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Toyota Kata: Empowering Employees for Target-Oriented Improvement - A Best Practice Approach

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Suggested Citation: Ehni, Matthias; Kersten, Wolfgang (2015) : Toyota Kata: Empowering Employees for Target-Oriented Improvement - A Best Practice Approach, In: Kersten, Wolfgang Blecker, Thorsten Ringle, Christian M. 978-3-7375-4059-9 (Ed.): Innovations and Strategies for Logistics and Supply Chains: Technologies, Business Models and Risk Management. Proceedings of the Hamburg International Conference of Logistics (HICL), Vol. 20, epubli GmbH, Berlin, pp. 175-200

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Mitglied der Leibniz-Gemeinschaft

Proceedings of the Hamburg International Conference of Logistics (HICL) — 20

Matthias Ehni and Wolfgang Kersten

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Published in: Innovations and Strategies for Logistics and Supply Chains
Wolfgang Kersten, Thorsten Blecker and Christian M. Ringle (Eds.), August 2015, epubli GmbH
ISBN (online): 978-3-7375-4059-9, ISBN (print): 978-3-7375-7805-9
ISSN (online): 2365-5070, ISSN (print): 2635-4430

Toyota Kata: Empowering Employees for Target-Oriented Improvement - A Best Practice Approach

Matthias Ehni and Wolfgang Kersten

In western companies Lean Management is often falling short of expectations. Normally, the reason for this is the focus on a methodological approach concurrently neglecting behavioral aspects. The article based on a case study approach offers a holistic approach to Lean Management implementation by empowering employees for a decentralized and goal-oriented improvement process considering behavioral aspects.

Keywords: Lean Management, Employee Empowerment, Toyota Kata, Case Study

1 Introduction and Problem Statement

Business environments are characterized by global competition, saturated markets and differentiated customer requests. Long-term survival in these environments claims for entrepreneurial agility and continuous improvement of business processes. An approach to handle these challenges is Lean Management (LM).

1.1 Lean Management - An Introduction

The term Lean Management originates from the book "The machine that changed the world" by Womack, Jones, und Roos (1991). It summarizes the results of a study on the performance of automobile manufactures, which identifies the performance superiority of Toyota compared to other manufactures. Womack, Jones, und Roos (1991) trace the performance superiority of Toyota to the applied production method, which they name Lean Management after the focus on waste elimination within the value-adding process. LM focuses on the customer´s need to which corporate activities are aligned. Focusing on these value creating activities from a customer´s perspective enables two major opportunities: First, non-value adding activities (waste) can be minimized, which results in cost reduction. Second, by producing according to customer needs the customer satisfaction is achieved, which results in sales increase. As both of the results enable competiveness, LM has drawn attention from companies worldwide as an effective instrument for the development of companies´ performance.
However, LM implementation efforts often do not provide the desired efficiency increase in western companies (Blanchard 2009; Abele, Cachay, und

Witecy 2012). Liker (2012) and Rother (2009) name the way to LM as the cause for this underperformance. Western companies mostly approach the lean philosophy by setting up projects, who apply lean methods like value stream mapping and kanban to smooth the processes and thereby improve the process flow. This results in a significant process improvement first; but after the project end, the process will not be further improved and stay, in the best case, at the created level.

Toyota follows a different approach, whereby employees on the shop floor-level are entrusted with the task of process improvement. Their goal: a consistent and target-oriented development of new standards in the processes of value creation. This strongly emphasis a mixture of soft factors like leadership skills for empowering the employees and hard factors like methods to analyze the processes.

Liker (2007) underlines this hypothesis by referencing to an internal Toyota Document, which describes the fundamental Toyota Principles guiding the way to a LM Implementation, named the 4P-Model (Figure 1). Thereby, the fundament is laid by a philosophy, achieving a long-term vision, which in the Toyota case is a just in time process (Rother 2009). The second layer is a guide for process development following certain principles, i.e. leveraging the customer needs and creating flow, to approach the vision. The third and fourth layer emphasize the importance of soft factors, like the way of collaboration between employee and supervisor, as a basis for process improvement at the shop floor-level, which has been neglected in western LM approaches so far.

