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Management directed kaizen: Toyota's Jishuken process for management development

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Abstract

Purpose – The purpose of this paper is to analyze Toyota's management directed kaizen activities named Jishuken. Currently, there are many variations in understanding how Toyota develops its managers to support daily kaizen, especially when Toyota managers have different levels of understanding of Toyota production system (TPS) and skills essential in applying TPS.

Design/methodology/approach – This paper will study Toyota's Jishuken process in the context of strengthening TPS and analyze both the technical and management aspects of Toyota's Jishuken process.

Findings – When integrated into plant-wide long-term continuous improvement, Jishukens can be extremely effective at developing management's ability to conduct and to teach others to conduct daily kaizen and problem solving. This paper shows how Jishukens function within the TPS system to continuously improve managers' understanding of TPS both for their own concrete problem solving and to support manager's roles in communicating, coaching and teaching problem solving to production workers.

Originality/value – Most attempts to imitate Toyota fail because techniques are adopted piecemeal with little understanding of why they exist or what kind of organizational culture is needed to keep them alive. Jishuken serves as an example of a technique which is successful only when embedded within the right organizational culture.

Keywords Management development, Manufacturing systems, Continuous improvement, Lean production

Paper type Research paper

1. Introduction

Toyota's success is largely and rightly attributed to their unique approach to manufacturing. Accordingly, the Toyota production system (TPS) (in the USA,

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more generically, “lean manufacturing”) has been widely studied beginning in the 1970s but successful imitators have been few. Thus, researchers continue attempting to understand how TPS works.

What makes Toyota’s approach to manufacturing difficult to grasp is often the unexamined assumptions or perspective of the analyst, not necessarily TPS itself. That is, TPS is too often examined analytically and as if it were static – despite notable examples of a contrary view (e.g. [Bhasin and Burcher, 2006](#), who also provide a useful review of the literature arguing this position). For one thing, at any given time what is called TPS is actually the current state of a dynamic system that has evolved to that point and will continue to evolve.

Commentators have described Toyota’s approach as in some sense a mystery (Mishina, 1998) or as a set of contradictions (Takeuchi *et al.*, 2008). As Fujimoto sees it, the mystery is that Toyota’s system has evolving emergent qualities that cannot all be known in advance. He sees TPS problem solving as an “evolutionary learning capability” that is both “intentional” and “opportunistic” in that the company uses established routines to generate possible new production improvements and at the same time is able to seize emergent “unintended” or surprise improvements and then skillfully institutionalize them as well ([Fujimoto, 1999](#)).

If lean/TPS is discipline that develops over time, then it requires constant and consistent leadership engagement and participation. One element in the current TPS approach that is of interest as a focus and can also make this picture of lean clear is Jishuken.

There have been various attempts to explain Jishuken (Smith, 1993; Montabon, 1997; Liker and Meier, 2006); however, these attempts have described Jishuken only as a rapid shop floor activity similar to the kaizen blitz model ([McNichols et al.](#), 1998; [Bicheno, 2000](#)) with connections to supplier development for those situations needing urgent solutions. What is more misleading is that none of the current work discusses how lean problem solving is applied or how this activity can actually weaken worker involvement if applied incorrectly. There is also little understanding of how managers can initiate, support or lead problem-solving activities when they themselves need help in developing their understanding of TPS problem solving. These descriptions of Jishuken mislead by creating the impression – a static impression – that managers within Toyota have a complete understanding of TPS, one which they somehow attained instantly without needing to develop it over time ([Alloo, 2009](#)).

Seen more clearly, Jishukens, like many TPS activities, have both a learning goal and a productivity goal: as they harness manager teams for problem solving needed by the production process, Jishukens help managers continue to improve their ability to coach and teach TPS problem-solving to others, specifically production workers.

The scope of this work is to analyze how Toyota applies Jishuken to develop managers’ ability to solve problems in management teams and to support problem solving by production worker teams. Accordingly, Toyota must establish an organizational culture where managers feel comfortable asking for help and learning TPS. This paper will evaluate what makes Jishuken successful or unsuccessful. Two case examples that illustrate some salient characteristics of Jishukens inside Toyota are included. Last, Jishukens are discussed as they might exist “outside” Toyota. The goal of this work, however, is not to enable copycat imitation of Jishukens, but to offer a point of view that may be helpful for those interested in understanding TPS as a system.

2. Background

Jishuken can be misunderstood as “single purpose”: as only a plant improvement activity (Smith, 1993; Toushek, 2006; Masaaki, 1997; Montabon, 1997; Worley, 2007; Heard, 1998; Hallum, 2007) or as only a supplier development activity (Heckscher and Adler, 2006). In fact, Jishuken has two main purposes: to solve problems in the workplace that need management attention and to correct, enrich and deepen understanding of TPS by management through first-hand on the job application of the problem-solving principles using hands-on activity and coaching. It differs from problem-solving activity conducted by production workers (“Team Members” in Toyota’s language) because Jishuken involves only management teams to identify the problems and implement the countermeasures (Toyota Motor Manufacturing Kentucky (TMMK, 2009)).

Since in addition to their other roles, managers perform an important function in TPS as coaches and teachers for team members doing problem solving, Jishuken is both a technical problem-solving activity and a management development process that helps managers learn how to be better teachers (Hall, 2006; Saito, 2009). Jishukens continually develop management’s interpersonal skills so that they understand the right way to coach and support kaizen (Alloo, 2009). A third organizational culture function of Jishuken is to communicate, maintain and reinforce the company’s values, beliefs and behaviors (known as the Toyota Way) (The Toyota Business Practice (Toyota Motor Corporation, 2005)). Participation in Jishukens gives management a common language and a common approach to problem solving standard across the company.

