

Making stream of production

-9. Making stream of production for “small demand and constraint process”

At this time I introduce my teaching style in the dialogue.

Basically I don't teach, but draw their idea as much as possible.

The things which were taught are forgotten very easily.

But the things which they considered by themselves are never forgotten.

After the Jishu-ken from the Friday night to this Saturday, again they came my hotel at the end of their wits.

They couldn't find the solution in the novel (The Goal. an economic novel written by Eliyahu M. Goldratt).

At the last description, I described as follow.

Should the constraint process be controlled?

Of course it should be and It is quite commonplace!

(As one of usual process.)

The meaning of above is

Whether the constraint (neck) process or normal process, any process should be controlled as commonplace.

My thought is that “there is no constraint process”, and the furnace also is the normal process.

Anyway how to control this?

I would introduce the dialog with the Jishu-ken members (project members).

P.M; Project members (5 persons). And K.K.

P.M; Sensei. Please help and let us know, how to control the constraint process which is at the moment the furnace process.

K.K; OK. Let us discuss this. And first of all I have a doubt and please let me know. What is your saying “constraint process”?

What is the definition of “constraint”?

I know the situation that there are many WIP which is waiting furnace. I know this thing.

I attended the production meeting which held 25<sup>th</sup> of the last month.

And in the meeting we confirmed the necessary capacity of labor, machine and lines and also the materials preparation including the root cause analysis of excess and obsolescence.

Then according to the report, the furnace process is not in the capacity shortages. You also attended in the meeting, don't you?

Now. Please let me know what is the definition of “your saying constraint”?

It is quite clear that at the moment the capacity is not in the deficiency.

P.M; According to the TOC, TOC, TOC-----.

TOC, TOC-----.

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K.K; Humming (and soliloquy)  
 TOC, TOC, TOC, Tic, TOC, Tic, TOC, Bhon, Bhon. (Imitative sound of a Wall clock). -----.

P.M; Sensei, sensei. What is TOC, Tic, -----?

K.K; Oh. Never mind. This is a Japanese popular song.

P.M; Japanese popular song? Popular song?  
 Sensei. We are in serious! But what is TOC, Tic-----?

K.K; Students. Let us take a break and coffee. This Japanese song?  
 Please imagine the situation of that one young girl who lost the love is in her bed and can't fall asleep.  
 The song.  
 Ah, sad. Ah I can't fall asleep. I can't. I can't.----.  
 TOC, Tic, TOC, Tic, Bhon, Bhon. Ah Noisy. The wall clock also troubles me.  
 Lean, lean, lean, rean, rean (the imitation sound of insects).  
 Ah noisy. Sound of insects also annoy me.  
 Sic, sic (the imitation sound of cry), six, six, six sigma, six sigma-----.  
 Ah I hate tears, I hate. Sic sic six six sigma.

P.M; (All laughing)  
 And sensei, your advice is to leave from TOC at the moment, isn't it?

K.K; That's right. Please forget TOC, 6 Sigma, Lean and also TPS.  
 Again please discuss what is the problem?  
 What is the definition of constraint?  
 You like the word of "Control" and say control, control, control.  
 What is "control"? Also what is the control points?

Note) The meaning of Control.

Quality control, production control, process control-----. In many cases the word of control is used. These members also used the word quite often.

The mean of control is to adjust or correct the way, if the way missed the planned route to the target (the goal).

Therefore if use the word of control, it is necessary to have following items.

The goal or purpose. (for instance, this project) the date of out-put.

P.M; (Their discussion by themselves.)

Firstly Trouble.

What is the trouble to be occurring?

The trouble is "Occurring delivery delay".

And one of big cause is the furnace process.

Is there capacity? Yes it is quite true and no necessary to consider the furnace process capacity.

Note) This Company had already started the 3 important monthly meetings which are the meetings of Management, Quality Review, and Production.

In the monthly production meeting which is held at the end of the last month (25<sup>th</sup>), the necessary capacity or excess or shortages of labor and machines, materials,

processes and lines are discussed based on the KPI and the results. (More detail I will describe in Factory Management.)

(Back to the discussion)

P.M: I believe that the worker of the process can't know the priority.

Then he puts the parts in the furnace in order the First-in First- out (in the order of arriving in the stock yard), if there is no special indication by the supervisor.

When looking at the indicated delivery date of products of WIP, there are various dates and some are the end of next month and some are (for instance) the end of this month.

Understood. He can't know the priority. Therefore the solution is quite simple. If we can find the method of delivery date indication, it is possible to identify the priority. Yes?

Wait a minutes, wait a minutes. Even though identifying the delivery date, it is not possible to decide the priority in the furnace process, because after this process, it is necessary to pass others processes. Therefore delivery date plus something are necessary.

In the first place, why necessary parts which the delivery date of the products are this month and unnecessary parts which the delivery date are next month are there and mixed in the same timing?

