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Kaizen in Japan: an empirical study

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Abstract *This paper reports the study of kaizen as practised in a selection of Japanese companies. After discussing the general understanding of kaizen and proposing a clear definition, the paper describes the methodology of the study, and presents findings from the research, taking Nippon Steel Corporation (NSC) as a base model and comparing this with the data from other companies. The development of kaizen activity in NSC is presented together with a description of the current nature of kaizen, which is compared with other firms in the steel and automotive industries to assess uniformity. The paper concludes that kaizen evolves uniquely within each organisation, following changes to the organisation's business environment. Detailed implementations vary considerably between organisations, but all rely on kaizen to achieve targets as an integral element in the operations management system. This yields insights into kaizen's sustainability, and points to its vulnerability to external economic conditions.*

Introduction

Many authors have written about the importance of *kaizen* as a key element in Japanese management, and the concept is often presented as one of the underlying principles of lean production and total quality management (TQM). Yet there remains considerable ambiguity and inconsistency in the way the concept is described in the literature: *kaizen* is regularly misrepresented as either an endless "free lunch" of improvements which emerge magically from the workers or as the mundane application of suggestion schemes and quality circles (QCs). While many insist on the centrality of the concept, other influential books on both manufacturing and quality effectively ignore the term altogether. Furthermore, there is considerable confusion and inconsistency in the literature and in practice about the definition of the term, as evidenced by the proliferation of terms used as effective synonyms (for example, small group activities, continuous improvement).

There have been few systematic studies of how the concept actually works in Japanese manufacturing environments, nor what it means to those who work with the idea. In particular, it has not been clear hitherto how firms can maintain the momentum for *kaizen* activities, nor how the concept fits into the overall management system of target setting, control and incentives for participants; Bessant *et al.* (2001) comment on the more number of failures among Western *kaizen* programmes. This last point is particularly important: many descriptions of *kaizen*-like activity in the total quality literature seem to rest on a notion of worker participation based on intrinsic psychological



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rewards for workers found in "improvement", and many critics have challenged the realism of these claims.

This paper contributes to the literature on *kaizen* by presenting empirical findings from a study of *kaizen* in Japanese companies. It is based on the doctoral work of one of the authors (author A) under the supervision of the other (author B). The paper is structured as follows. First, some key issues surrounding the definition and meaning of *kaizen* are explored, and three key questions identified. After a discussion of the methodology of the study, some descriptive empirical data relating to the main case study organisation – Nippon Steel Corporation (NSC) – are presented. This is followed by a brief comparison with findings from the other firms examined, leading to a general description of *kaizen* as practised in the sectors concerned. Finally, some key theoretical insights are presented, and suggestions made for further research.

What is *kaizen*?

The management literature has often credited "*kaizen*" and the participation of the workforce in process improvement and refinement as being a key element in Japanese manufacturing success (Elgar and Smith, 1994; Senge, 1990; Utterback, 1995). However, there have been few attempts to provide a comprehensive description or explanation of the concept. The bulk of the extant literature relates to the context of Japanese transplant operations or implementations by Western companies (Cheser, 1998; Malloch 1997; Parker and Slaughter, 1988; Vasilash, 1998). The most well known proponent of the *kaizen* concept – Imai (1986, 1997) – provides descriptions of *kaizen* in Japan, but falls short of a detailed explanation in order to maintain prescriptive clarity.

Kaizen is the Japanese word for improvement, carrying the connotation in industry of all the uncontracted and partially contracted activities which take place in the Japanese workplace to enhance the operations and the environment. *Kaizen* epitomises the mobilisation of the workforce, providing the main channel for employees to contribute to their company's development. In isolation, the concept seems simple: "with every pair of hands, you get a free brain" (Bessant, 2000). There are close comparisons to be drawn between *kaizen* and ideas of past research in industrial relations, starting from Elton Mayo and the Human Relations school of Maslow, McGregor, Argyris and Herzberg. Various writers emphasise different key features, but many focus on three key notions:

- (1) that *kaizen* is continuous – which is used to signify both the embedded nature of the practice and also its place in a never-ending journey towards quality and efficiency;
- (2) that it is usually incremental in nature, in contrast to major management initiated reorganisations or technological innovation (e.g. the installation of new technology or machinery); and

- (3) it is participative, entailing the involvement and intelligence of the work force, generating intrinsic psychological and quality of work-life benefits for employees.

Kaizen is closely associated with but not identical to the idea of QCs (Lillrank and Kano, 1989) and TQM, and resonates with many recent ideas in management from the knowledge management of Nonaka and Takeuchi (1995, the development and communication of knowledge) to the balanced scorecard of Kaplan and Norton (1996, the continuous monitoring of a wide range of processes, see also Bond, 1999). De Haan *et al.* (2001) comment on the importance of *kaizen* to Japanese production control mechanisms. *Kaizen* needs to be distanced from the more recent Western development, *kaizen* blitz (Tillinghurst, 1997), whereby management involves employees in re-engineering brainstorming sessions.

The generality and simplicity of the *kaizen* idea is both its weakness and its strength. 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 realise that they are thinking *kaizen*". But later, Imai presents *kaizen* as a pervasive global program which subsumes TQM and just-in-time and total productive maintenance (TPM). For others it is a "tool" or a more narrowly defined practice and many important texts and authorities do not even use the word: despite its central relevance, the word does not arise in Tsutsui's (1998) *Manufacturing Ideology*, his magisterial history of how Taylorism evolved into modern Japanese manufacturing, nor does it feature as a substantial or distinct element in the writings of Deming or Feigenbaum. This omnipresence combined with the invisibility makes the construction of both analytical deconstruction and empirical research extremely challenging. A notable consequence of the wide variety of interpretations of *kaizen* is that it has remained free from any controlling influences and proponents have been able to cherry pick the best elements of other systems and methodologies.

