**OPERATIONS MANAGEMENT**

**GROUP PROJECT # 1**

**CASE STUDY 1**

**Toyota Motor Manufacturing, U.S.A., Inc.**

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**Q1. What are the principles and components of the Toyota Production System?**

**A1.** Toyota Production system followed two main principles namely, “Just-In-Time” and “Jidoka”. The first principle Just-In-Time production worked on the pull system philosophy. Its main motive was to produce the exact required amount at the required time. If it deviated from true production needs, would lead to wastage of the resource. Toyota used a variety of tools to let them not deviate from the path designed for production. For JIT, there were tools to keep information flow closest to the physical flow of parts by following the pull-technique from downstream stations based on actual usage. The upstream stations were designed to be able to change over parts to reduce the set-up time. Thus, creating a flow production process was one of the pre-requisites for the Toyota Production System

The second principle Jidoka followed the concept of building quality in the production process. They regarded everything as waste that made them deviate from the path of value-addition in their process. They would stop further production as soon as they detected a problem. The tools implemented in Jidoka were capable to detect and fix the problem immediately and facilitate visual control. The tools would work properly, in the normal state of operations that were well characterized and understood. Thus, standardizing the process being followed and documenting them was another pre-requisite for the Toyota Production System.

TPS is maintained and improved through the iterations of standardized work and kaizen. Kaizen meant “changing for the better”. It followed the mantra, “slow and continuous improvements”. The team would go an extra mile to solve a problem by establishing a standard way and then demolish it proactively to install an even better way. To keep the production up, running while reducing the production cost with improved quality is kaizen.

To sum up the basic principles of Toyota’s production system:

• Eliminate waste while optimizing value.

• Production planning is based on actual customer orders rather than best guesses.

• Manufacture products without maintaining inventory.

• Always improve.

**Q2. As Doug Friesen, what would you do to address the seat problem? Where would you focus your attention and solution efforts? What options exist? What would you recommend? Why?**

**A2.** The foremost step Mr. Friesen should do is to determine the root cause of defects in the seats. He should figure out if the operation to make those seats is the right method or not, mostly because it does not follow the TPS principle of stopping production. Whenever TPS faces a problem they start by stopping production, then determine what caused the problem and how to avoid these problems in the future, resolving the problem, and then resume production.

When looking at this problem, the two of the major reasons for seat defects are missing parts and material flaws. This was most likely due to poor design or operation steps, which is evident to have been addressed based on the data in Exhibit 7(in the case study). According to Exhibit 7, the other sources of problems include the poor manufacturing quality (wrinkles), manufacturing process errors (gap in the rear seat) and missing elements.

According to the graphs in Exhibit 8(in the case study), material flaws and missing part defects originate at KFS. While the defect of seat bolster originates at TMM, but it is not as significant as much as the other two problems. Looking at Exhibit 8 graph(in the case study), we can see that approximately 111 of the 135 problems reported between April 14-30, 1992 had to do with material flaws and missing part, which turns out to be 82%.

Based on this we are certain that KFS is highly accountable for the seat defects. So, it is essential that the problem is addressed at the KFS site. Mr. Friesen should use the TPS principle discussed in the first paragraph at the KFS site. He should check the manufacturing and QC process using the Five Why’s and determine the root cause. If he can address the problem at its originating point he should be able to eliminate the defects. We believe this approach will likely reduce the problems at the TMM plant.

