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The benefits of deploying the Toyota Kata

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Abstract. This research aims the identification of the theoretical benefits of Toyota Kata implementation. This analyze was done through a theoretical, combined, descriptive and bibliographic research, carried out through a literature review. To clarify these benefits, improvement kata and coaching kata was described according to the literature review. As this is a literature review of a subject of general implementation, the macro results of this research suggest as benefits, the creation of knowledge and organizational culture having as secondary results the efficiency improving and waste reduction. The results obtained will culminate in operational results such as the increase in the quality of services, growth in production volume, besides the tasks optimization and success in solving problems, which are typical characteristics of Toyota Kata, for involving people and routines, promoting a better engagement. This research showed also, when applied in its essence, Toyota Kata is an effective continuous improvement mechanism within organizations.

Keywords: Toyota Kata · Benefits · Improvement · Waste

1 Introduction

In many organizations, there is an implicit frustration due to the gap between the desired results and what actually happens. Goals are defined, but they are not achieved. The change does not occur [17].

Most companies are led, managed and occupied by caring and hardworking people who wants their organization, their team, to be successful. The conclusion is clear: it is not the people, but the current management system in which we work that is to blame. One problem is how we are managing our organizations, and there is a growing consensus that a new approach is needed. But we have not yet seen what this change should be [17].

Researches that have focus on individual importance show that in large, small and medium enterprises systematic strategy deployment is the most important routine in terms of increasing performance. Specifically in SME's (small

and medium enterprises), management support and leadership are the most important improvement routines for implementing lean practices and increasing operational performance [6].

Besides most large companies are indeed hierarchically organized in terms of business units, sites, product lines and teams, they don't necessarily grant each level the autonomy needed to effectively support performance improvement and adaptation. Such autonomy would demand the implementation (and the exercise) of the policy, intelligence and cohesion functions at all levels, as well endowing each organizational unit with the needed authority over the resources that are needed in order to exercise this autonomy [19].

In Japan, these patterns or routines are called kata (noun). The word derives from basic forms of movement in the martial arts, which are transmitted from master to student over generations [17].

In a more minimalist way, kata can be understood as the execution of a structured daily routine [20].

1.1 Toyota Kata

Usual lean manufacturing tools and also quality management tools are predominantly exploratory methods that allow optimization of previously existing assets and capabilities [1].

Toyota Kata is a proven and highly successful method for continuous improvement at the whole organization level. The Toyota Kata concept of a clear vision to strive towards is very appealing and powerful [21].

The idea behind the Toyota Kata is that it provides routines (katas) to practice that, over time and repetitions, will reconnect our brains in a way that systematic improvement and management become second nature to us. When this is achieved at an organizational level, it can allow the organization to adapt to changing circumstances faster and better than other organizations. The practice of the Toyota Kata is done through real problems and challenges related to work (increasingly difficult), which makes the practice economically viable as the Toyota Kata becomes second nature. In fact, it is a central idea of the Toyota Kata that everyone's work consists of two parts: real work and improving work [21].

According to Rother [17], a key concept underlying kata is that, although we often cannot exercise much control over the realities around us, we can exercise control over managing how we deal with them. The Toyota Kata is based on two concepts: the improvement kata and the coaching kata. According to Rother [17], the improvement Kata is the repetition of the management routine aimed at improving, adapting and evolving. The coaching kata is a repetition of the routine where leaders and managers teach the organization's employees the improvement kata. The technique called kata is passed on to all Toyota employees and this approach is a big part of what moves this company as an adaptive organization, towards continuous improvement. The objective is to develop systematic and scientific ways to develop solutions in dynamic and uncertain situations.

Furthermore, research in neuroscience reveals that, due to the plasticity of the human brain, it is possible to reconnect it to new ways of thinking and new habits, through repeated practice of a routine (kata). The focus of the 'Toyota Kata' is to provide routines (katas) for practice, which, over time, through a significant number of repetitions, allow the human brain to be rewired in such a way that systematic improvement and management of this improvement become secondary to nature [2].

The improvement kata According to Rother [17], the improvement kata describes a routine of continuous improvement. This kata is also part of Toyota's way of managing people every day. The psychology of improvement kata is universal and, at Toyota, everyone is taught to operate according to this systematic approach. This applies to many different situations, not just in manufacturing. The content varies, but the approach is the same.

