

Applying the Toyota Production System To The Animation Studio Environment



A look at how you can improve productivity, efficiency and employee satisfaction by using 'lean' production methods.

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Version**

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1. Introduction

What is the Toyota Production System?

Simply put, the Toyota Production System, or TPS for short, is a framework for creating, running and improving processes throughout an organisation. It relates to materials, processes, production and management and how they are utilised and co-ordinated within a company.



But I Don't Make Cars I Make Cartoons!

True, however TPS is not strictly for traditional manufacturing concerns. It can be applied to the service industry relatively easily and effectively.

Besides, in reality, animation is a production process with inputs (raw materials), process (production) and outputs (TV shows, movies, commercials, etc.). TPS can absolutely be applied to animation in an effective and efficient manner that will increase productivity and reduce waste.

Who Is This White Paper Aimed At?

This paper is not intended to be an all-inclusive guide or instruction manual but instead, offers a high-level view of how TPS could be initiated in a studio environment, large or small.

It aims to provide the reader with the fundamentals necessary to see why TPS is suitable, why it can improve production and why it will result in benefits for the studio and employee alike.

Based on the knowledge contained within, the reader is highly encouraged to explore TPS further and to acquire more information on the topic before implementing the system on their own.

So Why Should I Even Consider It?

Good question. Here's a few questions to ask yourself:

Do you want to see reduced production times?

Do you want to see less waste (monetary or otherwise) in your studio?

Do you want happier clients? (Who doesn't, right?)

Do you wish to see happier, more productive employees?

Do you wish to see higher quality products leaving your studio?

If the answer to any (or all) of the above questions is “yes” then you should consider using the Toyota Production System.

Great! Where do I Start?

The first thing we'll do is have a brief overview of the history of the system. Then we'll move onto the basics of what makes the system so successful. After that, we'll see how those basics were expanded to make the system what it is today. Lastly, we'll see how the system pertains specifically to animation and how it can be implemented for production.

While it may be tempting to skip to the end, a fundamental understanding of the history of TPS and how it came to be is of great importance. Knowing why the system is set up the way it is greatly increases your understanding of exactly why it is so successful.

Misinterpretation or glossing over the facts can lead to less than ideal results that may fall below expectations. If you need any proof, look no further than the Big 3 American car manufacturers.

They studied and copied Toyota in their production processes and factory layout but completely neglected to study the management structure and hierarchy. As a result, they were never able to match Toyota in scalability, productivity and, ultimately, sales.

In Western society, we often equate improving our people with improving our systems. People are not the same as organizational systems. They work in systems, but the systems existed before most of the people were hired and will continue after the current employees are gone. Improving systems takes a concerted, well-planned, usually cross-functional effort led from the top of the organization to the bottom. When a system is changed, people need to change what they do. However, changing what people do will not necessarily change the system.

In order to learn just how TPS can achieve the required changes in a company's systems, it is necessary to take a minute to look back at its history and why it was developed in the first place.

2. The History of TPS

Beginnings

While the (modern) Toyota company had been in existence since 1928 manufacturing sewing machines and other industrial equipment, by World War II, it had grown to a fully-fledged manufacturing concern with a primary focus on automobiles.

At the end of the War, with its factories almost devastated, the company was faced with a dilemma: it had nowhere to store finished goods or raw materials. Such a problem could be seen as insurmountable and would result in a stoppage in production. In Toyota's case, however, it decided to continue operations albeit without the traditional stores of raw materials or the usual warehousing of completed products.

Instead, the factory required that raw materials be delivered at regular intervals in small batches and that finished products be shipped to customers as soon as they were finished, whether they were ready early or not.

Funnily enough, the company's fortunes didn't diminish during this testing time. In fact, they improved! So much so, that the company continued operating like this well after it had rebuilt all its facilities.

Becoming a codified system

Gradually, the many rules governing production within the company were codified. The value in writing down the rules so that they could be preserved was recognised by management, thus protecting their effectiveness.

Over time, the rules were amended, expanded and slowly became ingrained in the culture of the company and the way it conducted its business. This led to the next development that would result in the Toyota Production System that we know today.

Towards the Toyota Production System

In the late 1970s the company realised that the rules had grown well beyond their original base of production and were, in effect, governing how the entire company was being run.

As a result, the decision was made to look at how the company operated and to codify a set of rules that reflected the many principles that had been developed over the years. The result was the creation of the Toyota Production System as we know it today.

