

Improvement Initiatives

"Change – for the better!"

One-minute Management

"Use it up, wear it out, make it do." - My Father
FREE NEWSLETTER

January 2011

The 14 Lean Principles by Jeffrey Liker

Principle 1

- *Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals.*

People need purpose to find motivation and establish goals.

Principle 2

- *Create a continuous process flow to bring problems to the surface.*

Work processes are redesigned to eliminate waste ([muda](#)) through the process of continuous improvement — [kaizen](#). The seven types of muda are:

1. Overproduction
2. Waiting (time on hand)
3. Unnecessary transport or conveyance
4. Overprocessing or incorrect processing
5. Excess inventory
6. Motion
7. Defects

Principle 3

- *Use "pull" systems to avoid overproduction.*

A method where a process signals its predecessor that more material is needed. The pull system produces only the required material after the subsequent operation signals a need for it. This process is necessary to reduce overproduction.

Principle 4

- *Level out the workload ([heijunka](#)). (Work like the tortoise, not the hare).*

This helps achieve the goal of minimizing waste ([muda](#)), not overburdening people or the equipment ([muri](#)), and not creating uneven production levels ([mura](#)).

continued on page 2 ...

14 Lean Principles (continued)

Principle 5

- *Build a culture of stopping to fix problems, to get quality right the first time.*

Quality takes precedence ([Jidoka](#)). Any employee in the [Toyota Production System](#) has the authority to stop the process to signal a quality issue.

Principle 6

- *Standardized tasks and processes are the foundation for continuous improvement and employee empowerment.*

Although Toyota has a bureaucratic system, the way that it is implemented allows for continuous improvement (kaizen) from the people affected by that system. It empowers the employee to aid in the growth and improvement of the company.

Principle 7

- *Use visual control so no problems are hidden.*

Included in this principle is the [5S](#) Program - steps that are used to make all work spaces efficient and productive, help people share work stations, reduce time looking for needed tools and improve the work environment.

- Sort: Sort out unneeded items
- Straighten: Have a place for everything
- Shine: Keep the area clean
- Standardize: Create rules and standard operating procedures
- Sustain: Maintain the system and continue to improve it

Principle 8

- *Use only reliable, thoroughly tested technology that serves your people and processes.*

Technology is **pulled** by manufacturing, not **pushed to** manufacturing.

Principle 9

- *Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others.*

Without constant attention, the principles will fade. The principles have to be ingrained; it must be the way one thinks. Employees must be educated and trained: they have to maintain a learning organization

Principle 10

- *Develop exceptional people and teams who follow your company's philosophy.*

Teams should consist of 4-5 people and numerous management tiers. Success is based on the team, not the individual.

14 Lean Principles (continued)

Principle 11

- *Respect your extended network of partners and suppliers by challenging them and helping them improve.*

Principle 12

- *Go and see for yourself to thoroughly understand the situation ([Genchi Genbutsu](#)).*

Toyota managers are expected to "go-and-see" operations. Without experiencing the situation firsthand, managers will not have an understanding of how it can be improved. Furthermore, managers use Tadashi Yamashima's (President, Toyota Technical Center (TTC)) ten management principles as a guideline:

1. Always keep the final target in mind.
2. Clearly assign tasks to yourself and others.
3. Think and speak on verified, proven information and data.
4. Take full advantage of the wisdom and experiences of others to send, gather or discuss information.
5. Share information with others in a timely fashion.
6. Always report, inform and consult in a timely manner.
7. Analyze and understand shortcomings in your capabilities in a measurable way.
8. Relentlessly strive to conduct [kaizen](#) activities.
9. Think "outside the box," or beyond common sense and standard rules.
10. Always be mindful of protecting your safety and health.

Principle 13

- *Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly ([nemawashi](#)).*

The following are decision parameters:

1. Find what is really going on (go-and-see) to test
2. Determine the underlying cause
3. Consider a broad range of alternatives
4. Build consensus on the resolution
5. Use efficient communication tools

14 Lean Principles (continued)

Principle 14

- *Become a learning organization through relentless reflection ([hansei](#)) and continuous improvement ([kaizen](#)).*

The process of becoming a learning organization involves criticizing every aspect of what one does. The general problem solving technique to determine the root cause of a problem includes:

1. Initial problem perception
2. Clarify the problem
3. Locate area/point of cause
4. [Investigate root cause](#) (5 whys)
5. Countermeasure
6. Evaluate
7. Standardize

SOURCE: **The Toyota Way** is a set of principles and behaviors that underlie the [Toyota](#) Motor Corporation's managerial approach and production system. Toyota first summed up its philosophy, values and manufacturing ideals in 2001, calling it "The Toyota Way 2001." It consists of principles in two key areas: 1) continuous improvement and 2) respect for people.

