THE STRATEGIC ROLE OF THE KAIZEN EVENT IN DRIVING AND SUSTAINING ORGANIZATIONAL CHANGE

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Abstract
This paper examines the Kaizen event as a strategic vehicle for organizational change. Specific performance metrics targeted for improvement through Kaizen events are identified and mapped to two strategic frameworks: sociotechnical systems theory (STS) and the Balanced Scorecard (BSC). The paper identifies which metrics have been reported in the Kaizen event literature to date, as well as which dimensions of the frameworks have been addressed. A case example from a large manufacturing organization is used to further explore linkages between Kaizen events and strategic change. Based on gaps in the current literature, the paper concludes with propositions for future research.

Introduction
Lean production is a business model focused on eliminating waste in all areas of an organization, by pulling (rather than pushing) product and information, and through a commitment to continuous improvement and workforce development by all members of the organization (Womack et al, 1990; Womack and Jones, 1996b). While first recognized within the Japanese automotive industry -- as the Toyota Production System (Monden, 1983) -- in recent years, lean principles and practices have been adopted in a wide variety of countries and industries (De Meyer, 1992; Jina et al, 1997).

One implementation vehicle for lean production practices that appears to be currently increasing in use is the Kaizen event (Oakeson, 1997; Melnyk et al, 1998; Bodek, 2002; Bane 2002). Kaizen events are defined as process improvement initiatives that are short-term, team-based, highly action-oriented, focused, results-driven and repetitive in nature (Melnyk et al, 1998). The scope of the Kaizen event is thus highly focused, generally concentrating on a specific process or product line, or part thereof (for instance, setup reduction Kaizen events are generally focused on a single bottleneck machine). Kaizen events are not designed for broad, organization-wide policy or technology changes (Farris et al, 2004). Generally, the targeted process improvement centers on some form of waste elimination (ex. reduction of *work-in-process inventory*, *floor space*, *lead-time*), by using practices commonly associated with the lean toolkit. Some of the lean production tools commonly used in Kaizen events are shown in Exhibit 1.

Exhibit 1. Tools Commonly Used in Kaizen Events

Tool	Description
5S	A formal approach to housekeeping and workplace organization (Melnyk et al, 1998)
Standard Work	A method of documenting guidelines for each job to improve consistency across employees (Berger, 1997)
Single Minute Exchange of Die (SMED)	A method for reducing setup time (Mika, 2002)
Poka-Yoke	A simple, low cost "fool proof system" based on devices to prevent defective parts from being made or passed on in a process (Adams et al, 1997)
Takt time analysis	A method of calculating the production rate needed to exactly match customer demand (Mika, 2002)
Creating cells	Organizing production equipment and personnel in a small, usually U-shaped space to reduce cycle time and increase productivity (Adams et al, 1997)
One-Piece Flow	A production method based on making one unit at a time to exactly meet customer demand (Adams et al, 1997)
Kanban	A manufacturing and inventory management tool used to pull product from one workstation to the next (Mika, 2002)
Total Productive Maintenance (TPM)	The practice of managing physical assets by involving operators and maintenance personnel in equipment cleaning and upkeep, to minimize time lost due to machine failures; "maintenance prevention," rather than "preventive maintenance" (Adams, et al, 1997)

Kaizen events are known by a variety of names in the evolving literature, including: kaizen blitz (Cuscela, 1998); kaikaku (Womack and Jones, 1996a); rapid kaizen (Melynk et al, 1998); breakthrough kaizen (Womack and Jones, 1996b); Gemba kaizen (Mika, 2002); and kaizen workshops (Sheridan, 1997). In this paper, the more general term "Kaizen event" is used to refer to these types of focused, action-oriented waste elimination interventions. Kaizen events typically range in length from two to five days, although some "lightening" Kaizen events are as short as one day (Sheridan, 1997). A Kaizen event team generally consists of six to ten individuals, including employees who work in the targeted area, support groups, management, external suppliers, customers and interested benchmarking partners (McNichols et al, 1999).