So How Does It Work?

Now that you know a bit of the history behind it, let's take a look at the basics upon which the whole thing is built.

3. The Basics of the Toyota Production System

The Two Guiding Principles

It may seem surprising that such a large and complex setup as TPS is based on just two principles and yet, it is! Unsurprisingly, they are also the key to why the system has managed to continually stay ahead of the game.

While both principles seem so obvious once you see them, they are perhaps almost forgotten in the race for that last dollar. Their inclusion as the foundation and bedrock of TPS is, however, no accident.

The two principles are:

1. Continuous Improvement
2. Respect for People

Continuous Improvement

The first one is self-explanatory, only by continuously and relentlessly improving the system could Toyota ever hope to stay ahead of the competition; if they didn't someone else would be guaranteed to overtake them.

The same goes for you, if you wish to implement the system you **MUST** endeavour to continually improve it. Admitting that the system as a whole will never be perfect is important.

Certain steps or parts of processes may reach a level that is acceptable for operations, but that does not mean that they are perfect. You should always be on the lookout for steps that could improve performance (we'll take a closer look at how to do this later in the paper).

Continuous improvement does not mean that you are spending hours or days trying to come up with ways to improve things. Far from it, it simply means that you act to implement improvements and not allow things to stagnate.

By doing this, you're strengthening your organisation and invoking the spirit among employees. The market is constantly changing, and being open and adept to changes will ensure that you stand a better chance than a company that adapts slowly, not at all or is even in denial.

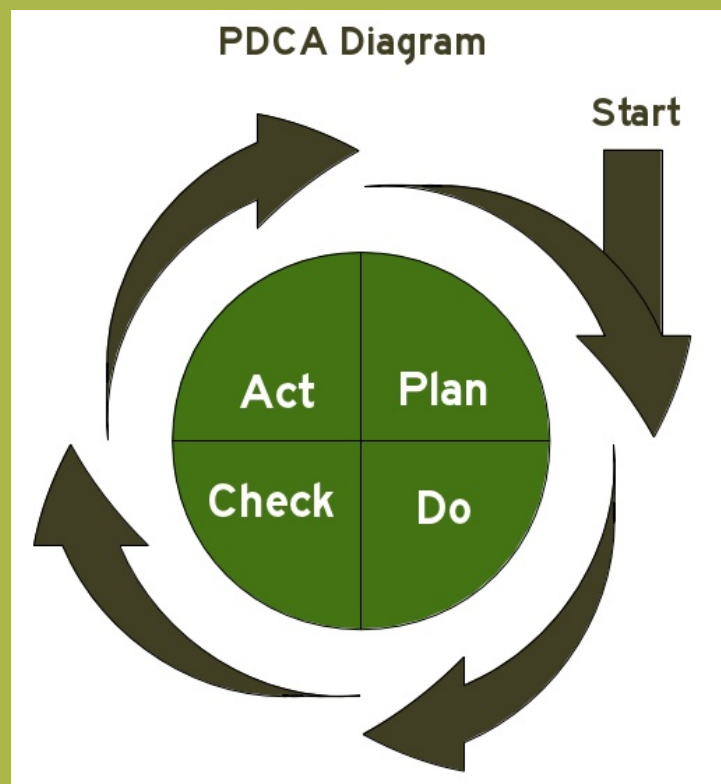
Is There A Process For Self-Improvement?

You bet there is!

Below is the PDCA diagram that illustrates the PDCA process that Toyota uses to ensure its processes are continually improved. The system is very simple:

1. **PLAN** the process
2. **DO** the steps in the process
3. **CHECK** to make sure it all works smoothly
4. **ACT** on any changes that need to be made.

Repeat constantly



Continuous improvement for Toyota means that although many copy their system (even their Japanese competitors Honda and Nissan) no-one has been able to match them in terms of development. Continuous improvement for Toyota means not so much keeping up with the pack as it does leading it.

Respect for People

The second guiding principle of TPS is respect for people. Perhaps surprisingly in the Western world, “people” does not equal “employees” or even “line-workers”. It encompasses exactly what it says it does, people!

The Japanese culture is much more collaborative in nature than the traditional authoritative structures that we are used to in the West. As a result, decision-making is done by consensus and teamwork rather than being made by a de facto manager.

