



4

Kaizen and Standardization

Tsuyoshi Kikuchi and Momoko Suzuki

There are many methods and concepts of *Kaizen* that can be used to achieve quality and productivity improvements. Most of these originated in the West in line with the desire to improve production management. These were imported to Japan, improved and modified to suit the industrial climate and corporate culture of that country. Together with those aspects independently developed in Japan, they were further developed as *Kaizen*. As this was the driving force for high economic growth in post-war Japan, it became the focus of global attention. Specifically, its components of Quality Control (QC) circle activities, Total Quality

T. Kikuchi (✉)

Consulting Division, Japan Development Service Co., Ltd., Tokyo, Japan
e-mail: go-kikuchi@jds21.com

M. Suzuki

Industrial Development and Public Policy Department, Japan International Cooperation Agency, Tokyo, Japan
e-mail: Suzuki.Momoko@jica.go.jp

Control (TQC) or Total Quality Management (TQM),¹ Toyota Production System (TPS) and Total Productive Maintenance (TPM) are well-known.

The United States (US) thoroughly scrutinized *Kaizen*, especially in the 1980s, and attempted to improve and modify the parts of the concept originating in Japan to match the industrial climate and corporate culture of the US. Typical examples of such improved and modified methods are the Six Sigma, the Lean Production System and the Business Process Re-engineering (BPR) methods. These have not only resulted in positive achievements among companies in the US but also become widespread in European countries, in Asia and in the rest of the world.

Among these newly developed methods, the problem-solving phases, relevant tools and techniques of the Six Sigma approach gained the status of international standards in 2011 as the Quantitative Methods in Process Improvement—Six Sigma—Part 1: DMAIC Methodology (ISO 13053-1: 2011) and the Quantitative Methods in Process Improvement—Six Sigma—Part 2: Tools and Techniques (ISO 13053-2: 2011). In December 2015, the ISO added further international standards concerning the required specific levels of competency regarding Six Sigma and Lean Production for individuals and their organizations. The title is ISO 18404: 2015 Quantitative Methods in Process Improvement—Six Sigma—Competencies for Key Personnel and their Organizations in Relation to Six Sigma and Lean Implementation.

There seem to be two types of *Kaizen* in the world today: the type that has a background of supporting the post-war industrial development in Japan and the type that incorporates new ideas from Western countries while referring to the principles that originated in Japan. In this chapter, the former is

¹“Total quality management practiced in Japan was conventionally called total quality control. However, control in English originally implies comparison with a standard, and does not mean the establishment of a standard or plan. As TQC deals with all aspects of business operation, it has become increasingly clear that the phrase “quality management” should be used to accurately convey the meaning of the phrase “quality control” in the Japanese language. As such, Japanese total quality control is now commonly called TQM in Western countries. The Union of Japanese Scientists and Engineers (JUSE) which is the primary organization for the promotion of TQC in Japan declared the change of the phrase from TQC to TQM in 1996” (Japan Industrial Management Association 2002/2012).

referred to as “Japanese-style *Kaizen*”² and the latter as “Western-style *Kaizen*.” Which type is best in terms of suitability and effectiveness depends on the industrial climate and corporate culture of the country in question, or the specific judgment of top executives (Kurosaki and Otsuka 2015, 201; Stern 2016, xvi). This is our own conclusion based on our experience of involvement in various *Kaizen* projects. Accordingly, a comparison is made between the characteristics of Japan’s TQM and Six Sigma, between TPS and the Lean Production System and between BPR and *Kaizen* in this chapter, but the relative superiority of one over the other is not discussed.

The important issues to note in this chapter are that there are “Japanese-style *Kaizen*” and “Western-style” *Kaizen* and that the Western-style, incorporating such approaches as Six Sigma and Lean Production, has been taken up by the ISO to develop relevant international standards. It is also important to investigate what impacts these international standards have on *Kaizen* projects assisted by Japan International Cooperation Agency (JICA) or any other international donors and what the desirable future direction for Africa is in relation to this methodology.

4.1 *Kaizen* Modified in the US

Japan originally learned production management technologies (the concepts of which were collectively called *Kaizen* in Japan, even though there was no exact definition of this term³) from the West, mainly the US, improved these to suit Japan’s industrial climate and corporate culture, redeveloped them, disseminated them throughout Japan first⁴ and then

²Since “*Kaizen*” was originally developed in Japan, there may be no need to say “Japanese-style *Kaizen*” because “*Kaizen*” itself already has the meaning of “Japanese-style” or “Japanese-born.” However, one of the intentions in this chapter is to compare “*Kaizen* originated in Japan” with “*Kaizen* modified or redeveloped in Western countries”, the term “Japanese-style *Kaizen*” instead of “*Kaizen*” is therefore used to assist readers to easily understand the comparison. In addition to the two types of *Kaizen*, the term “*Kaizen*” has a general meaning as used in this chapter.

³A new concept of the definition of *Kaizen* was established in Chap. 1 of this book.

⁴In Japan, private organizations played a prominent role in the learning of production management technologies from the West, improved them to suit the industrial climate in Japan and disseminated them to companies in Japan. Among others, the Union of Japanese Scientists and Engineers (JUSE), Japan Productivity Center (JPC) and Japan Management Association (JMA) fulfilled this role, especially after World War II (Kikuchi 2012).

re-exported them along with the overseas expansion of Japanese companies. Meanwhile, the West took notice of the improved, redeveloped or invented *Kaizen*, and re-learned *Kaizen* in turn, improving or re-arranging it to suit its own industrial climate and corporate culture, or systematizing it to achieve positive results in Western countries, and then spreading it worldwide. Western-style *Kaizen* is of course known in Japan and has been adopted by some Japanese companies. However there appear to have been mixed outcomes from adopting this style, as the performance of some Japanese companies has not necessarily improved. The one thing which is certain right now is that local *Kaizen* methods and concepts have taken deep root among Japanese companies.

Six Sigma, Lean Production System and Business Process Re-engineering (BPR) are typical *Kaizen* methods which have been improved, redeveloped or systematized in the US. Each of these is briefly described below, and then a comparison of the characteristics of Western-style and Japanese-style *Kaizen* is attempted.

4.1.1 Six Sigma

Six Sigma is a problem-solving method developed by Motorola, Inc. of the US in the early 1980s, when the company was trying to find a way to reduce the number of defective products it was making.⁵ It is said that this method was invented with reference to Japan's QC circle activities, factory floor *Kaizen* activities and TQC, TQM⁶ and TPS.⁷ According to

⁵In 1979, Motorola was planning to enter the pocket bell market in Japan but was surprised to find that the level of defects in its own products was much higher than that of Japanese manufacturers. Six Sigma is said to originate from Motorola's subsequent intensive quality improvement activities (Ito 2001).

⁶TQM (Total Quality Management) is a system used to economically produce goods or services where the quality meets the demands of purchasers. For the effective implementation of quality management, the participation and cooperation of all members of a company, ranging from the top executives to managers, supervisors and workers, are essential at all stages of business activities, including market research, R&D, product planning, design, preparation for production, purchasing and subcontracting, manufacturing, inspection, sales and after-sales service as well as finance, personnel affairs and education. Quality management implemented in this manner is called total quality management or company-wide quality management (Japan Industrial Management Association 2002/2012).

⁷TPS (Toyota Production System) is a general term to describe the production management system developed by Toyota Motor Corporation. As it emphasizes the maximum elimination of *muda*

the Six Sigma method, the problem-solving process is divided into four phases, that is, “measure,” “analyze,” “improve” and “control,” and is called MAIC by combining the initial letters of these four phases. A team of experts, which is unique to Six Sigma, works to solve a problem or task. For the formation of such a team, the top executive is the supreme leader, but the key members of the team are experts with specific education and training. These experts have the titles of Master Black Belt (MBB), Black Belt (BB) or Green Belt (GB) depending on their capability. The overall approach characterized by these features is called Six Sigma.⁸

Using the Six Sigma method, Motorola improved its business performance and was awarded the Malcolm Baldrige National Quality Award (MBNQA) in 1988. This award, given by the President of the US, was established by Congress in 1987 to raise awareness of the importance of quality management and to acknowledge that US companies were successfully implementing a quality management system.⁹ The granting of this prominent award to Six Sigma made the method known throughout the US. The General Electric (GE) Company, in particular, showed much interest in it.

John Francis Jack Welch, Chairman of GE, introduced Six Sigma to the company at the end of 1995 to successfully carry out GE's wide-ranging quality program. Six Sigma was introduced not only in the manufacturing departments but also in the non-production business departments throughout the company (Financial Times 2001). What was emphasized during the application process was the clear definition of who their customers were and what the focused problems and issues for improvement were. This approach led to the establishment of the DMAIC method, with the addition of D (define) before MAIC. The Six Sigma

(waste), it is sometimes called “Lean Production” (Japan Industrial Management Association 2002/2012).

⁸ Sigma (σ) or standard deviation (SD) is a statistical term to indicate variation in the distribution of a set of data values, meaning the probability of the occurrence of errors or mistakes. Six Sigma is the level of the occurrence rate of errors or mistakes of 3.4 times per million. In practice it is difficult to achieve this level; therefore, Six Sigma should be understood as a name based on an ideal target of reducing errors or mistakes infinitely close to zero.

