

Using the Help Chain to Maintain Production Stability

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This article aims to describe the importance of the Help Chain in the process of production stabilization and to introduce methods for reacting to problems of instability that arise during production.

1. DEFINITION

Help Chain is a routine for interaction and involvement to solve a problem when it arises, starting with the production operator and involving the immediate leaders up to the heads of all support areas, eliminating instabilities in the process.



Figure 1: The Help Chain

It also requires “zero” tolerance from people regarding problems that generate waste, in an environment where there is no asking “who is responsible” but rather “what is the problem.” This “mental model” that is predominant at Toyota is one of the factors responsible for the identification of these losses, where the objective is not to hide the problem, but to have a systematic process for the identification and solution thereof, as problems can be considered opportunities for improvements.

2. TYPICAL SEQUENCE OF ACTIONS

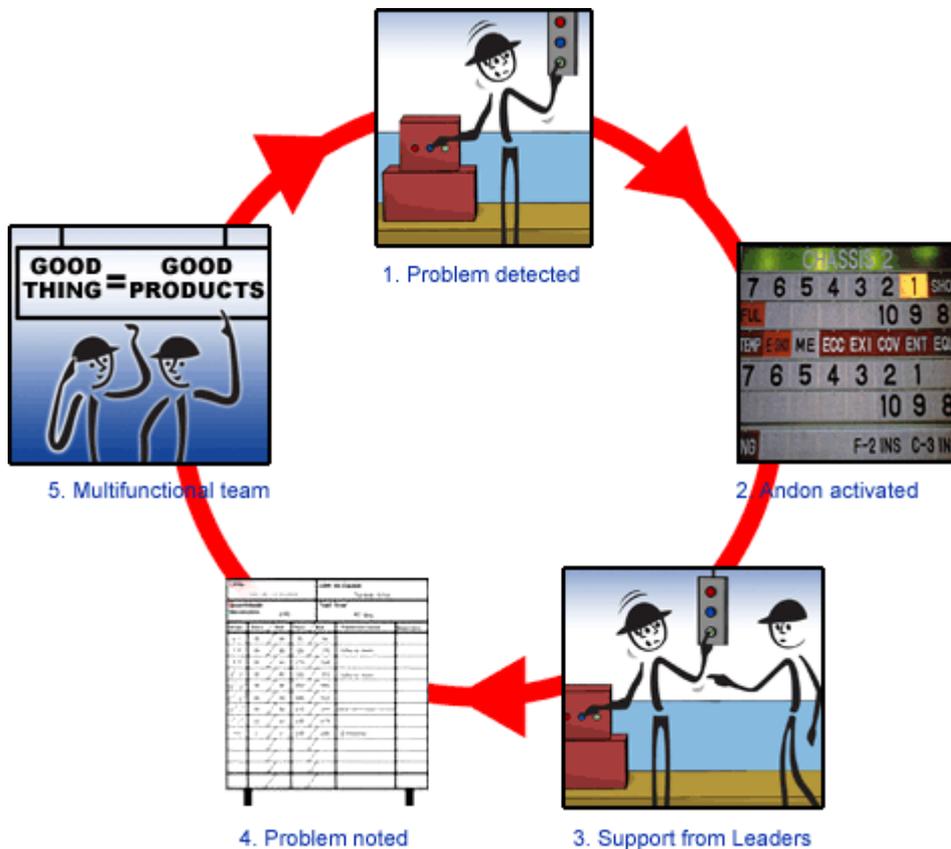


Figure 2: Sequence for deploying the Help Chain

The first occurrence in the Help Chain is to detect the problem at its source. Usually these are problems of quality, breakdown or setup of machinery, safety/ergonomics, absenteeism, or worker tardiness. In the above example (see Figure 2) we show basically what should happen.

The first intervention is made by the operator, and the more skilled and trained he/she is, the faster we will avoid further complications. Later we'll look at the importance of this training through the use of the Versatility Chart.

The second occurrence after a problem is detected is how to signal the problem. We usually use a light or sound signal in order to alert everyone involved. The signal is given before the production actually stops, and it is in this interval that the operator and the respective support personnel must act.

The third occurrence is the assistance from the leader of the area after the signal is on, indicating a problem, which is done automatically and within the "pitch" (a multiple of the takt time). The operator and the leader should try to solve the problem using simple and well-defined methods such as the "5 whys" or the Ishikawa diagram.