With this in mind, TPS is geared towards accommodating all levels within a company. It covers everyone from the lowliest line worker to the CEO. The reason for this is that if everyone operates within the system, they are all subservient to its rules and guidelines. This in turn keeps everyone in check and ensures that rules are not broken by upper management at the expense of those lower in the hierarchy, and vice versa.

This respect for people also manifests itself in the responsibilities of employees. TPS extends as much decision-making authority as possible to everyone within the system. The result of this is the ability of a single line-worker to halt an entire production line. (We'll take a closer look at how and why this is possible later in the paper).

In a studio environment, respect for people would manifest itself in how authority is distributed throughout the studio as well as imbuing in employees the fact that they act as part of a team and that the success of the team is directly dependent on their individual actions.

Now, let's take a look at how these two guiding principles were expanded to create the four rules which in turn provide the base on which every process and decision is made during day-to-day operations.

4. The Four Rules of the Toyota Production System

For a long time, while TPS was well known about, it was less clear exactly why it was so successful for Toyota but did not result in similar levels of success for other companies.

Steven Spear and Kent Bowen decided to have a look at this in their article, XXX and what they found was rather surprising. Similar to the description of the Big 3 earlier in the paper, they found that companies were implementing TPS within their organisations but only to a certain extent.

For example, they would implement the processes dealing with production but would completely neglect to implement them in the managerial process as well. The result was that you had a production system running on one level and a supervisory system running on a completely different one.

This incompatibility resulted in less than stellar results, leading the companies to render TPS as a quirky system that only the Japanese “got”.

Spear and Bowen went to work on this apparent ‘fault’ in TPS and uncovered what they consider the “Four Rules” that underline the “tacit knowledge” within TPS. They are as follows:

1. All work shall be highly specified as to content, sequence, timing and outcome
2. Every customer-supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses.
3. The pathway for every product must be simple and direct
4. Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organisation.

Do they seem complicated? Don't worry they're not. Let's break them down into more manageable (and relevant) chunks.

1. All work shall be highly specified as to content, sequence, timing and outcome.

What this means is that every single repeatable process is planned to the hilt. This includes the raw materials required, the resources needed to complete it and the time necessary to finish it.

In terms of an animated production, every step is broken down into its basic elements, time is allotted to conduct it and the required output is clearly specified.

The result of all of this is that the people involved in the steps are in no doubt whatsoever about the process and what the expectations are. Such rigidity means that deviations/problems are easy to spot.

2. Every customer-supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses.

A customer-supplier relationship does not necessarily mean what you think it means. In terms of TPS, a “customer” is whoever receives the product after your step in the production process and a “supplier” is either the person you receive work from or whoever supplies you with the resources you need in order to complete the work (tools, etc.).

Having a direct relationship means that everyone knows exactly where they need to go to find what they need. If you know exactly who your “suppliers” are then there is no need to search around for them.

This rule also stipulates that lines of communication are simple and direct. In addition, the communication itself is simple and direct in that it provides a definite yes-or-no answer. The result is that there is no ambiguity within the communication process.

This clear communication process extends throughout the organisation so that every employee and manager knows exactly who they need to contact regarding a certain need. This reduces time that is wasted trying to figure out who to contact.

When employees know exactly what it is they are doing and who they need to contact, you can be sure that it results in increased productivity and efficiency as well as improved work on the part of the employee because they are free to spend more time working on what they were hired for in the first place.

3. The pathway for every product must be simple and direct

This rule is fairly self-explanatory. No-one wants their products to go through a long, arduous and circumstantial route when a simple and more direct one will suffice.

Walt Disney utilised this rule when he built his studio in Burbank. There, every step of the animation production process was planned out in advance and the buildings built accordingly. Finished pencils were transferred to the inking department before moving over to the camera department all as part of a single, process.

Such simplicity can apply to any part of the production process, not just the animating part. Writing, storyboarding and effects can all be done with simplicity and without deviation.

4. Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organisation.

This is perhaps the most important of the four rules and also the most complex. For simplicity's sake, let's break it down further into three parts:

4A. Any improvement must be made in accordance with the scientific method...

The scientific method is where you create a hypothesis or idea, test it and then look at the results before determining what, if any, changes need to be made. If changes are to be made, you repeat the steps until the process runs without any problems.

In TPS, the scientific method is used for all processes within the system, including production, management or otherwise. The scientific method ensures that the processes will run smoothly, but also serves to filter out any potential problems before they can hinder production.

In a studio environment, this could mean a new piece of software is tested before being put into use on a production. It could also mean that a new way of creating a script is tested first before it is tried for real.