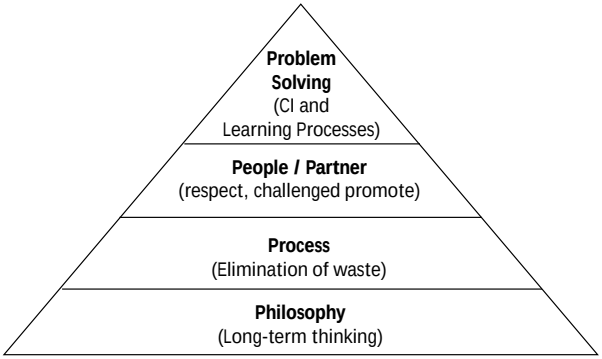

Figure 1 4-P Model of Toyota (Liker, 2007)

Aiming to fill the research gap, Liker and Franz (2011) as well as Rother (2009) focused their research on the questions how the improvement processes of Toyota are structured and how they could be integrated into the behavioral routines at the shop floor level. Liker and Franz (2011) identified the Toyota Business Practices (TBP) as the method used for continuous improvement (CI) at the shop floor level. The TBP are inspired by a simple PDCA cycle and follow 8 steps:

1. Define the problem in relation to the ideal state (Plan),
2. Capture the current state (Plan),
3. Identify the root cause (Plan),
4. Set an improvement target (Plan).
5. Select a suitable approach (Plan),
6. Experiment (Do),
7. Control the results (Check),
8. Adapt, standardize and spread the solution (Act).

For applying this procedure as a routine an internalization is needed. Toyota achieves this internalization by using the procedure at the shop floor under the guidance of a coach. This approach is didactically valuable, because it supports the following key assumptions of learning (J. K. Liker und Meier 2007):

- people learn by taking small steps through a long-term period,
- the knowledge should be transferred by a coach,
- the process should be undertaken as learning-on-the-job,
- the small learning steps should be integrated into a big picture and be standardized.

Rother (2009) carried out several experiments in which he derived a structure combining the 8 steps of problem solving and the key assumptions of learning. He named the procedure the Toyota Kata, referring to the martial art procedure of continuously repeating motion sequences till they become automatic routines. The Toyota Kata consists of the Improvement and the Coaching Kata. The Improvement Kata is the routine for a target-oriented improvement. It consists of four basic steps, which can be understood as an equivalent to the Toyota Business Practices (Figure 2):

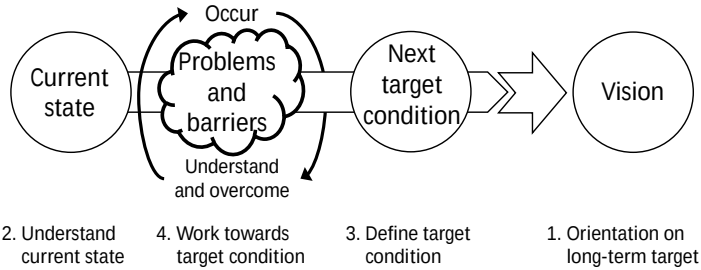

Figure 2 The 4 Steps of the Improvement Kata (Rother 2009)

The basic idea is the strategic orientation on a long-term target (step 1). In case of Toyota this is a Just-In-Time-Principle representing a process with no waste, which provides an orientation for the improvement activities. Step 2 is about understanding the current situation of the process in scope. Depending on the current situation, a reachable, short term target in direction towards the long-term target can be defined (Step 3). Step 4 is a step by step approach to reach the set target. For the step by step approach experiments are applied. Within these experiments a hypothesis is formulated first. Second, experiments are performed within the process. Third, result and hypothesis are compared. Fourth, if the hypothesis can be confirmed the experiment is standardized and implemented into the process.

The Coaching Kata on the other hand is the complementary routine to the Improvement Kata. It serves in providing the needed skillset for the improver, guiding him with questions by a coach through the improvement process (Figure 3).