Right. Why are the parts which are used for the production of next month in the waiting yard?

How to give the production order to the processes currently?

Well. In the production control department (my department), firstly printing the production order cards which is printed the delivery date. Then these are given to the processes.

That meaning is that there is no consideration of the delivery date, the timing of ordering to factory and individual process production date. No?

Yes they do consider these. But there is no standard and methods of the timing of order (to factory). Therefore they do these in their idea.

That meaning is that it is necessary to indicate the production date or out-put date for individual process. And if not, in the furnace waiting yard, necessary and unnecessary WIP occur, which is the cause of the congestion, miss of priority and the cause of delivery delay.

Right! But how? How can we decide and indicate the out-put date of Individual process?

MMMMMM-----.

I think I found the solution!

I believe the answer is "Pull" and pull system! I have read the lean book (Lean Thinking).

In the Lean book, it is suggested the pull system. In our case the before process (furnace and parts fabrication process) should supplement the parts which next process (sub-assembly and assembly process) requires like as the model line.

It is no necessary to indicate the out-put date in the furnace process, but just the signal of pull by the next process.

OK. I also have read the book. Sensei taught us the pull system.

In the lean book-----, lean, lean, ----

Lean, lean,-----.

K.K. (Humming)

Lean lean rean, an insect is singing. Rean rean rean.

(Japanese children's song.)

P.M; Sensei! What is the meaning of Lean rean rean ---?

Is the meaning to leave from lean?

K.K; Never mind. Mere soliloquy.

But please let me know how many kinds of excess inventory are in the warehouse?

Note) 1. Pull system. In the Toyota line, the production order is given to just the final assembly and is not given to the each process. The pull signal is Kanban.

2. When diagnose a manufacturing company, I make the plant tour and start from the warehouse. And it is almost possible to understand the managerial level and the problems. When looking at the warehouse of this company, I saw so many kinds of excess parts and materials (thousands of).

K.K; When looking at the warehouse I was surprised because of so many "kinds" of parts inventory. Individual kind has not so many inventory. But there are so many kinds. Why?

P.M; As you pointed out our business model is typical "High mix-low volume".

Then as the economic lot size (minimum lot size) and for future demand, we have continued the batch production style.

We know that it was wrong and started the lean concept manufacturing and shorten the LT and minimize the lot size.

How many kinds? More than 2 thousands.

But why? Is there relation to our discussion?

K.K; As I taught, "pull system" is useful in the condition expected which is the continuous demand. (Even though after one, possible to expect another demand.)

And the business model of your company is typical "High mix-low volume" and the next demand is unknown.

If saying "High mix-low volume" and unknown, there are such company as usual. And it is possible to use logically the pull system in having the stock.

But for this system in the condition of high-mix low-volume, next demand unknown and many kinds of parts preparation, you need to pay

the prices which are the increases of the WIP, space (for many kinds of WIP), excess, obsolescence, scrap and control cost.

My previous company also paid the price and stopped the pull system in the parts fabrication after K. Suzumura and his group left.

Your company paid the price which is the excess inventory in the warehouse.

Basically how do you pull the parts from the assembly of the product “7” which still hasn’t been started? No assembly and no occurrence of pull.

Many hours have past already.

Please let me know the summary of this discussion.

P.M; MMMMMM-----.

-----, “Pull system” is out of the question.

Sensei. We could understand the next things.

1. There is no process so called “constraint”, but just “missing control” process.
2. The out-put date of the furnace process hasn’t been indicated and controlled.
3. Delivery date is quite clear in any products. But out-put date is unknown in individual process including parts fabrication process. This is the cause of the trouble.
4. The production department should know the timing of making order and indicate the out-put date.

However this is the problem.

K.K. Very good.

Please understand when saying the “constraint process”, the situation is 2 whether the necessary capacity to be there or not.

If there is a capacity shortage which can’t be supplemented with the overtime work, of-course the business is constrained. And the countermeasure is quite clear and is whether to abandon the business or to invest and supplement the capacity.

In your case which you have the necessary capacity of furnace process but have the confusion and delivery delay, it is not say “constraint process”, but mere control missing process.

Additionally not only the furnace process, but also the parts fabrication process has no process control.

P.M; But sensei, in the novel, the furnace which has the necessary capacity also was described as “constraint” process. Is this wrong? (And in the novel the constraint process was solved in the “constraint process control”.)

K.K. Leave from TOC.

And if you want to define the missing control process also to include in “constrain”, you can call so. But no meaning.

Now let’s go back to the theme.

You understood the necessity to identify the out-put date for the process control. Yes?