⁹ The award is named after Malcolm Baldrige, who proposed the program and was the US Secretary of Commerce at the time. The award targets six sectors, that is, manufacturing, service, small business, education, health care and non-profit (<https://www.nist.gov/baldrige/baldrige-award>).

method of GE was systematized as a method to solve problems faced by all departments of GE. In other words, it became a *Kaizen* method to deal with the business challenges faced by GE and greatly contributed to enhancement of the company's business performance. The achievement of Six Sigma at GE became widely known not only in the US but also in Europe and Asia, accelerating its worldwide diffusion. We compare the characteristics of Six Sigma with TQM. As Six Sigma is said to have originated from TQM, there are obviously similarities between them as well as differences, as shown in Table 4.1, which is self-explanatory.

4.1.2 Lean Production System

The Lean Production System (or simply “Lean”) was developed in the US as a method to thoroughly eliminate *muda* (waste) with reference to the Toyota Production System (TPS). This method was popularized by James P. Womack, Daniel T. Jones and Daniel Roos in 1996 (Pepper and Spedding 2010; Womack and Jones 1996). It has since become widely known and used by not only American companies but also European companies.

Lean is said to hardly differ from TPS. For example, the Glossary of Production and Manufacturing Management Terms edited by the Japan Industrial Management Association (2002/2012) explains that “the Lean Production System is a synonym for the Toyota Production System or Kanban System which puts just-in-time (i.e., the production or supply of what is needed when it is needed, and in the quantity needed) into practice.” Even the Home Page of Toyota Motor Corporation treats them as the same system.¹⁰ However, some researchers claim that these systems differ in several respects. Nakano (2017)¹¹ is one such researcher and he explains the differences between TPS and Lean as outlined below (see also Figs. 4.1 and 4.2).

¹⁰Toyota Motor Corporation's vehicle production system is a way of “making things” that is sometimes referred to as the “Lean manufacturing system” or “just-in-time (JIT) system,” cited from Toyota's Home Page, on 1 June 2017.

¹¹Nakano worked at Toyota Central R&D Labs., Inc. for 25 years and has conducted research on production management and production systems in different countries (Nakano 2017).

Table 4.1 Similarities and differences between Six Sigma and TQM

Similarities and differences	Six Sigma	TQM
Similarities	<p>Systematic improvement of quality for growth</p> <p>Action guidelines for quality management, including the importance of a top management and customer-oriented approach</p> <p>Use of statistical data</p> <p>Essence of implementation steps (both have their own steps for improvement)</p>	<p>Everyday organizational set up as the basis: <QC circle (small group)></p> <p>Leader (selected from the circle members)</p> <p>Circle members (front-line workers)</p>
Organization of improvement activities	<p>Organization formed by dedicated members:</p> <p><Six Sigma system></p> <p>Champion (president)</p> <p>Promotion manager (director)</p> <p>Sponsor</p> <p>Master Black Belt</p> <p>Black Belt (practical team leader)</p> <p>Green Belt</p> <p>Yellow Belt</p>	
Customer satisfaction	<p>Seeking customer satisfaction to achieve a profit (profit oriented)</p> <p>Top-down approach</p> <p>Standard phases of implementation: DMAIC</p> <ol style="list-style-type: none"> 1. Define: define the problem 2. Measure: collect data to determine the current situation 3. Analyze: identify causes through data analysis 4. Improve: devise and test hypothetical solutions 5. Control: sustain successful solutions 	<p>Achievement of customer satisfaction leads to profit (customer oriented)</p> <p>Bottom-up (+ top-down) approach</p> <p>Self-motivating Kaizen process: <problem-solving type QC story>^a</p> <ol style="list-style-type: none"> 1. Select the theme 2. Establish the current situation and target 3. Formulate an action plan 4. Analyze causes 5. Examine and implement solutions 6. Verify the effects 7. Standardize and establish a control 8. Reflect and identify future tasks
Decision on implementation theme		
Steps of implementation		

Source: Prepared by the author following Yamada (2006/2015) for the framework of this table, and following Yamada et al. (2012), Uchida (1995/2006), Japanese Standards Association (2017) and Union of Japanese Scientists and Engineers (2001)

^aThere are three types of QC story, that is, "problem-solving QC story," "task-achieving QC story" and "policy-implementing QC story" (Yamada et al. 2012)

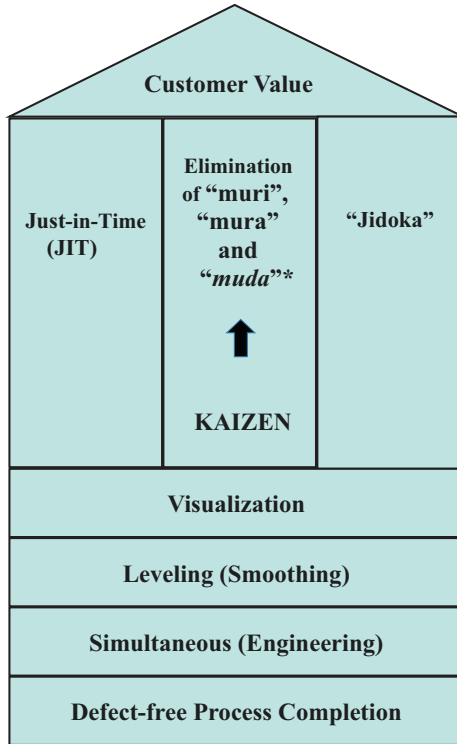


Fig. 4.1 Basic concept of the Toyota Production System (TPS). (Source: Nakano (2017, 13)). *Elimination of “muri,” “mura” and “muda”: Toyota has identified as “mudas” seven types of non-value-adding waste in business or manufacturing process, that is, *overproduction*, *waiting (time on hand)*, *unnecessary transport or conveyance*, *over-processing or incorrect processing*, *excess inventory*, *unnecessary movement* and *defects*. Liker (2004, 28–29) added an eighth waste to the abovementioned seven wastes, that is, *unused employee creativity*)

According to Toyota’s home page, the Toyota Production System was established based on the two concepts of “just-in-time” and “*jidoka*” (automation with a human touch).¹² The former means “making only what is needed, when it is needed, and in the amount needed.” The latter

¹² Kiichiro Toyoda established Toyota Automotive Company on the philosophy and management approach of his father, Sakichi Toyoda, but added his own innovations. “For example, while Sakichi Toyoda was the father of what would become the *jidoka* pillar of the Toyota Production System, Just-in-Time was Kiichiro Toyoda’s contribution (Liker 2004, 18).

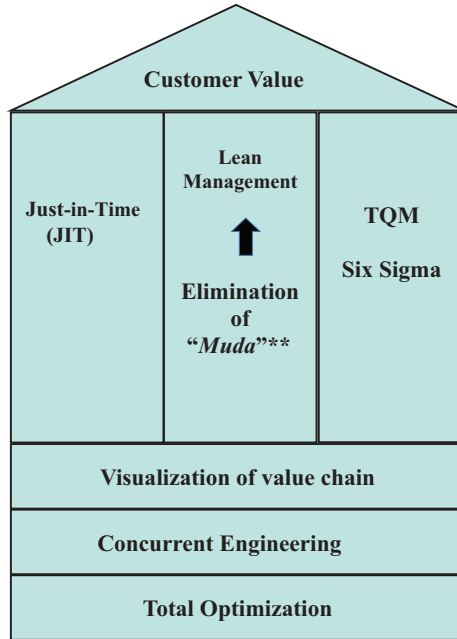


Fig. 4.2 The basic concept of a Lean Production System. (Source: Nakano (2017, 17). ** Elimination of "muda": Womack and Jones (1996) add one more "muda" to the seven that Toyota identified as non-value-adding wastes, that is, *service which does not meet the customer's requirement*)

means that "if any equipment malfunctions or defective part is discovered, the affected machine stops automatically, and the operators cease production and correct the problem." Under TPS, daily *Kaizen* efforts are made to eliminate "muri, mura and *muda*." There should be no "muri" or unrealizable task in work practices, any "mura" or unevenness in production activities and their results and no "*muda*" which means a lack of customer value or added value. TPS adopts such methods as "visualization," "smoothing," "simultaneous engineering" and "defect-free process completion" to produce concepts, policies, activities and results related to "just-in-time," "jidoka," "muri, mura and *muda*" and "*Kaizen*" (Nakano 2017, 13–14).

“Visualization” is a powerful method to make stakeholders share a common understanding by clarifying problems and factors on the production floor. “Smoothing” means the elimination of variations by means of making the work load of each process of a production system even and is also called “levelling.” “Simultaneous engineering” means simultaneous merchandise planning, product design, production system design and marketing planning activities in-house or in cooperation with companies in the supply chain. The purpose of this method is to shorten the development period, to lower the cost and to develop high-quality products and services. “Defect-free process completion” means the concept as well as activity of upholding the creation of a process whereby inferior products are neither produced nor sent to the following process. In other words, it treasures the idea of “completing the quality within a process” (Nakano 2017, 14–15).

Compared to Fig. 4.1 for TPS, the pillar “jidoka” in TPS is replaced by TQM and Six Sigma in Fig. 4.2 for Lean, both of which were developed in the West. In Lean management, the elimination of *muda* takes precedence over the elimination of *muri* and *mura*. To materialize Lean, the value stream mapping method¹³ is frequently used to make “the value chain visualized.” “Concurrent engineering” is an approach then used to shorten the development period by making several sections work concurrently.

One special characteristic of TPS worth mentioning here is that Toyota heavily invests in the education and training of not only future leaders but also shop-floor workers. Toyota applies its production system used at home, that is, TPS, to all its factories throughout the world, regardless of the different industrial climates or corporate cultures in other countries. A thorough understanding of the methods and tools of TPS among all employees, ranging from top executives to front-line workers, is the result of focused and unsparing investment in education and training. One phrase which is often heard at Toyota is “Toyota makes people before making cars” (Liker 2004). In other words, Toyota may represent an exceptional case where it has successfully exported its own corporate culture to countries with different industrial climates and corporate cultures from Japan.