The use of the scientific method also means that any hiccups in the course of the system's operation will be easy to spot as deviations from the norm. This can be quite useful in discovering problems within the system or in its interactions with other parts of the production chain.

4B. ...Under the guidance of a teacher...

Who is a "teacher"? No, he is not a professor, or even necessarily someone with an education degree! Within TPS, a "teacher" is considered anyone who gives instructions regarding a process.

This can refer to instructing new employees about their work or, as is more often the case, instructing existing employees about a change in the production process in which they are familiar with.

In essence, "teachers" within TPS are anyone within the organisation. They could be co-workers on the same level or the CEO. Everyone is expected to help others because the success of the whole is dependent on everyone helping each other.

4C. ...at the lowest possible level in the organisation.

When this rule stipulates “the lowest possible level”, it means just that. If a worker on an assembly line can correct a problem, he should. Giving as much authority as possible to each individual empowers them to make the changes, because they understand that if they can make a change that will improve conditions for them, they will!

This is why single workers can stop an entire production line in Toyota's factories. They are trained and are highly attuned to spotting problems, or rather, deviations from the script. If a problem is identified, a supervisor is immediately notified. This makes the problem known to superiors.

If it is a fairly minor issue, it can be dealt with by the employee or their supervisor. If they can't resolve it, notification is made to the next supervisor in the chain and so forth as far as the factory manager or (theoretically) the CEO.

One fundamental aspect of this setup is that supervisors are expected to deal with almost any situation that warrants it. Problems that can be resolved, are, and should they prove to be persistent, changes to the process can be made to eliminate them.

These four rules work in harmony to create an environment where tasks are easily understood, employees can complete them with the required resources and know where to ask for assistance. Lastly, the use of the scientific method allows problems to be highlighted immediately and dealt with in a timely manner, before they can cause major problems further down the line.

The success and successful implementation of TPS is utterly dependent on the correct use and understanding of these four rules. If any or all of them are ignored or skimmed upon, the entire system will stop working at peak efficiency.

The Four Rules in Plain(er) English.

The four rules are fairly simple to understand but they still seem quite wordy, don't they? Here they are again broken down into the simplest form possible:

1. Know what you're doing, how you're going to do it, how long it's supposed to take you and exactly what it is you hope to achieve at the end of the whole process.

2. Know exactly who you need to contact for any reason and vice versa. No ambiguous communication either; it's either send/don't send with an answer of yes or no, up or down, left or right.

3. People take direct paths for their advantages. Your products can stand to reap them too.

4. Study, design, construct and implement any new process the same way, preferably by someone who knows what they're doing and ideally by the lowest person on the corporate ladder who can feasibly achieve it.

5. Applying TPS To Animation

TPS Isn't Just For Cars

Back in chapter 1, we discussed the fact that TPS is applicable to much more than just auto manufacturing. This is because TPS itself is independent of the actual processes it regulates. It doesn't care if you are installing seats in a Camry or animating a car chase.

While it is easy to think of TPS as a highly regimented system that expects everyone to follow the same set of rules, this is not the case. It only regulates how the work is conducted, not what the work itself.

This section will detail, at a high level of concept, how TPS could be applied to the various steps in the animation process. It is by no means comprehensive, but it should be enough to give you a good grounding in how to begin implementing the system in a studio.

Concept

Writing

Storyboard

Voice tracks

Animatic

Animation

Special FX

Final product

Setting The Groundwork

It is vitally important to understand that TPS cannot be applied just to certain sectors of a studio or parts of the production pipeline. If you are to achieve the levels of efficiency that TPS promises, you must implement it across the entire system from start to finish.

While this may seem like a tough sell, especially if your production extends overseas, it can be accomplished. Toyota manages to link hundreds of suppliers across many continents to ensure that the bolts holding that seat in the aforementioned Camry arrive in the right place at the right time and in the right size. Ensuring your animation comes back to spec should be no more difficult.

Splitting Production Into Described Tasks

This is perhaps the trickiest part of the entire TPS process, especially if it is being implemented in an existing studio. However, once it is up and running, creating and implementing new tasks will require significantly less time.

TPS is heavily dependent on tasks being highly prescribed insofar that the employee knows exactly what to do. This can be achieved in a few ways:

The goals of the task are clear

How the task is to be completed is known beforehand

What the final product should be is clearly defined.