The improvement kata is a model of how to develop a capacity for continuous systematic improvement. This model must be learned by the leadership so that it can train and teach the entire organization [3].

In preparing for the use of the improvement kata, the organization must ensure that the improvements to be made are aligned with each other. To achieve this, an analysis of the value flow must be carried out. The future state value stream map is used to focus the efforts of the various improvement kata on the prioritized processes [20].

In summary, Toyota's improvement kata continuous repetition routine looks like this: (1) considering a vision, direction or target, and (2) with a first hand understanding of the current condition, (3) a next condition is defined target in the visual path. When (4) we strive to advance step by step towards this target condition, we encounter obstacles that define what we need to work with and with which we will learn [17].

While a high level of competence is not achieved, it is important don't deviate from the improvement kata routine because this will harm the learning of the improvement kata mental model and lower the probability of achieving good results in the long term [21].

The coaching kata One of the main characteristic of Toyota Kata is that it offers an existing pattern to teaching, coaching and managing the improvement kata the coaching kata [21].

The goal of the coaching kata is to teach the improvement kata and bring it to the organization [17].

Mastery is the goal of any kata, and even people at the highest levels of Toyota are honing their skills and working to achieve that goal. Like the improvement kata, the training kata standard is also practiced at all levels at Toyota. Each employee is assigned to a more experienced employee a mentor who provides active guidance during the process of making real improvements or dealing with work related situations. This mentor, in turn, has his own mentor who is doing the same [17].

A person's need for coaching never goes away. Regardless of how much experience the person has acquired, it is unlikely that anyone can become so good at discerning the reality of a situation and applying the improvement kata that coaching will no longer be needed. The intention is that both the improvement kata and the coaching kata become increasingly second nature (automatic and reflective) as the person moves up in the organization [17].

Coaching Kata can help an organization to realize the possibilities inherent in other kata. In the case of Improvement Kata, it can help make improvement part of the company's "day to day" [16].

In a business environment, training a kata facilitates improved performance by improving a process [16].

1.2 Toyota Kata opportunities and barriers in organizations

The development process is full of uncertainties that must be controlled in order to achieve the goals of improvement within the time, costs and results. However, there is little literature on how to manage these uncertainties, integrate developers, maximize knowledge sharing and minimize their losses in a development environment [15].

According to Michels et al. [10], their results suggest that the main barriers encountered in various contexts are: 1 - lack of direction and environmental preparation (awareness), 2 - lack of value flow map, and 3 - lack of Additional coaching Kata meetings. The main opportunities were: 1 - short cycles, 2 - knowledge sharing and 3 - adaptability. Table 1 presents a brief summary of the main opportunities and barriers, in accord to the cited authors.

2 Method

According to Torres et al. [22], scientific research is characterized by the possibility of multiple classifications, however, its classification according to academic criteria is of fundamental importance for a better understanding. This methodology can be divided in 4 groups: research methods, objectives, nature and used techniques [4, 7–9, 18, 24]. Based on these groups, it is possible to classify the present re-search. Thus, in agreement with the aforementioned authors, in terms of Research Methods, it is possible to say that this research presents deductive characteristics (because it allows conclusions based on true premises), with the focus strategy based on bibliographic research (through sampling, using technological resources of online search as an instrument to perform the research). About the Objectives, the research is classified as descriptive, as it seeks to understand the relationship between variables (aspects of the coach and improvement kata, with leadership). As for the Nature of the research, it is classified as applied, as it seeks to generate knowledge to enhance the use of kata philosophy. Finally, as a last classification criteria, a research can be differentiated according to the used technique for data collection, which in this specific case, was carried out through the review of documents.