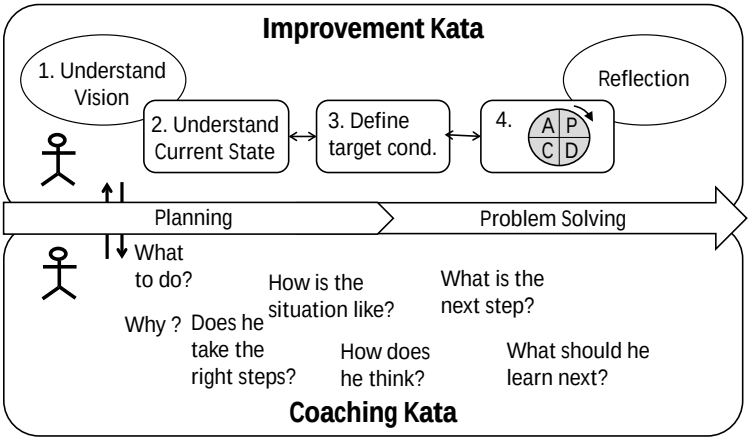

Figure 3 Interaction between Coaching and Improving Kata (Rother 2009)

1.2 Problem Statement and Research Aim

Liker (2011) and Rother (2009) provide an idea how the Toyota philosophy and process principles can be approached within operational processes and thereby provide a consistency of improvement at the shop floor. Nevertheless, they do not provide a holistic approach to implement the routines into companies as they neglect strategic aspects. The paper aims in filling that gap by the development of a holistic concept which provides answers to the following research questions:

- Which elements need to be considered in the concept?
- How should the elements be allocated?
- What does a suitable implementation approach look like?
- How should an evaluation of the approach look like?

The research questions will be answered through empirical research in companies, who apply a lean approach based on the fundamentals raised by Liker (2011) and Rother (2009). Therefore, section 2 provides a detailed view into the methodology applied, before the findings will be presented in Section 3. Finally, Section 4 discusses the findings and concludes the paper.

2 Research Methodology

The project aims at answering the research questions, which include subjective and interpretative parts as they deal with behavioral aspects (Frankel, Naslund, und Bolumole 2005). For obtaining scientific results in this area qualitative methods are particularly suitable (von Rosenstiel 2005, 238).

To meet this demand the research project follows a methodology suggested by Gläser and Laudel (2010). It is based on three steps,

1. Preparation of the empirical research,
2. Conducting the empirical research,
3. Analysis of the data, which are used to structure this section.

2.1 Preparation of the Empirical Research

Empirical research should ensure that the survey methods are following research standards and provide the requested answers to the research aim (Flick, Kardorff, und Steinke 2005).

To meet this demand the current state of research in the field was integrated by a comprehensive review, whereby the soft factors were considered particularly. The theory provides deep insights into the structure and

application of CI at an operational level. Nevertheless, they show some shortcomings from a management perspective as they neglect strategic and normative aspects. These strategic aspects are relevant for implementation efforts dealing with an adaption of behavioral aspects. To integrate them, a generic approach from organizational theory constructed by Bleicher (2011) was selected and used for the embedment of LM theory. It will be introduced in the following.

2.1.1 Embedding Lean into the Management Approach by Bleicher

The approach by Bleicher (2011) offers a systematic procedure for the adaption of corporate-culture, in which normative and strategic as well as operative management perspectives are considered. It can be categorized as a socio-technical approach. Socio-technical approaches understand the organization as a system containing social and technical aspects, which have equal importance to the organization. In Bleicher´s work this is reflected by activities through the different management perspectives supporting the management aim. Those activities are supported by structural aspects referring to the hard facts as well as behavioral aspects referring to the soft facts. An overview about his management approach is offered in figure 4.

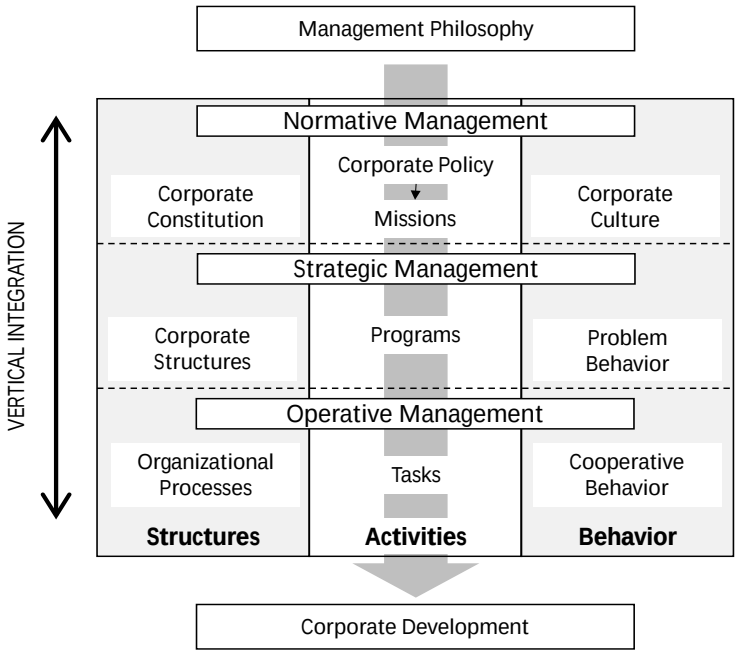

Figure 4 Management Approach for Cultural Adaption Considering Soft and Hard Factors (Bleicher 2011)