3. Toyota’s purpose for performing management directed kaizen

As stated above, lean/TPS requires continuous management involvement and support. Jishukens are one concrete way to provide that involvement and at the same time to provide the company with useful problem solving so that the activity is not seen as merely “training.” Another key to the function of Jishuken is that the practice is continual and long-term, not a course from which managers graduate. To become skilled at coaching problem solving, managers must use the same hands-on techniques at all levels of the organization. To ensure that coaching is consistent throughout the organization, management must be given opportunities to share understanding of TPS with other managers. Note that Toyota does not assume that its management shares a common understanding of problem solving or how TPS should be applied. Therefore, Jishuken functions to stimulate discussion and communication among work groups as a means to reach a common understanding. The Jishuken practice also gives managers the chance to learn how to be better teachers while engaged in the development of TPS that occurs through daily effort over time (Hall, 2006).

Jishuken also functions as a manager’s way to get help when kaizen in his/her department/division has begun to slow down, something that happens periodically. It is relatively easy to eliminate waste at first, especially in a young system or a new process. However, over time, as more problems are solved and as workers become accustomed to a particular process, waste elimination can become much more difficult; problems are no longer as visible. The Jishuken process becomes a way for managers to get help from other managers who can bring a fresh eye, can stimulate waste elimination by helping waste become visible.

It is not unusual for managers in industry or business to feel uncomfortable about asking for help. Larger cultural factors like gender roles can influence this; witness the standard

joke about males in the USA that they will refuse to ask for directions when lost rather than admit to not knowing something. In US culture, generally and in some companies more than others, asking for help can be seen as an admission of weakness or incompetence. Another not untypical kind of organizational culture assigns blame for problems; this cultural attitude can include blame for those who discover or identify problems, thus encouraging lower levels to conceal problems and mislead upper levels about any negative aspects of the actual situation. In such a culture, system effects will tend to be invisible. Problems would not be seen as more or less inevitable causes of aspects of a system that were not foreseen or have developed over time but as the fault of someone performing badly.

Thus, Jishuken – because it is standard expected procedure – functions to lessen managerial reluctance about asking for help. Here is an example of why Jishuken cannot be used as a “tool” (like a hammer, for example, something than can be used effectively regardless of cultural factors) but only works when it is consistent with and supported by the larger culture, here with Toyota culture which treats the identification of problems as a valued skill and a positive activity. This valuation in turn rests on the principle of continuous improvement, which, in order to continue, requires continuous improvement in the ability of team members and managers to see problems. It should be clear by now why a lean implementation can fail if it is not consistent with the culture of the larger organization.

Kaizen, for example, will not be successful if employees do not receive the right kind of coaching and support. Jishukens or some equivalent are needed. But for Jishukens to be effective, managers at all levels need to feel comfortable and supported when highlighting and exposing problems. Thus, a company cannot outsource TPS to one group or level and ignore it otherwise. If company leadership discourages the discovery of problems, Jishuken will wither, no matter how many books on TPS are bought and read. If Jishuken is not effective, kaizen will be ineffective and lean implementation will likely have failed in such an organization because the particular problem-solving approach to waste elimination it depends on will not take root. Consequently, if leadership is not wholeheartedly engaged in promoting this behavior, managers will conceal rather than identify problems (Alloo, 2009).

Lastly, it should not be forgotten that, in addition to being a form of learning, Jishukens do indeed help solve unique kinds of problems. Jishukens let managers perform problem solving across departments or within work groups at various levels. Jishukens can thus help the company tackle broad problems, those with a high priority or those that may have the potential to expand or grow beyond their current level. For example, Jishukens can be applied to company-wide problems related to safety, quality, productivity or cost. Jishuken activity can be used to work on any problem, but the typical focus is problems at the management level.

4. Scope and span of control of Jishukens

As shown in Figure 1, Jishukens can be initiated by any level of management, anyone from the group leader (GL) for production, quality and maintenance or the assistant manager for staff up to the president. As stated earlier, Jishukens can be initiated voluntarily or by request from other areas that need support. Jishukens often begin with information from key performance indicators (KPI) at the system level where a line, section or department is tracked. In all cases, Jishukens are initiated by the manager who intends to lead the problem-solving activity within his/her area.

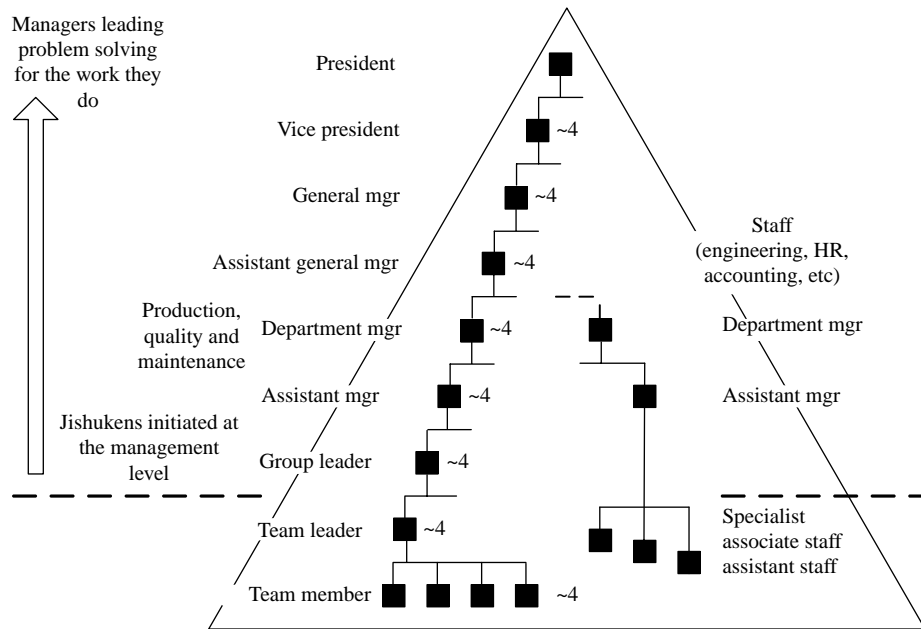


Figure 1.
Typical Toyota
organization structure
showing Jishuken
initiation boundary