The typical phases of a Kaizen event are: "(1) training; (2) documentation of the process "as is"; (3) identification of potential opportunities for improvement; (4) an iterative and immediate process of introducing enhancements and assessing the effectiveness of these enhancements; (5) presentation of results (typically to management); and (6) generation of the 'action list' [for follow-up interventions]" (Melnyk et al, 1998, 70). Unlike some other common improvement approaches, Kaizen teams often have the authority to implement solutions as they are developed, without direct approval from management (Oakeson, 1997; Sheridan, 1997; Laraia et al., 1999). Meanwhile, the output of more traditional process improvement activities is often the presentation of a list of recommended changes to senior management, creating a lag in implemenation of these changes, as well as uncertainty regarding whether the recommended changes will, in fact, be implemented. In addition, the focused and action-oriented nature of Kaizen events creates emphasis on low-cost, low-technology solutions; this focus on improvement without capital expenditure is aligned with the general lean philosophy. By contrast, some process improvement approaches, such as reengineering, concentrate almost solely on technological interventions, which often require extensive capital expenditures (Harrington, 1998).

Most of the published implementations of Kaizen events occur in the manufacturing sector; however, it appears that Kaizen events are equally applicable to the non-manufacturing sector, including knowledge-based industries. Indeed there is growing evidence of the use of Kaizen events in service industries (including education, government, project management and engineering/product development).

In addition to targeted business process improvements, Kaizen events also seek to impact human resources by building employee proficiency in the tools, techniques and tenets of lean production and continuous improvement (Laraia et al, 1999). Therefore, the dual aims of the Kaizen event as an organizational change mechanism are to substantially increase the technical performance of the targeted work area (often by implementing lean manufacturing practices) and to develop the underlying human resource support needed to sustain the changed system and develop future solutions (Sheridan, 1997; Melnyk et al., 1998; Laraia et al., 1999). As previously mentioned, as part of a given Kaizen event, employees participating in the event receive training in the lean production tools and practices they will apply to achieve event goals. In addition, the "hands on," action-oriented nature of Kaizen events can be viewed as a learning laboratory in which employees apply the skills they have just learned. This focus on "just-in-time" training for Kaizen events is a contrast to the more traditional TQM/Continuous Improvement process improvement approach, where employees generally engage in the improvement initiatives using only the knowledge they already possess (although this prior knowledge can come from previous training in the quality tools to be applied in improvement activities) (Jha et al, 1996). The human resource aspect of Kaizen events is especially important, since employee training and skill development has been cited as a factor necessary to generating and sustaining organizational improvement (McGarrie, 1998; Gulbro et al, 2000; Jha et al, 1999; Beckett et al, 2000). Additionally, organization-wide benefits cited by the evolving Kaizen event literature include: increased cooperation and improved communication across departments and work functions (Mika, 2002).

The extant literature therefore suggests that Kaizen events are a flexible and well-rounded organizational change mechanism capable of driving improvement both at the more short-term focused process level and the longer-term focused organization level (by synchronous improvements to multiple processes and by driving change in organizational culture through employee Kaizen event participation). However, the existing Kaizen event literature is lacking in structure. The majority of the literature is anecdotal, consisting of results from companies who have implemented Kaizen events (Sheridan, 1997; Cuscela, 1998), and design recommendations from parties that facilitate Kaizen events (Mika, 2002; Laraia et al, 1998). The types of improvements resulting from Kaizen events do not appear to have been investigated systematically. There appears to have been little examination across the existing literature to identify the types of improvements most often achieved through Kaizen events, or to assess the "balance" of these measures under multiple strategic frameworks. While technical process improvements have been reported in the literature,

albeit anecdotally, human resource results appear almost completely neglected to date (Farris et al, 2004; Miller, 2004).

This paper seeks to add to the existing Kaizen event literature by clearly identifying and examining the types of changes (performance metrics) targeted by Kaizen events. The balance of such changes is assessed using both the sociotechnical systems (STS) framework and the Balanced Scorecard (BSC) framework. The STS framework assesses balance across two dimensions: technical and social systems (Appelbaum, 1997). The BSC framework assesses balance across four dimensions: financial measures, customer measures, internal (process) measures and innovation/growth measures (Kaplan and Norton, 1996). The results of these assessments are used to identify measurement gaps in the current literature and propositions for future research.

The Role of Kaizen Events in Organizational Strategy

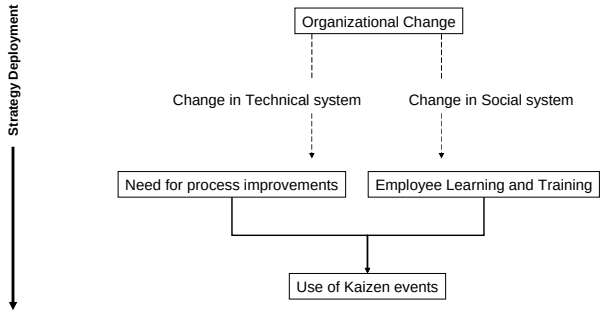
The first theme of this paper is to identify how Kaizen events ususally fit into organizational strategy. Athough there is no indication that Kaizen events cannot be used as a more *ad hoc*, problem solving (trouble shooting) tool, many sources in the current literature support the use of Kaizen events as an action-oriented tool to systematically deploy organizational strategy (Laraia et al, 1999, Melnyk et al, 1998) .

