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A Way of Continuous Improvement: Kaizen A Review Paper

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Abstract

The following review paper lets us know about the Kaizen and its importance in today's world. It allows us to understand how Kaizen can be used as a tool to increase productivity of the organization, co-operation among the employees from different levels in the organization. The case study which is included in the paper also highlights that how we can learn and apply different strategies from less successful Kaizen events.

Introduction

This concept is often presented as one of the basic principles of lean manufacturing and total quality management (TQM). there remains inconsistency in the way the concept is described, kaizen is regularly misrepresented as either an endless "free lunch" of improvements that magically appear from workers, or as a mundane application of design schemes and quality (QC) circles. While many insist on the concept's central importance, other influential books on both manufacturing and quality ignore the term virtually entirely. Furthermore, there is considerable confusion and inconsistency regarding the definition of the term in the literature and in practice, as evidenced by the proliferation of terms used as effective synonyms. There is no systematic, empirical evidence as to what kind of Kaizen event designs may be most effective in achieving and sustaining improvements in business performance or human resource outcomes.

What is Kaizen?

After World War II in Japan the foundation of Kaizen was laid as they wanted to rebuild factories and rethink many systems. In 1950 the concept of Kaizen took off. It is used both to improve and streamline company processes and to gain development on a personal level. The Japanese meaning of Kaizen is "small, gradual, continuous improvement" and its English counterpart is "continuous improvement". The Kaizen philosophy focuses on process and results. According to Masaaki Imai, Kaizen can be considered as an umbrella. (Imai, 1986). Done right, it increases human interaction in the workplace, eliminates unnecessary hard work, teaches people to perform quick experiments using scientifically proven methods, and helps eliminate the production of unnecessary waste in business processes. In fact, the main difference between Japanese and Western management is its focus on improving all components of the production and business process, especially on such factors as the stimulation and involvement of workers and middle managers in the decision-making process. The result is process-oriented management with relevant criteria versus result-oriented management focused on control. Management literature often attributes "kaizen" and workforce participation to process improvement. Kaizen is the Japanese word for improvement, which in industry carries the connotation of all the non-contractual and partially contracted activities that take place in Japanese workplaces to improve operations and the environment. Kaizen embodies (is a perfect example of) workforce mobilization and provides employees with a major channel to contribute to the development of their company. Different authors emphasize different key features, but many focus on three key concepts:

(1) that kaizen is continuous—which is used to denote both the embedded nature of the practice and its place on a never-ending path to quality and efficiency;
(2) that it is typically incremental in nature, as opposed to major management-initiated reorganizations or technological innovations (eg, installation of new technology or machinery); and

(3) it is participative, implying the involvement and intelligence of the workforce, creating intrinsic psychological and quality of work life benefits for employees.

Kaizen is closely related to, but not identical to, the idea of QC (Lillrankand Kano, 1989) and TQM, and resonates with many contemporary ideas in management from Nonaka and Takeuchi's (1995, knowledge development and communication) knowledge management to the Balanced scorecard of Kaplan and Norton (1996, continuous monitoring of a wide range processes, see also Bond, 1999). kaizen blitz (Tillinghurst, 1997), when management involves employees in reengineering brainstorming Imai (1986, p. xxix) notes that the concept is "so deeply ingrained in the minds of both managers and workers that they often do not even realize they are thinking kaizen." But later Imai presents kaizen as a pervasive global program that includes TQM and just-in-time and total productivity maintenance (TPM). In their study, Adam Paul Brunet and Steve New define Kaizen as: kaizen consists of pervasive and continuous activities, outside the contributor's explicit contractual roles, to identify and achieve results that are believed to contribute to the organization's goals. Now let's break down the concept by considering two axes: the degree to which kaizen processes are systematized and organized, and the degree to which senior managers specify or influence the themes of kaizen activities. The following four types of activities associated with kaizen are depicted.