For the purposes of this investigation, we adopt a definition of *kaizen* which is more focussed than that of Imai, by excluding the formulation of strategy and the design of production systems. We take *kaizen* to consist of *pervasive and continual activities, outside the contributor's explicit contractual roles, to identify and achieve outcomes he believes contribute to the organisational goals*. Further, we decompose the concept by considering two axes: the degree to which the processes of *kaizen* are systematised and organised, and the degree to which senior managers specify or influence the themes of *kaizen* activities. This gives rise to the grid as shown in Figure 1, which allows a degree of categorisation of activities associated with *kaizen*. As an example, the following four types of activity associated with *kaizen* are plotted.

- (1) "ZD" refers to the actions associated with the adoption of a "zero defect" mindset in the organisation, in which employees spontaneously and autonomously improve things.

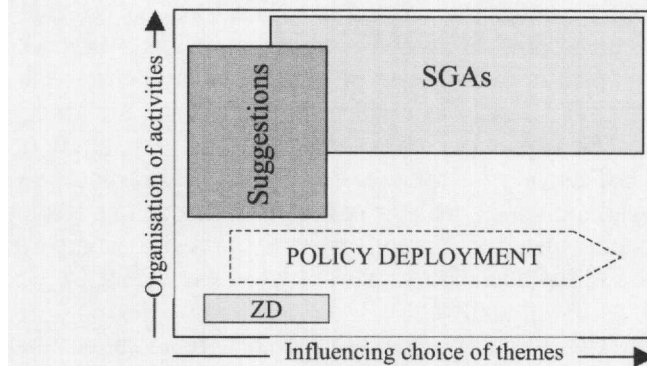


Figure 1.
A framework for
understanding *kaizen*

- (2) “Suggestions” refers to the operation of suggestion schemes, which may require considerable organisation to process, evaluate and potentially act upon employee suggestions, but for which the topics of the suggestions are determined by the particular inspiration of the employees.
- (3) “Policy deployment” refers to the process by which top management targets and agendas are promoted throughout the organisation, which need not in itself require the organisation of resulting activities (Tennant and Roberts, 2001).
- (4) “SGAs” refers to small group activities which form the core of overt *kaizen* activity.

Three key issues arise regarding *kaizen* in practice. First, what is the nature of *kaizen*: what purpose does it serve, how does it do so and is its deployment in a specific organisation relatively stable? Second, how uniform is the adoption of *kaizen*? Is there a consistent pattern of application, and – if so – what are the implications for attempts to reify and export the concept outside of the Japanese setting? Finally, how is *kaizen* sustained, once the “low hanging fruit” of easy improvements have been harvested?

Methodology

The approach adopted in this research was to visit, in 1998, a small selection of Japanese companies, mostly in the steel and automotive sectors, and to seek to make some sense of *kaizen* as practiced. The fieldwork was carried out by author A, and his prior background – establishing and operating Citra Tubindo, a steel manufacturing company in South East Asia – strongly influenced both the selection of organisations and the nature of the visits. Access to the Japanese companies was arranged through existing industry contacts, and that author’s status as an industrialist gave credibility to the approaches made. Furthermore, the author’s practical experience meant that less time is needed to be spent in understanding the shop-floor operations in question – a significant advantage in comparison to researchers with less industrial exposure, allowing the author to

maintain the interest of the persons involved for a period as long as possible and to maximise the significance of the discussions within that period. (Author A has 15 years experience co-operating with Japanese companies on commercial and technical issues relating to shop floor development.) This advantage is particularly applied to the company which became the "base" case study of the investigation – NSC. Extensive prior knowledge and excellent contacts within this organisation allowed a detailed analysis of *kaizen* in this setting; the other organisations in the study (listed in Table I) were then used as comparators against this main case. All the main companies surveyed were visited a second time after a six-month period of analysis.

The ambiguity of the *kaizen* concept meant that great care had to be taken to avoid misinterpretation in data collection and interviews. To this end, a variety of diagrammatic visual aids were prepared which served to stimulate discussion and provoke debate. This transpired to be a useful tool, although it then required careful checking to ensure that the data collected had not been unduly biased through the use of this technique. Where necessary, translators were hired to assist in the meetings and interviews. Two colleagues, Shisuke Kira (representative of Citra Tubindo in Japan) and Katsuyoshi Kokubun, manager of export sales at NSC, assisted with the research by attending meetings with author A. Meetings were predominantly with managers (of varying seniority) but shopfloor workers were formally interviewed at three of the companies studied, and in the others informal discussions took place with such staff in the course of the shopfloor visits.

It is not possible to eliminate "observer effects" entirely in this type of research. For example, the visits to Honda and Suzuki were arranged via the

Company name	Activity	Sessions	Participants
Nippon Steel	Integrated steel manufacturer	6	13
Sumitomo Metals	Integrated steel manufacturer	1	5
Japan Casting and Forging Co.	Manufacturer of very large forgings and castings	2	7
Nippon Tube and Pipe Co.	Manufacturer of steel couplings and machined products	1	1
Honda Motor Corp.	Car, motor cycle and small engine assembler	3	6
Suzuki Motor Corp.	Car and motor cycle assembler	4	11
Toyota Kyushu	Car assembler	1	6
Somic Ishikawa	Manufacturer of suspension subassemblies	2	7
Takagi Seiko	Manufacturer of plastic parts	6	15
Mori Seiki	Manufacturer of machine tools	1	2
Isogai	Manufacturer of small machined parts for electrical equipment	2	3
Total		29	76

Table I.
Summary of company visits

respective presidents' offices, and this made the researcher somewhat of an enigma. This could have led to the visits being used for personal publicity, but by no means at any stage there was any question that comments would be "reported back", and posturing was not apparent. Wherever possible, "triangulation" of data was attempted through analysis of company documents and the use of multiple informants.