Also you could understand the identification of out-put date for the

furnace process and also parts fabrication process. Yes?  
How can we decide the out-put date of individual process?  
You see. In the book of (for instance lean), just the case of Seiryuka  
and/or one piece flow process is introduced.  
and emphasize the necessity of Seiryuka of parts fabrication  
with machines layout change in the Shingijutsu style.  
But for your business model which is “High mix and low volume  
plus change the products variation which relate the variation of  
necessary machines in each month & week  
plus requires many kinds of machines in the parts fabrication  
for many kinds of parts.  
plus has butch style expensive machines already”,  
it is difficult or almost impossible to make Seiryuka.  
Your task is to find the control methods which can realize the making  
stream without Seiryuka, another words realize the stream in  
very small layout and machines modification.

Note) Machine modification: Downsizing and/or rightsizing.

For making stream of production, one of idea is to re-layout (re-range) the  
necessary machines in order the processes. For realizing it, the important  
factor is the size (small) of machines. And I need to point out one of  
misunderstanding.

Toyota never make “Downsizing or rightsizing of the machines, but simplify the  
function. For instance the machine has 5 functions.

Toyota divides the 5 functions to each one and makes single function machines.  
And he makes the work combination and harmony of 5 machines and the  
worker.

So. Toyota gives his importance to make up the combination and harmony of  
machines and person.

This explanation is also not enough.

In first place, Toyota doesn't like and buy such multifunctional machines which  
are very expensive (machine price and maintenance cost), and makes necessary  
single (or double whatever) function machine by himself. And the step of  
making single function machine for a new work is

Design jigs and make for the work.

Use in the line and kaizen and kaizen.

Find the possibility and the effect of the unit of (for instance) 5 single  
function machines.

Design the machines and the combination & harmony with worker.

Make and install in the line.

These development is made by the kaizen group (which I described in Making  
Stream of Production-7) with the machine design engineer.

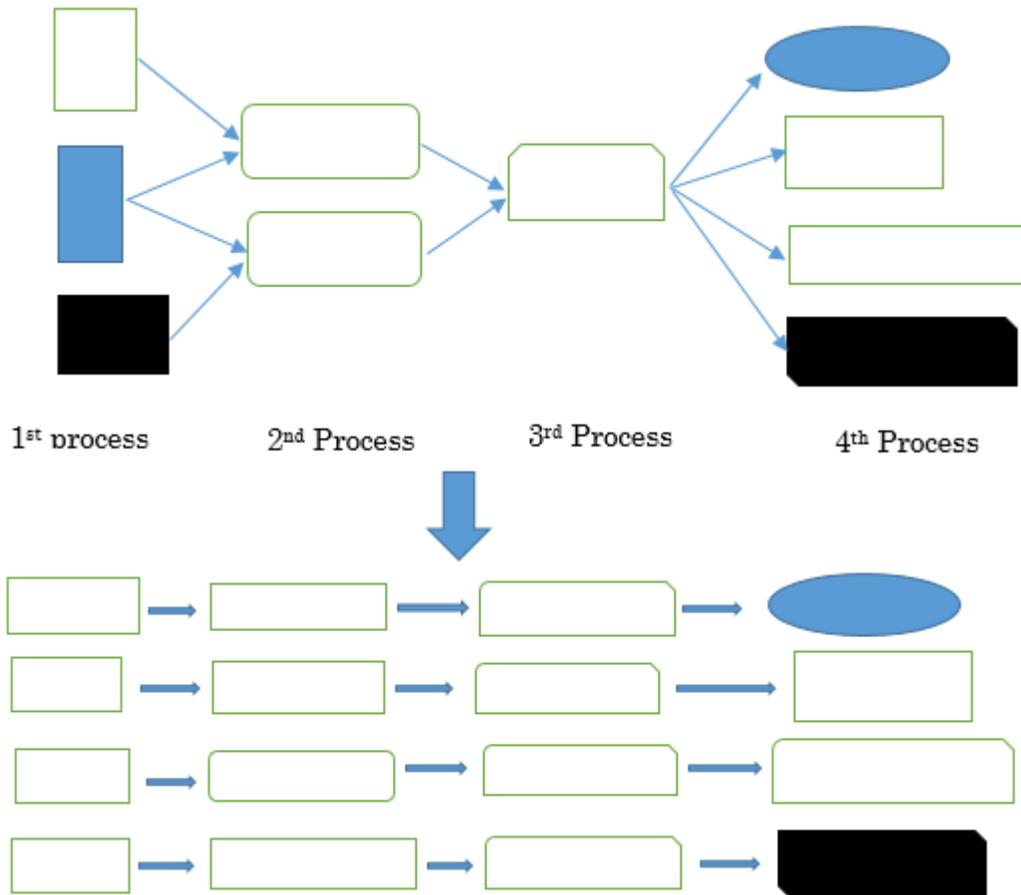
(Go back to the dialogue)

K.K; You see. This is the main theme of this project.

In your company it is not better idea to seek Seiryuka with the layout modification. But it is required to find the Seiryuka effect. And the key is out-put date identification and visual control. (And Mizusumashi.) Now consider, and How?

