of Research

This study examined cases of 5S activity in manufacturing workshops published in journals.

Specifically, 5S activity cases were collected from two journals, which carry many articles on Kaizen activity cases in detail, i.e. 'Kojo Kanri' and 'IE Review', for five years each, totaling 185 copies⁴.

The reason why articles of journals were made subjects of

study matches the purpose of this study, to identify 'what kind of effects can companies which introduced or plan to introduce 5S methodology for continuing their Kaizen activity expect', 'what sort of management is required for producing effects', and 'what cannot be expected from 5S activity'. In order to fulfil this purpose, it was considered necessary to collect information about actual 5S activity in companies extensively, for analyzing how such activity may contribute to the continuation of Kaizen activity, and hence articles carried in journals were examined.

3. Overview of 5S Methodology

3.1 Subjects of Research

At the outset, what has been discussed in the prior studies regarding overview (definition) and effects of 5S methodology (activity) is summarized below.

The term '5S' comes from the first letters of five words in Japanese, that is, Seiri, Seiton, Seisou, Seiketsu, and Shitsuke (Central Japan Industries Association, 2015). According to the website of Keyence Corporation (accessed on June 9, 2016), 5S is explained as follows: '5S is the name of a workplace organization methodology that uses five Japanese words. These Japanese words have been converted in English to Sorting, Setting-in-Order, Shining, Standardizing and Sustaining the Discipline.'

Definition of these five words is as follows (Central Japan Industries Association, 2015). Seiri (Sorting) means to 'sort things out into those which are necessary and unnecessary and dispose of those which are unnecessary'; Seiton (Setting-in-Order) is to 'place those which are necessary in designated places and indicate their locations'; Seiso (Shining) is to 'clean tools and materials around one's own areas as well as workshops'; Seiketsu is to 'maintain things in good order so that anybody looking at them or using them do not feel uncomfortable'; and Shitsuke means to 'abide by rules and discipline in workshops'.

Main features of the activity include that it involves total participation, and that it is useful not just to workshops but also to administrative and indirect work (Central Japan Industries Association, 2015; Echizen, 2009; Ishikawa, 2008; Nishizawa, 2007). While effects of the activity may be expressed slightly differently by different people, wide range of effects are observed as pointed out as 'improvement of corporate image', improvement of efficiency, lead time reduction and sure delivery, reduction of inventory, improvement of quality, eradication of equipment failures, assurance of safety, reduction of cost, organizational vitalization and enhancement

4 As regards the journal 'Kojo Kanri (Factory Management)', a total of 100 copies from 2009 Jan. edition to 2016 May edition were used for the study. As

for the journal 'IE Review', a total of 85 copies from 1999 Jan. to 2016 May were used.

of morale (Central Japan Industries Association, 2015). It should be noted that direct relationships between many of these effects and 5S activity contents are not quite clear. It is also commonly observed that 5S activity helps developing human resources. On the other hand, it was pointed out that there were failure cases of implementing 5S activity, then it was important to realize ‘standarization’ and ‘visualization’ through 5S activity (Central Japan Industries Association, 2015; Nishizawa, 2007).

Identifying ‘Seiri’ and ‘Seiton’ as ‘2S’ (Ishikawa, 2008) and ‘Seiri’, ‘Seiton’ and ‘Seiso’ as ‘3S’ (Echizen 2009) out of 5S, it is suggested that implementing 2S or 3S in the early stages of activity in a thoroughgoing manner is important and that partial implementation of 5S may be called 5S activity.

4. Methods of Analysis

Process of analysis of this study is as follows.

4.1 Search of 5S Activity Cases

First of all, articles on cases of 5S activity were searched from a total of 185 copies of two journals, i.e. ‘Kojo Kanri’ and ‘IE Review’. Key words used in the search were ‘5S’, ‘2S’ and ‘3S’.

As a result, a total of 58 cases were found out⁵.

4.2 Extraction of 5S Activities of Cases and their Direct Effects

Next, concerning 58 cases found in the articles, content

of 5S activities and their effects which ensued were organized into a table.

At this stage, such cases were found in which, despite the description that 5S activity had been carried out, both concrete content and direct effects were not indicated, as well as those cases in which, while content of activities were described, there was no description about their direct effects. It was decided that, where there was no description about the content of 5S activities, and where there was no description about direct effects, the relevant column in the table was filled with ‘Content of activity unclear’ and ‘Effects unclear’, respectively.