Three methodological points are key for understanding the nature of this research. First, although a common set of commensurable data was sought from each of the companies, the authors' ideas and understanding developed with each organisation visited; the emphasis of the investigation evolved as issues emerged in the course of the work. Though all the main companies were visited a second time and follow-up data gathered, the interpretation continued to evolve up to the final visit. Although we acknowledge this as a weakness, we also contend the evolutionary nature of the research to be a strength. Second, our research was constrained by the data obtainable practically by companies, and not all the organisations were able to provide all the information we would have liked; for example, Nippon Steel's formal chronology of relevant activity expires in the mid-1980s (Table II) rather than progressing to the time of the research. Third, the companies investigated do not in any sensible way constitute a random sample of Japanese companies, and so we urge extreme caution in attempting to extrapolate from our current observations to a wider population. However, we would contend that the sample is large enough for us to have seen an interesting range of variation, and that the necessary compromise between breadth and depth has been made in a way appropriate for the investigation.

NSC

The Japanese steel industry has been at the forefront of technical and social innovation in Japan, providing technically innovative raw materials for onward manufacturing (Morris-Suzuki, 1994). It has been closely involved with the quality movement and voluntary activities. In his history of the Japanese iron and steel industry, Yonekura (1994) devotes a complete section to voluntary activities putting forward that "without the incremental improvements based on hands-on work experience, the Japanese iron and steel companies would not have been able to introduce new technologies successfully". NSC dates back to the eighteenth century and has always been the largest Japanese steel manufacturer, acting as industry leader in dealings with the government and amongst the manufacturers themselves (Johnson, 1982). By the 1970s, it was the world's largest steel company producing 30 million tons of crude steel and employing 80,000 staff. The history of NSC has been well documented in both Japanese and English and the company itself maintains a library of historical records and reports that was used extensively in the research.

NSC instituted lifetime employment in 1962 and a year later started experimentation with *kaizen* in the guise of "zero defects" activities. Various forms of voluntary activities have operated ever since. Table II shows a chronology of these activities up to 1986, as recorded in company documents. Discussions with longstanding members of the staff revealed that these activities were developed on top of the existing work team structure and that one of the biggest issues was to moderate the rivalry between teams which existed before the voluntary activities were introduced. Examples were cited of

1963	"Zero-defect" movement was launched at No.1 hot strip mill
1965	All plants and mills were put into operation
1966	"ZD" movement was introduced into Tobata Works QC circle activities were introduced to Yawata Works
1967	Yawata's first QCC presentation conference Tobata's first ZD presentation conference
1968	Company's first voluntary activity convention held at Sakai Works
1969	Participated in JISF's first voluntary activity convention
1970	NSC established. Group leaders' seminar held in Yawata
1971	"CD activities" (creation and development activities) launched at Yawata works and CD activity promotion council, secretariat and leaders' committee set up Yawata's first CD activity conference held
1972	First CD conference of Yawata's cooperative companies held
1973	Luncheon was held for discussion between general superintendent and Special Prize winners
1975	First promoters' conference was held First floating seminar on a cruise liner lasted two days to celebrate the best CD contributions
1976	CD convention was held in commemoration of the 10th anniversary of Yawata Works
1977	QCC activities.
1979	"CD News" published Federation of CD Groups was established
1980	"CD Report" published "CD Day" established
1984	First female employees' CD convention held A CD fulfilment goal was set at four projects per year per group (including at least two related to quality improvement and cost reduction)
1986	The designated "CD activity" was changed to "JK activity" (<i>Jishu Kanri</i> -self-management) A JK convention was held in commemoration of the 20th anniversary of Yawata's voluntary activities and the symbolic mark of JK was redesigned

Table II.
Chronology of Yawata's
JK activities 1963-1986

Source: NSC (1993)

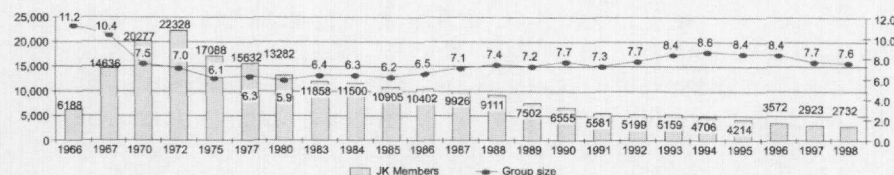
teams undoing improved machine settings at the end of the shift to keep them secret from others. Voluntary activities widened the means of assessing contribution beyond pure production shift by shift output to ease this tension.

Figure 2 shows the rapid development of registered improvement groups in the early stages, achieving almost universal participation among shopfloor workers by 1970 and then diminishing with the number of employees. It can be seen that the group size stabilised quickly and has since remained fairly constant around seven members.