FURTHER READING:

Liker, J. 2004. ["The 14 Principles of the Toyota Way: An Executive Summary of the Culture Behind TPS"](#)

Liker, J. 2004. ["The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer"](#)

Improvement Initiatives LLC

Managing Editor, Jay Watson

2135 e. La Jolla Drive
Tempe, Az 85282

(480) 820-0877

Off the page ...

What, if any, are the differences between the Toyota Production System and Lean?

A research paper by: Ivan Kochnev November 2007

Introduction & Overview

Toyota is renowned not only as one of the World's greatest manufacturers and for its Toyota Production System (TPS), but also as the company that inspired Lean Production (Lean). However, there is a common assumption that Lean Production and the Toyota Production System are identical. In this research paper we will compare TPS and Lean and will try to answer the question: Are there any differences between TPS and Lean and, if yes, what are they?

Our approach to comparing TPS and Lean will be based on the 14 Management principles described in Jeffrey Liker's book *The Toyota Way*. We will briefly describe each TPS principle and then search the Lean literature: books, journal articles, and web-sites to find evidence of whether or not the same principle is present in Lean Production and whether there are any differences in the interpretation of the principle, its scope and depth. It is worth noting that this research paper will focus on one way comparison between TPS and Lean; we will not try to outline topics present in the Lean literature and then identify whether or not they are covered in the TPS literature.

This research paper is based on the usage of three types of resources: books, articles and organizational web-sites. The books listed in the references section can be generally subdivided into three groups: the origination of Lean and its connection to Toyota ([1] and [3]), books describing the Lean tools and providing limited guidance on the implementation of Lean ([2], [4], [6] & [8]) and books focused on the successful implementation of Lean and the transition to a Lean enterprise ([5] & [7]). It is interesting to note that K. Suzaki's book, *The New Manufacturing Challenge* written in 1987 is a typical book on Lean, but does not use the term "lean", which was first introduced by the MIT International Motor Vehicle Program researcher John Krafcik sometime around 1986.

Due to the abundance of research articles on Lean we decided to only use those published in peer-reviewed journals. It is necessary to point out that most of the articles on Lean take a completely different and more critical approach to the subject than the books. The usage of organizational web-sites is a part of the requirements for this paper; they bring a different, more commercial dimension to the Lean research resources and therefore we used them with caution.

Appendix A is a table which evaluates to what extent each book, article, or web-site covers each of the TPS principles, according to the following scale:

- 2 - The principle is described well and in depth in this publication (book, article or web-site);
- 1 - The principle is briefly described or mentioned for completeness in this publication and
- 0 - The principle is not described in this publication.

We started our research with a review of the books on Lean. After we established that six TPS principles are not developed in the books on Lean we examined, our next step was to find out whether or not the journal articles on Lean and the organizational web-sites fill in the gap we identified. To narrow our research we focused on reading Lean articles and web-sites that could potentially match the TPS principles that are missing in the Lean books. Therefore, in appendix A we evaluated the journal articles and web sites only according to these six principles.

The number of the publications included in our research is not big enough to draw conclusions about the main focus areas of Lean publications in relation to the TPS principles; however, our research may provide some indication about the correlation and be basis for further research.

Listed below are "The Business Principles of the Toyota Way", from Jeffrey Liker's book The Toyota Way - 14 Management Principles from the World's Greatest Manufacturer.

1. Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals.
2. Create continuous process flow to bring problems to surface.
3. Use "Pull" systems to avoid overproduction.
4. Level out the work load.
5. Build a culture of stopping to fix problems, to get quality right the first time.
6. Standardized tasks are the foundation for continuous improvement and employee empowerment.
7. Use visual controls so no problems are hidden.
8. Use only reliable, thoroughly tested technology that serves your people and processes.
9. Grow leaders who thoroughly understand the work, live the philosophy and teach it to others.
10. Develop exceptional people and teams who follow your company's philosophy.
11. Respect your extended network of partners and suppliers by challenging them and helping them improve.
12. Go and see for yourself to thoroughly understand the situation.
13. Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly.
14. Become a learning organization through relentless reflection and continuous improvement.

The following is the analysis of each principle.

Principle # 1: Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals.

This first principle of the Toyota Production System is not explicitly expressed in the Lean books that we examined. Liker talks about the need to have a philosophical sense of purpose that takes precedence over short-term decision making. The philosophical mission is the foundation for all the other principles of the company.

At first glance the illustrative examples of this first principle overlap with some of the other TPS principles, which typically have Lean parallels and are addressed in the Lean literature. For example, The Toyota Way talks about "Building Trust with Employees" and The New Manufacturing Challenge talks about "Developing Co-destiny with Employees." A deeper look reveals that the first TPS principle is about making principle-based managerial decisions focused on the long term prosperity of the company and the stakeholders affected by the decision. In contrast Lean does not put as much emphasis on the principle-based approach as TPS does.

This TPS principle should be followed even under difficult circumstances where there could be short-term losses. The majority of companies try to avoid or minimize losses for the quarter or for the year, falling prey to a managerial "short-term myopia". Such a principle of accepting losses that are avoidable seems outrageous from the point of traditional business thinking and is not reflected in the Lean literature.

It is also interesting to point out that while explaining this first TPS principle Liker compares the Toyota mission statement with the one of Ford. Liker shows how the guiding principles of Toyota are interwoven in the mission statement of the company. Our research could not identify any Lean sources in which the mission statement of the company is connected with its Lean principles.

The journal article How Do Your Measurements Stack up to Lean? [11] indirectly ties up the decision making with the lean principles. The performance measures used for decision-making are evaluated on their level of agreement with five lean principles.

In our opinion the lack of coverage of the first TPS principle in the Lean literature constitutes the first and the most significant difference between TPS and Lean.

Principle # 2: Create continuous process flow to bring problems to surface.

The creation of continuous process flow and its benefits is well covered in the Lean books [2], [4] & [8], and is briefly discussed in [5] & [6]. We identified two gaps between TPS and Lean.

First, the earlier Lean publications that deal with the concept of flow do not put as much emphasis on the one-piece flow as TPS does. The one piece flow is very briefly described in [5], pg. 54 in an article not so much about Lean but primarily focused on TPS implementation in the US.

Second, excluding [2] & [4], the books on Lean do not emphasize the importance of the proper physical layout of the facilities/work module, as much as The Toyota Way.

However, the later books, such as Lean for Dummies (2007), fill in both of these gaps. Overall principle # 2 is equally covered in both TPS and Lean and can be considered to be a common feature of both systems.

Principle # 3: Use "Pull" systems to avoid overproduction.

This principle describes what "pull" is, along with the replenishment through usage of Kanbans. In the earliest book on Lean among those we explored [2] the author does not use the term "pull". He talks about "on demand machine utilization", which in essence is the same concept as "pull". He introduces the Kanban in chapter 11 of The New Manufacturing Challenge. On the other hand Lean Thinking explains the concept of "pull" in great detail in a separate chapter. Lean for Dummies combines the concepts of flow and pull in one chapter, but the emphasis is on the tools to achieve them. Some groundbreaking Lean books [3] and those focusing on the implementation of Lean and the organizational change to a Lean enterprise [5], [6] & [7] do not explain the process flow and the pull principles.

It is necessary to point out, however, that: "The Toyota Way is not preoccupied with adhering to Principle 3. "... There are many examples of "push" scheduling throughout Toyota. ... When Toyota managers do schedule, they are preoccupied with timeliness." (The Toyota Way: Pg.110) Our limited research could not find such an idea of sometimes using the "push", instead of the "pull" approach, throughout the Lean literature we examined.

To summarize, the Lean books that describe the "pull" principle, approach it differently, but in fact the Lean understanding of "pull" is identical with the one of Toyota.

Principle # 4: Level out the work load.