¹³The value stream mapping method is designed to visualize value chain from the beginning of product or service through the customers (Nakano 2017, 54).

4.1.3 Business Process Re-engineering (BPR)

The basic idea of BPR is for an organization to identify its key business processes and to shed any excess fat from these processes to make them efficient. The background of this idea is the discovery of the necessity to fundamentally review and re-design the business organization whereby business processes are segmented and to carry out a series of reforms to produce value for end customers.

BPR spread throughout the world with the publication of “Re-engineering the Corporation” by James Chamy, co-founder of the consulting company CSC Index, and Michael Hammer, an electrical engineer and former professor of computer science at the Massachusetts Institute of Technology (MIT). They defined re-engineering as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance such as cost, quality, service and speed.” Its roots lay in the research carried out by MIT from 1984 to 1989 on “Management in the 1990s” (Financial Times 2001). It is said that these two authors referred to many fashionable business ideas, such as TQM, just-in-time, customer service, time-based competition and Lean manufacturing, at the time to come up with the idea of BPR, but it is clear that many of these ideas were derived from the *Kaizen* methods and concepts that had originated in Japan.

What then are the similarities and differences between BPR and the *Kaizen* that originated in Japan? One similarity is that both set out a target to be achieved. As described later, however, the concept and the method for setting out the target are different. The crucial aspects of the target are that both BPR and *Kaizen* are approaches to enhance customer satisfaction, and thus both aim at eliminating *muda* in business activities and business processes to improve efficiency. However, one important difference is that while BPR has a strong connotation of fundamentally reviewing and improving the business process or reforming the business process at once, *Kaizen* involves gradual and continual improvement with the existing business process being largely maintained. For the setting of a target, while BPR designs the ideal situation, *Kaizen* identifies the gap between the reality and the ideal (target) as a problem to be solved. The approach is thus strongly conscious of the need to improve quality along with the elimination of *muda*.

BPR's handling of workers can be harsh, as illustrated by the phrase used by its proponents: "peripheral processes (and, therefore, peripheral people) must be discarded. Don't automate; obliterate."¹⁴ In contrast, the basic of *Kaizen* is to respect people.¹⁵ The proponents of BPR also state that "scoping to scale" in re-engineering means more than the simple change in individual business processes and that true re-engineering targets the entire organization or is a recipe for company reform (Financial Times 2001). In this sense, BPR aims at achieving total optimization. In contrast, *Kaizen* can be described as an attempt to achieve total optimization through the piling-up of partial optimization successes. Table 4.2 summarizes the above descriptions of BPR and *Kaizen*.

4.1.4 Background of Japanese-Style *Kaizen* and Western-Style *Kaizen*: Differences in Industrial Climate and Corporate Culture

At the outset, it must be asserted that whether *Kaizen* methods or concepts are suitable or effective for a company depends on the industrial climate of the country involved, and its corporate culture, as well as judgment by the executives of the company in question. Both Motorola and GE became aware that Japan's TQM which was born in a different industrial climate and its corporate culture did not easily fit with the industrial climate and corporate culture in the US. Because of this, it is essential to clarify the differences between the industrial climate and corporate culture in Japan and those in the US and the background for the emergence of Western-style *Kaizen*.

Compared to Japanese top executives, those in the US are said to be required to produce results in a shorter time. Because of this, they are reluctant to resort to a bottom-up approach to accumulate small *Kaizen* achievements to ultimately produce a substantial result, as in the case of

¹⁴ One of the problems of BPR was "that re-engineering appeared inhumane. In some cases, people were treated appallingly in the name of re-engineering" (Financial Times 2001).

¹⁵ *Kaizen* activities are led by a QC circle (small group). One of the basic principles of a QC circle is "to respect humanity to create a meaningful and buoyant workplace" (QC Circle Headquarters 1970/2012).

Table 4.2 Similarities and differences between BPR and Kaizen

	BPR	Kaizen
Similarities	Setting of a target Enhancement of customer satisfaction Improvement of efficiency and effects of business activities and business processes	
Process	Elimination of <i>muda</i> (non-added value), in particular to improve efficiency Completely reviewed at once, that is, re-engineering and re-design	Continuous improvement of existing processes
Viewpoint of reviewing processes	Re-engineering of processes from the viewpoint of customers	Quality improvement and cost reduction to enhance customer satisfaction
Involvement of management and front-line workers	Re-engineering is conducted with the decision taken by and under the strong leadership of the top executive. In this sense, BPR is management-led task achievement or a top-down approach	<i>Kaizen</i> activities are implemented by a QC circle comprising employees although these activities follow the philosophy and policy expressed by the top executive. In this sense, <i>Kaizen</i> is a bottom-up with a top-down approach
Optimization target	Participation of front-line workers are limited Total optimization	Front-workers' participation is emphasized Total optimization through accumulation of partial optimization

Source: Prepared by the author with reference to the Financial Times (2001) and Stern (2016)

Japan. Instead, top executives in the US tend to aim at finding a breakthrough as quickly as possible.¹⁶ Therefore, they have little choice but to employ a top-down business approach. Moreover, the educational standard of factory workers in the US is not particularly high, and top executives therefore do not expect these workers to have the ability to propose solutions or to solve problems. This situation is also assumed to strengthen the preference for a top-down approach.

There is another reason why American executives take a top-down approach. Dynamism in the labor market works in the US more than in Japan, where a lifelong employment system still exists. Thus, American executives seem to have no other choice to take a top-down approach with strong decision-making due to large turnover of labor.¹⁷ On manufacturing floors in Japan, QC circle activities by workers (small group activities) are trusted as well as respected by top executives. The high educational standard of workers and strong sense of loyalty among workers to their own company due to the lifelong employment system¹⁸ are some of the reasons for the strong trust of top executives in their workers. Nevertheless, even though there is a strong trend among Japanese companies to opt for the bottom-up approach, this does not mean that workers practicing QC circle activities conduct them arbitrarily, or away from the framework of company policies. In short, the seemingly independent activities of workers are performed within the framework of company policies with the understanding of the top executive. Presentation meetings for the results of QC circle activities are attended by the top executives who commend or even give a special reward to those groups achieving excellent results. Therefore, it is safe to say that the business

¹⁶“Because Western firms tend to focus on breakthrough innovation and are weak at continuously improving in small amounts, this has been the focus of teaching *Kaizen* to Western firms” (Liker 2004, 26).

¹⁷According to Liker (2004, Preamble to Japanese version), it is very difficult for Americans with strong individualism to standardize their works. They prefer to be treated as independent individuals who decide their own approach by themselves. Efforts and a sense of discipline to learn excellent approaches or manners from others are therefore lacking in most American work places. In contrast, it is very natural for Japanese to follow the best approach which the whole team believes or selects in their companies. It is one of the teamwork processes in Japan.

¹⁸Japan is a country with a high educational standard and very high literacy rate. Its lifelong employment system nurtures a sense of loyalty to the company (Nakano 2017).

activities of these Japanese companies are performed with company-wide full participation from top to bottom.¹⁹ It may thus be more apt to describe corporate management in Japan as being based on both the bottom-up and top-down approaches.

Six Sigma activities are conducted in a top-down manner, and the principal body for the implementation of these activities is a Cross-Functional Team (CFT) made up of members from different departments. In the case of QC circle activities (small group activities) which are the mainstay of *Kaizen* activities in Japan, the group members continually find new problems every day at the same production floor and solve such problems internally using their combined wisdom. While a CFT in Six Sigma disbands when the problems are solved, QC circle activities continue all the time. However, it must be noted that a CFT is formed even in Japan when there is a need to solve inter-departmental problems.

As shown by the Six Sigma activities, *Kaizen* activities in the US emphasize original data and quantification; however, it would not be correct to say that such activities in Japan ignore statistical data. Rather, it is simply that *Kaizen* activities in Japan strongly emphasize facts (at the production floor).²⁰ Such activities in the US, especially Six Sigma activities, use detailed instructions to employees along with strict manuals. In contrast, in Japan they demand that workers tackle new problems almost daily that cannot be dealt with by the available manuals. To do this, all group members must rack their brains compared to their US counterparts, who conduct their *Kaizen* activities as instructed or as shown in manuals. For example, ISO 18404 specifies the methods and tools to be used for different stages of *Kaizen* or, more specifically, each phase of

¹⁹“Top executives and managers consider QC circle activities to be important activities for human resources development and vitalization of the workplace, practice such company-wide activities as TQM themselves and provide guidance and assistance aimed at the full participation of all while respecting their human qualities so that QC circle activities can contribute to improvement of the quality as well as development of their companies” (QC Circle Headquarters 1970/2012).

²⁰According to Ohno (1978), the founder of TPS, “Data is of course important for manufacturing, but I place the greatest emphasis on facts.” Liker (2004, 226) wrote that “To Ohno, the big difference (between data and facts) is that data is one step removed from the process, merely ‘indicators’ of what is happening. What you want to do is to verify the on-the-scene facts of a situation. Mr. Ohno’s approach is very much like that of a forensic scientist investigating a crime scene.”