Meanwhile, where 5S activity was carried out in stages, activities conducted presumably in the same period were organized into one line, and activities carried out in different periods were shown in separate lines. Content of activity and effects were put together in pair. Thus, for cases in which 5S activity was carried out in stages, both content of activity and direct effects were described in one line for each stage, resulting in multiple lines for each case.

Where there was description of points to be noted during the activity, the content was put in the column ‘Points noted during 5S activity’. Some cases were found to include ripple effects associated with direct effects, in which case such ripple effects were put in the column ‘Ripple effects.’ As regards those cases in which 5S activity alone was considered to be insufficient, the description explaining the condition, as well as that about additional activity planned and/or implemented to supplement 5S activity, were put in the column ‘Limitation of 5S activity and actions taken’. This is how cases were organized into one table (Table 4-1).

Table 4-1: Content of 5S activity and direct effects of cases (excerpt)

ID	Article No.	Journal	Year/Month	Company Name	Line No.	5S?	Content of Activity	Direct Effects	Points noted during 5S activity	Ripple effects	Limitation of 5S activity and actions taken
70	K35	Kojo Kanri	2015/04	Fuso Industry	1	○	<ul style="list-style-type: none"> Starting of systematic 5S 1st step, Seiri To sort things out into those which are necessary and unnecessary, To keep only essential items and eliminate things not required. 	reduction of inventory			
71	K35	Kojo Kanri	2015/04	Fuso Industry	2	○	<ul style="list-style-type: none"> 2nd step, Seiton Actions by top down Set-in-Order: there should be a place for essential items, To be located of essential items at the regular positions throughly 	‘Effects unclear’			
72	K35	Kojo Kanri	2015/04	Fuso Industry	3	○	<ul style="list-style-type: none"> Modelling of Keeping 5S-shape for sustaining Free proposing suggestions for improvement and indicating troubles based on pictures of workplaces 	confirmation of indicated troubles and execution of Kaizen		easier to exchange views, motivation-up to one when one’s view is utilized for Kaizen	

4.3. Analysis of Direct Effects Extracted

This Two types of analysis were conducted on the direct

and ‘IE Review’, respectively.

⁵ 46 cases and 12 cases were extracted from ‘Kojo Kanri’

effects extracted as described above.

The first one is to divide periods impacted by direct effects⁶. A look into direct effects revealed that there were two types of cases: cases in which improvement effects were obtained at the time of conducting 5S activity, although it presumably did not impact on the Kaizen activity which followed (hereafter referred to as effects at the time of implementation); and those in which effects also contributed to the Kaizen activity which followed (hereafter referred to as continued effects). Because of this, effects at the time of implementation and continued effects were separately indicated for each direct effect. Where there were multiple direct effects in the same period and where both items having effects at the time of implementation and those having continued effects coexisted, The Table 4-1 above was modified to separate items with effects at the time of implementation and those with continued effects.

The second analysis involved finding to which points of occurrence of standstill conditions (Figure 1-1) did the extracted direct effects contributed for avoidance⁷. Specifically, with regard to direct effect generated from 5S activity, to which of the three points, i.e. 'Being aware of trouble conditions', 'Identifying improvement areas' and 'Determining methods' did the effects contributed was examined.

What follows is a specific example of this analysis. As part of improvement case of Fundokin Co. (Kojo Kanri, 2011

Apr. edition), there was 5S activity conducted as phase 3 activity, which is to 'determine and post in one place addresses where raw and packaging materials should be placed'. The direct effects generated by the activity are described as follows: 'As a result of managing locations for individual raw and packaging materials, we naturally came to think about appropriate level of inventory, and eventually could reduce inventory of materials and carry out ordering point management.' In this example, clarifying places for putting different materials led people to 'be aware of inappropriate conditions' of current inventory level and ordering method which lied behind it, and thus, contributing to making the level of inventory at an appropriate level an 'improvement area'. As regards the method of reducing the inventory level and that of ordering point management, however, it was not possible to clarify contribution by 5S activity. So the conclusion about the combination of 5S activity and direct effects was that, while contribution was made to 'awareness of problems' and 'identification of improvement areas', contribution to 'determination of improvement method' could not be confirmed.