The types of strategic changes targeted by Kaizen events include both technical system changes (to be achieved in the shorter-term) and social system changes (to be achieved in the longer term, through Kaizen event participation). Exhibit 2 depicts the hierarchal structure of strategy deployment through Kaizen events. The top level reflects the desire for change within the organization; Kaizen events are the implementation vehicle for this strategy (bottom level).

It is critical that the strategy be deployed into actionable initiatives (Carpinetti et al, 2000). Policy deployment is a systematic method of identifying organizational improvement initiatives and cascading the implementation of these initiatives to lower levels of the organization (Lee et al, 1998). Policy deployment has also been described as the application of the plan-do-check-act cycle to the planning and execution of strategic organizational objectives. The success of the policy deployment process depends on senior management leadership and effective communication throughout the process (Lee et al, 1998).

In the policy deployment process, the organization begins with strategic-level goals (strategic objectives or key performance areas). These are then deployed down into actionable objectives (improvements in performance metrics). One deployment strategy for achieving actionable objectives is the Kaizen event. Goals for Kaizen events can be set to reflect the desired level of improvement in performance metrics for a given process. A series of Kaizen events in a given work area can also be used to more incrementally achieve desired change.

Exhibit 2. Hierarchy of strategy deployment



Measuring the Impact of Kaizen Events

Performance measurement is critical to the implementation and sustainability of improvement initiatives (McGarrie, 1998; Gulbro et al, 2000; Kaye and Anderson, 1999; Beckett et al, 2000). The following two sections examine and assess the balance of the performance metrics targeted for improvement through Kaizen events. STS and BSC are examined separately as assessment frameworks.

While the current literature review does not claim to have identified all published Kaizen event results (the intent is to provide an overview of the types of results published, not an in depth examination of each published case study; meanwhile, the body of Kaizen event knowledge is rapidly evolving), it does provide a more systematic and structured comparison of published outcomes across multiple companies than the authors have encountered to date. In addition, to the authors' knowledge, this is the first attempt to systematically examine the balance of the performance measures targeted for improvement through Kaizen events.

STS assessment

A sociotechnical performance intervention focuses on the joint optimization of both social and technical system outcomes (Gerwin and Kolodny, 1992). The technical system consists of the equipment and processes (e.g., technology) used to produce the core outputs of the organization, while the social system consists of the human resources used within core and supporting work processes (Fox, 1995). As previously mentioned, Kaizen events can be considered a STS intervention, since these events seek to jointly impact

both the technical and social systems. Thus, it is imperative that STS be applied to evaluate process improvement outcomes. Traditional methods for achieving organizational change are often more technology-focused, neglecting to jointly design and measure social system impacts. This unbalanced approach often leads to mediocre performance at high social costs, since technical components are designed first, and then people are asked to adapt to the technology (Appelbaum, 1997). If Kaizen events are employed within organizations in a balanced manner, one would expect to see organizations jointly tracking (that is, measuring) both technical and social system outcomes. However, an examination of the current Kaizen event literature reveals that technical outcomes have been measured far more extensively than social outcomes (which often have not been formally measured at all).

Exhibit 3 depicts the metrics most commonly found in the current literature review as those used by the companies to measure the impacts of Kaizen events. While the number of companies considered for this research is somewhat limited (i.e. 20), the literature review does suggest a trend in the types of metrics used to measure impacts. It appears that technical system measures (such as *productivity*, *lead-time*, *WIP* and *floor space*) reduction are the primary metrics used by companies; meanwhile, few companies appear to empirically measure Kaizen event impacts on social systems (e.g., *labor turnover*, *value added per employee*, *employee knowledge*, *attitudes* and *skills*, etc).