5. Starting point of management directed activities

An abnormal condition – a gap between the actual condition and the standard at the management/system level – triggers a Jishuken. Figure 2 shows five such cases. There are also three conditions where Jishukens could be applied to (Figure 2):

- (1) establish a new standard;
- (2) maintain the standard; and
- (3) improve the standard.

The condition chosen depends on the actual condition of the system in relation to the standard.

Jishukens are sometimes labeled “kaizen activities” but kaizen is always used to improve the standard where Jishukens are also used when the system is unstable or has fallen below standard. The reverse misunderstanding can occur when companies hold kaizen events, but in actuality they are only trying to meet the standard or stabilize the current system.

6. Structure and coordination of management team

Once the need has been identified, a Jishuken team is assembled with help from the Operations Development Group (ODG) (discussed in more detail later). A typical Jishuken team will have four-six members from various management levels, from GL to the president. The exact composition of the team is not specified in procedures because the emphasis is on what the particular problem demands.

Figure 3 shows a typical organizational structure for a production environment in which material flows from Department A to D. Here, activity in A negatively impacted

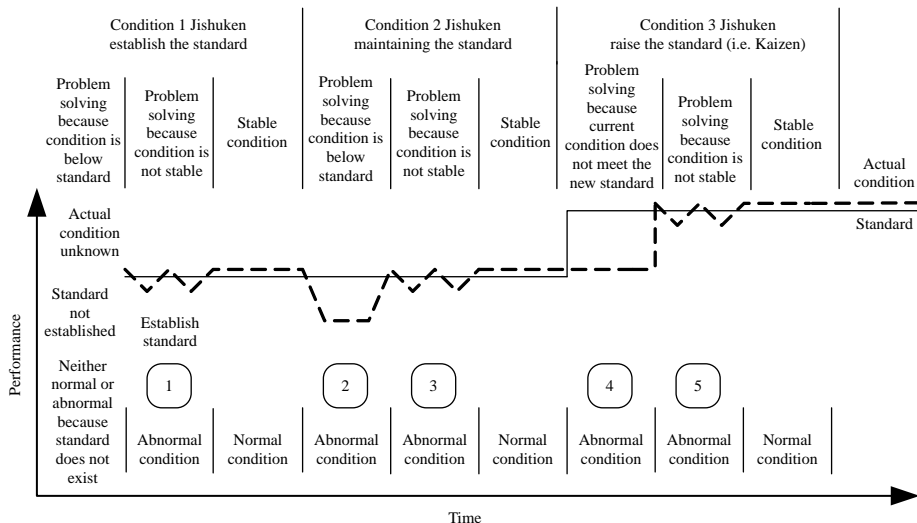


Figure 2.
Description of Jishuken
conditions

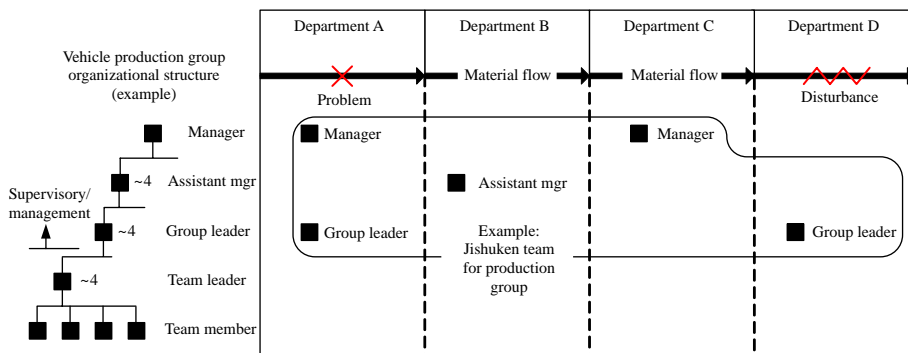


Figure 3.
Example: Jishuken team
for a production problem

a downstream process at D. In this scenario, the Jishuken leader would likely be chosen from A, ideally at the management level closest to the situation. The Jishuken leader would then get assistance from the ODG group in assembling the team. Here, the team would include members from A and from Department D. Although other departments could also be tapped, depending on the nature of the problem, the Jishuken team should be drawn from the department where the problem appears to originate. The ODG facilitator will request that particular people join based on various factors including Jishuken experience and applicability of related process knowledge or with no prior knowledge, to give a fresh eye. The facilitator will also try to include members from different shifts.

7. Significance of roles in management directed activities

Understanding the roles needed and playing these roles effectively on the Jishuken team are two critical factors for success. Although the roles tend to be fixed, members

are encouraged to develop and strengthen new skills by taking on different roles to learn and improve over time. Three functional roles within Jishukens are key:

- (1) a full-time leader to manage resources;
- (2) a facilitator to help teach new skills; and
- (3) members who will contribute ideas but ultimately will support the team's chosen direction.