Note) Seiryuka (in Japanese).

Look at Seiryuka in the figures and imagine the processes with machines.



As above figures, Seiryuka is to rectify the stream in individual product. And is the most ideal case of the making stream of production. In general text book, Seiryuka is introduced as the example of making stream with ranging the machines in order the processes. Are there such ideal case? Yes there are. Toyota and other car assembly maker's line. How about the (small) parts fabrication companies which supply to the car makers? The answer is "No, not possible to make Seiryuka in most of the case" because of the following constraint. The conditions of Seiryuka are

Easy to realize the “one piece flow”. (like as Toyota assembly line.)

Not so many kinds of parts fabrication.

(The case of SUMITOMO. Wiring harness: One car has more than 1,500 circuits which are all completely unique parts.

These are completely different like as individual unique parts and are required to prepare all circuits in JIT to supply to wiring harness assembly process.)

Not many product variation. (Toyota factory makes just cars which is constituted of almost common parts. And not makes for instance refrigerator in his factory.)

Not many variation change which requires variation of the machines in the month and week (The factory of Camry makes just Camry).

The necessary machines are very cheap and abundant number and right sizing.

There is no process which uses large machine (Press, Furnace).

The SMED level is high.

Of course it is possible to make Seiryuka without above conditions in logical as one of model and demonstration line, but never realistic to expand to entire.

Then what is Seiryuka? How is different to “making stream of production”?

My definition is that Seiryuka is one part of “making stream of production” and most ideal form.

Is it possible to make “Stream of Production” without the Seiryuka case? Yes it is possible and is the task of this project.

(Back to the dialogue)

P.M; Sensei I found the solution. Is it “Te-ban” isn’t it?!

Firstly it is necessary to standardize the Te-ban for each parts and process.

Secondly identify the out-put date of parts fabrication in the parts ordering cards.

Then based on the date of the cards, the production planner makes order to the parts fabrication.

(One of other member)

Wait, wait. If we do so, it seems to be not “pull system”, but to be “push”.

Do we seek to introduce Lean manufacturing in TPS, don’t we?

I believe “push system” is not acceptable in TPS. Right?

Sensei how about your suggestion?

Note) Te-ban.

This is the meaning of LT (Lead Time). But I teach LT and Te-ban in different meaning.

I teach LT as the net lead time and LTE (Lead Time Efficiency).

I wrote LT in “Making Stream of Production-4” and actual lead time and the net lead time (physical lead time).

And the actual lead time should be gotten near to the physical lead time.

On the other hand Te-Ban is also LT which is considered current situation and capacity. For example.

A part fabrication. Net LT; 20 seconds. But actual capacity; 1 day because of waiting time in Immature SMED, Immature lean condition (batch style).

In this case it is not realistic to decide 20 seconds Te-ban. To control the production 1 Te-ban is realistic.

And when deciding te-ban for individual parts and product, it is required the challenge te-ban but achievable.

(Go back to the dialogue)

K.K; Very good. As you understand Te-ban is the standardized LT of each Process and also is one of fundamental factor of production control.

Now “pull or push”.

Firstly please remember what is the policy of this year announced by the president?

The policy has 3 contents. And one is

“To seek the continuous development of our company, we intend to introduce the lean manufacturing”. OK?

And based on this policy, this project was established. Yes?

Then what is lean manufacturing?

And our aim is not to establish TPS, but to establish the lean Manufacturing.

As I have taught that TPS and Lean manufacturing are different.

Lean manufacturing is one of thought which hasn't concrete method or system itself.

※On the other hand TPS is also mere one of method to realize the lean manufacturing.

Another word and to realize the lean manufacturing, there are not only TPS, but also other method which is the factory management.

Factory management is the essential base of TPS and also the universal method for realize the lean company.

And the Te-ban control is the orthodox method of production control.

Again please don't misunderstand the final goal (which is to realize the lean manufacturing) and the method. OK?

Note) Once again TPS was and is developed for the car manufacturing. Therefore for the car manufacturing TPS is useful as the tool of lean manufacturing. On the other hand in the methods of TPS, some are universal for any business model and some are not. Pull system is not comprehensive.

(Is “push” bad and is “pull” good? I will write in next description.)

K.K; Now how about the progress of LT standard for individual parts?

P.M; The parts list and products list with each LT (net lead time) are almost finished.

And in the lists we believe it is necessary to put the column of te-ban. Yes?

K.K; Yes. Please proceed this. Also discuss the te-ban of each parts and put in the lists.

P.M; Sensei. How the te-ban is required the fineness? And how can we make it?

K.K; First of all the fineness of te-ban.

It is acceptable “más o menos (about)”. And it is no meaning to decide exactly.

Do you know that Japanese urinal has the target mark? The purpose of this mark is to be the target of the water gun.