Into this generic approach the theory of lean management was embedded, filling every pillar from the normative to the operational management perspective. As a result a complete theoretical picture on implementing LM considering culture change through the different management perspectives was developed and used for the deduction of an interview guideline, confirming that important aspects were included.

2.1.2 Selecting Appropriate Cases

The selection of cases is an important part of case-study research as it defines the set of entities from which the sample is drawn and thereby has huge impact on the results (Eisenhardt 1989). In this case we tried to select companies, which have decent knowledge in the context of the research questions. Pilot interviews showed that randomized samples will not lead to suitable cases, as we just interviewed companies using technocratic approaches focusing on hard factors for implementing Lean Management. One Company used a CI-Process. But employees were restricted in empowerment and the process was not linked to the company's goals.
A consultant company collaborating with Mike Rother and collecting hands-on experience in this field could name two companies, who gained first experience with the concept of the Toyota Kata. These two companies, who can be categorized as OEMs, were contacted and selected as appropriate cases.

2.2 Conducting the Empirical Research

Guided by the constructed theoretical framework the companies and consultancy were interviewed. The persons interviewed were each responsible for the lean implementation efforts. Afterwards, if possible, a walkthrough in applying departments - investigating the procedures of the method - was done. Finally, a CI cycle was observed and the improver was interviewed. The collected data was additionally verified and completed using documents like presentations and data results of the CI processes. Table 1 summarizes the empirical research approach listing companies as well as the applied research methods.

Table 1 Overview of Methods Applied in the Observed Companies

Company	Interview time [hours]	Observation of CI cycle	Interview with the Improver	Analysis of internal documents
A	5	Yes	Yes	Yes
B	1	No	No	Yes
Consultancy	5	Yes	Yes	Yes

2.3 Analyzing the Empirical Data

Analyzing the empirical data aims at an understanding for the different causal mechanisms of the LM approaches. By comparing the differences as well as the similarities of the concepts, a concept can be derived which is suitable for a generic LM approach and thereby provides an answer to the research aim (figure 5).

To make the empirical data comparable steps of extraction and preparation were applied (Gläser und Laudel 2010).

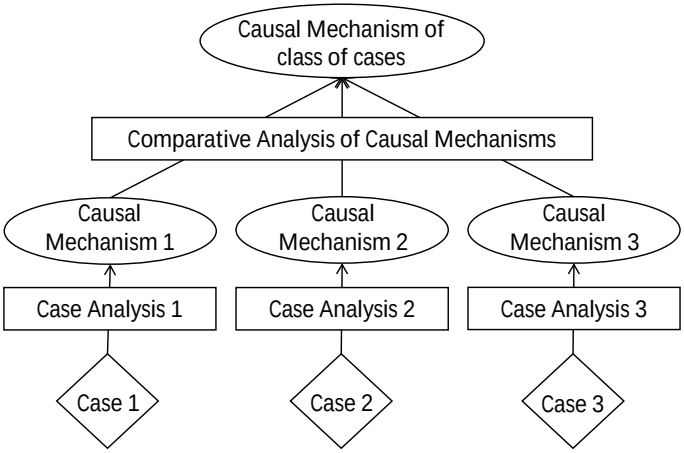

Figure 5 Procedure of Deriving a Causal Mechanism for LM Implementation (Gläser und Laudel 2010)

2.3.1 Extraction of Data

In this step relevant data for an understanding of the individual LM concepts is extracted. To identify the relevant data a search grip, based on the theoretical framework including its categories, was constructed and applied to the collected data. By aligning the research grip and its categories to the theoretical framework it was secured that the theoretical considerations guide the study (Gläser und Laudel 2010). Still, the categories within the research grid were openly shaped and could be adapted during the investigation, confirming that all relevant information could be considered.