The Lean literature reviewed indicates that TPS and Lean are somewhat different in their understanding of leveling out the work load. In the Toyota Production System leveling the workload, and thus eliminating the overburden to people and equipment, is equally important as eliminating waste. However, according to Liker, companies trying to implement Lean generally do not understand and apply this principle.

In *The New Manufacturing Challenge* Suzuki talks about "scheduling a steady flow for better control." Here again, even though the author does not use the typical lean terms "to level the work load" and "line balancing" the concept is the same as in TPS: the benefits of leveled mixed production model. Leveling of production is very briefly described in [5], part 2, "Bringing the Toyota Production System to the United States: a Personal Perspective" by John Y Shook. Level scheduling and balancing the line are only mentioned in "Lean for Dummies".

A review of the journal articles [9] & [21] somewhat narrows the gap between Lean and TPS regarding TPS principle # 4. Locher [9] explains how the work load of some office activities can be leveled out.

The authors of [21] conclude that the actions of the supplier's customer significantly affect the ability of the supplier to level the work load and to be Lean.

Overall, except for [2], [9] & [21] the concept of leveling the work load is not as well developed in the lean literature as it is in *The Toyota Way*. Therefore this principle may be considered as a point of difference between TPS and Lean, although not a significant one. .

Principle # 5: Build a culture of stopping to fix problems, to get quality right the first time.

Both TPS and Lean literature elevate the importance of quality to the utmost degree. All TPS concepts covered in this principle (jidoka, andons, poka-yoke, etc.) are really well developed in [2]. These concepts are also covered in [4] but not separately or in a systematic, structured manner. Instead they are interwoven in the explanation of flow (TPS principle # 2).

Automatically stopping the production when a problem is detected is very briefly covered in [5] and it is in connection with TPS. The principle of "five whys" is only mentioned in [6]. Therefore, when evaluating the coverage of principle # 5 by [5] & [6], we assigned them zeroes in our table in appendix A. Finally, [8] covers this fifth TPS principle very well in one neatly organized chapter "Perfection tools" with the exception of the mistake proofing concept which is explained in the chapter about flow.

One point that is explicitly stated in *The Toyota Way*, which is only implicit in the books about Lean, is to keep the quality control simple and that building in quality it is not so much about technology, but mostly about following the principle # 5.

Overall, the fifth TPS principle is a point of parity between TPS and Lean.

Principle # 6: Standardized tasks are the foundation for continuous improvement and employee empowerment.

Standardization is one of the foundations of both TPS and Lean. In describing the TPS principle # 6 The Toyota Way puts emphasis not so much on how to standardize tasks, but more on the importance of standardization as a basis for the quality, continuous improvement and as an enabler of employee empowerment.

Suzaki is on the other end of the spectrum, detailing how to standardize and not so much the importance of the process of standardization. The Cedar Works case study in [5] provides a number of examples of the application of standardized work; John Shook in [5] talks about the importance of standardized work and that it is empowering and life-enriching for the workers. The Hitchhiker's Guide to Lean explores standardization and its importance throughout the book, without separating it into a stand-alone principle. Standardized work has a special place in [8] and is very well explained in both perspectives: how to standardize and how important standardization really is.

Lean books not only show the importance of standardized work, as does TPS, but also in some cases provide guidelines about how to standardize. To conclude, TPS principle # 6 is a point of parity between TPS and Lean.

Principle # 7: Use visual controls so no problems are hidden.

Visual controls are a common feature found in both TPS and Lean literature. Even though the usage of visual controls is not described in [4] in a separate chapter, the book is abundant with examples of the usage of visual controls. Two of the case studies in [5], namely: Implementing Lean Manufacturing at Gelman Sciences, Inc. and Operational Excellence: a Manufacturing Metamorphosis outline the introduction of a visual control system with very little detail on what the visual system is comprised of, but instead with an emphasis on the human factor. The visual control tools, such as andons, display boards, charts, etc. are well covered in [8].

The Toyota Way includes the description of 5S in the chapter about principle # 7; Lean books [2], [4], [5], [6] & [8] cover 5S outside the concept of visual controls.

While the Lean literature describes the tools, the usage and the human aspect of the visual tools, it does not clearly show the connection of the visual controls and adding value to the process. In contrast TPS emphasizes the role of using the visual control systems for the improvement of the value-added flow.