To anyone who has worked in a traditional studio, these aims should seem like a bit of a no-brainer, except that within TPS, such steps become critical.

Setting the task's goals ensures that what the employee should achieve by the end is not left to guesswork. This may require either more defined instructions or additional training on the part of the employee.

Secondly, how the employee should complete the task should be known beforehand. They should be in no doubt as to how to go about doing their task. It should also be noted that the steps used should be the exact same for every employee completing the task. Differentiation undermines the prescribed rhythm of the system and can lead to unnecessary delays and waste.

Lastly, the product of the task should be clearly defined so that the employee knows what he should be passing along in the production to the next team worker.

All of this extends to management as well. The TPS system cannot function if managers don't also adhere to the same requirements. This means that they should be aware of what the final product will be and that they do not interrupt the production process with changes/alterations.

Why Such Heavily Prescribed Tasks?

The reason for such heavily prescribed tasks is simple, they provide the necessary data with which to measure the overall system performance. If tasks are inconsistent for each employee, then it becomes impossible to measure their relative response. Having each one complete the task differently means that inefficient steps in the system cannot be determined.

How To Spot Inefficiencies

The key to finding and fixing inefficiencies or problems within the TPS system is to let employees find them. Traditionally employees have been taught to deal with problems on the own as best they can before alerting management. This has the unfortunate effect of burying potential problems that may well be common to many employees.

TPS requires that employees notify their supervisor as soon as an event that is outside their prescribed task occurs. This ensures that management is made aware of the problem and takes steps to remedy it before it leads to serious kinks in the production.

For an animation studio, this could easily be, say, an animator having computer troubles. Instead of quietly suffering or letting things get progressively worse, she would immediately notify her supervisor who is then required to find an acceptable solution as quickly as possible.

While this may seem counterproductive in terms of costs, it will lead to savings in time and manpower as the problem is solved quickly and the employee's productivity restored.

Allowing employees to 'pull the emergency brake' as it were empowers them. Such empowering is acknowledgement of their critical place in the production and gives them an incentive to act. If they can directly affect the success of the production (and therefore their own work) they will be much more inclined to act.

Why Measure Efficiency?

Unsurprisingly, the very nature of TPS results in a lot of data being produced. The great part about this is that data can be analysed and studied with the aim of improving the system.

The self-improvement rule can be achieved significantly more easily if data created by the system is analysed to see if it is meeting expectations. Naturally, while the self-reporting nature of problem identification will help overcome kinks, it will not necessarily result in strategic improvements to the system. For that to occur, the data produced must be looked at and decisions made by team consensus in regards to changes.

How to Adjust for Outside Production

As mentioned earlier, some animated TV shows and features send animation overseas for part of the production. While this presents an obstacle to TPS implementation, it is not insurmountable.

Many productions are shipped overseas for cost considerations, an understandable measure, animation is expensive to produce after all. In effect, these overseas studios act as outside suppliers to the production that would appear to be that and nothing else.

However, can you guess what Toyota did with its outside suppliers? That's right, it went to the suppliers and offered to help them improve their efficiency using TPS!

While such moves may be considered ballsy, they nonetheless had the effect of raising the supplier's efficiency to match that of Toyota and ultimately resulted in increased profits for the supplier and lower prices for Toyota.

Such moves by an animation studio would be on a much smaller scale but would have similar results for both parties.

However, overseas studios are more than capable of meeting their goals if they are sufficiently well-prescribed beforehand. In fact, some studios, like Taiwan's AWNtv have a rigorous production schedule that sees them push out their infamous treatments of the news of the day in hardly any time at all. They are clearly working to a very rigid and defined production regime that allows them to have a video out in under a day.

A well-run organization with well-functioning systems allows people from top to bottom to do work of which they can be proud.

6. Conclusion

This paper aimed to provide you with an introduction to the Toyota Production System and how it could be implemented in a studio environment.

While this is more of a high level overview, the good news is that there are plenty of resources available should you require further information. Below is a selected bibliography to help you.

Furthermore, Toyota themselves run many training seminars and programs to help companies who wish to either establish the system or have already done so and would like to train the employees. Indeed, many company's have made the trek to Japan to see first-hand how the system has ingrained itself in the company and how it is meant to function.

The Toyota Production System allows each employee to work to the best of their abilities by removing any unnecessary or unwanted tasks that detract from the production pipeline.

By increasing efficiencies, only positive benefits can result.

Comments, Concerns, Criticism?

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