The fourth occurrence arises when the problem is noted on the Production Control Board, based upon which we can take certain actions: if the problem was not solved, production is shut down and support is received from Foremen, Supervisors, Managers, and from relevant areas (multi-departmental group). If the problem was resolved or containment was made in order not to stop production, it is registered on the Board and then the systematic problem-solving process is followed. We can display the A3 documents (PDCA), the forms with the points of the “5 whys” and Ishikawa diagrams alongside the Board, as a way to provide a feedback for area workers and passers-by.

And the fifth and final occurrence is the intervention of the multi-departmental group, which will deal with the problem in a more suitable manner with the existing scientific methods. This multi-departmental group is composed of people from wide-ranging areas of support such as Quality, PPC, Engineering, Maintenance, Purchasing, Logistics, and others.

3. FUNCTIONAL STRUCTURE AND FREQUENCY OF SUPPORT IN THE GEMBA

In the company’s organizational chart there should be conditions so that this help procedure occurs as the problems arise. Demanding too much from people without having proper working conditions is a common problem, and one that usually causes dissatisfaction and resistance to the procedure.

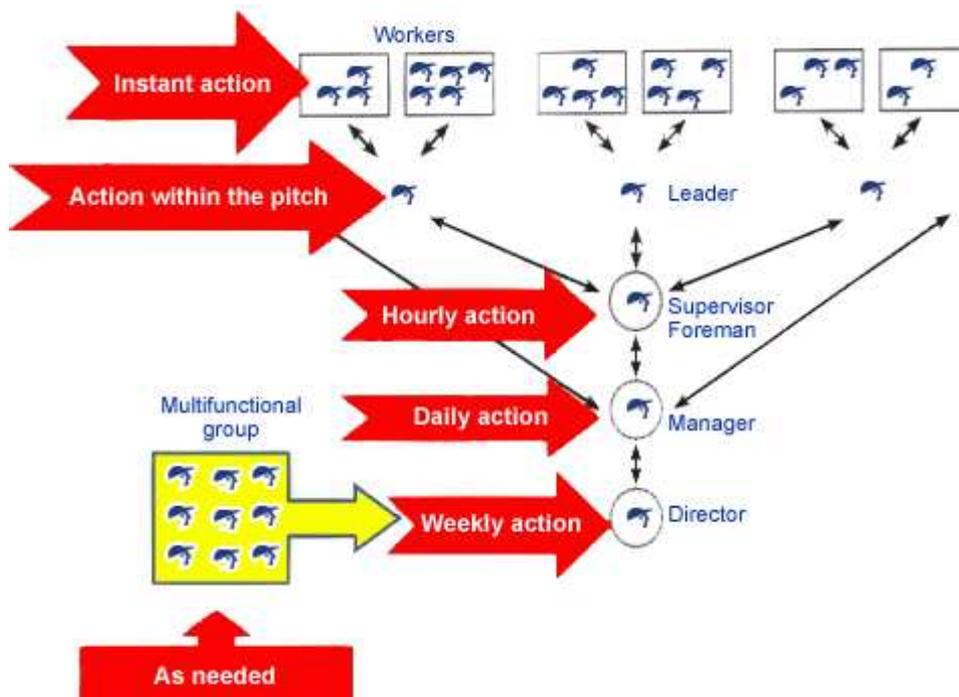


Figure 3: Organizational structure and frequency on the Gemba

Normally we would like to find the ratio of 5:1 in the organizational chart (see Figure 3), i.e.: one Director is responsible for five Managers, each of whom is responsible for five Supervisors/Foremen, each of whom responsible for five Leaders, each of whom is responsible for five workers. The Leader would be that multi-functional employee who can be trained to work in another area; in the absence thereof, another Leader should replace him/her (the Leader's Versatility Chart would be geared toward skills to work in and lead other areas), and likewise for the positions of Foreman, Supervisor, Manager, and Director. This training ensures that the higher-ranking positions can always act in aid of their subordinates, thus ensuring help in the process as well as encouraging the development of people.

In addition to these proper working conditions, there should be a habit of acting directly in the Gemba. A minimum frequency would be for the Director to go the factory floor at least on a weekly basis; the Manager to be there daily; the Supervisor and Foreman at an hourly frequency; the Leaders should of course be working within the "pitch" (multiple of takt time); and the workers should have immediate action towards problems.

The creation of a multi-departmental group with more specific technical knowledge is also essential in supporting the aforementioned structure. These collaborators must have the mission to help—under the coordination of management—and solve problems that the production area couldn't solve.