It is significant that the names of the activities always differentiated them from being purely quality oriented, starting with "zero defects" which changed to "CD – creation and development activities" in 1971 and later to the common name for such activities in the Japanese steel industry, "JK – *Jishu Kanri*" or "self-management" activities in 1986. This coincides with comments that the main justification for improvement activities was to enable teams to be responsible for their output rather than just deal with *ad hoc* quality issues and is borne out by the broad spectrum of *kaizen* style activities performed in NSC. This can be seen in Figure 3, which shows the juxtaposition of the multiple

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

Figure 2.
JK membership and
group size at NSC
Yawata 1966-1998

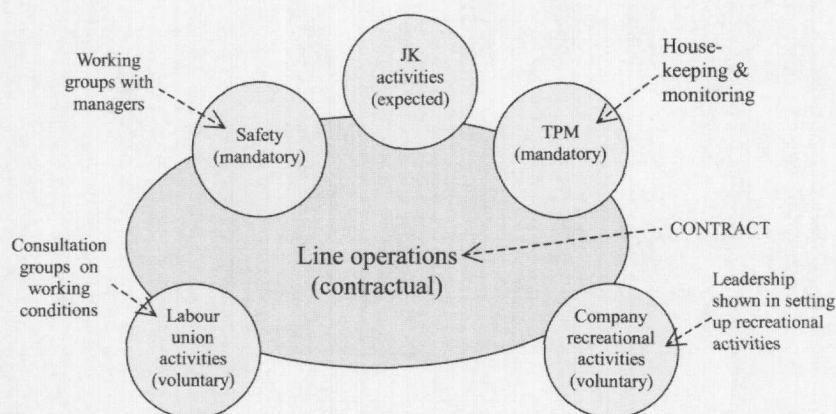


IMAGE OF WORKING ACTIVITIES FOR BLUE COLLAR WORKERS

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

Figure 3.
Working activities for
blue-collar workers at
NSC Yawata

kaizen type activities relative to production work and Figure 4 shows a breakdown of different topics covered by *kaizen*.

Following the categorisation of *kaizen* activities introduced above it was found that quality, safety and TPM represent the most systematised aspects of *kaizen*. These are treated as individual mandatory activities performed in paid overtime hours and with specific targets for the number of projects to be completed each year in order to ensure that specific goals achieved are not directly associated with team performance. Other activities are left more to the devices of the teams and usually contribute towards annual objectives. The nature of the efforts varies from individual ZD initiatives to QC style team projects following a comprehensive *kaizen* storyboard approach (see Imai (1986) for complete explanation). Suggestions are not common and are used principally for requests for personal facilities since the emphasis for improvement is on team development and implementation. Depending on the ability of the team to look after itself and work towards its annual targets or topical issues requiring attention, management may intervene with interim objectives presented during monthly meetings, but the majority of *kaizen* themes are chosen by the teams themselves.

The JK secretariat supports JK activities in NSC and provides a computerised technical support system offering access to records of projects elsewhere in the company, on screen guidance through the storyboard analysis process and on-line recording and reporting of progress. Managers can monitor

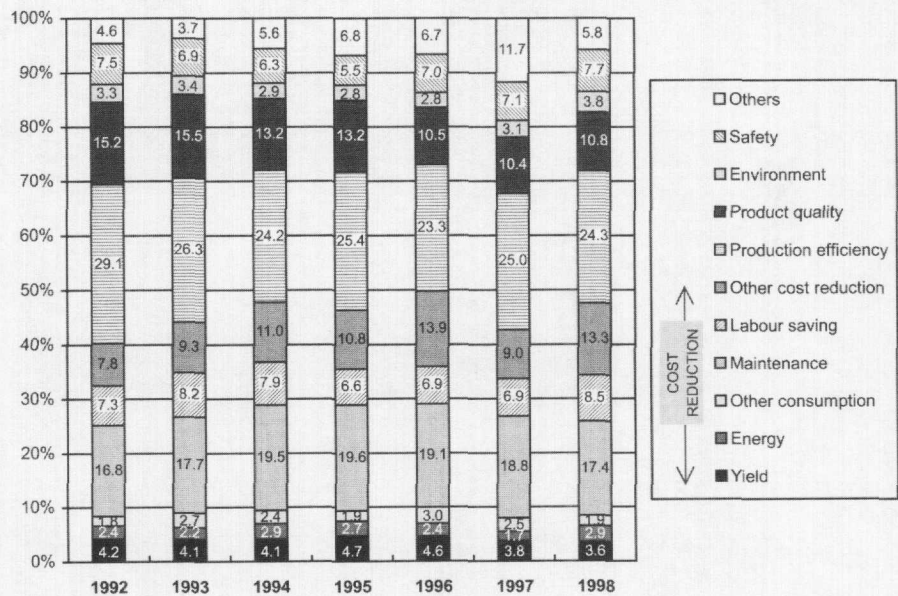


Figure 4.
Breakdown of NSC JK
projects by type

Source: NSC (1997, 1999)

project progress through the system. The JK secretariat can also provide more traditional training or assign a specialist to assist in a particular project. Its final role is one of coordinating assessment of *kaizen* projects and organisation of award ceremonies.

The research at NSC revealed how *kaizen* evolved from shopfloor work teams with rapid growth in participation paralleling or even surpassing reports of growth in the quality movement (Nonaka, 1995). However, instead of following the quality movement as a complementary contribution aimed at improving the quality of the product and the working practices, JK activities in NSC directly integrate into the mainstream shopfloor management system providing the shopfloor teams with the capabilities to address wide-ranging objectives laid out through a process of negotiation and policy deployment. Crucially, the work team structure around which all the *kaizen* activities revolve creates autonomous units which can take responsibility for challenges provided under the overall planning and policy deployment process. By doing so the policy deployment process does not need to address targets to individual workstations and the complexity of the exercise is reduced to a practical level.

Not surprisingly, given the integrated nature of *kaizen* within the overall management framework, it is not truly voluntary, nor is it unpaid. Some elements of *kaizen* such as TPM and safety are mandatory. Each member must attend and the teams have a quota of such projects every year. Members are paid for this participation at overtime rates. Other productivity oriented activities are paid but voluntary and, perhaps to satisfy the rules of JUSE (1980), quality oriented *kaizen* is both voluntary and unpaid. Since teams must achieve their targets and *kaizen* is the expected way to achieve this, participation in all *kaizen* becomes routine. Whether by design or coincidence the average compensation level for all *kaizen* activities almost exactly balances out to standard hourly wages. Prizes and awards are provided as additional incentives, but are more significant for their acknowledgement of contribution than their monetary value.