(1) "ZD" refers to actions associated with adopting a "zero defect" mindset in an organization in which employees spontaneously and autonomously improve things.
(2) "Proposals" refers to the operation of design schemes that may require considerable organization to process, evaluate and possibly act upon employee suggestions, but for which the topics of the suggestions are determined by specific employee inspiration.
(3) "Policy deployment" refers to the process by which top management's goals and agendas are promoted throughout the organization, which in itself may not require the organization of resulting activities (Tennant and Roberts, 2001).
(4) "SGA" refers to small group activities that form the core of an open kaizen activity.

Quality circles, just-in-time deliveries, automation, design systems, Kanban (a bulletin board as a form of integrated parts supply management) and 5 S are part of the Kaizen system of business management. As a set of principles, Kaizen is often presented in the form of guidelines: 1. Throw away conventional fixed ideas. 2. Think about how and not why it doesn't work. 3. Don't make excuses. Start by challenging current practices. 4. Don't look for perfection. Do it now, even if you only reach 50% of your goal. 5. Correct the error immediately. 6. Throw wisdom at the problem, not money. 7. Ask "WHY?" five times and look for root causes. 8. Seek the wisdom of ten rather than the knowledge of one. 9. Ask workers to apply their knowledge and present solutions to problems they face. Results include:

- Reducing waste in areas such as inventory, waiting times, transportation, labor movement, employee skills, overproduction, excessive quality, and ongoing processes •
- Improving space utilization, product quality, capital utilization, communications, production capacity and employee retention
- Immediate results. Instead of focusing on large, capital-intensive improvements, Kaizen focuses on creative investments that continuously solve large numbers of small problems. The real power of Kaizen is in the continuous process of constantly making small improvements that improve overall processes and reduce waste.

Total Quality Control

Total Quality Control (TQC) involves organizing different activities in a systematic way that would ensure involvement of members across all levels in an organization thus ensuring improvement in the organization as whole. It focuses on improved results in areas which deal with customer satisfaction among the organizations customers. Again, there are contradictions in the concept of innovation between Japanese and Western companies. Innovation in the West is seen as a unilateral, costly and dramatic breakthrough, the results of which are overwhelming. On the contrary, the effectiveness of Kaizen is not immediate, but brings comprehensive and long-term results. At first glance, everything is quite clear and simple - what you need to do is to improve the surrounding processes to make things more efficient. However, the first obstacle that appears on the way to improvement usually starts with a few questions: what to improve, why to improve, who should improve, where to improve, how much to improve, what will it cost. Kaizen answers all these questions. This philosophy emphasizes the high importance of the work environment as a real site of improvement and a source of information about areas for improvement. Anything that creates a waste of resources—time, emotion, financial resources, raw materials, unnecessary steps—could be improved. The Japanese distinguish between Kaizen and innovation: Kaizen is gradual, using small steps, conventional know-how and a lot of common sense, while innovation is understood as The fact that Kaizen, unlike the Western concept of innovation, does not include sophisticated techniques and state-of-the-art technologies, as well as large

investments, is essential from the perspective of SMEs in the current global economic crisis. Another difference in approach between Japanese and Western companies is related to the concept of total quality control (TQC). In Japan, it is based on market entry rather than product output. The Japanese are traditionally sensitive to customer needs, and this is an important aspect of Kaizen as a total quality control strategy. Its customer orientation is therefore essential. This is one of the "secrets" to the success of Japanese products around the world.

Case Study 1

Nippon Steel Corporation (NSC) NSC started experimenting with Kaizen in 1963. Various forms of voluntary activities have been operating since then. The following table shows the chronology of these activities up to 1986 as recorded in company documents.

1. 1963 "Zero-defect" movement was started at hot strip rolling mill No. 1

2. 1965 All factories and mills were put into operation

3. 1966 "ZD" movement was introduced to Tobata Works QC circle activities were introduced to Yawata Works.