Exhibit 3. Frequency of Metric Citations

Metric	Number of Citations
Productivity	15
Lead-time	9
Floor space	7
WIP	7
Setup time/loading time	4
Market share/throughput	4
Walk time/parts travel time	4
Defect rate/quality issues	4
On-time delivery/customer wait time	3
Product prices	2
Product line diversity	2
Ideas generated	2
Labor turnover	2
Value added per employee	1
Employee satisfaction	1

Technical system impact. An examination of the current literature reveals that technical performance metrics commonly targeted for improvement include: *productivity*, *work-in-process* (*WIP*), *floor space*, *throughput*, *lead-time*, *set-up time*, *part travel time*, *percent on-time delivery*, *defect rate*, *throughput and product design measures* (*price*, *product line diversity*, *etc.*) Exhibit 3 summarizes the performance metrics used to track technical system improvements from Kaizen events, as reported by different companies in current, anecdotal literature reviewed for this research. The objective of the table was to provide a brief summary of the performance areas (metrics) targeted by Kaizen events, as well as the relative frequency of citation in the existing Kaizen event literature.

Productivity, simply defined, is total output divided by the total input (Misterek et al, 1992). In improvement initiatives, an increase in *productivity* indicates a more efficient use of resources. Therefore *productivity* is commonly used as a metric to examine the effectiveness of a given Kaizen event. Previously published (anecdotal) results indicate gains ranging from incremental (around 10%) to orders of high magnitude. For instance, AlliedSignal Inc.'s jet engine manufacturing facility achieved an 885% *productivity* increase through one Kaizen event (Sheridan, 1997) and Dana Corp. published a 400% increase (Cuscela, 1998). Other published *productivity* improvements from Kaizen events include: 60% by Moore Products Company (McNichols et al, 1999), 51% by Cooper Automotive-Wagner Lighting (Taninecz, 1997), 45% by Pella Corp (Sheridan, 1997), 43% by Australian Die Casting (Rusiniak, 1996), 41% by Australian Wiring Systems (Rusiniak, 1996), 33% by WABCO (Oakson, 1997), 30% by Standard Products Co. (Sheridan, 1997), 23% by Freudenberg-NOK (Vasilash, 1997), 20% by Landscape Structures Inc. (Smith, 2003), 19% by Baxter Healthcare (Creswell, 2001), 12% by Mercedes-Benz do Brazil (Oakson, 1997) and 12% by Pentair (Seikman, 2002). In addition, WIKA Instruments Inc. reported a *productivity* improvement range of 15-30% from Kaizen events (Anonymous, 2002).

Work-in-process (*WIP*) is an indirect measure of two factors, inventory levels and process efficiency. Though *WIP* does not include raw material and finished goods, it does show the amount of material that is currently being processed, and is therefore a count of the "average" number of pieces (undergoing some stage of processing) in a given process at any given time (Dickeson, 2002). Once improvements are effected, lower *WIP* indicates a better process structure, and therefore *WIP* is commonly used to measure process improvements. Published *WIP* improvements (percentage reductions) from Kaizen events include: 89% by AlliedSignal Inc. (Sheridan, 1997), 85% by

Standard Products Co. (Sheridan, 1997), 82% by WABCO (Oakson, 1997), 81% by Australian Die Casting (Rusiniak, 1996), 77% by Australian Wiring Systems (Rusiniak, 1996), 75% by Dana Corp. (Cuscela, 1998), 74% by Black & Decker Corp. (Sheridan, 1997), 50% by Pella Corp (Sheridan, 1997), approximately 50% by WIKA Instruments Inc. (Anonymous, 2002) and 35% by Freudenberg-NOK (Vasilash, 1997).

Floor space depicts the square footage of facility space dedicated to a given process or part of a process (generally including associated storage area). Reductions in *floor space* due to Kaizen event-based improvements are another measure of effectiveness. Improvements in floor space are often linked to the implementation of 5S through Kaizen events. The practitioner literature suggests that the first Kaizen events in most companies often center on 5S implementation; therefore, *floor space* may often be one of the first metrics used to evaluate the successfulness of a Kaizen event program. As a metric, *floor space* is not only confined to the shop floor, but is also frequently used in office, storage and other non-manufacturing work areas. The current literature review indicated published reductions in *floor space* ranging from 39% (Sheridan, 1997) to 94% (Cuscela, 1998). Other published improvements in *floor space* from Kaizen events include: 50% by Forma Scientific Inc. (Sheridan, 2000), 50% by Moore Products Company (McNichols et al, 1999), 50% by Aeroquip-Inoac (Hasek, 2000), 40% by Freudenberg-NOK (Vasilash, 1997), and 25% by WIKA Instruments Inc. (Anonymous, 2002). In addition, some companies reported *floor space* improvements in terms of square footage saved. For instance, Pentair reported a savings of 112,000 square feet through Kaizen events (Siekman, 2002) and AlliedSignal Inc. saved over 2000 square feet through Kaizen events (Sheridan, 1997).