The Toyota Way describes the application of principle # 7 not only on the shop floor but also in the office, for example the creation of one-page reports. With the exception of The Hitchhiker's Guide to Lean, which has a chapter on Lean accounting principles, in our research we could not identify lean sources showing examples of the application of lean principle to office work.

Overall, with some minor differences, the TPS and the Lean principle of using visual controls are identical.

Principle # 8: Use only reliable, thoroughly tested technology that serves your people and processes.

This principle should not be confused with the lean appeal to "Right-size your tools" [4]. According to Liker "People do the work, computers move the information;" new technology must be adopted appropriately and support people, processes and values. Except for some brief statements in support of TPS principle # 8 in [4] & [8] there is almost a complete lack of coverage of this important TPS principle in the Lean books.

Error-proofing for the creation of defect-free products is discussed in [14]. It is very interesting to note that the article points out that at Delphi Corp. Lean initiatives sometimes replace automation with manual processes. The author of [20] very briefly points out that if companies combine Lean processes with the application of the right technology tools they can move manufacturing forward very fast.

In our opinion this principle is one of the most significant differences between TPS and Lean.

Principle # 9: Grow leaders who thoroughly understand the work, live the philosophy and teach it to others.

TPS principle # 9 is somewhat present in the lean literature, but is not systematically and well developed. The Toyota Way emphasizes the importance of growing leaders from inside the company who truly understand the work; we could not identify lean sources supporting such an idea.

Liker describes in depth the role of the chief engineer as a link to innovation, leadership and customer satisfaction. The leadership role of the chief engineer (shusa) is mentioned by Womack, Jones and Roos; they discuss the strong in-depth knowledge and the influence of the team leader at Honda, Toyota and other Japanese companies, and compare it to the weak, powerless position of the team leader in the western companies. The above statement is supported by the case study Team concept at CAMI by Rinehart, Huxley and Robertson. The leadership, coaching, mentoring and advisory role of managers and supervisors in the lean enterprise is discussed very briefly in [8].

Nash & Poling (2007), talk about training the employees and educating them about Lean, developing Lean managers and Lean facilitators as well as having a Lean Master (Sensei). While this seems to be touching on TPS principle # 9, the ideas in this article [12] are quite different than those presented in The Toyota Way. Developing the Big Picture [15] touches on the problem of Lean flat organizations of developing leaders with strategic thinking.

Even though some of the elements of the TPS principle # 9 are covered in the lean literature, overall TPS principle # 9 is a point of difference between TPS and Lean.

Principle # 10: Develop exceptional people and teams who follow your company's philosophy.

Most of the elements of the tenth TPS principle are present in the lean literature. Liker starts the description of TPS principle # 10 with an outline of the work team structure and culture, which is also outlined in [7] & [8]. Compared to the Lean sources we examined, The Toyota Way is more explicit about the role of the company culture in developing teams. Also, even though different aspects of training and individual performance are present in [5], [6], [7] & [8], The Toyota Way shows the connection between developing the individual and team effectiveness. Motivation and the human side of change are discussed in [2], [5] & [8]. Both TPS and Lean are in agreement about the central role of people in continuous improvement.

Taking into account some of the differences between different authors in presenting the Lean & TPS concepts, we conclude that TPS principle # 10 is a point of parity between TPS and Lean.

Principle # 11: Respect your extended network of partners and suppliers by challenging them and helping them improve.

TPS and Lean literature discuss the supply chain however, they are somewhat different. The authors of both groundbreaking books on Lean The Machine that Change the World and Lean Thinking have dedicated significant portions of the abovementioned books to coordinating the supply chain and supplier relationships. This topic is consistently presented throughout [7] and is also developed in [5] & [8]. So what, if any, are the differences in the TPS and Lean approaches? With the exception of [3] Lean books are more focused on the mechanics of the supply-chain, while The Toyota Way is more concerned with partnering for success with its suppliers and helping them improve by sharing and teaching the TPS principles.

One aspect of The Toyota Way that we could not find in the Lean literature is maintaining the internal capabilities for key processes and even for some of the outsourced processes.

Partnership with suppliers regarding inspection and quality control is the topic of [13]. However, the article does not view the suppliers as partners and the collaboration with suppliers does not extend beyond the inspection process. Levy (1997) discusses some of the problems of the lean companies with the international supply chain management. Both lean articles [13] & [18] do not cover the TPS principle # 11.