To estimate how much time per month was being spent on *kaizen* activity by workers and group leaders, Table III was compiled with the help of several NSC staff in March 1998. The time categories emerged in discussion: the "paid" category refers to weekly JK, safety and TPM meetings; "unpaid casual" refers to time spent interacting outside working hours when *kaizen* is discussed but under social circumstances; "unpaid" refers to time outside working hours spent specifically on *kaizen* on such activities as writing up; "extra" time refers to time which is found in the occasional efforts within routine working time to perform *kaizen* tasks (and so is expressed here as a percentage of the working hours).

From the time estimate it can be seen that the demands are moderate for the workers, consisting primarily of paid meetings and casual time during breaks

Table III.

Time spent every month
on *kaizen* activities
at NSC

Description of time spent	Workers' h./month	Leaders' h./month	Category
Official meetings for JK	5	5	Paid
Official meetings for safety, TPM	4	4	Paid
Time spent immediately after working hours discussing causally (includes lunch time)	2.8 (partial)	2.8 (partial)	Unpaid casual
Time spent outside working hours on project work (approved for payment)	0.5	0	Paid
Time spent outside working hours on project work (not approved for payment)	0	0.5 h	Unpaid
Social events during which <i>kaizen</i> features	2	4	Unpaid casual
<i>Kaizen</i> convention	2	2	Unpaid casual
Time spent during working hours thinking about <i>kaizen</i> (without affecting routine activities)	$200 \times 2\% = 4$	$200 \times 5\% = 10$	Extra time
Time spent during working hours performing work specifically related to <i>kaizen</i> (using time freed up by team cover)	0.20 (avg. 2)	0.40 (avg. 6)	Extra time
Working time spent writing up <i>kaizen</i> themes	0	avg. 4	Extra time
Non-working time spent writing up <i>kaizen</i> themes	0	avg. 4	Unpaid
Totals			
Paid time	9.14 (avg. 10)	9.14 (avg. 10)	
Unpaid time	0	2.10 (avg. 6)	
Unpaid casual time	6.12 (avg. 8)	8.14 (avg. 10)	
Extra time	4.8 (avg. 6)	14.54 (avg. 20)	
Total	avg. 24	avg. 45	

and before and after work. The unquantifiable factor is the reclaimed or "extra" time and effort associated with working on projects during unoccupied time during the working hours and paying due care and attention to prescribed working practices encouraged by involvement in the overall team performance. An estimate for this "extra" time has been included in the time breakdown, indicating a considerable direct time contribution before considering the value of the workers' special care and attention in their routine work. Nor does it include the cost of redundancy in distribution of work to allow workers some slack during normal production hours, which may reabsorb some of this contribution. Demands on team leaders were more significant and included several unpaid hours during the month spent writing up projects, an unenjoyable task, when this could not be done during working hours. Nevertheless, the team leaders interviewed did not report *kaizen* as a major hardship and the company has already taken steps to reduce the writing load by lowering the quota for fully reported projects. Overall, while it should be

emphasised that the breakdown is very subjective it would seem that the demands and compensation for *kaizen* effort by the production teams are fairly balanced, which agrees with comments from both the managers and workers.

In contrast to the situation for team members, recent rationalisation has led to reduction in the amount of staffing redundancy within the teams and at supervisory levels, which is making demands on middle management extremely high. At the same time, due to economic pressures, the number of projects per group and the estimated value of the benefits of *kaizen* have been increasing as shown in Figures 5 and 6 as the company has struggled to rationalise and come to grips with the national recession starting in the early 1990s. The impact of this on the sustainability is discussed later.

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Other companies

Kaizen has been seen to be widely practised in NSC under the work team structure covering a broad range of topics as an element within the overall management system, placing only a modest additional load on the workforce. In order to assess whether this is the representative of *kaizen* in Japan observations were made in several other companies from the steel and motor industries. Of these, six proved to have active *kaizen* programs, but nevertheless showed a surprising level of inconsistency with those from NSC. The findings in these six companies, Suzuki, Honda, Toyota Motor Kyushu (TMK), Sumitomo Metals Industries (SMI), Somic Ishikawa and Japan Casting and Forging Company (JCFC), are discussed below. Comments regarding two other companies, Mori-Seiki and Takagi-Seiko, which were compatible but did not have effective *kaizen* programs are added where relevant.

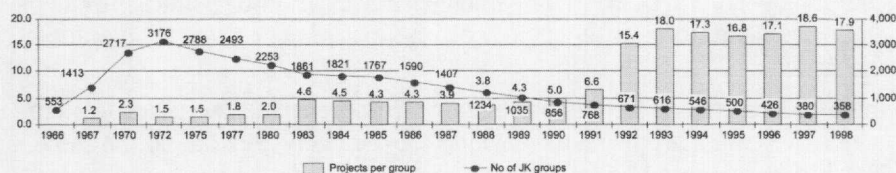


Figure 5.
JK activity at NSC
Yawata 1966-1998

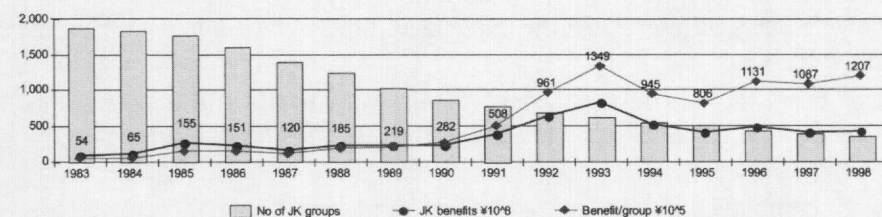


Figure 6.
Benefits from JK
activities at NSC Yawata

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

When looking into the details of each *kaizen* implementation, various important differences were noted:

- the work team make up was similar, but the focus of *kaizen* varied from the individual (JCFC, Suzuki) to much larger groups – across shifts in Honda or entire shifts of 25 in Somic;
- several companies (Honda, Somic, TMK) claimed that *kaizen* was voluntary while others enforced mandatory participation (JCFC, SMI, Suzuki);
- the split was different when it came to payment for time spent doing *kaizen*; Honda, TMK and SMI strictly offered no compensation, while Somic, Suzuki and JCFC paid for some or all of the time spent on *kaizen* outside working hours;
- Suzuki and Honda placed more emphasis on suggestion systems while other companies looked towards small group activities (SGAs) or QCs; only Somic and Honda involved white-collar workers in *kaizen*, while NSC, Somic and JCFC used *kaizen* for developing technical projects;
- the reward and incentive systems for *kaizen* varied from significant direct rewards at Suzuki, TMK, JCFC to nominal prizes elsewhere;
- *kaizen* contribution was considered for personnel performance review in all companies, but the potential mobility this offered for high performers was much greater in Honda, Suzuki and Somic;
- involvement of team members in negotiation of the annual targets was high in NSC and Honda, but non-existent in Suzuki, TMK and SMI;
- the JK Secretariat at NSC provided support on request for *kaizen*. Most companies had similar arrangements, but SMI and Somic provided engineer facilitators on the shopfloor on a permanent basis to maximise the results;
- the JK Secretariat at NSC also provided a comprehensive software system which disseminated the results around the company; Suzuki did the same, but TMK, Honda and SMI did not bother to share the results of *kaizen* projects nor standardise the results into operating procedures; JCFC and Somic, being smaller, could not be directly compared on this issue.

The above features differentiated the implementations of *kaizen* in detail, but in common with NSC:

- each company established targets for its work teams and expected the team members to use *kaizen* to achieve these targets whether individually or in groups;
- each company had in place a long-term motivational package to encourage the employees to contribute;

- all guaranteed lifetime employment for mainstream blue-collar workers although there were different attitudes to part-time or temporary workers, with TMK relying on temporary labour for 30 per cent and Somic hiring Brazilian labour;
- an important though varying degree of mobility was available to blue-collar workers;
- a seniority-based wage system provided greater rewards to long serving employees; and
- significant bonuses were based on the company and team performance.

It was found that *kaizen* activities can be grouped into three levels, which were noted in all the companies.

- (1) An enforced system of fully analysed and reported *kaizen* projects following the *kaizen* storyboard utilising the whole gamut of tools available; as part of this, formal *kaizen* meetings are regularly scheduled among team members, sometimes with their supervisor, during which the teams not only discuss *kaizen* projects, but also review the overall production performance and issues occurring to identify topics for other *kaizen* activities.
- (2) An intermediate level, "before and after" *kaizen*, deals with problems by implementing a simple solution on the shopfloor and reporting on a single sheet with an explanation of the situation before and after, often accompanied by diagrams or photographs and an assessment of the contribution; such *kaizen* is often reported *ex-post*.
- (3) Low level *kaizen* taking place continuously in a form similar to zero defects; on the shopfloor, workers who know their expected performance, and how to monitor it, take corrective actions to keep on track when they fall behind or a quality problem occurs; such *kaizen* is unreported.

All companies including NSC hold a hierarchy of conventions where teams get a chance to show off their achievement in formal *kaizen*.

Summary of the *kaizen* system as encountered

The findings above show that implementations of *kaizen* in Japan are far from uniform and that within each company *kaizen* has adapted itself to different conditions. In NSC, *kaizen* was also seen to evolve with time. Nevertheless, in all the cases reported, the systems under which the companies operate their *kaizen* programs aim not simply to achieve *ad hoc* improvements to operations, but to assure achievement of objectives in a target-driven planning system.

Imai's comment on the ingrained nature of *kaizen* was seen to be particularly appropriate and acknowledgement of this points to many similarities behind the external differences; continually involving the entire workforce in thinking about improvement readies everyone for change including that introduced by

management; not only does this make acceptance more straightforward, but *kaizen* can be used to tune the changes during implementation.

Although the actual numbers and complexity varied, all the companies insisted on a certain amount of formal *kaizen*. This provides the background for personal training which in all companies was predominantly provided on the job and allows the inclusion of non-performance oriented projects such as for safety, health or environment which may otherwise be overlooked by teams and their managers trying to achieve production objectives. The skills in analysis and the understanding of the job which are acquired in the formal projects are then utilised in normal work, "zero defects" and "before and after" style *kaizen*. Seen in this light and treating the practice of *kaizen* as a closed system seems to confirm the "free lunch": the contribution of *kaizen* to the company is to provide achievement of production targets and adherence to Taylorist operating procedures; fair compensation for time spent, moderate rewards and satisfaction of achievement adequately sustain *kaizen* participation.

Such an apparently simple system of challenge and reward may work in the short-term and may indeed be the key to early success reported in many Western projects (Hill, 1991), but what stands out among these Japanese implementations is their embeddedness and long-term survival. The key appears to lie in the overall "contract" between the company and its employees including security through lifetime employment, gainsharing through the complex compensation systems and the joint commitment to team-oriented annual targets which provide the underlying direction and challenge to sustain the *kaizen* effort. As noted, these factors were all present in the companies observed with successful *kaizen* implementations but were clearly dysfunctional in other companies where *kaizen* was not successful; Mori-Seiki lacked a team structure and Takagi-Seiko gave the impression to their employees that the company expected to get something for nothing when they tried to introduce *kaizen*.