(All members, roar of laughter. Is it true? Yes it is.)

The te-ban which mentioned in the production card should be kept.

However deciding te-ban is acceptable the level of the urinal target mark. More important thing is to make the QRQC (Quick Response Quality Control and Quick Response Kaizen Activity).

You have already experienced the QRQC and need to do it in the gemba. Now QRQC and QRKA.

In the parts fabrication gemba, so many problems might occur. Yes?

What kinds of trouble and problem are predicted to occur?

P.M; Well. Quality problem----

(other member) No, No, No. We need to say that the problem is “delay”.

Then the causes of the delay are quality, machine trouble, material trouble and human trouble.

Additionally there might be environmental trouble such as air, oil, gas, luz etc.

K.K; Very good. It is correct and we need to resolve the causes of “delay” against the te-ban in each occurrence in QRQC.

By the way, is the problem just “delay” to the target date (te-ban)?

P.M; ----- . Sensei anything else?

K.K; You forget most important thing.

No delay and no problem in the te-ban is the problem.

No delay against the current te-ban standardized is too lenient.

You need to look at the gemba. And if you find the case of “no delay” another word the parts processed to be in stock yard long time, the te-ban is too long and can afford to reduce.

Of course the te-ban in the parts list should be revised.

This is also Kaizen.

Once again.

Decide the te-ban of each parts and process.

Now I tell you the necessary activity for te-ban control another word out-put control.

1) One is this te-ban list. You are already understand this.

And omit to explain.

2) One is Ordering control (visual) board.

This is for production order by production control department.

With this, the production control department needs to consider and plan the ordering timing in the delivery date, te-ban, Takt Time and also in the consideration of “workload Heijunka”.

- 3) One is Ordering control board in the factory (each process)

With this, the production control department and the supervisors of each area discuss and decide the ordering date and hour in the consideration of work load Heijunka and Takt Time of each machine.

- 4) One is Progress control board of each machine, each line (include cellular).

With this, the supervisors needs to control and check the progress of each parts and product.

- 5) One is Design of parts production card with color code.

Weekly color code; 5 colors.

Daily color code; 6 colors.

These are used in the parts production card for visual control in the parts fabrication gemba.

- 6) One is to nominate and train the persons of Mizusumasi.

Mizusumasi (also Toyota word) is one kind of material handler.

Their job is one of key for making stream.

- 7) One is the start of quick Kaizen activity (QRQC & QRKA).

- 8) One is installation of ANDONs in each machine and equipment.

Listen. Your task is to find the gemba control methods and system.

But to seek the solution in Shingijutsu style layout modification which is introduced in the lean book is not realistic, because of your business model.

Now we stop the today’s discussion. Next Monday I teach “Visual Control”.

When saying visual control, you come up with “5Ss”. Yes?

5Ss is very important for visual control. However 5Ss is just the base of the base of the base of the visual control.

At the moment the situation of 5Ss in your factory was improved. But still we can’t see and know the manufacturing “stream” visually.

The machine. What’s product is making? In delay or too early timing? Why the machine is stopping?----

The assembly line of the car manufacturer is easy case to understand the situation with ANDON, because of one piece flow.

But your parts fabrication process is not possible or not realistic to seek the one piece flow.

But we are expected to realize the “Making Stream (continuous flow) of Production.

And how? One of key issue is the visual control.

We discuss one by one of 1) to 8).

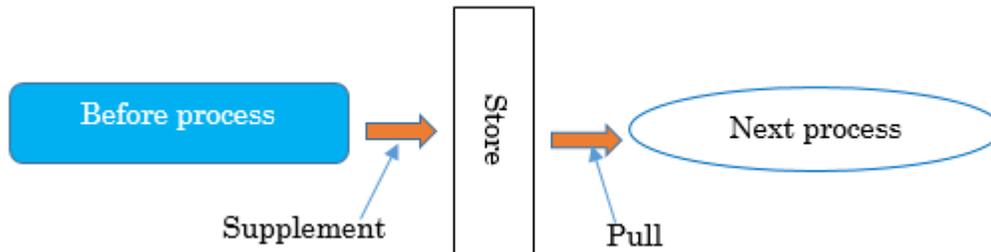
Pull system.

In the discussion there was a question about the “pull”.

What is “pull system”?

Let’s look the “pull” of TPS.

In pull system there are 2 factors, which are “pull” and “supplement”. I explain these in following figure.



It is told that Taiichi Ohno found the principal of the pull system in the US supermarket which implements the products supplement system between the warehouse and the retail floor.

Above figure.

The next process pulls the necessary (for instance) parts in JIT from the “Store”. And the before process should produce and supplement just the parts and quantity pulled. And the information of the production timing, quantity and kind are made by kanban.

Store; TPS calls the WIP stock yard “store”.

This concept is the base of the Kanban system.