Articles [21] & [22] support TPS principle # 11: the former shows the extra efforts the Japanese automobile manufacturers in the US are making to help their suppliers to be Lean and the latter shows the interaction of Saturn its dealers.

TPS principle # 11 is not only about logistics and supply-chain management and this is one of the differences with the Lean approach. This may be subject to discussion, but in our view TPS principle # 11 is a point of difference between TPS and Lean.

Principle # 12: Go and see for yourself to thoroughly understand the situation.

TPS principle # 12 is only present in a few of the lean books we examined. The Hitchhiker's Guide to Lean lists five practices for "personal lean", the last one of which is "see more with your own eyes." Lean for Dummies hits all the high points of TPS principle in a summarized fashion.

Even though the TPS principle is covered in the Lean literature it is missing one important element that is abundant in The Toyota Way: examples of the application of this principle.

If one compares the way Liker presents this principle with the way it is presented in the lean literature, the comparison between the eastern culture and the western way of thinking is almost inevitable! Liker emphasizes the "deep understanding" and presents TPS principle # 12 as the Japanese would see it; the lean approach is more of an adaptation of the TPS principle to the western culture.

In conclusion, even though the TPS principle # 12 is not presented in the Lean literature as convincingly as it is in The Toyota Way it is essentially the same in both TPS and Lean.

Principle # 13: Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly.

Decision making is not a focal point in Lean literature as opposed to TPS. TPS principle # 13 analyzes thorough consideration of alternatives, obtaining many people's input and thus generating consensus, clearly communicating on a single piece of paper and improving the decision making.

Not many out of all of the above elements are reflected in the Lean books. The Hitchhiker's Guide to Lean is the only lean source we identified that touches on this TPS principle; it formulates Lean principle: "Establish agreement on what and how". This Lean principle is, however, mostly concerned with collaborative standardization and answering the question about how the "what" will be achieved.

A review of Lean articles and web sites does not support the TPS principle # 13. Cappelli & Rogovsky, (1998) explore workers' involvement in decision-making and the legal and psychological implications and not on the consensus and considering all options.

This TPS principle is not to be confused with the Lean Kaizen event. In essence TPS principle # 13 is about good decision-making and building the consensus needed for the successful implementation; we could not identify such guidance in the Lean literature. TPS principle # 13 is definitely a point of differentiation between TPS and Lean.

Principle # 14: Become a learning organization through relentless reflection and continuous improvement.

The combination of Lean books covers the spectrum of the TPS principle #14. Identifying root causes through the 5-Why method is well described in [2], [4], [6], & [8]. Building learning organization and the transition to a Lean enterprise is one of the central topics of [5] and one of the main topics of [8]. Metrics are very briefly covered in [8]. The Toyota Way also describes the Plan-Do-Check-Act method which is well illustrated across the Lean books.

Despite some of the misalignments between Lean and TPS in the presentation of this last TPS principle, overall it can be considered as a point of similarity between TPS and Lean.

Conclusion

To conclude, despite the many similarities between TPS and Lean, TPS principles 1, 4, 8, 9, 11 and 13 are not reflected or are significantly different in the Lean literature.

As Lean evolved from TPS their principles are similar, but organized differently, and not always identical. TPS is more than just a set of Lean tools. TPS and Lean are quite sophisticated and the holistic approach is key to the success of their implementation.

Based on our research we can conclude that TPS is somewhat broader than Lean. Many of the Lean books emphasize the Lean tools for increasing efficiency; the purpose of these tools, however, is sometimes lost and the central role of people is not as strongly emphasized as in TPS. We could define both TPS and Lean as very similar business philosophies; however, TPS puts more emphasis on the principles of the Toyota Way, while Lean is more of a continuous improvement methodology (similar to other methodologies such as TQM, JIT, Six Sigma, etc.). On the other hand all books on Lean we included in our research cover at least to some degree the implementation of Lean and put it in organizational perspective, thus narrowing the gap between Lean and TPS.

One may speculate that Lean is an adaptation of the Eastern philosophy of Toyota to the Western thinking; Lean is putting the Toyota principles to work in a way that is easier for the Western culture to understand and apply.