Table 1. Summary of bibliographies (Source: Michels et al. [10])

Authors / Year	Implementation model	Opportunities	Barriers
Soltero, C. / 2011	None	Adaptability; TWI & Toyota Kata integration	Lack of a value screening flow
Soltero, C. / 2012a	None	Foster a culture of innovation throughout the organization; Address continuous improvement, favoring innovation for the external customer	Lack of experimentation with the client; lack of value sorting flow
Soltero, C. / 2012b	None	Creative inspiration; Standard problem solving process; Improvement in behavior patterns; Improvement impact; Short cycles in the use of Improvement Kata	Lack of value sorting flow
Reverol, J. / 2012	None	Implementation of Coaching Kata that can facilitate the implementation of other Katas; Pre-work can mean the successful implementation of Toyota Kata routines; Develop more adaptable and valuable employees for the organization.	Prepare the company's strategy and identify the value chain before applying the Toyota Kata; Appropriate time for the work of the coach and apprentice Coaching Kata; not following the routine steps of the TK, as proposed in the literature
Casten, et al. / 2013	None	Knowledge sharing; Routine of learning and constant improvement; Leadership development; Adaptability	The preparation of the environment in the construction industry is different and even predictable; compared to the manufacturer's environment; Need for more experimentation with Toyota Kata routines
Tillmann, P; Ballard, G; Tommelein, I. / 2014	None	Collaborative environment; Leadership development; Creating an environment with psychological security	Lack of consensus in the team in the use of routines and methods; Conflict of interest between those who support and those who do not support the initiative
Toivonen, T. / 2015	None	Oppose cognitive prejudice; Creates alignment in the organization from the strategic level to the operational level; A greater number of more creative ideas for solving problems; A systemic approach to understand efforts to improve intangible aspects, which are nowadays most important in industries;	It creates pressure on Coaches, who must be very competent in the teaching method to make it accessible to everyone in the organization. The amount of work to create a sustainable level of competence and support culture.
Merguerian, et al. / 2015	None	Apply the Toyota Kata first in the value-adding process; Automate the collection and process to improve exposed indexes.	Collect data manually; Manual processes; Not all the collaborators were included for the cost estimate
Iberle, K. / 2015	None	Short steps in the PDCA cycles are better adapted to people's workload; Coaching meeting 2 to 3 times a week; The questions in the training Kata push the trainer and the apprentice in the right direction.	Low quality in the formation of hypotheses; Lack of constant entertainer and apprentice encounters; Lack of verification in the gemba; Coaching meeting only once a week
Ehni, M; Kersten, W. / Villalba-Diez et al.	Rother [17] & Bleicher (2011)	Definition of target condition; Using Hoshin Kanri; Using the value stream map	Lack of systemic use of PDCA

In this informational scenario, the literature reviews, due to their summarizing aspect, mainly assume an important organic function, together with the indexes (here in the biblioteconomic sense), abstracts and specialized bibliographies. Often times more time is spent trying to identify whether a particular study has been carried out before than actually carrying it out [11].

3 Results

This step explains the knowledge of the addressed issues which were found during the application of the bibliographic review. The bibliographic research development was focused on the theoretical and practical research of Toyota Kata routines.

The authors emphasize that the researches for the literature review happened through the keywords "Toyota + system", "lean + manufacturing", "Toyota + Kata", "benefits", "improvement", "waste", "lean + management", "coaching + Kata" and "improvement + Kata". A fair amount of articles associated with the themes "Toyota system" and "lean + manufacturing" was found. Once the term "Kata" was added to the filter, the number of articles found (which would be useful for this study) decreased significantly.

As a result of the results, Table 2 shows in an objective way a summary of the bibliographic research regarding the aspects desired in this study.

Table 2. Summary of Bibliographic Review (Source: Prepared by the Authors).

Authors / Year	Segment	Benefits
De Oliveira et al. / 2018	Product development	<ul style="list-style-type: none"> • The TK approach provided a knowledge management framework that made development management easier and simpler. • TK's cycle structure record provided an organized source of information, as they could access it and easily find what they needed. The coaching sessions increased the integration between the developers of the subsystem. • Development risks were reduced, as with the TK approach, it was certain that all the activities that each developer performed were in line with the development objectives. If they went out of the way, it was easy to see and correct. • Developers started to think about how what they were doing would lead them to achieve their Challenges.
Carvalho et al. / 2016	Manufacturing firms	<ul style="list-style-type: none"> • Reduction of lead time; • Dramatic improvement in the quality of service perceived by customers; and • Increase in production, maintaining the same number of employees in the cell.
Ferenhof et al. / 2017	Service companies	<ul style="list-style-type: none"> • Alignment between company objectives and behavior in the workplace and the development of human skills related to work. • Building knowledge and organizational culture through routines involving all stakeholders in the development of consistent and stable processes.
Merguerian et al. / 2015	Health area	<ul style="list-style-type: none"> • Improvement of efficiency and reduction of waste in a multidisciplinary clinic; • 69% reduction in costs of clinical preparation and improvements in outcome metrics, such as clinical volume, family experience and, to a lesser extent, value-added time;
Martins et al. / 2016	Occupational Health & Safety	Problem solving through teamwork with a deep understanding of the PDCA.
Bonamigo et al. / 2015	Logistics area	Loss prevention of retail logistics