DMAIC. In contrast, *Kaizen* activities in Japan generally demand the development of a new method or technique for each problem or task, even though some activities may follow a manual exactly. In other words, such activities in the US can be described as ready-made activities, and those in Japan can be described as custom-made activities.²¹

4.2 ISO and *Kaizen*

4.2.1 Internationally Standardized *Kaizen*

As described at the beginning of this chapter, the International Organization for Standardization (ISO) published ISO 18404 as a new international standard in December 2015. The full title of this standard is “Quantitative methods in process improvement – Six Sigma – Competencies for key personnel and their organizations in relation to Six Sigma and Lean implementation.” This standard clarifies the requirements for an organization to implement Six Sigma as a process improvement method and establishes the required competencies for key personnel to implement Six Sigma and Lean. There are different titles for key personnel for Six Sigma implementation as shown in Table 4.3. ISO 18404 specifies the experience and competencies required of each key person. All key personnel must undergo training organized by a specified body (an accredited body in the future) to equip themselves with the required standard competencies (Ishiyama 2017b).

Prior to ISO 18404 (2015), the ISO published ISO 13053-1 and ISO 13053-2, making Six Sigma an international standard in 2011. The full title of ISO 13053-1 is “Quantitative methods in process improvement – Six Sigma – Part 1: DMAIC methodology” and that of ISO 13053-2 is “Quantitative methods in process improvement – Six Sigma – Part 2: Tools and techniques.” According to the DMAIC methodology, *Kaizen* activities subject to Six Sigma are divided into Define, Measure, Analyze,

²¹ A similar discussion is seen in the paper “The Quality and Productivity Improvement in Tunisia: A Comparison of Japanese and EU Approaches” (Kikuchi 2013).

Table 4.3 Six Sigma (SS)/L(Lean)/L&SS methods and key personnel

Methods	Title of key personnel
Six Sigma (SS)	Master Black Belt (MBB) Black Belt (BB) Green Belt (GB)
Lean Production System (L)	Lean Expert Lean Leader Lean Practitioner
Lean & Six Sigma (L&SS)	L&SS-MBB (MBB + Lean Expert) L&SS-BB (BB + Lean Leader) L &SS-GB (GB + Lean Practitioner)

Source: Prepared by the author with reference to Ishiyama (2017a)

Improve and Control Phases (ISO 13053-1), and the tools and techniques used in each phase are set out in ISO 13053-2 (Stern 2016).

Another widely known ISO related to *Kaizen* is the ISO 9000 series (or ISO 9000 family), which consist of a set of international standards for quality management and quality assurance published by the ISO in March 1987. ISO 9001 was revised in 2000 and on 23 September 2015 as ISO 9001:2015, which is the latest version. The purpose of this latest version is to provide a core set of requirements which can be used for the next ten years or longer in a stable manner, taking changes in the implementation methods and techniques regarding Quality Management System (QMS) since 2000 into consideration (Nakajyo and Suda 2015). In short, the revisions made in 2015 aim at enhancing confidence in the competency of organizations providing conforming products and services, thereby increasing confidence in QMS based on ISO 9001 among customers (Nakajyo and Suda 2015). ISO 18404 specifies the competencies required of experts (key personnel) for Six Sigma and Lean and the requirements for organizations promoting these approaches. Accordingly, ISO 9001 and ISO 18404 are considered to have a complementary relationship, whereby the latter supplements the former.²²

²²This statement is based on the materials distributed at the “International Symposium on Trends of ISO 18404” held by the Japanese Standards Association (JSA) on 10 February 2017. At this symposium, a JSA person stated that “for organizations which already operate QMS based on ISO 9001, the introduction of Six Sigma as a business *Kaizen* technique should prove effective, even though the introduction of Six Sigma alone is possible.”

Currently, ISO 9001 certification is widely obtained regardless of company size, public or private sector or business fields. Users of this standard are not restricted to the manufacturing sector but include such diverse business fields as engineering and building construction, information and communication, electricity and gas, transportation, wholesale, retail, restaurants, hotels, medical care, welfare, education, finance and public administration. While ISO 9001 certification is relatively easy to obtain even for a small organization, ISO 18401 Certification is much more difficult unless the organization concerned is fairly large. Because of this, the likely way forward for a small manufacturer is to obtain ISO 9001 certification to start with, in preparation for ISO 18404 certification in the future. It is highly unlikely that any organization wishing to obtain *Kaizen*-related ISO certification can obtain quality management or *Kaizen*-related ISO 18404 certification prior to ISO 9001 certification.

4.2.2 Significance of International Standardization

What then is the significance of international standards, such as the ISO standards? In general, the purposes of standardization are those listed below. In the past, the principal purposes of standardization were (1) through (4) but have been broadened in recent years to include (5) through (9) (Takayama 2011). The intention of the ISO to make Six Sigma and Lean international standards will require the achievement of most of the purposes listed below, especially (2) through (7):²³

1. Securing interchangeability and interface consistency;
2. Improvements in production efficiency;
3. Setting of appropriate quality for a product;
4. Promotion of mutual understanding;
5. Dissemination of technologies (outcomes of R&D);
6. Strengthening industrial competitiveness and development of a competitive environment;

²³ *Kaizen* projects assisted by JICA aim at improving the the productivity of individual companies as stated in (2), improving quality as (3), disseminating *Kaizen* technology to industries in general in recipient countries as (4), and strengthening the industrial competitiveness of recipient countries through the dissemination of *Kaizen* as (5).

7. Promotion and facilitation of trade;
8. Securing of safety and peace of mind (consumer protection, consideration of the elderly and handicapped, and so on); and
9. Environmental consideration (energy saving, recycling, etc.).

While the above list spells out the general advantages of international standardization, the advantages at the company level, industry level and country level are listed side by side. The revised list shown below focuses on the company level with some supplementary adjustments:

- Improvement of the quality of operation of an organization;
- Improvement of the quality of goods and services provided for customers by an organization;
- Improvement of the image of an organization (including the public image);
- Improvement of the credibility of an organization (especially for existing and potential partners for business transactions);
- Advantage in terms of international transactions; and
- Contribution to the national and regional economy as well as trade.

However, standardization does not always bestow advantages. “Whether or not an internationally established standard is the best standard is a different matter” (Hashimoto 2013/2015). Such a statement makes sense when we look at the history of the revisions made to the ISO 9000 series. Thus, for ISO 18404, it is planned to periodically review the ranking of the techniques used at each stage of DMAIC (Ishiyama 2017b). The ISO is an independent international non-governmental organization. Its head office is in Geneva, Switzerland, and its membership consists of 163 national standards bodies. Accordingly, the international standards published by the ISO are not necessarily binding. As far as *Kaizen*-related ISO standards are concerned, neither ISO 18404 nor ISO 9001 demand the compliance of individual organizations. It is up to the judgment of each organization or top executive to try to obtain ISO 18404 or ISO 9001 certification.

However, there can be situations where it is necessary to obtain ISO certification to support a certain business transaction. One example is ISO 9001, which is said to be a hit product of the ISO. Even if an organization

can offer a product or service with a high level of customer satisfaction through its own quality management system without obtaining ISO 9001 certification, possession of ISO 9001 certification can help it to gain the trust of even a new customer (business partner or general consumer) in its products or services. In recent years, there appears to have been an increasing trend both at home and abroad to add the possession of ISO 9001 certification to the trading conditions set by a business partner or customer when placing an order. This trend shows that ISO 9001 is becoming the benchmark for measurement of the trustworthiness of a new trading partner. However, it is said that obtaining and maintaining (periodic inspection, etc.) ISO 9001 certification is hugely expensive. In fact, many organizations, especially SMEs even in Japan, are reluctant to have ISO 9001 certification for this reason, even though they acknowledge the advantages of this certification.

On 10 February 2017, an International Symposium on the Trends in ISO 18404 was held in Tokyo with the sponsorship of the Japanese Standards Association (JSA). At this symposium, it was disclosed that while ISO 18404 was published by the ISO in December 2015, the UK is currently the only country working to further elaborate this standard.²⁴ The UK is said to be planning the introduction of a certification system based on ISO 18404 with the leadership of the Royal Statistical Society (RSS) and the United Kingdom Accreditation Service (UKAS). British speakers were invited to the symposium and one of them explained: “the UK’s efforts regarding ISO 18404 are currently at the pilot project stage but the intended certification system would attract some EU countries to follow, with possible expansion to the world if the pilot project proves to be successful.” The sponsor of the symposium took the view that ISO 18404, which has systematized and standardized methods for the improvement of manufacturing and business processes, will follow the historical development of ISO 9001.²⁵

Has any African company obtained ISO 18404 certification? There is a future possibility that African companies will be required to obtain ISO

²⁴Both Six Sigma and Lean were originally systematized in the US with reference to Japanese *Kaizen* methods. However, the UK is said to be the country which put them on the stage of the ISO with a view to making them international standards.

²⁵Many *Kaizen* consultants in Japan take the view that while the number of Japanese companies obtaining ISO 9001 certification is large, the number of those obtaining ISO 18404 certification may be small.