The Jishuken leader allocates team resources and sets the group's goals and targets. A good leader makes sure that everyone has what is needed, whether it is training, tools or other resources. The leader should be a manager from the department where the problem originated so as to be able to conduct follow-up after the Jishuken. The leader has final decision-making responsibility for the group but must take care not to block or inhibit the process. A good leader can encourage contributions and then help the team unite to support a decision they may not all agree with; although even the most successful Jishuken teams rarely agree on everything, successful teams do support the group's decisions. Since most disagreements involve choosing the right approach to solve the problem, the leader can prevent most conflicts by following the problem solving methodology (discussed later) with the help of a trained facilitator. Lastly, the leader keeps the team on track by setting goals.

A role common at Toyota but rare elsewhere is that of facilitator. Toyota's facilitator takes the role of neutral person who guides the group through a structured process while encouraging team participation. In Jishukens, the facilitator's main jobs are to ensure that the TPS problem solving methodology is applied and that team members are playing their roles. A good facilitator will not only be effective at managing interpersonal dynamics within the team but can also step in when the team is stuck. In some cases, this role is confused with that of the tough sensei that refuses to provide solutions and only raises the hard questions. It is true that the facilitator should not provide answers, but instead coach the group on how to complete each step in the problem solving methodology. Lastly, the facilitator has to make sure that communication among all team members is good. For example, if team members have different understandings and do not communicate to make those explicit, progress can stop and the team can fail.

On the Jishuken team everyone plays the role of supporting the group in the problem-solving activity by making contributions. Jishuken members can also perform supporting roles such as coordinating, planning, tracking, and distributing information. With the exception of leader and facilitator, team roles can be rotated or shared within the group. There are no formal prerequisites for being a part of a Jishuken team; however, working knowledge of the Jishuken procedure and the problem-solving process are generally required.

8. Support function of the ODG

The ODG group is an entity within Toyota that helps with the Jishuken process, as an aspect of its main role: to strengthen TPS. This group provides assistance by offering training, facilitation and expertise in various areas. In the case of Jishukens, the ODG group helps assemble the team, teaches and facilitates the problem-solving process, tracks progress and ensures that desired outcomes of the Jishuken process are achieved.

Coach and facilitate problem solving

Conducting Jishukens correctly requires much guidance and outside support for the team. With no facilitator, the problem-solving activity may have unexamined biases or otherwise be followed incorrectly. Even the most experienced Jishuken teams have a tendency to rush to countermeasure selection by skipping and shortcutting other necessary steps. This common desire to quickly find and fix problems can interfere with a major purpose of Jishuken by reinforcing behaviors contrary to the principles of TPS and by communicating a mistaken idea of the problem-solving process. Problems prematurely “solved” in this way can cause problems to return.

Model the company's approach to work

Jishuken needs to be carefully facilitated to ensure that the managers model, the company's values, beliefs and behaviors while working through the problem-solving process. The ODG facilitator can help raise awareness of non-TPS attitudes and work behaviors (Toyota Motor Corporation, 2005). If management does not learn the right ways to practice and implement TPS, damage to organizational culture can outweigh any particular “fix.” Because of management's authority and power to influence, managers should mirror the company's standard for TPS rather than local variations. By the same token, if managers come away from a Jishuken with a common understanding of TPS, TPS is strengthened.

9. Jishuken methodology

The general work flow for performing Jishukens follows the eight-step problem-solving process are as follows:

- *Step 1.* Clarify the problem.
- *Step 2.* Break down the problem.
- *Step 3.* Target setting.
- *Step 4.* Root cause analysis.
- *Step 5.* Develop countermeasures.
- *Step 6.* See countermeasure through.
- *Step 7.* Monitor both results and processes.
- *Step 8.* Standardize successful processes.

The eight-step method is an agreed to use procedure for developing countermeasures that keep problems from returning. The eight-step is effective because, it links methods to results by running trials to determine countermeasures. Examples of its use and detailed descriptions of its steps can be found elsewhere (Ohno, 1988; Liker and Hoseus, 2008).

What is unique about the eight-step problem-solving process is that it contains two cyclic work flow patterns (outer and inner) as shown in Figure 4. These two cycles affect the Jishuken activity because several iterations of the problem-solving process occur for a single problem. The eight-step process aims to break down large problems into small problems and test various countermeasures for each small problem. The outer cycle prioritizes the order of the small problems and the inner cycle prioritizes the order of the countermeasures for each small problem. These cycles continue until each small