Though contractual packages vary from company to company, each achieves an adequate balance to sustain motivation in *kaizen*; the universal lifetime employment ties the long-term interest of the workforce to that of the company though the practice of outplacement of excess staff to lower tier companies in the *keiretsu* or supply chain is becoming common; traditionally, seniority-based compensation reinforces the employees' long-term interest in ensuring their company's success, although several companies, most notably Honda, were reducing the seniority factor in order to prioritise more immediate incentives; companies provide the main welfare structure for their employees including retirement benefits and healthcare; employees have experienced gainsharing over a long period with their salaries steadily rising since the 1960s, giving confidence that they will share any improving fortunes of the company, but also that they will suffer if their company fails to continuously

improve ahead of the competition; this creates a carrot and stick situation and in SMI the stick was more evident than the carrot at the time, but still gave the necessary justification for participation in *kaizen*; typically 20-30 per cent of remuneration is performance based either as part of the salary or as bonus which is budgeted on corporate or divisional performance and allocated based on personal and team performance; mobility is proven with employees rising within the organisation based on their performance; peer pressure is applied to weak contributors as they deter from the performance of their whole team, and examples of poor performers being removed from the company at the insistence of their peers were cited. All these factors combine to provide very strong motivation to contribute to the company beyond any direct and usually equitable compensation for *kaizen* activities.

This balanced contractual package may justify why employees are ready to participate in *kaizen*, but why should they agree to a set of targets? First, according to one source there is "common acceptance of the need for 'our' company to improve". Such "cultural reasoning" was often suggested by managers, and even though this may not be the principal driver, it cannot be ignored. More rationally, it was noted that in most cases the teams themselves were involved in setting their targets and wherever they were able to consult with the teams there was no indication that the targets were over ambitious, while the management stressed the importance of making the targets achievable. The common opinion was that to be successful an improvement program had to ensure that all members were able to gain satisfaction through achievement without significant increase in work or risk of security. The result is that non-assisted improvement targets are moderate and the vast majority of major improvements are achieved through management initiated change; the satisfaction of achievement is shared by early introduction to the workforce and tuning during implementation.

Discussion

In seeking to understand *kaizen* as practised in a selection of Japanese factories, it is clear that there are great risks in trying to see too clear a pattern among the diversity of practice. Two issues emerge from this work which have particular relevance to theory and practice in operations management.

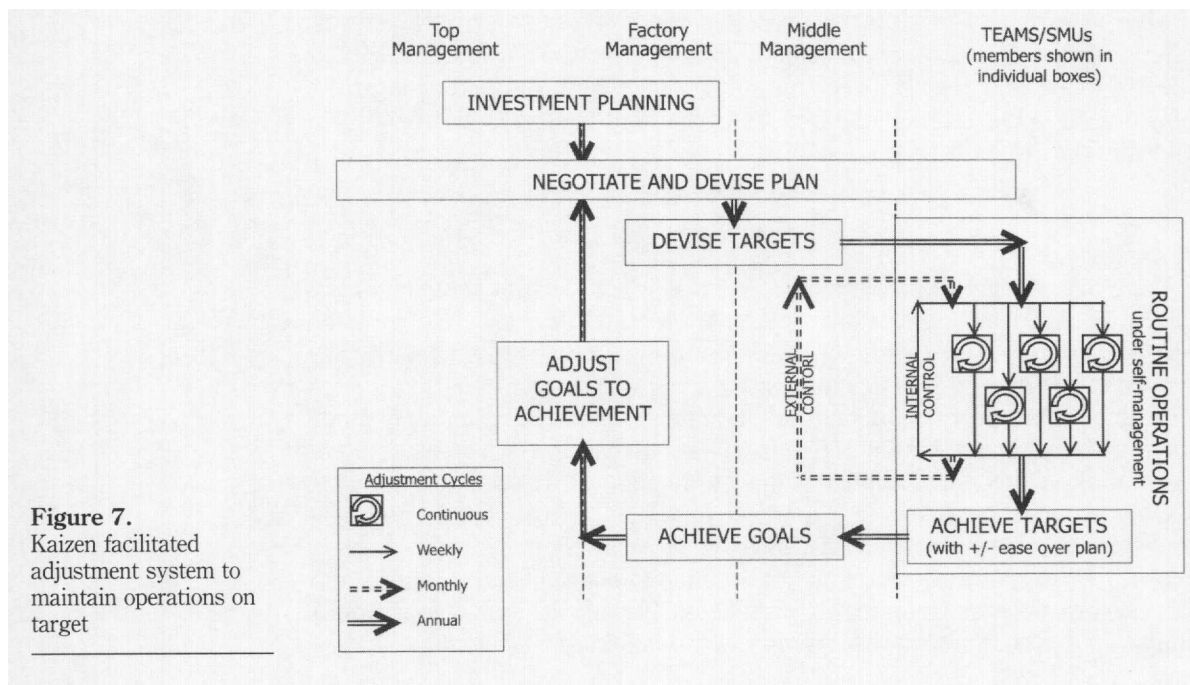
The first, which we touch on only briefly here, concerns the commonly made distinction between innovation and *kaizen*. Rather than the two ideas being in some kind of tension, our findings in this study suggest that a major outcome of *kaizen* is that it helps create a mindset in which radical change and new technologies become more easily accepted in the workplace.

Second, *kaizen* appears to be a less stand-alone suite of techniques and practices and more as an integral part of an overall system of operations planning. In all those companies in this study who exhibited functional *kaizen*

systems, all of them had a close connection to both the setting and achievement of annual performance targets, and the operation of teams and workgroups.