Lead-time is defined as the amount of time, which is required to meet a customer demand (iSixSigma LLC, 2004). The current literature indicates that companies have achieved significant *lead-time* reduction through Kaizen events, often reducing product *lead-times* from days (or even weeks) to hours. For instance, Lantech reduced *lead-time* for its stretch-wrapping equipment from eight weeks to approximately 12 hours (Redding, 1996). Published *lead-time* reductions from Kaizen events include: 97% by Moore Products Company (McNichols et al, 1999), 92% by Landscape Structures Inc. (Smith, 2003), 84% by Baxter Healthcare (Creswell, 2001), 75% by Freudenberg-NOK (Vasilash, 1997), 73% by Australian Wiring Systems (Rusiniak, 1996), 63% by Mercedes-Benz do Brazil (Oakson, 1997), 60% by Pella Corp (Sheridan, 1997) and 54% by Australian Die Casting (Rusiniak, 1996).

Setup time is the total time required to change settings and tooling from one production run to another (Samaddar, 2001). Reducing *setup time* is a key factor in allowing smaller lot sizes, and thereby increasing production flexibility and reducing product *lead-time.* (Thus *setup time* can often be a driver for *lead-time*). SMED is the methodology commonly used in Kaizen events to reduce *setup time*. Published *setup time* improvements include: 83% by Dana Corp. (Cuscela, 1998), 80% by Technimark (Bane, 2002) and 39% by Australian Wiring Systems (Rusiniak, 1996). Some companies also reported the magnitude of *setup time* reduction. For instance, WABCO reported a reduction in *setup time* from four hours to 20 minutes (Oakson, 1997). Meanwhile, Cooper Automotive-Wagner Lighting reported a reduction in *setup time* from approximately five hours to less than one hour (Taninecz, 1997). Some types of service organizations use the term *loading time* to measure the same phenomenon in a non-manufacturing environment. A Chicago based shipping firm reduced its *loading time* by 87% using Kaizen teams (Bane, 2002).

Part travel time is the time taken by a product to travel through the entire process. It does not involve actual processing time or waiting time, but is used to measure the effectiveness of facility planning and housekeeping in a company by tracking travel time. A lower *part travel time* indicates that the facility or process has been planned more effectively, so as to reduce non-valued-added time consumed by travel. 5S implementation is one tool used to reduce *part travel time (o*ften by reducing *floor space).* One example of improvement in *part travel time* achieved through a Kaizen event was a 97% reduction achieved by Dana Corp. (Cuscela, 1998). Other published examples include: an 80% reduction by Aeroquip-Inoac (Hasek, 2000), an 80% reduction by Moore Products Company (McNichols et al, 1999) and a 49% reduction by Australian Wiring Systems (Rusiniak, 1996) A related metric is *employee walking distance* (distance the employee physically travels within a given time period as part of his/her job).

Percent on-time delivery tracks the percentage of shipments received by customers by the expected date (Kumar, et al, 1992). Since the entire concept of lean manufacturing is based on takt time – that is, exactly matching the production (supply) rate to customer demand – percent *on time delivery* can be a prominent indicator of how effective Kaizen events have been in implementing a stable lean production environment. Example improvements in *percent on-time delivery* achieved through Kaizen events include on-time delivery percentages above 99% obtained by Aeroquip-Inoac (Hasek, 2000) and Baxter Healthcare (Creswell, 2001). A related metric is *customer wait time for delayed shipments*. Technimark reported a 70%

reduction in *customer wait time* through Kaizen events (Bane, 2002).

A reduction in *defect rate* (e.g., percentage of parts that are defective) is a direct measure of the improvements in quality that have resulted from a given Kaizen event. Increased quality often can be attributed to process improvements and/or more motivated, skilled and disciplined employees (Carlopio and Gardner, 1996). One example improvement in defect rate from Kaizen events was a 75% reduction in defects achieved by Landscape Structures Inc. (Smith, 2003). Another example is an 84% reduction in defects by Freudenberg-NOK (Vasilash, 1997) and a 50% reduction by Aeroquip-Inoac (Hasek, 2000). Related measures included *scrap cost* and *rework cost*. For instance, Cooper Automotive-Wagner Lighting reduced *scrap cost* by $60,000 through a Kaizen event (Taninecz, 1997).