The solutions which Mr. Friesen can resort to are summarized in the following points:

1. The team which assembles the seat should examine if there are any changes in the processes, in the employees who are operating the assembly line or training that needs to be given.
2. KFS should perform quality control inspection at their site according to TPS principles. This can be easily done using Jidoka. Mr. Friesen should work with KFS to ensure that KFS does a quality check before sending the seats to TMM.
3. The number of defective cars waiting in the inventory should be reduced by first reworking on them and reordering new seats for the car that has been in inventory for more than 4 hours (Approximate number) and therefore applying the Just-In-Time (JIT) principle thereby fixing the problem right then instead of letting the number of defective cars pile up in the inventory. This considers the principle of reducing inventory.
4. Mr. Friesen can also consider reducing the number of seat options which might be responsible for contributing to missing and defect parts. This can be considered because it seems that KFS is unable to handle the complexity of the orders. Again, a Jidoka process would moderate the problem and tell us if this is a problem. If it is shown that this is, in fact, a problem, the focus of the Kaizen team could be explained.
5. Mr. Friesen can also consider replacing KFS with another vendor. Although this wouldn’t be a great idea because it would damage their relationship a lot. Instead, appointing additional vendors, wherein the manufacturing and handling of the process would be distributed among multiple vendors, this can reduce the burden on KFS eventually resulting in increased quality as well as cost benefits. Additionally, TMM could manufacture a few models of seats on their own. This measure would require more capital, but it would affect in the long run.

**Q3. Where, if at all, does the current routine for handling defective seats deviate from the principles of the Toyota Production System?**

**A3.** The current routine of Toyota Production System fails in handling defective seats in the methods discussed below:

1. Just-In-Time: This process required to follow the Push Inventory Upstream principle. This principle reduces the inventory costs but there were certain issues that resulted in increasing the number of cars in the overflow parking area. The cars with the defective seats arrived at Code 1 clinic were first tried to resolve but if the issue persisted, the car was moved to the overflow parking area where it had to wait until the replacement seat was ordered as special delivery, thus increasing the inventory cost. It was not clear or specified how long will it take for the replacement seat to be delivered. This principle was highly dependent upon the communication with the suppliers and how much are they aligned with the principle being followed. It is not discussed in the study whether the Toyota manufacturing team lacked somewhere in following this principle, but there were might issues on the other side, like supplier might have issues with understanding the principle information, the process to be followed, etc. It can be implied that there were problems with this process that were not directly linked because of JIT, but rather failures to implementing and following it with suppliers.
2. JIDOKA: Based on the case, proper working of Jidoka system meant that, “the normal state of operations was well characterized and understood” and there was standardization of the process. As an approach to set right the seat problem, there were a lot of limitations: -

•There was not a normal state of operations designed.

•The problem was not understood clearly.

•There was no way to address the problem in a standardized way.

It was seen that the organization continued with the production of the cars and fixed the seat problem after the rest of the cars were finished. They followed this approach; instead of stopping production and waiting for the new seat to arrive and then fixing the seat before production restarts. As we know, that Jidoka believed in identifying and addressing problems in production on an immediate basis, but keeping all the above points into consideration, we see that the principle of Jidoka was not applied effectively.

1. KAIZEN: This process was based on the ideology of “changing something for the better” constantly. This required standardization and documented process so that the ideas of the improvement can be evaluated accordingly. But Toyota was not following this instead, it had taken up another approach of fixing the issue. The tried to fix the problem on the ad hoc basis. The employees used to signal the defective seat by pulling the andon cord, but the production line ran with the marked cars until they reach the clinic for fixing. Instead of fixing the issue as it occurs, the routine goes against the principle of Jidoka. Although Toyota had kaizen experts for multiple other process workflows, they were not pursuing the kaizen principle in their off-line routine that was currently being used to fix their persisting issue of defective seats.

From the study, we can decipher that they did not try to discover the root cause of the problem but just tried to fix the defective cars as on they arrived. Hence, the organization continued to manufacture the cars in the off-line production leading to an increase in the amount of overtime work required to maintain production numbers.

References:

[1] Mishina, Kazuhiro. "Toyota Motor Manufacturing, U.S.A., Inc." Harvard Business School Case. Harvard Business School Publishing. Case: 9-693-019, September 8, 1992.

[2] <https://en.wikipedia.org/wiki/Toyota_Production_System#Principles>