Drawing on insights from the cybernetics of Beer (1966), we argue that one interpretation of *kaizen* is that it allows for the management of complexity in the management of target-oriented operations. Figure 7 illustrates this idea. The schematic model shows a system of four adjustment cycles in the planning and realisation of strategic goals. Individual members perform their routine tasks under individual control (continuous) against production plans, internal team control (usually weekly) and external control by middle management (usually monthly), and activities are reinforced by "redundancy" (Nonaka and Takeuchi, 1995) in middle management, and team capabilities. Completed targets contribute to achievement of division goals. A new plan is negotiated and devised based on the past achievements, judgement of current abilities and new annual investment plans. *kaizen* is taken seriously and is made to be effective because it is the cornerstone of how performance is improved. This principle applies across the spectrum of types of *kaizen*.

The theoretical implications of this are significant, not least because it offers a more realistic approach to the question of why workers, supervisors and managers participate in *kaizen*. Some proponents of *kaizen* maintain that it is necessarily a rewarding and fulfilling process in itself, and others go so far as to argue for an almost religious commitment to "improvement" as being the vital logic. Others argue that particular national cultural characteristics



determine workers' intrinsic motivation (Petersen and Ruiz-Quintanilla, 2003) and that this explains differences in quality and engineering management (Khoo and Tan, 2003; Lynn, 2002). Instead, we argue that a more plausible approach is that the actors work to support *kaizen* because they perceive that it is in their interest to do so. This means that *kaizen* does not need to be identified with any particular set of managerial mechanisms which motivate or penalise people in regard to corporate targets. In other words, it frees the analysis of *kaizen* from the notion that Japanese workers are somehow more amenable to "theory Y" theories of motivation than others. Okabe (2002) presents a detailed argument of this point, and the idea finds some support in the earlier study by Recht and Wilderom (1998). Furthermore, it releases the analysis of *kaizen* from heroic claims of empowerment and the magical transformation of the labour process or the work ethic. (We note that both the proponents and critics of *kaizen* have a propensity to cast the idea in this way; see Styhre (2001).)

However, we observe that *kaizen* has arisen in a unique national employment system, and one which is currently under unprecedented strain (Ahmdadjian and Robinson, 2001; Lincoln, 1997). If employees' participation and commitment to *kaizen* is driven by an evaluation of their own interests, then it is clearly vulnerable to changes in employment practices. So far the indications given were that lifetime employment for the blue-collar workforce is still considered sacrosanct, but the jury is still out for white-collar workers and more companies are structuring their operations around a core of permanent labour supplemented by others on short-term contracts. It is also conceivable to create an employment system where lifetime employment is not guaranteed, but beyond the immediate satisfaction of achievement from *kaizen*, employees can be assured of fair compensation for their past contribution if and when they leave the company. This may be an important idea to explore when looking into the potential of exporting *kaizen* outside Japan.

The other critical issue identified was the need for the workforce to find *kaizen* projects which generate satisfaction. In growth sectors this is relatively simple since productivity issues are the easiest to develop, but several of the companies were in contracting sectors; hence, finding suitable projects was a major dilemma. Yet without this the entire *kaizen* system and motivation for the workforce to perform their routine work enthusiastically was seen as being under threat. Certain companies were shifting *kaizen* to more fundamental issues than just process refinement such as product development. This may work for the most talented employees, but may be less successful at lower levels. In retrospect, this indicates that the modest expectations for production improvement targets found in this study may explain *kaizen's* longevity in Japan. *Kaizen's* greatest contribution is in existing and ensuring good working practices so the less ambitious the goals, the longer improvement can continue.

Conclusions and recommendations for further research

This paper has shown that the form taken by *kaizen* within an organisation may adapt over time, and reflects the changing environmental conditions. Further, there is considerable diversity in the way in which *kaizen* may be operated; there were significant and interesting differences in the organisations included in this study. There were, however, profound similarities too, especially in terms of the integration and role of *kaizen* within the overall system of target setting and performance measurement. Casting *kaizen* in this way allows a more realistic analysis of the interests and motivations of the actors, removing the need to conceive of *kaizen* as merely some idealistic philosophy about constant improvement.

These conclusions have profound implications for both practice and research. For academic investigations, the study points to the need for more extensive and careful descriptions of what management practices mean for the participants, and for the need to take into account the economic and cultural setting. Here we point out three key consequences that emerge from the study. First, operations management academics have perhaps been sometimes guilty of presenting phenomena which are temporally and geographically contingent as timeless and universal truths; this work has illustrated the danger of declarations about "how *kaizen* is practised in Japan." Not only is there great diversity amongst companies, but each organisation's practice is the result of a complex and specific history. We take from this that operations management research must increasingly look to contextualise against a shifting economic background. As employment systems and socio-political contexts change, so will the practice of operations management. In particular, as Japanese employment systems evolve, we should expect quality and production practices to change too; Shibata (2002) and Watanabe (2000) give overviews of the recent developments.

Second, we note that all the findings of our research would have been largely invisible to survey-based research. Although such approaches may yield some interesting findings (Magaña-Campos and Aspinwall, 2003), the detail and complexity of organisations' practice may be lost. Furthermore, the effort needed in this study to ensure that managers and workers understood what we were talking about, and the subtlety and nuance of their answers imply that we must be highly sceptical of questionnaire-based research in this area.

Finally, the very diversity of practice amongst these firms suggests to us that there remain good reasons for continuing to seek the transferable "core" of management ideas, especially as organisations across the world seek to replicate the operational success of many Japanese firms. However, our research supports Lillrank's (1995) opinion that the transfer of organisational practices is complex, and should be based on reinterpretation and reinvention in the new context. The practical lessons point to the need to understand the motivational calculus of all the participants in the system, and to appreciate the considerable investment of time and effort required to make *kaizen* work within an organisation.

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