18404 certification, or to appoint a black belt expert of a Western partner company or other for international transactions. However, there is speculation that SMEs in Africa are hesitant to voluntarily obtain ISO 18404 certification, presumably because of the following reasons. First is the question of company size. The companies which developed Six Sigma are such international companies as Motorola and GE. Japanese companies which have introduced it to Japan are also large companies, including Toshiba, Sony and NEC. There is a suspicion that Six Sigma may only be applicable to large companies. In the case of the *Kaizen* projects assisted by JICA, the companies selected for guidance²⁶ are mainly small and medium enterprises (SMEs) with up to 100–200 employees, including the president and factory manager; with those with ten employees or less not being unusual. Therefore, there is no possibility of African SMEs introducing Six Sigma because of their size.²⁷

A second reason relates to human resources development. Most developing countries do not have a human resources development body for Six Sigma.²⁸ However, it is possible that individual consultants with Six

²⁶Strictly speaking, one of the main purposes of a JICA *Kaizen* project is to foster and train personnel who can then disseminate *Kaizen*. Local companies offer their actual production floors as training venues. In other words, *Kaizen* guidance for local companies is not the direct purpose. Nevertheless, the themes to be dealt with on the production floors used for training are selected from the problems faced by host companies, and the fostering and training of *Kaizen* dissemination personnel are conducted with the participation of the owner, factory manager and workers of each host company.

²⁷JICA *Kaizen* projects occasionally feature local large companies. In Ethiopia, in line with the policy of the Ethiopian government to foster model companies for *Kaizen*, large state-owned sugar factories have been selected as the subjects for *Kaizen* guidance along with large private metal processing, textile, garment and other factories in the private sector (see Chap. 5). It is conceivable that there will be requests for fostering model companies or factories for *Kaizen* from other developing countries. The possibility remains that in some cases, the introduction of or guidance on Six Sigma or Lean may also be requested. International diffusion of ISO 18404 in the future may lead companies of a certain size to opt for the introduction of Six Sigma as these companies aiming at exporting or increasing the export of their products may conceive that the possession of ISO 18404 would be beneficial for their business.

²⁸One report submitted at the symposium held in Tokyo on 10 February 2017 suggested that there are only three training bodies for Six Sigma in Japan. The number is nearly 100 in the UK, more than 100 in the US, and there are several dozen in China. Such bodies are said to also exist in France, but the number is unclear. When the author asked a British speaker about the dissemination situation of Six Sigma in Africa at the symposium, the reply was that “although the identities of companies which have introduced Six Sigma are unclear, they are likely to be multi-nationals, if any. One training course on Six Sigma existed at Nairobi University in Kenya where a friend taught the course.”

Sigma training experience abroad and experience of providing guidance on Six Sigma will emerge. It is also theoretically possible that foreign experts could be invited to provide training at home. Also, a company can dispatch its staff abroad to undergo training but may find the cost and duration of training problematic.²⁹ It is likely therefore that the subject SMEs of JICA *Kaizen* projects in developing countries do not have the financial ability to pay for the training of Six Sigma experts (black belt or green belt, etc.). If so, is there any top executive who can decide on human resources development as an anticipatory investment for future profit? This is the problem faced by companies in developing countries, especially by the top executives or owners of SMEs. While the people who can be considered candidate members of a Six Sigma project are, by definition, capable people in their companies, the top executive of every company is haunted by the risk of employees with a black belt or green belt qualification being head-hunted by another company (including multi-nationals) willing to pay a higher wage.

The third is the problem of developing an organizational structure. In general, JICA *Kaizen* projects aim at fostering staff members capable of transferring *Kaizen* technologies (methods and concepts) to local companies (human resources development), and developing or strengthening those organizations receiving JICA assistance, usually the counterpart organization, that are developing an organizational structure. However, it is not easy to successfully develop human resources capable of providing guidance on Six Sigma as well as an organizational structure for *Kaizen* dissemination during the project period,³⁰ as described earlier, let alone

²⁹ The training duration and cost differ depending on the country and training body. In the case of Toshiba Sigma Consulting Corporation, for example, the Master Black Belt course lasts for 10 days at a cost of ¥600,000, the DMAIC Black Belt course for 20 days at ¥1,200,000, the Lean Six Sigma Black Belt Course for 9 days at ¥540,000 and the Lean Six Sigma Green Belt Course for 6 days at ¥360,000 (<https://www.toshiba-sigma.com/education>, 14 September 2017).

³⁰ A JICA *Kaizen* project usually lasts for one to three years. There have been one-year projects (Argentina 2009–2010) and a two-year project (Tunisia 2006–2008), while the *Kaizen* project in progress in Ethiopia at present is a ten-year project and an exceptional case (Phase I for 2009–2011, Phase II for 2011–2014, Phase III for 2015–2020; see Chap. 5). The main activities during the project period are human resources development (fostering of *Kaizen* dissemination personnel) and the development of an organizational structure. Guidance for specific local companies is provided during these activities but the time available is quite limited. Meanwhile, guidance for local companies (transfer of *Kaizen* technologies) takes place simultaneously with the fostering of dissemination personnel.

successfully guide SMEs to develop an organizational structure capable of introducing Six Sigma given the time constraints.

The fourth reason is the difficulty in mastering advanced methods. Six Sigma uses difficult and advanced techniques, such as statistical tools (e.g., multivariate statistics and multivariable analysis), probability distribution tests (normality test, etc.), design of experiment (DOE), project risk analysis and measurement systems analysis (Ishiyama 2017b). Most companies participating in JICA *Kaizen* projects are SMEs in developing countries and the educational background of top executives or factory managers is not necessarily high. Therefore, it is safe to assume that they do not possess sufficient skills to use these complex and advanced methods.³¹

The four reasons described above suggest that SMEs in developing countries, especially in Africa, are unlikely to show interest in Six Sigma. It may be possible for them, however, to examine the possibility of introducing Six Sigma once they have developed to the stage where their products or services are about to enter the international market. In any case, obtaining ISO certification is not compulsory. It is up to individual organizations whether they employ the methods standardized by the ISO. Six Sigma and the Lean Production System may prove to be suitable and effective methods for some organizations. However, other *Kaizen* methods, such as TQM and TPS, may be better suited to other organizations.

4.3 What Kind of *Kaizen* Methods and Concepts Are More Appropriate for African SMEs?

Here, we approach the question of what kind of *Kaizen* methods and concepts are more appropriate for African SMEs. The first viewpoint is to examine under which conditions *Kaizen* is likely to be accepted by SMEs in Africa. This is an examination from a relatively short-term viewpoint in contrast to the second viewpoint to be discussed later. African SMEs

³¹ Six Sigma is armed with an arsenal of sophisticated technical methods. At Toyota, they keep things simple and use very few sophisticated statistical tools. The quality specialists and team members have just four key tools: (1) go and see, (2) analyze the situation, (3) use one-piece flow and “and lamp on” to expose problems and (4) ask “why” five times (Liker 2004, 135).

may pursue more advanced *Kaizen* activities when their size as well as business activities are expanded in the future. When this happens, they will face the decision of needing to select either TQM or TPS that originated in Japan, or Six Sigma or Lean that was developed in Western countries. In preparation for this decision, it is essential to explore what should be done now. This decision has implications for the way JICA as well as other international donor agencies assist *Kaizen* diffusion in Africa.

4.3.1 More Acceptable Conditions for *Kaizen* (First Viewpoint)

In the last ten years, JICA has assisted *Kaizen* projects in eight African countries.³² The contents of this assistance are the development of human resources capable of disseminating and guiding *Kaizen* and the transfer of *Kaizen* methods and concepts to local companies (mostly SMEs), along with practical training on the production floor. The outputs of both human resources development and implemented *Kaizen* at SMEs participating in a JICA project have been generally praised by the governments of recipient countries (see Chaps. 2 and 5). Here, the appropriate conditions for the introduction of *Kaizen* to African companies (not limited to SMEs but including large companies which would be introducing *Kaizen* for the first time) are examined by focusing on *Kaizen* methods and concepts. Based on the first author's experience of involvement in such projects,³³ the authors would like to argue that the following conditions can make *Kaizen* more acceptable to African SMEs. The first condition is that the methodology must be "easy to understand." Any *Kaizen* method or concept should be easy to understand for both the top executive and employees involved. The top executive or owner of an African SME may not necessarily have a high educational background. In fact, there are many with only basic education. Moreover, many employees have not even had sufficient basic education. In consideration of this situation, it is essential for any *Kaizen* method or concept to be easy to understand.

³² Cameroon, Egypt, Ethiopia, Ghana, Kenya, Tanzania, Tunisia and Zambia.

³³ For the last ten years or so, the first author has been involved in JICA *Kaizen* projects as the project team leader in four countries: Tunisia (two years: 2006–2008), Argentina (one year: 2009–2010), Ethiopia (three years: 2011–2014) and Mexico (one and a half years: 2014–2015).

The second is to be “not so difficult to implement.” It is desirable for any *Kaizen* method not to be complex but easy to implement on the production floor in addition to its ease of understanding by the top executives and employees of African SMEs. Preparatory work is required for the introduction of *Kaizen*. For a company planning to introduce this approach for the first time, it is essential to deploy someone who is responsible for its implementation. This means that the company concerned must train or secure the services of such person(s) and, therefore, a company may be reluctant to implement *Kaizen* because of the time and cost involved.

The third is “results in a short time.” For the successful introduction of *Kaizen*, a methodology that does not require much preparation time and which produces results in a relatively short period of time after its introduction is desirable. Although some *Kaizen* results take some time to emerge, there are many methods capable of producing visible results in a relatively short time. What is important is that not only the top executive but also employees feel and verify the results at an early stage of implementation even if these are only small. Such results then lead to an increased level of recognition of the approach, thereby becoming the driving force towards the next stage of *Kaizen*.

The fourth is that it must be “inexpensive to introduce.” There are many *Kaizen* methods and concepts which can contribute to quality improvement (e.g., reduction of defective products) or productivity improvement (e.g., productivity improvement per employee or unit of machinery) without much investment and using existing machinery. Even if investment is required to introduce *Kaizen* for the first time, it is desirable that the amount of investment does not constitute a burden on a SME.