Where contribution was confirmed by the direct effects from 5S activity, columns of 'awareness of troubles', 'identification of improvement areas' and determination of improvement method' were added in the right hand side of the above Table 4-1, entered the applicable places the 'circle mark' to create another table (Table 4-2.)

Table 4-2: Contribution to the avoidance of standstill conditions points (excerpt)

ID	Article No.	Journal	Year/Month	Company Name	Line No.	5S?	Content of Activity	Direct Effects	...	periods impacted by direct effects	Being aware of trouble conditions	Identifying improvement areas	Determining methods
70	K35	Kojo Kanri	2015/04	Fuso Industry	1	○	<ul style="list-style-type: none"> Starting of systematic 5S 1st step, Seiri To sort things out into those which are necessary and unnecessary, To keep only essential items and eliminate things not required. 	*reduction of inventory	•••	effects at the time of implementation	○	○	○
71	K35	Kojo Kanri	2015/04	Fuso Industry	2	○	<ul style="list-style-type: none"> 2nd step, Seiton Actions by top down Set-in-Order: there should be a place for essential items . To be located of essential items at the regular positions throughly 	'Effects unclear'	•••				
72	K35	Kojo Kanri	2015/04	Fuso Industry	3	○	<ul style="list-style-type: none"> Modelling of Keeping 5S-shape for sustaining Free proposing suggestions for improvement and indicating troubles based on pictures of workplaces 	*confirmation of indicated troubles and execution of Kaizen		continued effects	○	○	

4.4 Result of Analysis

The following five points were found out from the

analysis of the table showing contents of 5S activity and effects for each case (Table 4-2).

The first point relates to the description of column of

6 In 4.2, where direct effects were indicated as (content unclear), they are put outside of this analysis for failure of categorization.

7 In this study, those cases in which 5S activity content was

indicated as (activity content unclear) and direct effects were indicated as (effects unclear), they were put outside of the analysis because of difficulty of analysis.

'Content of Activity' and 'Direct Effect'. There are 12 cases⁸ which both 'Content of Activity' and 'Direct Effect' are 'unclear' in all 58 cases implemented 5S methodology. Moreover, there are also 12 cases which 'Direct Effect' are 'unclear', even though 'Content of Activity' are described. Then, there are limited to 35 cases which were described in both 'Content of Activity' and 'Direct Effect' column. Almost of these 'Content of Activity' and 'Direct Effect' are found to be combinations of 'small scale Kaizen activity' and 'small and steady results'⁹.

The second point relates to characteristics in terms of impact of effects at the time of both implementation and continued given to points of occurrence of standstill conditions. It was found out that in 43 activities out of the total of 50 activities¹⁰ which had effects at the time of implementation, contributions were made to overcome 'awareness of problem conditions', 'identifying improvement areas' and 'determination of improvement methods'. On the other hands, the number of activities in which continued effects can be confirmed is limited to 9¹¹, which is much smaller than that of effects at the time of implementation. As regards points of occurrence of standstill conditions on which continued effects impact, while the number of cases only for 'awareness of problem conditions' was 7, both for 'awareness of problem conditions' and 'identifying improvement areas' was 2. This proves that it is fair to say that 5S activity has effects for contributing to overcoming standstill conditions at all points of occurrence when implementing 5S methodology, while continued effects of avoiding standstill conditions are limited to two points of 'awareness of problem conditions' and 'identifying improvement areas'.

The third point was found out relating to 'points to be noted at the time 5S activity'. 19 cases¹² point out the importance of 'voluntariness of employees' and 'not imposing activity on people'.

The fourth point is about description of 'ripple effect'. Though there are wide variations of description, 6 cases point out the improvement of communication, 4 cases becoming it possible to acknowledge problems.

The fifth characteristic found is that in as many as 18 cases, combined use of 5S activity with other improvement methods or with activity for improvement of business performance based on topics chosen from the management viewpoints was mentioned as 'Limitations of 5S activity and actions taken'. With the second finding of this study, i.e. 'the none of the continued effect of 5S activity to 'determination of improvement method', it is fair to say that implementation of

5S activity is necessary but not sufficient in continuing improvement activity.

The above points were the result of analysis.

5. Discussion

Based on the above results of the study, consideration was given to effects of 5S activity, prerequisites for effective 5S activity and limitations of 5S methodology.