The store is kept in the minimum stock control which is calculated in MRP. Therefore pull system is kept in having stock.

As I wrote in the “Making Stream of Production-6”, the pull system and kanban system are useful in just the case of continuous demand to be able to expect.

On the other hand for this company which is typical “High-mixed Low-volume” and “many kinds of parts” business model, the pull system and also kanban is not suitable. No. it is wrong to say “impossible”. And it is possible to use the pull system in the very high price (many kinds of WIP, Excess & obsolescence, Space and control cost).

Therefore it is not recommendable. But this company also has the products which are possible to expect the continuous demand (even though it is a seasonal demand.

Product “8”). In such the continuous demand to be expected, the pull system and kanban system are possible to use partially (like as the model line).

Let’s look and consider the pull system from different view.

And let’s look at the pull system in the history of SUSHI restaurant.



Above picture is one of traditional and famous SUSHI restaurant in Tokyo.  
The system is

The customer, after sit down (and use clean wet towel served by the restaurant).

Choose the kind of SUSHI which he or she wants to eat.

And makes order.

The sushi workman starts to produce the SUSHI. Firstly cut the fresh raw fish.

Including the work of cleanse of the kitchen knife and cutting board.

And cleanse his hand and grasps the rice and puts the raw fish cut.

(A skilled workman grasps the rice in the accuracy of  $450 \pm 3$  grains.)

Then puts the SUSHI in the dish beautifully and serves to the client.

Normally one order 2 SUSHIs in a dish.

And one of important factor is the time.

They serve SUSHI within 1 ~ 2 minutes. And it is possible to call JIT which is

Supply or produce “Necessary things (true demand) in the necessary timing and the necessary quantity”.

Now main subject.

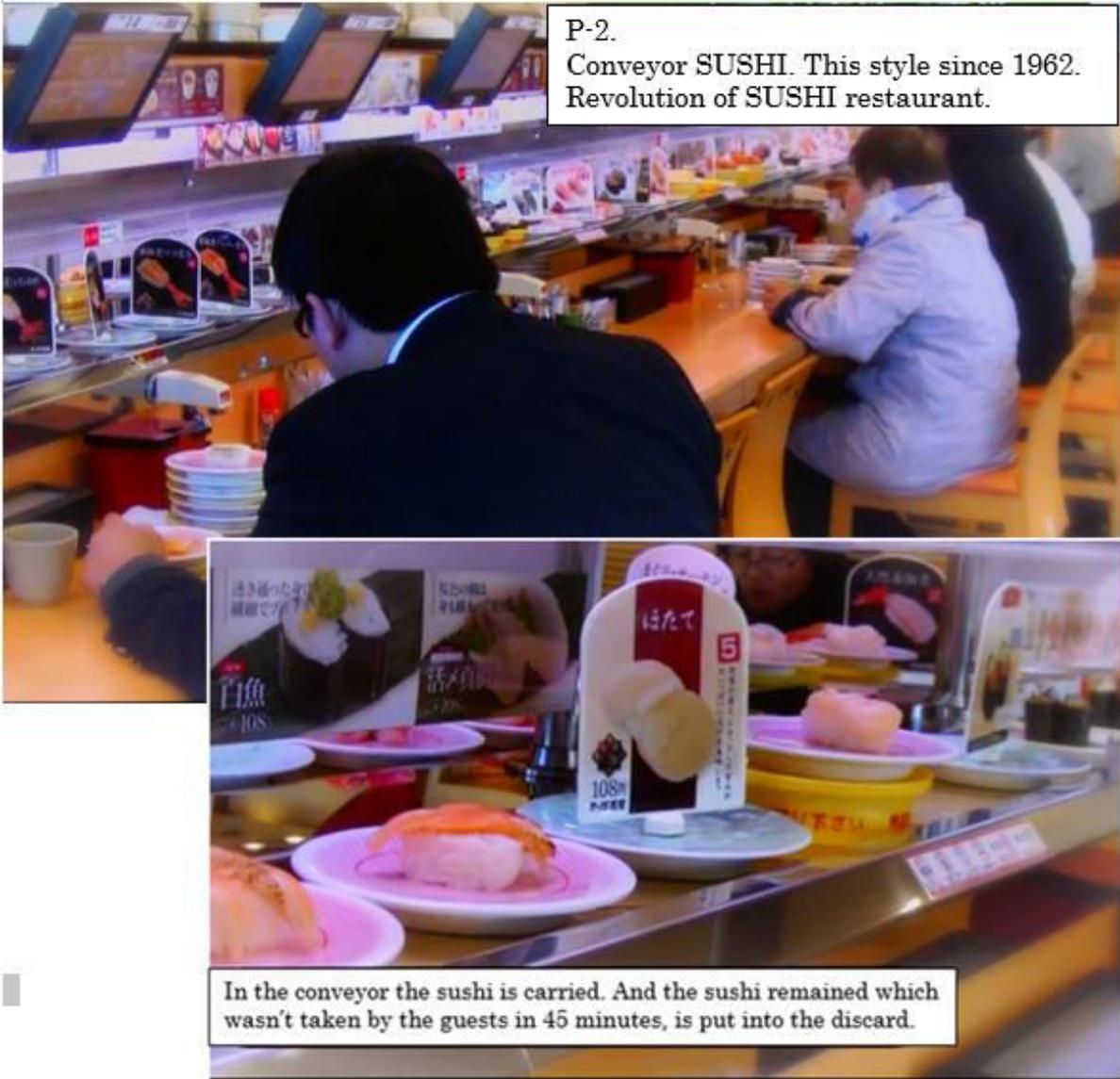
The process of serving SUSHI is the pull system which