The fifth is “low risk.” Although it is possible to initiate *Kaizen* on a large scale, it is also possible to begin small. Such efforts mean lower costs if such efforts fail or do not produce the expected results. The sixth is that it should not “be difficult to train employees.” Whichever *Kaizen* activity is to be implemented, the training of a person(s) implementing the activity is required regardless of whether the approach originated in Japan or was redeveloped in the West. It is desirable for this training not to become a burden on African SMEs in terms of time and cost. If possible, the

preferred course of action is to develop the ability of employees to educate themselves,³⁴ and to solve problems by gaining experience through the process of implementation, even if the level of theoretical knowledge of *Kaizen* is not high to start with.

These are the six conditions which would make *Kaizen* more acceptable for African SMEs. Which *Kaizen* methods and concepts can meet these conditions in a concrete manner? Table 4.4 compiles the basic methods and concepts based on the experience of JICA *Kaizen* projects. Many of the methods and concepts listed in the table generally satisfy the six conditions discussed above.³⁵

In JICA *Kaizen* projects, most of the methods and concepts listed in Table 4.4 have been transferred to developing countries through classroom lectures. Meanwhile, the number of methods experimented with on the

Table 4.4 Basic *Kaizen* technologies (methods, tools and procedures)

Categories of basic <i>Kaizen</i>		Basic <i>Kaizen</i> methods, tools and procedures
Basic <i>Kaizen</i> technologies	Fundamental methods and tools of <i>Kaizen</i>	Process analysis, motion study, time study, work analysis, work sampling, line balancing, layout improvement, direct costing, cost accounting and so on
	Common methods and tools of <i>Kaizen</i>	5S ^a , 7QC tools, new 7QC tools, why-why analysis, brainstorming, TWI, visualization, <i>muda</i> elimination, QC circle and cross-functional team, suggestion system and so on
	Basic procedures of <i>Kaizen</i>	PDCA, QC story, problem-solving procedure, task-achieving procedure, project management and so on

Source: Prepared by the author with reference to Chap. 3

^aStrictly speaking, the 5S constitute the entry point for *Kaizen* activities

³⁴In recent years, there has been emphasis on the self-learning ability of workers for corporate growth or development among scholars, researchers, policy planners and business people (Hosono 2016). Japanese-style *Kaizen* contains methods conforming to this emphasis.

³⁵Toyota is one of the companies which have produced the best *Kaizen* results. One independent consultant who obtained his experience at Toyota emphasizes that “80% of the problems on the production floor can be solved by basic *Kaizen* methods. *Kaizen* leaders and trainees in developing countries often want to learn advanced *Kaizen* but should concentrate on mastering basic *Kaizen* methods instead.”

production floor is limited because of the constraints posed by the limited duration of each project. In this chapter, the methodology is discussed in terms of “Japanese-style *Kaizen*” versus “Western-style *Kaizen*.” The methods and concepts shown in the above table are commonly included in both styles (Ishiyama 2017b; Stern 2016; Nakajyo and Yamada 2006).

4.3.2 Direction for *Kaizen* Promotion in Africa (Second Viewpoint)

The discussion in this chapter is based on the idea that the suitability of *Kaizen* methods and concepts for companies planning to introduce these depends on the industrial climate of the country concerned, the culture of each company planning such introduction and the judgment of the top executive of the company concerned.³⁶ Let us now explore the question of how African countries should deal with *Kaizen* in line with the expansion of their business activities and organization from different viewpoints.

Technology transfer under the *Kaizen* projects assisted by JICA so far targets the methods and concepts listed in Table 4.4. In short, the methods and concepts for transfer are the basic ones common to both Japanese- and Western-style *Kaizen*. To be more precise, JICA’s assistance helps the target companies to build foundations that can be used for either style in the future. This approach can be upheld as being desirable for international cooperation, because it allows those companies (mostly SMEs) that have received JICA’s guidance to opt for not only Japanese-style *Kaizen* (TQM and TPS, etc.) but also for Western-style *Kaizen* (Six Sigma and Lean, etc.) when they decide to introduce such activities in the future. While it may sound repetitive, the key point here is that JICA’s assistance does not force only Japanese-style *Kaizen* on recipient countries.

After the completion of a JICA *Kaizen* project in Tunisia in which the first author was involved, it was learned that one of the Tunisian companies assisted by JICA had obtained ISO 9001 certification. In other words,

³⁶There are cases, such as Toyota, where exactly the same TPS as employed at the head office in Japan is successfully introduced in foreign countries or regions with a different industrial climate and corporate culture. However, in all likelihood, such success is only made possible because Toyota’s creed of “Before we make cars, we make people” is thoroughly implemented at Toyota’s plants in various countries across the world.

JICA's assistance had made it easier for this company to obtain ISO 9001 certification. This may also mean that there could be cases in the future where participation in a JICA *Kaizen* project facilitates the obtaining of ISO 18404 Certification for participating companies in developing countries. In short, JICA *Kaizen* projects contribute to the development of the basic capacity of the target companies so that these companies can adopt appropriate *Kaizen* methods, including such Japanese-style methods as TQM and TPS, and such Western-style methods as Six Sigma and Lean, and can also obtain ISO 9001 and ISO 18404 certification.

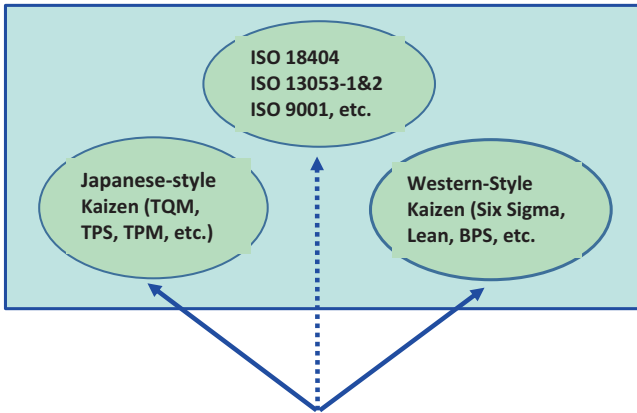
JICA may not have consciously sought this kind of outcome, but it can be said that the approach it has adopted has ended up achieving something desirable in terms of international cooperation. Any future *Kaizen* project assisted by JICA should be formulated to make such potential a reality. At present, JICA is implementing a research project on the required level of the standardization of *Kaizen* for Africa. In its standardization efforts, JICA should consider the desirable contribution of these efforts to the development of the basic *Kaizen* capacity of companies in the target countries to enable them to opt for either style, and meet the challenge of obtaining ISO 9001 and ISO 18404.

Figure 4.3 outlines an image of the future direction of African enterprises (MSEs), based on the above discussion. It is hoped that JICA's research project on this issue is expected to show the standard contents and direction for future *Kaizen* assistance for African companies. At the result of the research project implementation "African-style *Kaizen*," which paves the way for more advanced methodologies (Japanese style or Western style) for African SMEs, may be suggested. The significance and outline of such standardization of *Kaizen* for Africa are discussed in the next section.

4.4 Standardizing *Kaizen* Approaches in Africa

JICA's current research study on "Standardizing *Kaizen* Approaches in Africa" aims to produce a handbook to guide policy makers and practitioners who intend to promote and implement these procedures in their country to enhance its competitiveness and productivity. The handbook will consist of

Advanced Kaizen for African Enterprises (MSEs) in the future



Basic Kaizen Methods and Tools for African Enterprises

Basic Kaizen:

5S, Daily Management, Process Analysis, Motion Study, Time Study, Work Analysis, Work Sampling, Line Balancing, Layout Improvement, Direct Costing and Cost Accounting

Common Kaizen Tools:

7 QC Tools, New 7 QC Tools, Why-Why Analysis, Brain Storming, TWI, Visualization, *Muda* Elimination, QCC, Cross Functional Team, Suggestion System, and so on

Basic Methods and Procedures of Kaizen:

PDCA, QC Story, Problem Solving Procedure, Task Achieving Procedure, Project Management, and so on

*See Table 4.4

[Remarks] Basic Kaizen methods formulate “the basic Kaizen capacity” with which African enterprises could select future advanced Kaizen, Japanese-style Kaizen or Western-style Kaizen.

Fig. 4.3 An image of future *Kaizen* for African enterprises (MSEs). (Source: Prepared by the author)

definitions of *Kaizen*, recommendations and methods for dissemination and deployment approaches, as well as standard curricula, a syllabus and textbook lists for *Kaizen* facilitators.³⁷ Recommendations for the certification system

³⁷ *Kaizen* facilitators is a generic term used in this book to refer to lecturers, trainers and consultants, who disseminate it through providing training and consultancy services to an individual and organizations. See Chap. 3 for details.

will also be made. The guidelines will also contain key success factors and lessons learned from case studies in 14 different countries.³⁸

This research study is a sub-project of the *Africa Kaizen Initiative* that JICA and NEPAD launched in April 2017. The initiative was also one of the commitments from the Japanese government made during the Tokyo International Conference for African Development (TICAD) VI, held in Nairobi, Kenya, in August 2016. Prime Minister Abe addressed in his opening speech that “Japan will cooperate with NEPAD to spread *Kaizen* throughout Africa. We will aim to increase the productivity of factories by 30 percent where *Kaizen* is introduced.”