4. 1967 Yawata's first presentation conference QCC First presentation conference Tobata ZD

5. 1968 The first meeting of the company's voluntary activity at Sakai Works

6. 1969 Participation in the first convention of JISF voluntary activities 7. 1970 NSC founded. A group leadership seminar was held in Yawata

8. 1971 "CD Activities" (creation and development activities) started at Yawata plants, and the CD Activities Support Council, Secretariat, and Leadership Committee established the first Yawata Conference on CD Activities.

9. 1972 First conference of CD cooperatives of Yawata cooperative societies

10. 1973 luncheon held for discussion between the General Superintendent and Special Prize Winners 11. 1975 The first promoters' conference was held The first floating seminar on a cruise ship lasted two days to celebrate the best CD

12. Contributions

13. In 1976, a CD conference was held to commemorate the 10th anniversary of Yawata Works

14. 1977 activities of the QCC.

15. 1979 Edition of "CD News" Federation of CD groups was established

16. 1980 "CD Report" published "CD Day" established

17. 1984 The first convention of female CD employees

18. The CD performance target was set at four projects per year per group (including at least two related to quality improvement and cost reduction)

19 .1986 The marked "CD activity" was changed to "JK activity" (Jishu Kanri-self-management) The JK conference was held to commemorate the 20th anniversary of Yawata's voluntary activities, and the symbolic mark of JK was redesigned

table 1 Figure 2 shows the rapid development of registered improvement groups in the early stages, with near-universal participation among shop floor workers achieved by 1970 and then declining with the number of employees. It can be seen that the size of the group quickly stabilized and has since remained fairly constant at around seven members.

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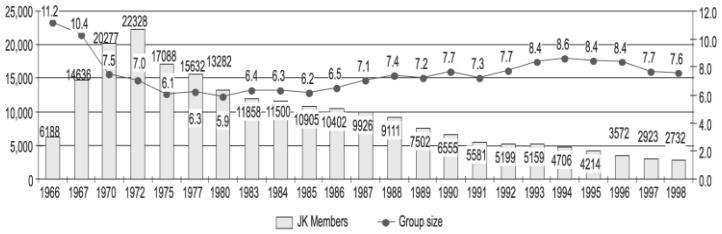


Source: NSC (1993, 1995); Sato (1999)

Figure 1

Starting with "Zero Defects", which changed in 1971 to "CD - Creation and Development Activities" and later to the common name for these activities in the Japanese steel industry "JK - Jishu Kanri", respectively. "self-management" of activities in 1986. This is consistent with comments that the main reason for improvement activities was to enable teams to be responsible for their outputs rather than just dealing with ad hoc quality issues, and is confirmed by the wide range of kaizen style activities carried out in the NSC. This can be seen in the figure which shows side-by-side multiple kaizen activities relative to production work and another figure shows a breakdown of the different topics covered by kaizen.

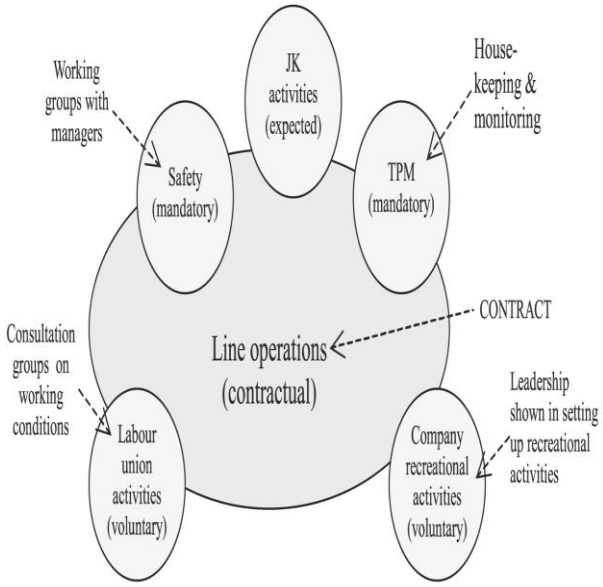
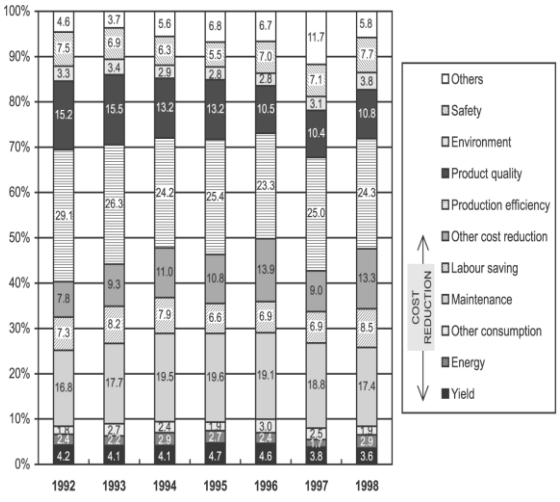