Confirming the customer demand. Begin the production and serve process.

And within 1 ~ 2 minutes which we can say very short LT.

Conveyor SUSHI restaurant.

Let’s look at the next photo which is Conveyor SUSHI restaurant.



P-2.  
 Conveyor SUSHI. This style since 1962.  
 Revolution of SUSHI restaurant.

In the conveyor the sushi is carried. And the sushi remained which wasn't taken by the guests in 45 minutes, is put into the discard.

This system was devised and introduced at 1962.  
 (I haven't seen in New York. May be there are, but I haven't seen in foreign countries.)  
 In front of the clients a conveyor which carries the SUSHI cooked is installed.  
 Then the customer choose and pick their favorite from the stream of SUSHI.  
 In this system there is no dialogue (including the making order) between the workmen and clients.  
 This system was one of epoch-making because made SUSHI to be popular in the common people.  
 Before this system (or current also), the traditional sushi restaurant like as P-1 is expensive because of the turnover rate of the clients.

The system is

Firstly the workmen make SUSHI in almost of all variation of sushi-neta in the kitchen and put in the conveyor.

(Now the sushi robot which is used for forming rice brick is in general use.)

Sushi-neta; raw fish and others which put on the rice.

After the general preparation in the conveyor, the clients draw (pull) their favorite SUSHI.

The workmen make and supply the SUSHI which has been drawn by the clients. And as you aware the conveyor is one kind of “Store”. And between the clients and store and workmen, there is the relation of “Pull and Supplement”. (McDonalds Hamburger also similar system.) This system was indeed epoch-making.

※However it had (has) one of defect, which is the waste.

One of important rule is the “45 minutes rule”. The SUSHI which wasn’t drawn by the clients within 45 minutes in conveyor, should be disposed because of keeping the fresh. Why does the waste occur? This system uses “pull system”. But why does occur?

The client’s favorite is always changing. And 45 minutes lifecycle.

Yes. SUSHI is very simple structure.

“But one of very unique point is that this product becomes obsolete in 45 minutes.”

High speed carrier SUSHI restaurant.

The last year, new type SUSHI restaurant appeared. (Look at the next photo-3.)

This system was developed from the conveyor system (photo-2).

The system is

The clients make order in the tablet computers which relate to the kitchen and the workmen.

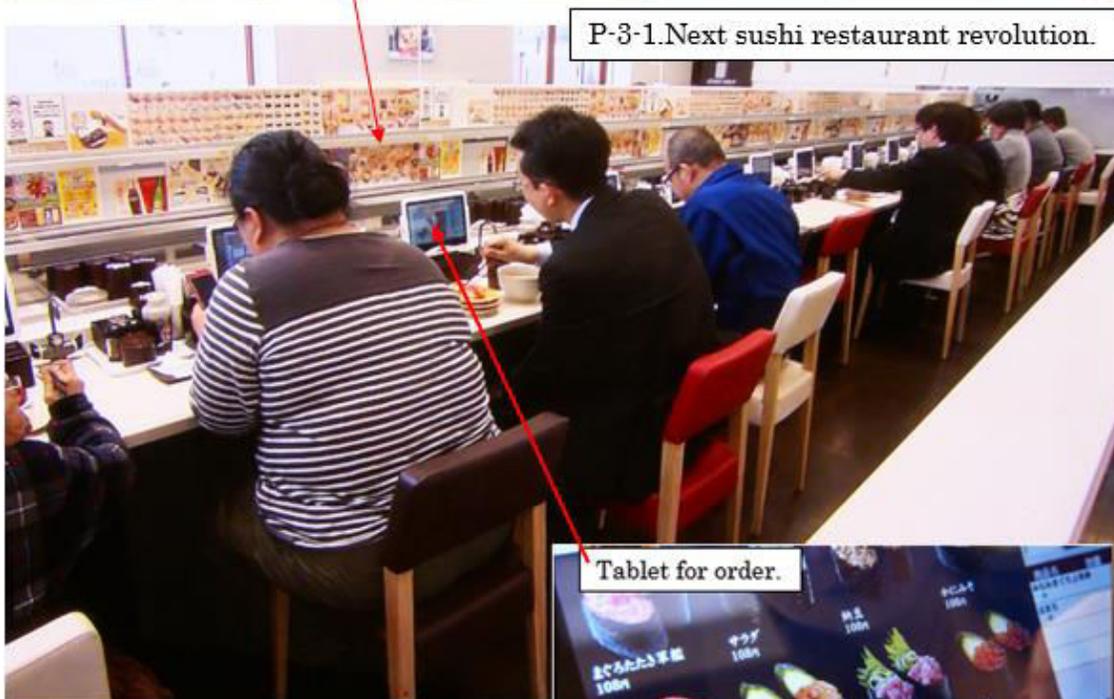
The workmen make SUSHI and put on the dish and put on the high speed carrier.