4 Discussion

Toyota Kata is a proven and highly successful method of continuous improvement across the organization. Toyota Kata was discovered by Mike Rother while he researched Toyota's quality improvement methods. It is a holistic system method for improvement efforts that contains processes and behavior patterns for strategically aligned goal setting, problem solving, coaching, management and training. It is a simple and teachable approach that also covers the management of improvement efforts. The disadvantage of the approach is its focus on incremental improvement instead of revolutionary innovation [21].

However, a kata is more than just a methodology. It is a philosophy, perhaps even a state of mind. It impresses on the worker's mind the idea that there is no limitation when making improvements, as long as the worker knows where he is and where he wants to go [16].

Companies that create knowledge use problem-solving routines to extend their corporate knowledge and to deal with complex challenges [12]. The Toyota Kata approach enables the establishment of management routines that can lead the development process, deal with uncertainties, stimulate organizational learning and integrate and align the entire development team with the development objectives [15].

In according to Sagalovsky [19], the team's responsibility is not limited to the mechanical execution of defined work tasks, but also to the ongoing improvement of their work process by, for instance, structuring their workplace and keeping it organized using tools like 5S, routines such as PDCA, A3 and the Improvement Kata in order to meet target cycle time, level workloads, among other gains, through operator's Standard Work. The team and team leader are also responsible for cross-training its members and setting up work rotation and for the replacement of any absentee.

To some authors like Michels et al. [10] and Noviyanti [13] it is clear that opportunities and barriers are faced and vary according to the area in which the routines are applied, besides the importance of a motivation system to the employees, because their discipline affect the competitiveness of the company.

In the healthcare sector, these approaches are seen as innovative, bringing about a radical change in the way things have been done to date. In fact, Walley [23] points out that when the service sector is compared to the industrial sector, it is widely felt that the service sector, and healthcare in particular, is lagging in terms of adopting new management innovations and improvements.

As commented by Hellstrom et al. [5], when the service sector is compared to the manufacturing or industrial sector, it is widely felt that the service sector, and healthcare in particular, is lagging in terms of adopting new management approaches [14]. For many years it has been considered sufficient for there to be only professional knowledge to ensure quality and safety in the delivery of healthcare services. Today's healthcare delivery systems are complex; however, calling for further organizational awareness in order to provide the appropriate medical care along the entire patient pathway, generating savings without incurring costs but also improving, for ex-ample, the standards of quality, flexibility and safety.

Consequently, the problem with healthcare today is largely organizational and not only clinical.

According to Toivonen [21] there are several benefits of the Toyota Kata:

- Creates alignment in the organization from the strategic to the operational level
- It involves employees through common challenges and frequent successes.
- Common approach to improvement and management facilitates effective collaboration across the organization the implementation of Fractal allows the use of the collective intelligence of the organization for continuous improvement activities.

We conclude that the Toyota Kata approach provides a management structure that allows the alignment of developers, integration, reduction of development risks and knowledge management [15].

5 Conclusion

The challenge faced is not to direct executives and managers to implement new production or management techniques or to adopt new principles, but to achieve continuous systematic evolution and improvement across the organization, developing behavioral routines applied repeatedly and consistently: kata [17].

According to the result presented, the work can be seen as successful, since it reached its main objective, which was to identify, through a theoretical, mixed, descriptive and bibliographic research, carried out through a literature review, the benefits Toyota Kata deployment and routine. The authors consider as a scientific contribution the fact that this article presents a recent and updated bibliographic review carried out on the subject, which follows the steps of a research classification. As for perspectives, this article can encourage researchers as well as lean healthcare implementers to adopt the Toyota kata as a methodology for the multipliers of their institutions.

However, in addition to this study, the theme allows other studies to complement the subject, such as: case studies that show the practical application of the elaborated standard process, analyzing the filling of the chart in the kata cycles.

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