The core strategies of the initiative are (1) advocacy at policy levels, (2) standardizing *Kaizen* in Africa, (3) identifying and strengthening the functions of centers of excellence and (4) networking with *Kaizen* promoting institutions in Africa and around the world. The initiative aims to disseminate *Kaizen* through centers of excellence utilizing *Kaizen* facilitators trained under a standard training program and certified by a regional accreditation system, while extracting buy-in from policy makers, and connecting *Kaizen* promoting institutions around the world. The next section will elaborate on the ideas behind standardization and the key features of the initiative’s *Kaizen* standards.

4.4.1 Why Is Standardization of *Kaizen* Necessary?

The purpose of standardizing *Kaizen* in Africa is to speed up the process of scaling up. There is no doubt that African firms need to upgrade their capacity to compete in the global market. As mentioned in Chap. 1, many firms in Africa do not possess the very basic skills for management. Cirera and Malony (2017) introduce *Kaizen* as an approach Japan took during the post-World War II years to successfully upgrade its business capacity. They argue that *Kaizen* enhances the production capability of firms, which serves as the basic layer of firm capability. To this day, *Kaizen* has spread throughout the world through Foreign Direct Investments (FDIs) or through consultants who have studied or practiced *Kaizen* and contributed to upgrading firm capability. Japanese firms operating overseas are also of great assistance in disseminating

³⁸ The research team conducted studies of Tunisia, Ethiopia, Kenya, Ghana, Tanzania, Zambia, Cameroon, Egypt, Costa Rica, Argentine, Singapore, Malaysia, Thailand and Japan.

Kaizen. However, in areas where FDI and experienced consultants are limited, a push from the public sector and international donors may be needed.

So far, JICA has implemented *Kaizen* projects in eight countries in Africa and has developed few hundred *Kaizen* facilitators in partnership with government agencies in each country. However, the number is not enough to meet the huge demand that exists in Africa. We need to have many more *Kaizen* facilitators on the continent and to accelerate the process. Partnerships with various organizations and bringing in forces from the private sector should be sought. To do so, we need to have a common understanding of *Kaizen*.

Unfortunately, the complex aspect of *Kaizen* makes it difficult to grasp what it really is. The knowledge of *Kaizen* has been continuously developing through trial and error, and each company in Japan has their own unique way of implementing and conducting *Kaizen*. Through dissemination around the world, new knowledge has been created and boundaries have been expanded. Some of the knowledge may be externalized and have become explicit knowledge but much still resides within the people. People have different understandings of *Kaizen* and sometimes this may be misleading. Thus, we need to have a common understanding of what *Kaizen* is and understand how it can be effectively implemented in African firms. Furthermore, we need to rephrase it in the context of today's Africa. We thus hope that the standardization of the *Kaizen* approach serves as the cornerstone for common understanding of what *Kaizen* is in Africa.

4.4.2 Key Features of the Initiative's *Kaizen* Standard

Although the research study for “Standardizing *Kaizen* Approaches in Africa” is continuing and the results are not yet finalized, there are five key features that are expected in the outcome. First, the initiative's *Kaizen* standard is a regional standard that should be designed to fit the needs of the African continent. Africa's ownership is essential. The standards will be drafted by the research study team but in consultation with major *Kaizen* promoting institutions in and out of Africa.³⁹ Finally, when the standard is set out, it should be approved by the African nations.

³⁹It is planned to consult with *Kaizen* promoting institutions in Cameroon, Ethiopia, Ghana, Kenya, Tanzania, Tunisia and Zambia where JICA projects are on-going and South Africa, where

Second, the standards will be set to develop qualified *Kaizen* facilitators. The study will formulate a standard training program (curricula and a syllabus) and develop a certification system. On the other hand, we should not attempt to impose a standard towards firms because we think it is unrealistic in Africa. Imposing such standards may overburden the firms especially if they are Micro, Small and Medium Enterprises (MSMEs). Our objective is not to standardize the firms but to upgrade their capability. We want more firms to be implementing *Kaizen* rather than feeling overburdened.

Through focusing the standards for developing qualified *Kaizen* facilitators, we hope to amplify the number of facilitators substantially. These facilitators can provide the firms with advice that targets their specific problems in more efficient way without overburdening them with standards. When the firms develop the capacity to implement more systemized and advanced *Kaizen* such as TPS, TQM and TPM, the facilitator can guide the firms to implement these approaches. Furthermore, this may also increase the number of facilitators. Until now, most of these facilitators were trained under a JICA project. However, if the standard curricula become open knowledge and the certification system is open to the public, more people from the business side may join and become *Kaizen* facilitators. We need many more facilitators in Africa than we have now. In Africa, developing firm capability is more necessary than standardizing them. Thus, standardization of qualified facilitators may be more practical and efficient approach in the continent.

Third, the scope of *Kaizen* knowledge tackled by the standard approach should respond to the needs of today's Africa by taking into account its future. Thus the knowledge and skills that will be dealt in the standard may be broader than the conventional knowledge associated with *Kaizen*. For example, those managerial skills that are usually not classified as *Kaizen* skills, such as business planning, marketing and accounting, will be also included in the initiative's standard. Likewise, Western-style *Kaizen* should not be discriminated against but observed and incorporated if deemed beneficial for African firms. We should keep the good aspects of Japanese-style *Kaizen* but also be aware of the criticisms made of it.

the Secretariat of PAPA resides. The initiative will also consult with Japanese *Kaizen* promoting institutions such as the Japan Productivity Center.

In fact, in the interviews conducted by our research study team, interviewees from Malaysia and Singapore commented that Lean and Six Sigma are much easier to implement compared with *Kaizen*. When the interviewer asked why, the answer was “*Kaizen* is philosophical, Lean is more technical.” “*Kaizen* depends on individual capacity. It is not sustainable.” Regardless of the correctness of their comments, we need to be aware of these notions. As mentioned earlier, much of *Kaizen* knowledge is tacit knowledge that resides in the people. This makes it difficult for people to understand. We need therefore to convert their tacit knowledge into explicit knowledge.

The fourth feature is flexibility. A word of caution that may appear to contradict the concept of standards is needed in Africa’s case. Although this is a regional standard, the African continent is made of more than 50 countries with different economic levels and policies. Even within the seven countries where JICA is currently implementing *Kaizen* projects, the context, purpose and means are different. In Ethiopia, the Ethiopia *Kaizen* Institute (EKI), a government agency which is the core *Kaizen* promoting institution in the country, is providing services to large and medium enterprises and to the public sector. The majority of EKI consultants are recruited from new graduates (see Chap. 5 for further detail). On the other hand, in Cameroon, the SME agency utilizes private consultants to provide *Kaizen* as part of its business development service to SMEs. The curriculum needed to train facilitators in Ethiopia and Cameroon may therefore differ. To respond to these different circumstances, dividing the curriculum into modules is suggested by this research study. In this way, each country can choose the modules needed according to their targets and the background experience of the consultants. Different levels of certification, such as basic level consultant to advanced level consultant, should also be considered depending on the modules taken, level of knowledge and the years of experience a consultant has.

Likewise, we need to understand that customization is one of the essential features of *Kaizen* as argued in Chaps. 2 and 5. For effective application in country, customization has had a great role in the past. As US developed Lean and Six Sigma to adjust *Kaizen* to their corporate culture, Asian countries have also practiced customization. In Vietnam, Nguyen Dang Minh (2017), Chairman of the Advisory Board of the GKM Lean Institute, introduced a managerial philosophy called TAM

THE to help Vietnamese understand the concept of Lean management. Here Minh acknowledges Lean management as equivalent to TPS. TAM THE is a “Made in Vietnam” Lean management philosophy that teaches that working seriously with good intentions will develop the firm’s capacity and that this is beneficial. African firms and communities should be able to customize and create their knowledge for themselves. Thus, the initiative’s standard should focus on transferrable knowledge and skills so that customization can be attempted in each country.

Finally, the standard should be subject to periodical revision. *Kaizen* knowledge is something that constantly evolves through continuous conversion of tacit knowledge to explicit knowledge and through customization. Furthermore, considering the current transformation of industries through digitalization and AI, the knowledge used today may not be relevant in the future. In order to accommodate these changes, periodical revision is needed.

In a nutshell, the initiative’s *Kaizen* standard is a regional standard for developing qualified facilitators. The set of knowledge and skills that will be dealt in the standard will be adjusted to the current challenges that African firms are facing. Though the bulk of the knowledge will be derived from conventional *Kaizen* knowledge, a broader set of skills will be incorporated. Furthermore, the standard will be periodically revised to accommodate new knowledge created within and out of Africa.

4.4.3 Significance of Standardizing *Kaizen* in Africa

As previously mentioned, the purpose of the initiative’s standard is to accelerate the catch-up process in African firms through the implementation of *Kaizen*. Up until now, aside from the counterpart organizations in JICA’s projects, only few organizations provide *Kaizen* or Lean services to firms in Africa. Since the few private firms that do exist provide services mostly for large or multi-national companies, local SMEs do not have a place to turn to. Even within JICA’s projects inefficiency can be seen. In each country where JICA has implemented a *Kaizen* project, the experts dispatched to those countries had to develop curricula and textbooks from scratch. If a standard curriculum and textbooks were available, there would be no need to develop these from the beginning.

Furthermore, if a qualification system for *Kaizen* facilitators is in place, more personnel from the private sector can be expected to join the force. There is no need for them to be trained in the standard training program if they already have experience in *Kaizen* applications. They could simply pass the exam and become qualified *Kaizen* facilitators, but if they wished to enhance a particular skill they could choose from the modules and receive training.