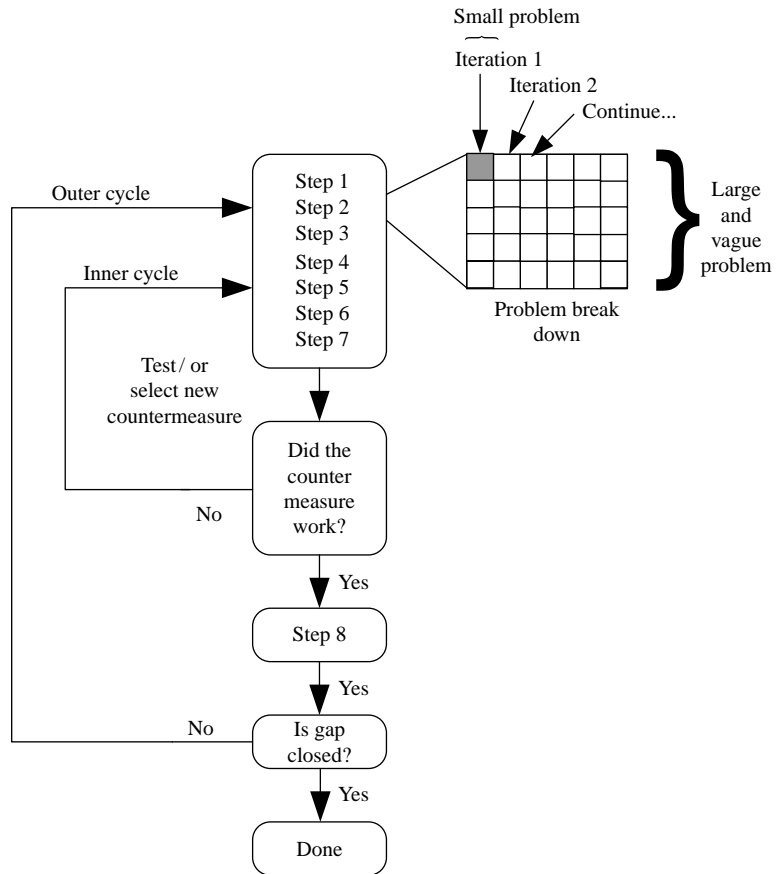


Figure 4.
General work flow pattern
for Toyota's eight-step
problem-solving process

problem has been addressed and the gap between the actual condition and target has been closed. What is significant about this process is that the Jishuken team will spend much time studying and analyzing the current system to find the smallest possible root causes for each countermeasure. This process can take time and cannot be rushed, which is why Jishukens can take weeks or months to complete, when done correctly.

Although Jishukens may vary in time depending on the nature of the problem, the Jishuken team may meet as needed to complete the problem-solving process. Jishukens could meet continuously over a short period or spend a few hours a week over the span of several months. The kind of time spent depends on the nature of the problem and what is involved in completing the problem-solving process.

10. Completion and final stages of Jishuken process

Jishukens are complete when the gap between the actual and standard condition has been closed. This occurs when all the steps of problem solving have been completed and the resulting process is stable. Poorly led Jishukens will often feel a temptation to skip or shorten Steps 7 and 8 without completely monitoring and standardizing

countermeasures. The only true way to know if a countermeasure was successful is by monitoring and tracking the current system. This process can sometimes take weeks or months to complete and depending on the nature of the problem can be difficult to track. Monitoring is simplified when countermeasures behave much like a light switch that can be turned on and off to see the abnormal condition. If the abnormal condition cannot be readily seen by turning off the countermeasure, then the countermeasure may not be effective or more time is needed to monitor the condition.

The last step of Jishuken is Step 8 – standardization. When countermeasures are successful and provide stable processes then these new methods must be documented and applied to the system. Standardization involves communication to work groups within the plant and/or work groups in other plants with similar processes (also known as Yokoten). The communication tool for knowledge sharing is the problem-solving report. Toyota's problem solving report is a single sheet of A3 sized paper (11" × 17") always formatted in the same way. It is very difficult to communicate all that has been accomplished in several months of work using a single sheet of paper, a constraint which forces the team to work hard on organization, concision and clarity in presenting their results. The A3 problem solving sheet is an extremely quick and effective technique for sharing information across the entire company since the format is standardized. At the same time, as with many other aspects of TPS, it has the effect of encouraging continuous development of better skills, since clarity, for example, is a skill that can be worked on for many years without the learning ever being complete.

Additionally, if there are many similar processes, multiple shifts or multiple plants, Step 8 can take a longer time to complete. This step may seem unimportant since other areas have not been impacted initially, but standardization has the ability to improve several areas of the company very quickly. Besides the prevention of errors, defects or inefficiencies that could be eliminated by standardizing successful practices, time wasted in redundant problem solving can be avoided.

11. Toyota's guidelines in performing management directed kaizen

There are several key factors that help make Jishukens successful. Yet, each Jishuken is unique and brings its own challenges. While not all considerations can be given in this brief paper, a few elements should be discussed to raise awareness of the most foundational concepts of the Jishuken process.

11.1 Management must lead and be involved in Jishukens

Essentially, Jishukens are problem-solving activities performed by management and intended to continuously improve managers' abilities to practice, coach and teach TPS team-based problem solving. Thus, if managers avoid working on the team – delegate or are not involved – Jishukens run the risk of becoming distorted into top-down controlling processes rather than team processes. Worse yet, managers who are not involved in the Jishuken process will not know how to teach and coach kaizen/problem solving. Jishukens are multi-purpose but it is true that Jishukens that do not strengthen management's understanding of TPS are not considered successful.

11.2 Jishukens must be standardized

One of the primary purposes of Jishuken is to be a procedure-based activity that can be repeated and improved over time. Regardless of the factors that affect a particular

Jishuken, if the process itself is not standardized, it cannot be improved – a basic TPS principle. Jishuken teaches management a consistent way of applying problem solving and developing skills essential in TPS. If the Jishuken process is not consistent, managers will likely begin teaching various more or less inaccurate versions of TPS, which means TPS is weakened.

11.3 Jishukens must work to the check-act cycle

A challenging aspect of Jishukens is to control the expectation that an instant improvement is going to occur from the process; whereas, typically, it can take time to follow the problem solving methodology without rushing to a countermeasure or jumping to Kaizen. In all cases, Jishukens must invest time in studying and stabilizing the current condition before a new approach can be tried. This “Check-Act” cycle ensures that a new approach will not be applied to an unstable system, which is crucial because implementing a new approach in an unstable system has little chance of success.