IMAGE OF WORKING ACTIVITIES FOR BLUE_COLLAR WORKERS

Note: light coloured circles represent responsibilities 'beyond contract' adapted to show overlap with routine line operations

Figure 2



Source: NSC (1997, 1999)

Figure 3

Research at NSC revealed how kaizen evolved from shop-floor work teams with rapid growth in participation that matched or even surpassed reports of growth in the quality movement (Nonaka, 1995). However, instead of following the quality movement as a supplementary contribution aimed at improving product quality and work processes, JK activities at NSC are directly integrated into the mainstream of the shop floor management system, providing shop floor teams with the ability to address broad objectives. established through the process of negotiation and implementation of policies. Crucially, the work team structure around which all kaizen activities revolve creates autonomous units that can take responsibility for the challenges of the overall policy planning and implementation process..

CASE Study 2

The following is a case study from a less successful Kaizen event that shows how this case study contributed to organizational learning. The case study organization is a major equipment manufacturer participating in the current research. The case study organization has been running Kaizen events since 1998 and has held events in both manufacturing and non-manufacturing work areas, with a ratio of roughly 70/30 in favor of non-manufacturing areas. We also present a set of methods and measures that can be used by engineering managers and technical management researchers to evaluate and analyze the performance of Kaizen events. With the help of current available knowledge, the results from the implications from the case study are explored along with suggesting an area of future research. As part of the current research, the case study organization collected data from a manufacturing event that occurred in February 2006. The event focused on improving the quality of raw material supplied to manufacturing and will be referred to here as the Raw Material Quality Event (RMQ).

The detailed objectives for the RMQ event are summarized below:

Goal	Result Achieved
1. Standardize the raw material inspection process throughout supply chain	1. Action plan developed - includes plans to designate a single inspection process owner (work group), create standard inspection criteria, and develop standard training.
2. Communicate incoming quality requirements to vendors	2. Action plan developed to communicate standard criteria to vendors
3. Reduce raw material inventory levels	3. Action plan developed to reduce inventory by implementing just-in-time delivery of raw material and a kanban system for safety stock
4. Decrease product throughput time	4. Estimated 59% decrease in throughput time if all changes implemented

Figure 4

There were 11 members in the RMQ event team. All 11 team members completed the Introductory Survey (100% response rate) and 10 team members completed the Report Out Survey (91% response rate). The aim here is not to present all the data collected from the event, but rather to highlight how current research has contributed to a holistic understanding of the event and how the event process could be improved. This is assessed both in terms of the relative levels of the various variables measured in this case study and in terms of the comparison of this event with other events studied in the first phase of a larger research programme.