Says Jeffrey Liker in the Toyota Way: "If you are using the Toyota Way to become lean, the lesson here is that you don't have to get hung up imitating Toyota's use of specific tools so you can appear to be lean like Toyota. The Toyota Way is a philosophy and a set of tools that must be appropriately applied to your situation. But understand that these principles are something to believe and strive for. They are part of a greater system that is seeking harmony and perfection to sustain success."

Appendix A

Appendix A is a table which evaluates to what extent each book, article or web-site covers each of the TPS principles, according to the following scale:

- 2 – The principle is described well and in depth in this publication (book, article or web-site);
- 1 - The principle is briefly described or mentioned for completeness in this publication and
- 0 - The principle is not described in this publication.

Publication Publication Topic Rating:

2 = principle is described well & in depth;

1 = briefly described; 0 = not described

Principle # 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Point of Parity (POP) or Point of Difference (POD) D D D D D D

1 The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.

2 2 2 2 2 2 2 2 2 2 2 2 2 2

2 The New Manufacturing Challenge. 0 2 1 2 2 1 2 0 0 1 0 0 0 1

3 The Machine That Changed the World. 0 0 0 0 0 0 0 0 1 1 2 0 0 0

4 Lean Thinking: Banish Waste and Create Wealth in Your Corporation. 0 2 2 1 1 0 2 1 0

0 2 0 0 1

5 Becoming Lean: Inside Stories of U.S. Manufacturers. 0 0 1 1 0 2 1 0 0 1 1 0 0 1

6 The Hitchhiker's Guide to Lean. 0 1 0 0 0 1 0 0 2 0 0 1 1 2

7 Lean Work: Empowerment and Exploitation in the Global Auto Industry. 0 0 0 0 0 0 0

0 1 2 2 0 0 1

8 Lean For Dummies. 0 2 2 1 2 2 2 1 1 2 1 2 0 1

9 In the Office: Where Lean And Six Sigma Converge 0 2 0 0 0 0

10 Development of a Collaborative Manufacturing, Planning, and Scheduling System:

Integrating Lean and Agile Manufacturing for the Supply Chain. 0 0 0 0 0 0

11 How Do Your Measurements Stack up to Lean? 1 0 0 0 0 1

12 Strategic Management of Lean. 1 0 0 1 0 0

13 Lean Inspection Through Supplier Partnership. 0 0 0 0 1 0

14 Produce Perfect Products. 0 0 1 0 0 0

15 Developing the Big Picture. 0 0 0 1 0 0

16 Should lean replace mass organization systems? A comparative examination from a management coordination perspective 1 0 0 0 0 0

17 Employee involvement and organizational citizenship: implications for labor law reform and "lean production". 0 0 0 0 0 1

18 Lean production in an international supply chain. 0 0 0 0 1 0

- 19 Trimming Organizational Costs . . . For the Long Term. 0 0 0 0 0 0
- 20 What's next after lean manufacturing? 0 0 1 0 0 0
- 21 Japanese automakers, U.S. suppliers and supply-chain superiority 0 2 0 0 2 0
- 22 Saturn's supply chain innovation: high value in after-sales service. 0 0 0 0 1 0
- 23 http://en.wikipedia.org/wiki/Toyota_Production_System 1 1 1 1 1 1
- 24 <http://www.toyotageorgetown.com/tps.asp> 0 0 0 0 1 0
- 25 <http://www.sae.org/topics/leanjun01.htm> 1 0 0 0 0 0
- 26 http://www.toyota.com.au/toyota/events/Content/0,4906,4076_1592,00.html 0 0 0 0 0 0
- 27 http://www.vorne.com/solutions/learning_center/tps.htm 1 0 1 0 0 0
- 28 <http://www.toyoland.com/history.html> 0 0 0 0 1 0
- 29 <http://www.mep.org/textfiles/LeanPrinciples.pdf> 0 0 0 0 0 0
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	Publication / Principle	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Point of Parity (blank) or Point of Difference (D)	D			D				D	D		D		D	
1	The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	The New Manufacturing Challenge.	0	2	1	2	2	1	2	0	0	1	0	0	0	1
3	The Machine That Changed the World.	0	0	0	0	0	0	0	0	1	1	2	0	0	0

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