11.4 Jishukens must demonstrate the right behaviors

Possibly, the most difficult aspect of Jishukens is managing the human element. Depending on how the Jishuken was initiated, several kinds of organizational dynamics could be introduced into the activity. For example, managers may feel personally responsible while their operations are under evaluation or defensive about their processes. The Jishuken process is intended to reinforce the TPS principles of trust, respect, and team work, in part because problem solving will not work well without them – analysis is difficult if the true behavior of the system is being concealed or falsified by a manager who feels threatened by the process. But Jishuken is also intended to help managers communicate TPS to others so managers who do not model the right behaviors, attitudes or demeanors pose the risk of distorting TPS for those they work with.

11.5 Jishukens do not replace daily kaizen

Jishukens are not intended to replace daily kaizen/problem solving for management or for team members. Jishukens are only one medium that allows management to align its effort on solving broad system-related problems. There are numerous problems that can be solved in various cross-functional teams throughout the work day without formalizing a Jishuken. In fact, a dangerous sign is when groups start to wait for a Jishuken to solve problems. If this happens, it may be for various reasons, but mostly it is because a mechanism is missing that allows work to be improved on a daily basis.

11.6 Do not force change in an area, work with them

Keeping a Jishuken to a predictable scope can be difficult since not all the details of the problem can be known when the process begins and it may eventually happen that the root cause of the problem lies elsewhere. Even the best Jishuken teams can end-up exhausting all possible countermeasures within their scope and yet not providing effective countermeasures. A Jishuken team may need help from other work areas but often this need is not seen until after the team is formed and the problem-solving process has begun. In any case, the Jishuken team has the responsibility to work with all affected groups by discussing the problem, eliciting opinions and seeking involvement from areas outside their scope. In these scenarios, effective communication is extremely

important in building and maintaining partnerships with other work groups. Jishuken team members should be proactive, personable and should informally discuss implications of countermeasures with all affected stakeholders before any change is actually made.

11.7 Do not expect everything to be finished in a three-five day period

Depending upon the scope of the problem, Jishukens can last anywhere from three days to three months. Jishukens are not an instantaneous improvement activity that brings overnight change with fast short-term results. Jishukens sustain improvement and keep problems from returning, which requires substantial study and tracking of the current system. This does not imply that Jishukens are not necessary suited for urgent situations. It only means that the Jishuken team needs to stay together and stay in the work area long enough to make sure that the results are sustained.

12. Case examples of Jishuken implementation

Interestingly, Toyota shares many of the same struggles and challenges in implementing effective management directed kaizen as most companies wanting to engage management. What is unique about Toyota is how they deal with these normal everyday circumstances that tend to interfere with improvement and break down standardization. Two case examples illustrate Toyota's diligence in pushing through barriers that would typically prevent companies from achieving the next level of performance. These examples have been shortened and generalized to highlight main distinguishing features key to Toyota's success.

Problem description (example 1)

In a production line the scheduling and coordinating of materials is a significant concern. If materials cannot be delivered on time, the production line can stop, and if materials are delivered too frequently, racks and storage areas can overflow causing congestion and other safety related concerns. This first problem describes a situation where parts are delivered too frequently.

Jishuken team action

The Jishuken activity was initiated by a request from the department head impacted by the problem. The ODG facilitator assembled a cross-functional team with representation on all shifts and an initial work schedule was agreed on by the group. After roles were assigned, the team started by consulting with the engineer who set-up the material conveyance system. The engineer indicated the system was being operated incorrectly and if brought back to normal, would work properly. The team reported back that afternoon that the problem was solved: they were using system incorrectly.

ODG response

This conclusion might appear reasonable. However, the ODG facilitator did not accept the team's response. Instead, the team was urged to go to the area and witness the problem personally. For some members of the team, this was a bit of a shock since they were convinced by the engineer's assessment. What is interesting is that even Toyota people can have trouble applying *genchi-genbutsu* (the principle of ignoring versions of the problem and instead going to the problem source to gather facts directly).

This check-stabilize cycle (described in Section 11.3) is considered essential in really understanding the current situation to avoid personal or professional bias. In this case, the engineer, being only human, would of course prefer to think that it was their behavior, not his design that was the problem. Since Toyota realizes it is tempting to skip steps, a trained facilitator plays an important role in preventing the team from short cutting the problem-solving process.

Problem description (example 2)

This next Jishuken describes a large-scale productivity problem caused by slowing down a production line due to changes in demand and in the model mix. This Jishuken was part of a five-year plan to increase production efficiency by rebalancing work. This particular activity was initiated from Toyota's *hoshin kanri* (annual planning) and thus required four separate teams at various management levels. This example will focus on one of the team's actions in resolving one part of the line's productivity problems.

Jishuken team action

The ODG facilitator coordinated with the general manager on a few initial study areas and activity schedule. Since this particular Jishuken activity was the beginning of a five-year activity to better understand productivity issues, the team started by analyzing the shop floor condition. After an initial study, several ideas to raise productivity in the area were generated. By the second day, several teams were eager to apply their ideas in an effort to raise productivity.

Management's response

One manager then asked to see results of Step 2 of the team's problem-solving process. Note that Toyota trains its managers to monitor the implementation of the problem-solving process to ensure teams complete each step; since Toyota's problem solving approach is standardized, management from any area can quickly understand a problem-solving process in any other area. Step 2 requires processes be checked for stability and is used to quickly eliminate common problem areas or causes. Here, the reviewing manager wanted to see if any audits or checks had been done to verify standardized work, work standards and process stability. Unfortunately, the team rushed past Step 2 to the countermeasure step. It can be assumed that the successful outcome of a Jishuken is "problem fixed" but in fact it is to "create conditions that keep problems from returning." Thus, potential solutions are tested as hypotheses in an experiment, until evidence shows the cause of the problem. This testing of countermeasures shows Toyota's scientific approach to consistent and effective countermeasures. In this situation, the manager requested the team to go back and review that the process was in control and within standard. Only after the team had checked that all operations were within standard could countermeasures be considered.