5.1 Effects of and prerequisites for effective 5S methodology to continuing Kaizen activity

As analyzed in 4.4, in the implementation phase, 5S activity contributes to small scale Kaizen activity, although proposes various method of Kaizen in its methodology to lead consistent achievements. On the contrary, in the sustained phase, effects of 5S activity to avoidance of standstill conditions are limited at two points of occurrence, 'Awareness of trouble conditions' and 'identifying improvement areas'. Next, consideration is given to prerequisites for avoiding standstill conditions at these two points in the sustained phase.

First is a question, 'What are prerequisites for causing 'awareness of trouble conditions?' For 5S to help people become aware of trouble/problem conditions, what counts most heavily is for many people to grasp the situation of workshops with total participation. For this to happen, there are two prerequisites, that is, voluntariness of people on the shop floor, and standardization represented by 2S.

Concerning prerequisites for 5S to contribute to 'identifying improvement areas', coordination between different departments and hierarchical levels is vital in leading 'awareness of problem conditions' to 'identification of improvement areas' (Yamaguchi and Kono, 2015). This leads us to conclude that the prerequisite is the presence of 'active horizontal and vertical communication'.

It can be said that 'voluntariness of people on the shop floor', 'standardization' and 'activation of communication' are prerequisites for effective 5S methodology to continuing Kaizen activity.

5.2 Limitations of 5S Activity for Continuing Kaizen Activity

A limitation 5S activity has for continuing Kaizen activity is that it does not have a continued effect of contributing to 'determining methods.' Although 5S activity itself becomes

8 In all of these cases, it was founded out that 5S methodology played an important role of Kaizen activities.

9 As an example, activity of 'designating and clearly marking jigs storage locations' resulted in 'time saving of the looking for jigs'.

10 These 50 activities belong to 33 cases.

11 These 9 activities belong to 7 cases.

12 In some cases, the failures of 5S implementation in the past were concluded to be owing to the inadequate consideration of voluntariness of employees.

tackling methods at the time of 5S implementation in many cases, during the course of continuing activity, its contribution to 'determining methods' is lost as shown by the result of this study. In the cases under study, the comment that '5S of motions and movements and work improvement are necessary' and the statement that '5S is used together with activity for improvement of business performance based on topics chosen from the management viewpoints' are found here and there, but this can be considered as a proof that 5S activity has limited capability in 'determining methods' during the continuation period. Management may be required to change strategies between 5S implementation period and continuation period. This study examined cases of 5S activity in manufacturing workshops published in journals.

6. Conclusion

This study deals with how 5S activity contributes to the continuation of Kaizen activity, prerequisites for such contribution, as well as limitations of 5S activity.

The specific method adopted for the study is: collecting articles on 5S activity cases in journals; organizing contents of and effects produced by those 5S cases; and how such activity contributed to avoiding standstill conditions at points of occurrence of standstill conditions during Kaizen activity.

The result of analysis shows that in the implementation phase, 5S activity is effective in avoidance of standstill conditions at all three points of occurrence. Then, in the continued phase, 5S methodology are effective for developing 'awareness of trouble conditions' and 'identifying improvement areas'. As prerequisites for producing effects for 'awareness of trouble conditions', allowing observation with wide perspective through ensuring voluntariness of people in the workshop, as well as allowing issues/problems to be surfaced through standardization as part of 5S (2S) were identified. It became also clear that for ensuring effect for 'identifying improvement areas', a prerequisite is to vitalize communication between departments and hierarchical levels on the basis of fact-based thinking and visualization of 5S.

A limitation of 5S in continuing Kaizen activity was identified as limited contribution to 'determining methods'. In particular, while 5S activity itself is 'determining methods' at the time of 5S activity, during the continuation period, methods have to be determined out of the framework of 5S, and therefore, there is a difficulty in how Kaizen activity is managed depending on the stages of activity.

Because this study is based on the investigation of articles of journals, it has an issue that it is difficult to obtain detailed information about 5S activity or to confirm effects of activity. On the other hand, it has a benefit of analyzing many cases across the board. This suggests that the study is a hypothetical presentation of contribution and limitation of 5S activity to continuation of Kaizen activity, and that a

demonstrative study on 5S activity cases should be held for the purpose of proving the hypothesis.

Another research topic is to apply the same approach to other improvement methods as the one adopted for 5S activity. It is expected that, by comparing results of different improvement methods, characteristics of 5S activity conducive to continuing Kaizen activity will become clearer.

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