The high speed carrier runs in the rail which is installed in front of the clients table and reaches to the client who made the order.

This system might be the second epoch-making, because this system mixed the traditional style and the conveyor system completes “pull and make to order system” which is no necessary to have the “store (WIP)”.



P-3-2. High speed SUSHI carrier and rails.



P-3-1. Next sushi restaurant revolution.



Tablet for order.

I said this system is complete pull system in above. But is this complete (internal) lean? Still this has a lack. Again comparing 3 systems.

	LT (JIT)	Price	WIP	Dialog
Traditional	1 ~ 2 minutes	expensive	No	Yes
Conveyor	Unknown	reasonable	on conveyor	No
High speed carrier	1 ~ 2 minutes	reasonable	No	No

Note) The clients need to wait the SUSHI coming on conveyor. And if he wishes to eat the SUSHI not to be on the conveyor, he needs to make the special order and wait more than 5 minutes.

Then high speed carrier is not the complete (internal) lean style, because of no direct dialogue (just one way dialogue).

The traditional style gives an importance to the dialogue with the clients.

Because in the dialogue, the workman gives the suggestion of good choice to customer's wish and gains the information of customer's demands.

As I have written and for me, the lean concept is

The essence of Lean manufacturing is the activity of

Approaching to the customer further on the subjects of

Physical LT and True demand (and reasonable price).

The meaning of "lean" is to be no flab and fat in the body.

And the meaning of flab and fat are the excess inventory and WIP, excess capacity of labour and machine. (which are the root of all MUDA.)

By the way (question to the overseas friends.)

Have you eaten SUSHI?

Of course your answer is "yes". But I don't think so.

I know that now SUSHI is very famous and there are many SUSHI restaurants in the world.

I take leave to say that you haven't eaten Japanese (true) SUSHI. Because in the first place there is no sushi-neta in your country. Still Japan can't spread the technology of keeping fresh of raw fish.

Note) The friends who say "yes I have eaten it" have eaten the raw fish, but I think just salmon of vacuum packing. The market share of salmon is Norway and Chile (more than 60 %). And there is no other sushi-neta (my favorited neta; red snapper, conger, spiny lobster).

The technology of keeping fresh.

You may imagine the frozen raw fish. This is also one of technology to keep fresh. But There are others.

One of important technology is the logistic. And this famous traditional style restaurant gains the live fishes which are transported with the special carrier (Ikesu in Japanese; fish well) in the truck.

Recently Japanese fresh fish companies began the export the fresh fish to foreign countries. The alive fish is packaged in the plastic bag with brine and air and kept in the refrigerator and exported with cargo.

Then the fish is delivered to the restaurant who ordered. When taking out this fish from the plastic back for starting cook, the fish is still alive and full of vigour.

(But the price of sushi which uses the alive fish is not reasonable, but expensive.)

One of unique innovative method is the technology of keeping "in suspended animation, but not go bad and damage". The fish which is treated in this technology is still alive and after wash in a water, begins to swim.

It is indeed that the neta of frozen fish is worse taste (and chewy) than the alive fish and the fish treated with the special technologies.

(of course these neta in the technologies also are reasonable price.)

My American friend family told me their wish which is to eat Japanese (true) SUSHI in their area. But it is required the technological innovation.

For ideal lean which the customer can “pull” his true demand, it is required the technological innovations (downsizing and rightsizing of machine, transportation technology etc.).

And if there is no technological background, it is mere pipe dream even though it is a good story.

We saw the theme of “pull system” in the SUSHI.

Again the pull system is to “to supply or make for the requirement of the customer (including the next process) in JIT”.

The ideal pull is to realize this without WIP.

The pull in TPS is to realize with minimized and controlled stock.

(Back to the dialogue of Jishu-ken)

Then we finished the discussion. And I identified the necessary direction to the students.

However I understood that still they had the doubt about the “push and pull” and the use of te-ban.

Therefore I promised them to make clear the use of “push and pull” and visual control next week.