Throughput is the amount of product produced by a process over a given time period (Goldratt and Cox, 1992). Published improvements in *throughput* from Kaizen events include a 185% improvement by Aeroquip-Inoac (Hasek, 2000) and a 69% improvement by Mercedes-Benz do Brazil (Oakson, 1997). A related volume measure is *sales income* or *market share*. These metrics can often serve as indicators of the overall effectiveness of a Kaizen event program. Some examples of improvement from the Kaizen event literature include Lantech, which doubled it sales since beginning using Kaizen events (Redding, 1996) and Freudenberg-NOK, which tripled its sales since introducing Kaizen events within the organization (Vasilash, 1997).

Other areas of technical performance improvements that can be achieved through Kaizen events include improvements in *product design*, *product cost* and *product line diversity*. For instance, Lantech revamped its product offering to expand the *diversity* of its product line in its first four years of implementing Kaizen events (Redding, 1996). Mercedes-Benz do Brazil showed a 63% decrease in *prices*, 24% increase in *product line diversity* and 39% reduced *time for launch of new product* (Oakeson, 1997).

Some other, less commonly cited metrics used to examine the technical system impact of Kaizen events are: *required overtime*, *operators required per day* (employees "freed" due to process improvements) and *profit margin*.

Social systems impact. While many technical outcomes of Kaizen events have been documented, albeit anecdotally, the current Kaizen event literature suggests that, to date, companies have almost wholly neglected to measure social system outcomes. This suggests that, contrary to STS theory, the technical performance aspects of Kaizen events have received more attention and focus that the social system outcomes

Though not generally empirically documented, the current literature suggests some of the social system outcomes from Kaizen events include: *safety improvements, improvement ideas generated* (Melnyk et al, 1998), *labor turnover*, *value added per employee*, and *implementation rate for suggested improvements*.

One apparent exception to this general trend of neglecting to explicitly measure social system outcomes is Vermeer, a farm and construction equipment manufacturing company in Iowa, which conducted a study that found that *employee satisfaction* was directly related to *participation in Kaizen events.* A survey conducted by an external agency found employees who had participated in more than six events were 20% more satisfied with the company than those who had not participated in any Kaizen events (Smith, 2003).

Another example of a company that explicitly reported social system outcomes is a first-tier automotive supplier in Michigan, which reported 200 *safety improvements* implemented through Kaizen events in a single year (Melnyk et al, 1998). Meanwhile, ASM Industries reported 60 *ideas generated* from one case event (Rusiniak, 1996), while Dana Corp. sets a goal of 120 to 175 *ideas generated* for each of its Kaizen events (Cuscela, 1998). Lantech has noted that its Kaizen event program has not adversely affected *labor turnover:* there have been no layoffs since beginning a Kaizen event program (Redding, 1996). In addition, Lantech suggests its Kaizen event program has contributed to high motivation among employees and an environment in which employees view themselves as team members rather than "just numbers," although these results have not been empirically documented (Redding, 1996). Similarly, Aeroquip-Inoac reported a year 2000 *labor turnover* rate of only 1.6% under its Kaizen event program (Hasek, 2000). Cooper Automotive-Wagner Lighting has not explicitly tracked social system outcomes, but does report a waiting list of employees who want to participate in Kaizen events, thus potentially illustrating a high level of employee enthusiasm and involvement in Kaizen event activities (Taninecz, 1997). Finally, Freudenberg-NOK noted that its *value added per employee* doubled over five years, since beginning to use Kaizen events (Vasilash, 1997).

Additional variables proposed to measure the impact of kaizen activities on the human resource include: *attitude toward Kaizen events, skills gained from Kaizen event participation, understanding the need for change, understanding the need for Kaizen, impact of Kaizen event on employee, impact of Kaizen*