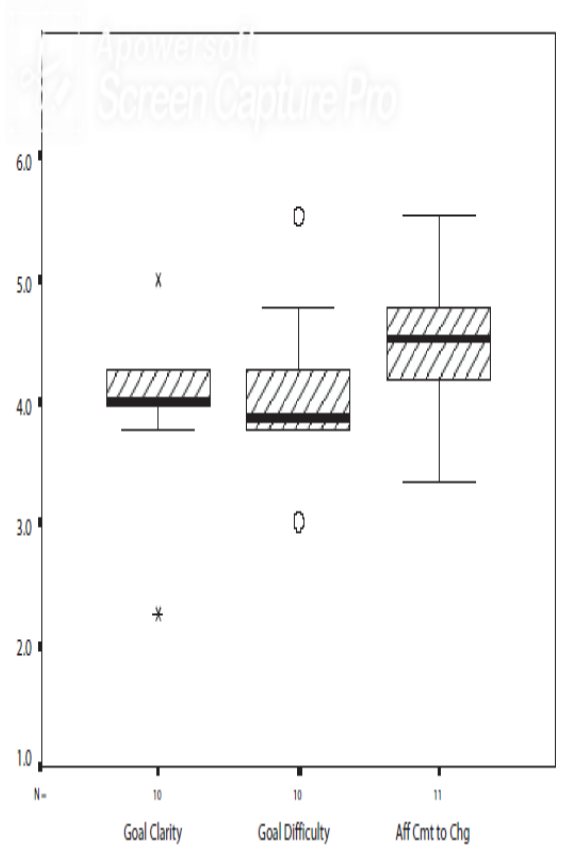


Figure 5

The figure above shows boxplots of team member ratings for the Inception Survey variables, and the following figure shows boxplots of team member ratings for the Report Out Survey variables. In the boxplots, the y-axes indicate the scales of responses to the survey questions. All survey questions used the same 6-point Likert-type response scale (Likert, 1932) (1 = “strongly disagree”, 2 = “disagree”, 3 = “rather disagree”, 4 = “rather agree”, 5 = “agree”, 6 = "I definitely agree"). The x-axes indicate the different survey variables. The median line of each boxplot represents the within-team mean score for that variable, while the box captures 50% of the data and the whiskers capture the upper and lower quartiles. Outliers and extreme outliers are marked with an empty circle and an asterisk,respectively.

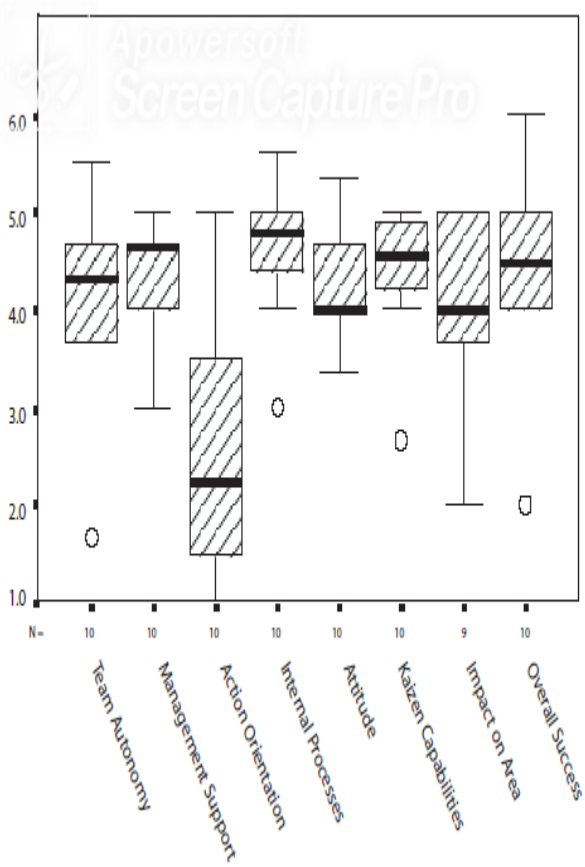


Figure 6

While the next image lists the summary statistics for the Kickoff Survey and Report Out Survey:

	Variable	Median	Mean	Standard Deviation	Range
Kickoff	Goal Clarity	4.00	3.98	0.69	2.25 - 5.00
Survey	Goal Difficulty	3.88	3.98	0.75	3.00 - 5.50
	Commitment to Goals	4.50	4.45	0.59	3.33 - 5.50
Report	Attitude	4.25	4.23	0.63	3.00 - 5.00
Out	Impact on Area	4.00	3.97	1.06	1.75 - 5.00
Survey	Skills	4.25	4.20	0.48	3.00 - 4.75
	Understanding of CI	4.63	4.45	0.81	2.50 - 5.25
	Team Autonomy	4.00	3.88	1.04	1.50 - 4.75
	Management Support	4.40	4.22	0.82	2.60 - 5.20
	Action Orientation	2.75	2.43	0.85	1.25 - 3.50
	Internal Processes	4.80	4.64	0.72	3.00 - 5.60
	Overall Success	4.50	4.20	1.32	2.00 - 6.00

Figure7

The figure above shows the calculated parametric statistics (mean, standard deviation) as well as non-parametric statistics (median, range) for the Kickoff Survey and Report Out Survey scales. Analysis of the distributional properties of the scale-level data for the larger sample of 51 events studied in this research indicated that most of the variables assessed were approximately normally distributed (Farris, 2006), supporting the use of parametric methods. Furthermore, examination of the boxplots (Figure 5 and Figure 6) suggests that the data for the RMQ event were also approximately normal for many variables (e.g., Affective Commitment to Change, Kaizen Capabilities), although skewness was noted for other variables (e.g., team autonomy).

Interpreting Team outcomes:

The figure above shows the calculated parametric statistics (mean, standard deviation) and non-parametric statistics (median, range) for the Kickoff Survey and Report Out Survey scales. An analysis of the distributional properties of the scale-level data for the larger sample of 51 events studied in this research indicated that most of the variables assessed were approximately normally distributed (Farris, 2006), supporting the use of parametric methods. Furthermore, examination of the boxplots (Figure 5 and Figure 6) suggests that the data for the RMQ event were also approximately normal for many variables (e.g., Affective Commitment to Change, Kaizen Capabilities), although skewness was noted for other variables (e.g., team autonomy) . At the time of the initial analysis of the case study, this action was highly successful in terms of "objective" results. An overall statistical study of the data obtained shows that the RMQ event was a preliminary success. However, compared to the larger dataset of 51 events, the RMQ event had the fourth lowest area impact score (bottom 8%), while the average area impact score was 4.94. Even among the 13 only non-realization events is RMQ the event had the third lowest score for area impact, while the average score for non-implementation events was 4.69. Finally, team members' responses to the Attitude and Kaizen ability scales indicate that the event had some positive impact on employees' Kaizen events and employees' continuous improvement abilities (see Figure 7). However, although team members' responses were on the positive ("agree") side of the survey scale, of the 51 events studied in the first phase of the larger research program, the RMQ event had the second lowest score (based on -team averages) for Attitude (bottom 4%) and seventh lowest score for Kaizen Capabilities (bottom 14%). therefore, it is clear that apart from the potential for sustaining gains in employee attitudes and Kaizen skills from participation, the RMQ event was ultimately not a major success (ie, did not directly lead to changes that were then implemented to improve organizational performance). Thus, it is clear that the multiple data sources and measures used in this research provided a more comprehensive picture of the overall impact and success of the event than any of the measures alone – especially if only the raw technical results were examined, as is common practice in published accounts of Kaizen events. This case example highlights the need for multiple measures