2.3.2 Preparation of Data

This step aimed in quality improvement of the extracted data. Therefore, the raw data was checked for redundancy and contradictions. Then it was structured according to the categories (Gläser und Laudel 2010).
The result is a structured basis of information which summarizes empirical information about the investigated cases and contains the relevant information to answer the research questions.

3 Results / Findings

In this section the results of the case studies as well as the derived concept developed by the analysis of the cases are presented. The section will be structured, regarding to the research questions, in three sections. In the first section fundamental elements of the CI process as well as the process itself are described. The second section is presenting the derived implementation approach for the CI process. In the third and last section the evaluation approach for measuring the success of the concept is introduced.

3.1 Method of CI

Both companies as well as the consultancy applied a CI method which is very similar to the approach by Rother (2009). They used the Improvement as well as the Coaching Kata. Nevertheless, they added additional elements like roles, detailed procedures for process analysis and a procedure to transform the vision into individual improvement targets.

3.1.1 Transforming the vision into personal objectives

The first step of the Improvement Kata "Orientation towards a long-term target" implies the need for a suitable target condition on process level. Nevertheless, Rother (2009) is not explaining the way Toyota is deriving individual target conditions for the processes from the company´s vision. The observed companies as well as the consultancy used a structured procedure named Hoshin Kanri (Löfving u. a. 2014; Reitz 2008) for cascading the vision into target conditions. Thereby, the first step is the development of a vision for the company´s processes. It should reflect an orientation for development, i.e. a process which results in competitive advantages. Within Toyota the process vision is a Just-In-Time-process (JIT) picturing a process without waste (Rother 2009). In the sample companies the vision was developed in a workshop on Top-Management-level. In both cases the vision was inspired by a JIT process and expressed in numbers like 0 defects, 0 waste, and 0 work accidents. After the vision was approved by the committee, a challenge for the company was derived from it. A challenge is representing a mid-term target on the way towards the vision. The consultancy recommends a time horizon from 1-3 years for its realization. The companies developed 1 year challenges due to the fit of 1-year-objectives, which were embedded in the companies.

For the development of the challenge the current state on plant-level needs to be mapped as the target-setting is dependent from the current situation. The tool used to map the current state was value stream mapping, because it provides deep quantitative insights into the processes. In the workshop a quick mapping of the process was preferred. From that current state a target condition was constructed and accepted by the whole leadership team.

In a last step the challenge, which was on plant-level, was derived into targets for the different departments.

After the workshop the department managers conducted target agreement discussions with their employees. Input for the discussion was the target agreement of the department manager. His target agreement was then transferred into suitable targets for the employee applying the method of "catchballing". Thereby, the department manager asked the employee to check the target for feasibility. After a plausibility check the targets were either accepted or renegotiated. The process was repeated through all hierarchy levels to the level of the improver. This procedure, cascading the vision to the operational level, ensures that all operational improvement activities add to the big picture and thereby enhance the companies' targets (figure 6).

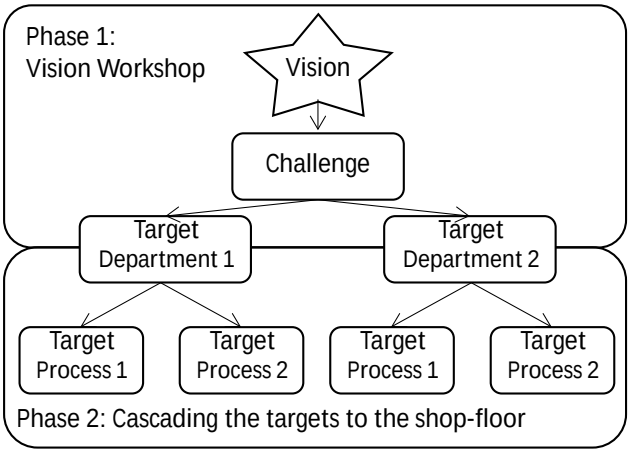

Figure 6 Setting Improvement Targets on Shop Floor Level

3.1.2 The Improvement Kata

In the observed companies the applied improvement routines on shop floor-level were similar to the procedure proposed by Rother (2009). The improvers followed the four basic steps introduced in Section 1.1. But the steps were extended by appropriate methods, i.e. to measure the current situation one of the companies applied a process analysis, consisting of four steps itself: The first step pictures the demand of the customer by calculating his tact time. In the second step, relevant process steps are mapped and delimited from processes out of scope. In step three, relevant data concerning process stability and process tact is collected. While in step 4 the collected data was compared to the customer demand. Comparing the customer tact to the current process tact allows the learner to set a target condition, which is reachable in a short-term horizon.