13. Framework for implementing Jishukens outside Toyota

The previous sections outlined the features, procedure, and outcomes of Jishuken as it is applied within Toyota plants for managerial development as well as the importance of Jishukens in building the problem-solving skills and culture for continuous improvement.

What is important to note is that Jishukens are not restricted to the production floor: Toyota performs Jishukens in payroll, accounting, safety and in many other areas not considered “manufacturing.” Part of the rationale here is this: if all managers regardless of area are not given opportunities to practice and engage in problem solving then how can problem solving be supported across the organization?

Based on these concepts, this section elaborates on how a non-Toyota company could go about performing Jishukens within their own plants. A step-by-step procedure is shown in Figure 5 and discussed below.

The first step in this process involves identifying a Jishuken topic. A discrepancy between a KPI and established standards or a voluntary request from a departmental manager whose performance has been affected are likely sources of potential topics for Jishukens. While the topic to be studied can be of any type (i.e. Type 1, Type 2 or Type 3, as discussed in Section 5), it is important that the initial Jishukens chosen are relatively simple and achievable, providing an opportunity of self-learning for the team. An important step in realizing the practice of Jishukens is encouraging problem identification, an act often looked upon as negative in Western culture. Therefore, as companies seek to embrace the practice of Jishuken, a transitional form of the practice should be designed to make people comfortable exposing problems in their area.

The second step in the process involves forming the Jishuken team. The source/origin of the problem, the downstream departments affected as well as upstream departments that can possibly contribute to addressing the problem should be the primary pool from which potential team members can be chosen. The training and development group (or any team similar to the ODG with Toyota that is responsible for the process) needs to facilitate the process by identifying and then requesting involvement from potential team members, as discussed in Section 7 above.

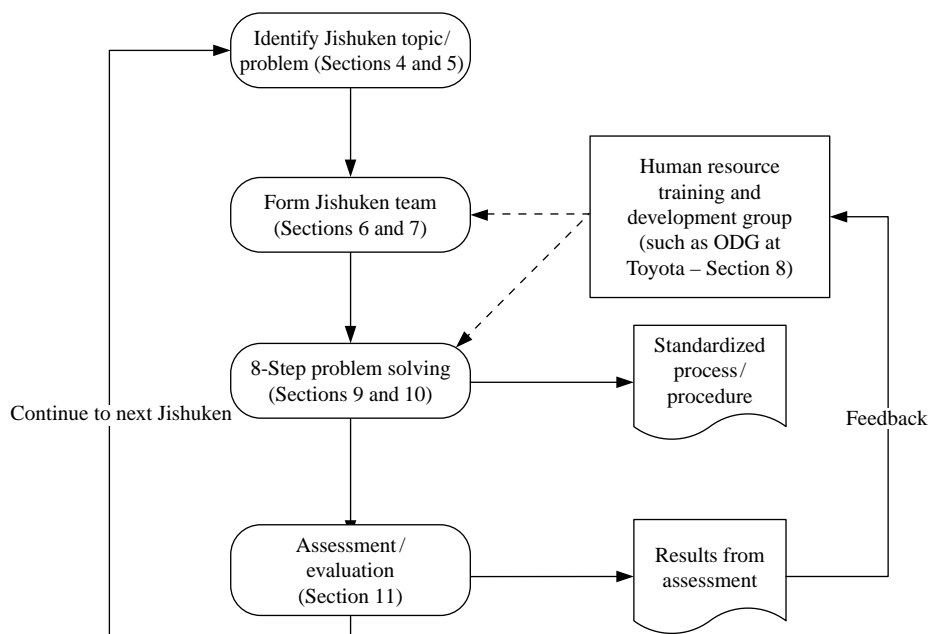


Figure 5.
Steps for implementing
Jishuken

The third step covers the core activities involved in performing the Jishuken itself. As elaborated previously, the eight-step problem-solving process is the foundation to achieve continuous improvement. The training and development group will play a large role in educating the Jishuken team on the eight-step process, particularly at the onset of Jishuken implementation. As elaborated in detail earlier (Section 9), it is essential that all eight steps are followed and completed, to ensure the team identifies a prioritized problem and fixes the problem to keep it from coming back by developing a standardized procedure that is then yokotened throughout. Application of the eight-step process can be time consuming; often the reason why many Western companies abandon some steps in the process, or cut short, not realizing that the end result will not be an end result at all: the problem is not solved permanently and will return.

The process of assessing and evaluating the Jishuken activities is important especially at the introductory stages, when a company is beginning to adopt Jishukens. Reflecting upon the process will help the training and development group identify future training needs as well as in improving the facilitation to form the teams and during problem solving.

Just as with adoption of any other practice, following a standardized procedure in introducing and sustaining the Jishuken efforts in a company is a way to assure that the practice can lead to attaining the same levels of management involvement and success in problem solving as within the Toyota plants.

14. Conclusion

- How do we make our team members feel valued for the work they do?
- Do our team members have a method to improve the work they do?
- Do our team members feel confident and comfortable exposing problems in the work they do?