However, to really accelerate the process, standardization of *Kaizen* is not enough. That is why the initiative has four main strategies. However, other strategies need to be put in place to give it real effect. First, government support from each country is needed. Many enterprises still do not realize what they lack in their management capabilities. Therefore support from the government is needed, especially for MSMEs with limited capital. In this way we can stimulate the potential demand in Africa.

Second, we need to have core partner organizations that have the capacity to provide standard training and accreditation for qualified facilitators. Of course, the seven organizations in our partner countries are candidates but there can be other organizations that provide this training. For example, the Pan-Africa Productivity Association (PAPA), a regional organization promoting and encouraging member countries⁴⁰ to develop productivity cultures that can assure better living standards, can be one of the candidates. Productivity South Africa, where PAPA locates its secretariat, has experienced consultants. These organizations are expected to become Centers of Excellence that can also provide assistance to neighboring countries through providing training or dispatching their facilitators. Together with a standard curriculum, the initiative aims to develop a database where materials and case studies are stored. Any country can access and read, listen and watch to see how *Kaizen* can be implemented in different environments.

Third, creating a network of *Kaizen* promoting institutions within Africa and globally is also expected to boost the process. The *Kaizen* network is also expected to facilitate the process of converting tacit knowledge residing within people and each country to explicit ones that can be shared on a borderless basis.

⁴⁰ Botswana, Burkina Faso, Ghana, Kenya, Mauritius, Namibia, Nigeria, South Africa, Tanzania, Zambia, and Zimbabwe.

The initiative will also attempt, at the policy level, to promote awareness of this approach. All African politicians recognize that they must enhance the productivity of their economy, firms and workers. Choosing what policy measures to adopt and implement is the hard task. Fortunately, the development of a basic *Kaizen* capability is compatible with other advanced methods, as we argued in the previous section. Furthermore, implementation can be achieved without large investment. The most basic factor for successful development is cultivating *Kaizen-oriented* minds and the *Kaizen* culture. It is also expected that eventually, this dissemination system will work on its own. The duration of the initiative is for ten years starting from 2017, and there will be a periodical review, which will make it possible to assess the extent to which our purposes are fulfilled. The challenge is whether we can create *Kaizen-oriented* minds and culture in Africa that will not only develop firm capacities but also create a learning society so that the continent can adapt to the future challenges that they may face.

4.5 Concluding Remarks

There appears to have been a somewhat ironic cycle of development in this area. Japan learned technologies (methods and concepts) from the West and developed them in its own way. In turn, the US learned technologies that had been successfully developed in Japan and redeveloped them in its own way to produce successful examples of these technologies. The technologies developed in the US then spread to the rest of the World, and the UK pushed some of them to gain the status of international standards (ISO standards). Following this cycle, the question may be immediately raised as to whether Japanese companies are affected by ISO standards, such as ISO 18404; however, there is no way of knowing at present how they will be affected in the coming years.

The more important question for us in this chapter was what impact will ISO 18404 have on African companies? The possibility that some multi-nationals based in Africa and large African companies operating in the international markets will opt to obtain ISO 18404 certification

cannot be denied. However, ISO 18404 does not appear to have much impact on most African SMEs that are operating within the local market. In short, it is currently inconceivable that African SMEs will move to obtain ISO 18404 certification.

Needless to say, African SMEs should eventually advance their *Kaizen* methods such as to TQM, TPS, Six Sigma, Lean and so on so that they could compete within the global market. They may even be challenged to obtain not only Japanese-style *Kaizen* but also Western-style *Kaizen*. In consideration of such prospects, international cooperation for African SMEs should start from the implementation of basic *Kaizen* to enhance their firm's capability so that the opportunity to challenge these styles of *Kaizen* and ISO standards can be seized where and when appropriate. To achieve this outcome, the standardization of these activities at the current level in Africa must contribute to "the development of a basic *Kaizen* capability" for African SMEs.⁴¹ This is precisely the direction that JICA's current research study on "Standardizing *Kaizen* Approaches in Africa" is heading towards.

References

- Cirera, X., & Maloney, W. (2017). *The Innovation Paradox, Developing-Country Capabilities and the Unrealized Promise of Technological Catch-Up*. Washington, DC: World Bank Group.
- Financial Times. (2001). *Handbook of Management* (2nd ed.). London: Pearson Education.
- Hashimoto, T. (2013/2015). *Monodukuri no Kagakushi (Scientific History of Manufacturing: Standardization Revolution Which Changed the World)*. Tokyo: Kodan-sha.
- Hosono, A. (2016). Industrial Strategies: Toward a Learning Society for Quality Growth. In A. Norman & J. E. Stiglitz (Eds.), *Efficiency, Finance, and Varieties of Industrial Policy*. New York: Columbia University Press.

⁴¹The World Bank (2008) assumes that foreign trade, foreign direct investment and contacts with diaspora are major channels of technology transfer for developing countries. The Bank gives scant weight to international technical assistance as an important channel of technology transfer. We would like to stress that standardization and transfer of management technology like *Kaizen* for SMEs in developing countries is a challenging topic, even for the Bank.

- Ishiyama, K. (2017a). Six Sigma to Kokusaikikaku ISO 18404: Hyoujunka to Hinshitsukanri (Six Sigma and International Standard ISO 18404: Standardization and Quality Management). *Journal of Japanese Standards Association*, 70(2), 45–46.
- Ishiyama, K. (2017b). Six Sigma Sainyumon: Hyojunka to Hinshitsu Kanri (Re-introduction to Six Sigma: Standardization and Quality Management). *Journal of Japanese Standards Association*, 70(6), 6–17.
- Ito, K. (2001). Six-Sigma no Igi to Kadai (Signification and Theme of Six Sigma). *Journal of Japan Society for Production Management*, 8(2), 77–82.
- Japan Industrial Management Association (Ed.). (2002/2012). *Seisan Kanri Yougo Jiten (Glossary of Production and Manufacturing Management Terms)*. Tokyo: Japanese Standards Association.
- Japanese Standards Association. (2017). International Standards for Certification of Kaizen Personnel and Their Organizations: Symposium on the Trends of ISO 18404, Unpublished Material, February 10, 2017.
- Kikuchi, T. (2012). *The Role of Private Organizations in the Introduction, Development and Diffusion of Production Management Technology in Japan*, GRIPS Development Forum. Tokyo: National Graduate Institute for Policy Studies.
- Kikuchi, T. (2013). The Quality and Productivity Improvement Project in Tunisia: A Comparison of Japanese and EU Approaches. In K. Ohno & I. Ohno (Eds.), *Eastern and Western Ideas for African Growth: Diversity and Complementarity in Development Aid*. Oxford: Routledge.
- Kurosaki, T., & Otsuka, K. (Eds.). (2015). *Korekara no Nippon no Kokusai Kyoryoku (Japan's International Cooperation in the Coming Years)*. Tokyo: Nippon Hyoron-sha.
- Liker, J. K. (2004). *The Toyota Way*. New York: McGraw-Hill.
- Minh, Nguyen Dang. *Kigyo no seisanseikoujyuu to jizokubatten no tameno made in Viet Nam Lean Management (Made in Viet Nam Lean Management for Enhancing Firm Productivity and Sustainability)*. National Graduate Institute for Policy Studies, Tokyo, January 24, 2017.
- Nakajyo, T., & Suda, S. (2015). *ISO 9001:2015 Shin-kyu Kikaku no Taisho to Kaisetsu (ISO 9001:2015-Targets and Explanations of Old and New Standards)*. Tokyo: Japanese Standards Association.
- Nakajyo, T., & Yamada, S. (Eds.). (2006). *TQM no Kihon (Basics of TQM)*. Tokyo: JUSE Press.
- Nakano, M. (2017). *Ima Sekai deha Toyota Seisan Hoshiki ga donoyoni Shinka shiteiruka (How Is the Toyota Production System Evolving in the World?)*. Tokyo: Nikkan Kogyo Shinbun-sha.

- Ohno, T. (1978). *Toyota Seisan Hoshiki (Toyota Production System)*. Tokyo: Diamond-sha.
- Pepper, M. P. J., & Spedding, T. A. (2010). The Evolution of Lean Six Sigma. *International Journal of Quality & Reliability Management*, 27(2), 138–155.
- QC Circle Headquarters. (Ed.). (1970/2012). *QC Sakuru no Kihon (Basics of QC Circle)* Tokyo: JUSE Press.
- Stern, T. V. (2016). *Lean Six Sigma*. Boca Raton: CRC Press.
- Takayama, J. (2011). *Kokusai Hyojunka no Genjo to Wagakuni no Kadai (Current Situation of International Standardization and Challenges for Japan)*. (Reference No. 725, June, 2011). Tokyo: National Diet Library of Japan.
- Uchida O. (1995/2006). *Hinshitsu Kanri no Kihon (Basics for Quality Management)*. Tokyo: Nikkei Publishing.
- Union of Japanese Scientists and Engineers. (2001). JUSE Special Japan-US Joint Seminar: Six Sigma and TQM, Unpublished Material, August 29 and 30, 2001.
- Womack, J. P., & Jones, D. T. (1996). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. London: Simon and Schuster.
- World Bank. (2008). *Global Economic Prospects: Technology Diffusion in the Developing World*. Washington, DC: World Bank.
- Yamada, S. (2006/2015). *TQM: Hinshitsu-Kanri Nyumon (Introduction to TQM Quality Management)*. Tokyo: Nippon Keizai Shinbun-sha.
- Yamada, Y., Shimoda, T., & Niikura, N. (2012). *QC Sutori no Kihon to Katsuyo (Basics and Application of QC Story)*. Tokyo: JUSE Press.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