In the next step experiments to approach the target condition were selected. Thereby, in both companies certain criteria needed to be fulfilled. The process selected for the experiments should improve the whole system and thereby provide a systemic impact. This is i.e. achieved when the selected process is a bottle neck, which may be caused by a tact above the aimed process tact time or unstable performance. The experiments comprise of:

- a hypothesis, which should be measurable,
- the testing of the hypothesis by conducting the experiments,
- the check of success by comparing hypothesis and results,
- and the standardization of the result, which includes an adjustment of work instructions and standard costs when the hypothesis is confirmed.

To manage the experiments the interviewee emphasized that within an experiment only one factor should be varied and that a short feedback time should be provided, which is essential for assigning the root cause.
All results from each step (current state, target condition, experiment selection, hypothesis and result) were documented. One company used a board located at the process, while the other used result sheets. The improver had the possibility to work on a daily basis on the improvement of his processes. Therefore, an average time span of 10% of the total working time was allowed.

3.1.3 The Coaching Kata

The coach acted very closely to the questions suggested by Rother, which is very helpful to guide the improver through the process. The consultancy pointed out, that a very important step is the definition of the target condition. It should be placed in a so-called learning zone, where the target is challenging but not out of reach. Thereby, the improver does not get frustrated but motivated.
The companies were very strict on not providing decisions by the coach. Even if the improver had a suggestion, which obviously did not point in the right direction, the coach just led through questions. If the learner did not see the point, he did an experiment and gained experience.
Nevertheless, the two companies decided to add the role of a 2nd coach. The 2nd coach provides a feedback to coach on a regular basis and thereby develops the coaching skills. Coaching as well as the feedback through the

2nd coach were held on a regular basis. In the observed companies coaching took place once a week. The feedback from the 2nd coach was provided one to two times a month.

3.2 Implementation Approach

Within the analyzed cases the initial step of the implementation aimed in convincing the management team of the Kata Approach. Therefore, a workshop in which the managers applied the Improvement Kata from the improver perspective under guidance of the consultancy was conducted. It provided an understanding for the value of the approach and resulted in a management buy-in as an essential precondition for success.

3.2.1 Setting the Project Scope

After the management-buy-in the setting for the project was designed in cooperation with the consultancy. Therefore, the scope of the project regarding the companies' penetration as well as personnel and financial resources was set. Both companies started with a pilot area. Within the pilot area the total numbers of improvers, coaches and 2nd coaches were named. In the observed cases the role assignment was strictly oriented on hierarchy. The improvers were the team-leaders of the departments in scope. The next hierarchy level was entrusted with the task of the coaches, while the 2nd coach was either a lean expert or the department manager. The consultancy emphasized that a role allocation due to hierarchy is a reasonable approach, but is not mandatory. Other possibilities might be the integration of staff positions etc.

While one company just focused on the shop floor-level as the area of improvement, the other company wanted to implement the improvement routine through all hierarchy levels. A restructuring of the organization was in neither company in scope. The reason for this exclusion is an approach, which prefers "function before structure". On the one hand the companies stated that workflow-oriented structures might be helpful for reducing potential losses in interfaces between the departments. But on the other they wanted to focus on the change in the improvement culture. This is best achieved with trusted work relationship and thereby sticking to the old structures.

3.2.2 Roll Out Approach

For the role out, initial training was provided. Thereby, in phase 1 the top hierarchy level underwent an in-depth Improvement kata training under guidance of the consultancy. When the routine was internalized phase 2 begun. In phase 2 the top hierarchy level managers took the role of the coaches and trained the next hierarchy level in the Improvement kata. Within that training the top managers were supervised by the consultancy, taking the role of the 2nd coaches. In the next phases this procedure was repeated till the learners on operational level were trained. This top-down training approach, which follows best practices in learning, as you learn in small steps with a trusted coach in a working environment, is visualized in figure 7.