Questions like these are the kind Toyota continually struggles with. This struggle can be intensified when TPS is moved to another culture. For example, when Toyota came to Georgetown Kentucky, American managers at TMMK told Toyota headquarters their approach was too much “the glass is always half empty” and insisted on more “pat on the back” recognition programs that showed the workers their contributions were valued (Mishina, 1998).

But this is not the only answer or even the best one. Various rewards and perks are helpful but somewhat indirect.

Jishukens are a better way to respond to these questions. That is, establishing a culture among managers that values identifying and solving problems among themselves and in the production workers they teach and guide is an essential step toward establishing that culture on the shop floor.

Establishing that culture means showing workers their abilities in identifying and solving problems are valued by making those abilities part of their work, rather than a potentially disruptive kind of troublemaking that needs to be hidden (Badurdeen *et al.*, 2009; Fujio, 2006).

In the larger sense, Jishukens can also be usefully seen as demonstrating that TPS, though it can be seen as a collection of tools and activities, is better approached as a dynamic evolving system within which those “tools” have multiple mutually reinforcing purposes.

References

- Alloo, R. (2009), *Interview – Toyota Motor Engineering & Manufacturing North America (TEMA) and Executive in Residence*, Center for Manufacturing, University of Kentucky, Lexington, KY.
- Badurdeen, F., Marksberry, P., Hall, A. and Gregory, B. (2009), “No instant prairie: planting lean to grow innovation”, *International Journal of Collaborative Enterprise*, Vol. 1 No. 1, pp. 22-38.
- Bhasin, S. and Burcher, P. (2006), “Lean viewed as a philosophy”, *Journal of Manufacturing Technology Management*, Vol. 17 No. 1, pp. 56-72.
- Bicheno, J. (2000), *The Lean Toolbox*, 2nd ed., PICSIE Books, Buckingham.
- Fujimoto, T. (1999), *The Evolution of a Manufacturing System at Toyota*, Oxford University Press, New York, NY.
- Fujio, C. (2006), “Hitozukuri and Monozukuri”, a special lecture for the 10th anniversary of Toyota Motor Vietnam, Hanoi, Vietnam, October.
- Hall, A. (2006), *Introduction to Lean – Sustainable Quality Systems Design – Integrated Leadership Competencies from the Viewpoints of Dynamic Scientific Inquiry Learning & Toyota’s Lean System Principals*, self-published by Arlie Hall, Ed.D., Lexington, KY.
- Hallum, M. (2007), “The Japanese connection”, *IET Engineering Management*, Vol. 17 No. 4.
- Heard, E. (1998), “Rapid-fire improvement with short-cycle kaizen”, *Annual International Conference Proceedings – American Production and Inventory Control Society, Falls Church, VA, USA*.
- Heckscher, C. and Adler, P. (2006), *The Firm as a Collaborative Community: Reconstructing Trust in the Knowledge Economy*, Oxford University Press, New York, NY.
- Liker, J. and Hoseus, M. (2008), *Toyota Culture – The Heart and Soul of the Toyota Way*, McGraw-Hill, New York, NY.
- Liker, J. and Meier, D. (2006), *The Toyota Way Field Book*, McGraw-Hill, New York, NY.
- McNichols, T., Hassinger, R. and Bapst, G. (1998), “Quick and continuous improvement through Kaizen Blitz”, *Annual International Conference Proceedings – American Production and Inventory Control Society, Alexandria, VA, USA*.
- Masaaki, I. (1997), *Gemba Kaizen: A Commonsense Low-cost Approach to Management*, McGraw-Hill, New York, NY.
- Mishina, K. (1998), “Making Toyota in America: evidence from the Kentucky transplant, 1986-1999”, in Boyer, R., Charron, E., Jürgens, U. and Tolliday, S. (Eds), *Between Imitation and Innovation: The Transfer and Hybridization of Productive Models in the International Automobile Industry*, Oxford University Press, New York, NY.
- Montabon, F. (1997), “Kaizen Blitz: Introducing a new manufacturing procedure based on the continuous pursuit of perfection”, *Proceedings – Annual Meeting of the Decision Sciences Institute, Atlanta, GA, USA*, Vol. 3.
- Ohno, T. (1988), *Toyota Production System – Beyond Large Scale Production*, Productivity Press, Portland, OR.
- Saito, K. (2009), *Nippon Steel Monthly*, June and July issues, Nippon Steel Corporation, Tokyo, Japan; Face-to-face discussion on R&D with Nippon Steel’s Senior VP, Bunyu Futamura.
- Smith, E. (1993), “Japanese methods of ‘lean production’ make splash in US – strategy: business adopt the management techniques of ‘kaizen’ and ‘jishuken’”, *The Orange County Register*, May 23, p. K06.

- Takeuchi, H., Osono, E. and Shimizu, N. (2008), "The contradictions that drive Toyota's success", *Harvard Business Review*, Vol. 86, pp. 96-104.
- Toyota Motor Corporation (2005), *TBP – The Toyota Business Practices – Problem Solving (Basic) Ver. 1.3*, TQM Promotion Division, Global Uman Resources Development Department, Toyota Institute, Toyota Motor Corporation, Tokyo.
- TMMK (2009), TPS Tools Training (training event, May) – unpublished, Georgetown, KY, Toyota Motor Manufacturing Kentucky, Georgetown, KY.
- Toushek, G. (2006), "Toyota Industrial Equipment Manufacturing Inc., riding high", *Manufacturing in Action*, Source: The Manufacturer US.
- Worley, J. (2007), "A comparative assessment of Kaizen events within an organization", paper presented at the IIE Annual Conference and Expo 2007, Nashville, TN, May 19-23.

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