of event outcomes (e.g., goal achievement, HR outcomes, perceived success) from multiple sources (e.g., team members, facilitator) to provide a holistic picture of the event, both immediate and brief. term results. After analysing the overall impact of the event and determining that it was a less successful application, the next step was to investigate what factors may have contributed to these results. Identifying barriers to team success In the current research, triangulation was used to evaluate the overall effectiveness of the event. In addition, triangulation of the collected data on input and process factors led to the identification of three main factors that likely contributed to the limited success of the RMQ event, thus suggesting ways in which the organization can improve its Kaizen event process and expand the existing body. knowledge of the effectiveness of Kaizen events. First, the method used to communicate event goals to the team likely resulted in less than optimal goal clarity. Information provided by the event facilitator (via the event information sheet) about the kick-off meeting process indicates that the event sponsor has completed the objectives presentation portion initial meeting and that he used a one-way, top-down delivery format. The sponsor's presentation of the goals did not include any description of the motivation behind the goals (i.e., how the event was identified or what the motivating business issues were) or any interactive discussion of the goals with the team. This way of communicating the team's goals likely made it more difficult to achieve improvement (due to confusion about what improvement was needed), and more importantly, put the team at risk of not meeting sponsor expectations because the expectations did not appear to be clear to the team and the team did not have the opportunity to ask questions, which would clarify or deepen their understanding. One team member stated that the main obstacle to his/her team's success was "[difficult] to focus on our main goal and who would be doing it." Thus, these results suggest that a low level of goal clarity may contribute to the failure to meet sponsors' expectations, even when the "objective" results achieved seem positive. Meanwhile, the results of a statistical analysis of a larger data set suggest that low goal clarity also reduces internal team effectiveness dynamics (i.e., internal processes), which in turn leads to lower levels of attitude and kaizen capabilities (Farris, Van Aken, Doolen, & Worley, 2007). This is consistent with the findings from this case study. Second, the team lacked representation from a key function, which likely limited the fit of the team solution and reducing the likelihood of implementation after the event due to lack of inputs and inputs from the function. Data from the event fact sheet indicates that a key contributor to raw material quality was not represented on the team: the group responsible for actually performing material inspections and thus ultimately responsible for implementing and maintaining changes. Ultimately, this lack of representation led to both team members and management members doubting whether the results of the event were realistic. In describing the team's biggest obstacles to success, one team member stated that "it's not allowed to be realistic' as the biggest obstacle. The second respondent cited "lack of support from process contributors to the team" as one of the biggest obstacles. Finally, one of the individual items related to the Management Support variable in the Report Out Survey is: "Our Kaizen event team had enough help from others in our organization to get our work done." Additionally, in descriptions of the team's biggest barriers to success, one respondent cited "leadership's reluctance to change" as one of the biggest barriers. further indicating the fact that management support for the decisions made during the event (and thus their willingness to empower the team to make changes) was not evident.

Discussion and Future Research

This research shows how a close examination of a less successful case provided a valuable opportunity for organizational learning. The identification of the three factors above that clearly limited the success of a particular RMQ event provided the case study organization with valuable learning information and may ultimately contribute to improving the effectiveness of the organization's Kaizen program as a whole. By identifying three key variables that appear to influence event success, the case study organization can now seek to develop mechanisms that can be used to influence or control these variables. Some of the recommended mechanisms were: communicate with sponsors in advance to ensure an interactive presentation of the team's goals, including an opportunity for the team to ask questions to clarify sponsors' expectations; obtaining management approval to implement a policy of not proceeding with an event without representation of all key functions on the team; negotiating with management to more clearly delineate the boundaries of team authority and develop mechanisms for clearer and stronger communication of management support for team decision-making. The organization has already implemented some of these remedial mechanisms with apparent success.

Summary of Kaizen as encountered

Imai's comment about the ingrained nature of kaizen was considered particularly apt, and recognizing this points to many similarities behind the outward differences; constantly involving the entire workforce in thinking about improvement prepares everyone for change, including that introduced by management; this not only makes adoption easier, but kaizen can be used to fine-tune changes during implementation. The results of Japanese management in recent decades based on the concept of Kaizen have been excellent. Since its inception, Kaizen's importance to enterprises and SMEs has outgrown its original scope in many parts of the world. It is studied at various universities and represents a strategy for companies

that are facing the current economic crisis and need to maintain a skilled workforce by eliminating waste and improving production and management according to Kaizen principles. Kaizen can be time and resource intensive, but it is one of the successful ways to increase an organization's productive output. In addition, failures are also common in Kaizen, but instead of neglecting them, the cause of failure should be thoroughly studied because they also have a huge potential to increase productivity. Even a very small event in Kaizen should be given equal importance because it was able to find the smallest obstacles that could cause the entire program to fail..

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