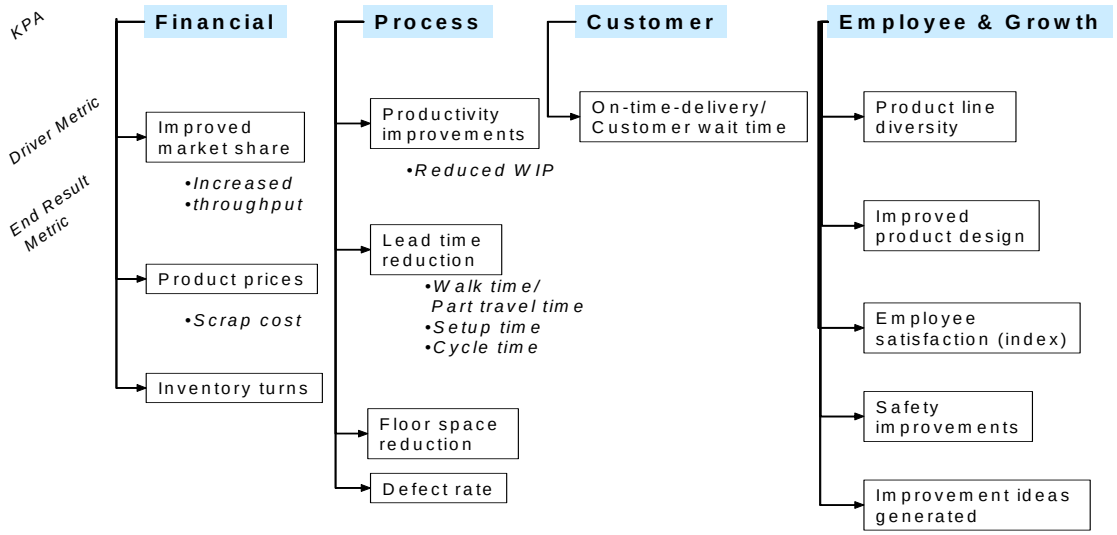
event on the work area, and the overall impression of the relative successfulness of the Kaizen event. (Doolen et al, 2003).

BSC Assessment

Exhibit 4 maps the metrics most frequently cited in the Kaizen event literature to the BSC framework.

The BSC assessment suggests that companies primarily measure financial, customer and internal (process) outcomes, while neglecting to measure innovation/growth outcomes.

Exhibit 4. Metric alignment with BSC



Overall Assessment Results

The most frequently cited metrics in the current literature review were presented in Exhibit 3, along with the number of companies citing each metric (out of the 20 companies reviewed in this research). A citation is counted when a company reported using the metric and reported numerical results. It is evident that technical system outcomes are cited much more frequently than social system outcomes (91% of the noted citations were technical system outcomes; only nine percent were social system outcomes). Similarly, 88% of cited metrics fall under the financial, internal (process) and customer dimensions of the BSC. Only 12% fall under the innovation/growth BSC dimension.

A Brief Case Example

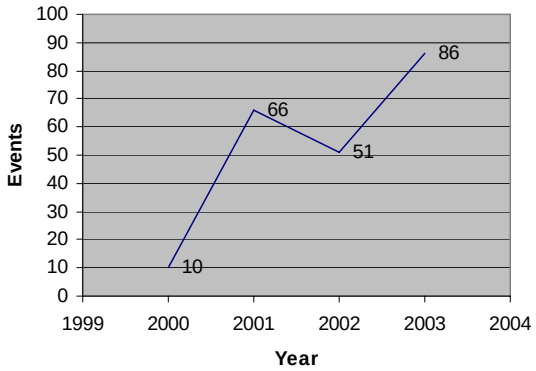
The following considers the use of Kaizen events within an assembly plant of a large manufacturing organization. This example is assessed in terms of the types of metrics targeted for improvement through Kaizen events, as well as the balance of these metrics, using the STS and BSC frameworks.

The case plant started conducting Kaizen events in September 2000, and the number of Kaizen events per year has generally been increasing each year, with a total of 86 Kaizen events implemented in 2003 (Exhibit 5). The plant conducts Kaizen events in both manufacturing and non-manufacturing areas.

The plant believes its manufacturing-focused events are generally more successful than events in non-manufacturing areas. The plant has hypothesized two reasons for this apparent difference in successfulness: 1) more events are held in manufacturing areas (thus, the company is more experienced in conducting these types of events), and 2), visibility of events and results is higher in manufacturing areas.

Overall, the plant estimates that 75% of its Kaizen event improvements are sustained, while the remaining 25% are lost. The plant hypothesizes this loss is due mainly lack of the leadership and resources needed to sustain the results.