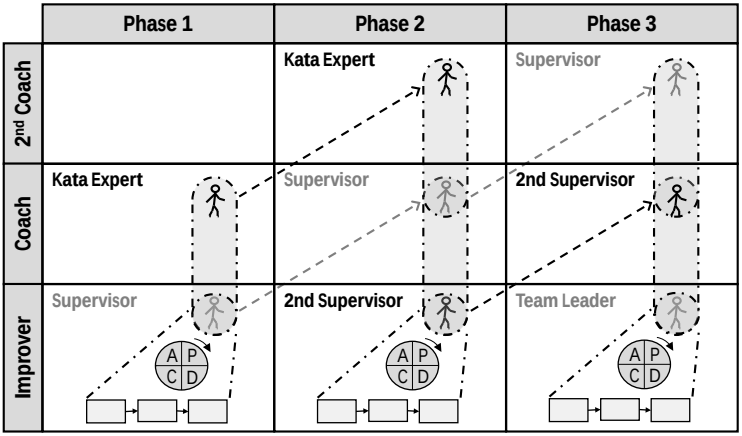

Figure 7 Top-Down Roll-Out Approach for Training the Staff

3.3 Evaluation Approach

To assess the success of the Kata Approach the companies applied monetary as well as non-monetary evaluations. The approaches are introduced in the following sections.

3.3.1 Monetary Evaluation Approach

The monetary evaluation aims at proofing short-term benefits of the approach. This is not the primary goal, but often a necessary prerequisite for realization as companies are more and more judged by short-term performance. In both cases the companies realized the monetary evaluation by a cost-benefit calculation. Thereby, all efforts for implementation like consulting fee, invested time for improvement efforts by the staff and experiments cost, were transferred into Euros and summed up. On the other side

improvement efforts, which were tracked in the cost standards, were offset against.

In calculations of both companies benefits outweighed the costs. While one company didn’t name exact numbers, the other had a positive result better than 0.5 Mio € in 2013 and a total sum close to 1.8 Mio € within 4 years after the start.

3.3.2 Non-Monetary Evaluation Approach

The non-monetary approach focuses on the penetration of the program through the organization and its long-term development. Due to its program phase the non-monetary evaluation approach was just applied in one company.

It works by "evaluating the kata through the kata" as the interviewee said. It is basically done by setting a target condition and approaching it by evaluating the current situation and taking actions to develop in direction of the target. In case of the applying company the categories for target condition were the stability of the coaching's (measuring the regularity against planned coaching's) and the penetration through the organization.

The evaluation took place every year and was done by the consultancy. This is not mandatory, but provides neutrality which can be a factor if different departments are asseded. At the end of the evaluation, countermeasures were disused and a new target condition was set.

4 Discussion and Outlooks

The conducted study shows that LM implementation efforts towards a decentralized and target-oriented CI by empowered employees can be successfully achieved in Western Industry.

Key to success is considering and influencing behavioral aspects, which has been successfully done by applying the Toyota Kata. The companies, which have been observed, adjusted the routine by adding analysis tools and complemented it by a target cascading process to the shop floor level ensuring its contribution to the big picture. For the roll-out a Top-Down Training process supported the skill transfer which was needed to conduct experiments, as well as behavioral change. To evaluate the progress of the change monetary and non-monetary evaluation approaches were used. The concept of implementation is summarized in figure 8.

Nevertheless, normative and strategic structure aspects like cooperative constitution and structures were not integrated into the approaches. The more progressed company planned to integrate those structural aspects in the next years, which could be a research focus in the near future.

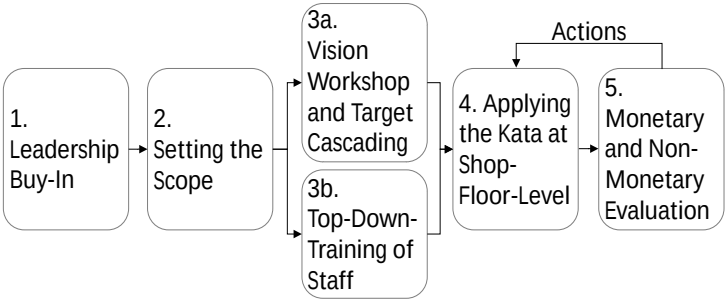

Figure 8 Summary of the LM Implementation Approach

As we could not find a consideration of behavioral aspects by randomly interviewing companies, we contacted a lean consultancy for accessing users of the behavioral LM approach. The potential integration of behavioral change without falling back to the consultancy is still to prove. The proof will be tested in a next research step, were the concept will be applied and further developed in a company.

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