Exhibit 5. Events implementation over past three years



Linking Kaizen Events to Organizational Strategy. The plant clearly links the use of Kaizen events to its strategic objectives. Specifically, Kaizen events were used as an implementation vehicle for strategic objectives within the plant's policy deployment system. Plant management identifies performance areas to be targeted for improvement (e.g., "what changes are desired"), based on higher-level strategic objectives. For the most critical areas for improvement, Kaizen events are often used to deploy improvements to the process level. Thus, plant management is also responsible for identifying the general method for achieving the desired change in a given process ("how") – that is, for identifying and coordinating the use of the Kaizen event as an implementation tool. Plant management is responsible for scheduling the use of a Kaizen event as an implementation tool and identifying the goals of each event; Kaizen event facilitators help identify the associated training and tools necessary to achieve the event goals. Every month, plant management updates the schedule for the Kaizen events to be implemented over the next two to three months. Once the use of the Kaizen event as a change mechanisms has been identified, it up to the Kaizen event participants to use their creativity, skills and training to achieve the desired changes. Thus, the specification of the exact action steps for achieving and implementing change ("implementation details") is left up to other members of the workforce (often 50% of the Kaizen team comes from the targeted work area), rather than plant management.

Resulting Kaizen event improvements are also distributed as part of the policy deployment process. Results are displayed on a visibility board within the plant, which also contains a list of future Kaizen events to be undertaken. Also, the plant holds a quarterly news conference to showcase the best Kaizen event results and share lessons learned from Kaizen events (team leaders provide a briefing on their successful Kaizen events).

Metrics Targeted for Improvement. Like the majority of the organizations identified in the current Kaizen event literature, the plant heavily favors the measurement of technical system outcomes. Thus, the plant's current Kaizen event impact measurement system is unbalanced under the STS framework in favor of the technical system.

Some of the most commonly used metrics include: *floor space*, *lead-time*, *productivity* and *WIP* (for Standard Work events); *5S rating* (for 5S events); and *setup time* (for SMED events).

Internally, the company does not explicitly track the human resource impact of Kaizen events; however, it does administer an internal feedback survey to all event participants at the close of each event. This survey asks for feedback on the thoroughness of Kaizen event preparation, facilitation and training. The survey also contains three items asking the event participant to rate the extent to which he/she felt he/she fully participated in the event (*level of participation*, *contribution of ideas/creativity* and *equal voice*). Although these items do not directly capture social system outcomes (e.g., impacts on the participant), they do measure human resource process variables (e.g., participation). In addition, research conducted through a contract with a university partner did study the social system impact of Kaizen events (Farris et al, 2004). In this case, the social system variables studied were: *attitude toward Kaizen events*, *skills gained from Kaizen event participation*, *understanding the need for change*, *understanding the need for Kaizen*, *impact of Kaizen event on employee*, *impact of Kaizen event on the targeted work area* and the *overall impression of the relative successfulness of the Kaizen event*. The company and university are currently pursuing collecting similar data on future events.

Under the BSC framework, the majority of the plant's metrics appear to fall under the financial and internal (process) dimensions. The company has few metrics in the innovation/growth dimension (e.g., employee outcomes) and only tracks metrics in the customer dimension for certain types of events.

As with the organizations identified in the current Kaizen event literature, it would seem beneficial to this plant to develop a more balanced performance measurement approach for Kaizen event impacts. Specifically, the plant can improve its Kaizen event impact measurement system by more explicitly tracking social system measures, as well as measures that related to the customer and innovation/growth dimensions of the BSC. The plant appears to be adequately measuring technical system impacts, as well as addressing the financial and internal (process) dimensions of the BSC.

Conclusions and Future Research

This paper used the STS and the BSC frameworks to examine the measures of Kaizen impacts that are most commonly cited in the current Kaizen event literature. This review led the authors to identify gaps in the current measurement process and the strategic use of Kaizen events. Specifically, while technical system outcomes (STS) and financial, internal (process) and customer outcomes (BSC) appear to be measured in most companies implementing Kaizen events, the explicit measurement of social system (STS) and innovation/growth outcomes (BSC) appears neglected to date. Since the Kaizen event is intended to provide both short and long-term social system (as well as technical system) change, this suggests that both researchers and companies need to empirically

investigate the effectiveness of Kaizen events in positively influencing human resource outcomes. This is especially important, since research has linked social system outcomes to the success and sustainability of improvement initiatives (Jha et al., 1996). Measuring social system outcomes will also make the link between Kaizen events and the organizational strategic deployment more explicit.

The results of the research can be used to identify a desired set of measures that are balanced across both the STS and BSC frameworks, which can be used by companies to more holistically assess the strategic impacts of their Kaizen events. In addition, more balanced measurement will allow future research to consider the dynamic linkages between the initial levels and sustainability of technical and social system outcomes, as well as the links between Kaizen event design decisions, work area context factors and outcomes.

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