4. DEFINITION OF RESPONSIBILITIES

In order for the Help Chain to work to reduce production instability, becoming a habit and instinctive for everyone involved, there should be a clear definition of responsibilities so that there aren't any breaks in the "chain" or duplicity of actions. There should be standardized and organized attitude so that people will get involved in an optimized manner, following a sequence that goes from the workers to the directors.

As stated previously, the first action should be undertaken by the workers (see Figure 4) who must be able to perform the job, as dictated by the Standardized Work procedures, with training on problem-solving methods such as the "5 whys" in order to act quickly, trigger the "Andon" to inform everyone that a problem is about to happen, and shut down the line. And when the worker can't solve the problem, he/she must urgently call the Leader.

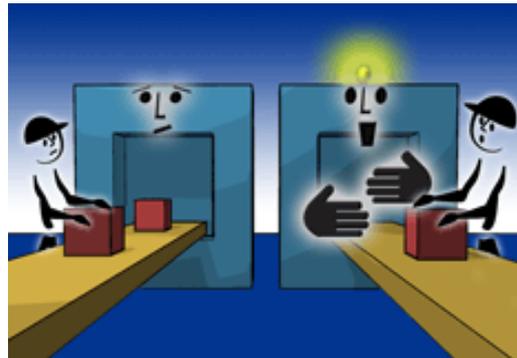


Figure 4: Workers trained according to the standard

The Leader (see Figure 5) starts to act even before the day's work begins, through daily 5-minute meetings, usually prior to the start of the work journey, where the Leader observes the presence of the workers, and using Kanri-ban diagram (daily presence control chart and individual training analysis) and allocates each worker to a work station, observing the Versatility Chart. The Leader is also responsible for implementing worker training, following the Versatility Chart determined by the Supervisor, as well as analyzing the shortcomings of the trained workers on the Kanri-ban diagram.

Whenever the areas set off a light/sound signal of the Andon to alert that there is a problem, the Leader should go to the area and assist the worker. By acting quickly and being technically trained, the Leader should analyze the problem within the pitch, as well as plan the solution and execute such solution with the existing resources. He/she has the responsibility of identifying the problems, whether solved or not, using the Production Control Board, since the unsolved issues must be addressed by superiors.

One of the attitudes of the Leader is the constant observation of the Andon since it informs the existence of problems. When it is showing "green," the Leader's attitude should be one of prevention, planning and analyzing improvements. When it is showing "yellow," the Leader must move and interact, and when it is showing "red," the Leader must act jointly with all people responsible in order to address the cause of the problem.

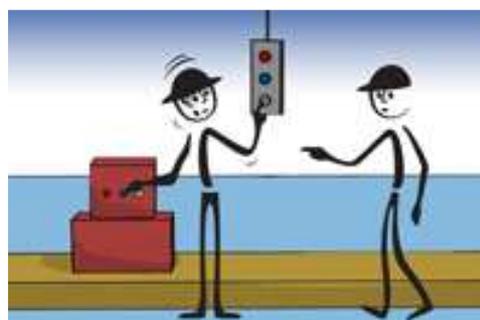


Figure 5: Immediate support by the Leader

The Supervisor or Foremen (see Figure 6) should check the Production Control Board on an hourly basis to ensure that problems are being identified and addressed. The Supervisor/Foremen should be responsible for any problems that couldn't be solved by the Leader, and should use existing resources to eliminate or reduce waste, acting in a planned and methodical manner (Quality Control Circle, Kaizen Circle and Suggestion Plan). The Supervisor/Foremen is also responsible for directing the actions of the multi-departmental group to resolve problems pending of the Board, and there is a shortcoming in worker training, he/she should elaborate the plan for training people as well as defining the Versatility Chart.

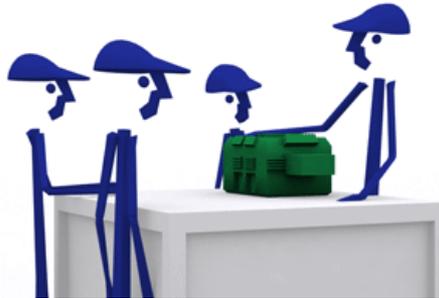


Figure 6: Teaching/training employees and implementing kaizen, the main job of the Supervisor

The Managers and Directors also have a major role in solving problems. They should monitor the daily production and Control Board, verify if the lean tools and concepts are working properly (audits), and interact whenever problems are not solved.

They are also responsible for training and developing new leaders, perhaps the most important mission of this hierarchical level, and must direct and support the Supervisors, their workers, and the multi-departmental group in eliminating waste and solving problems.

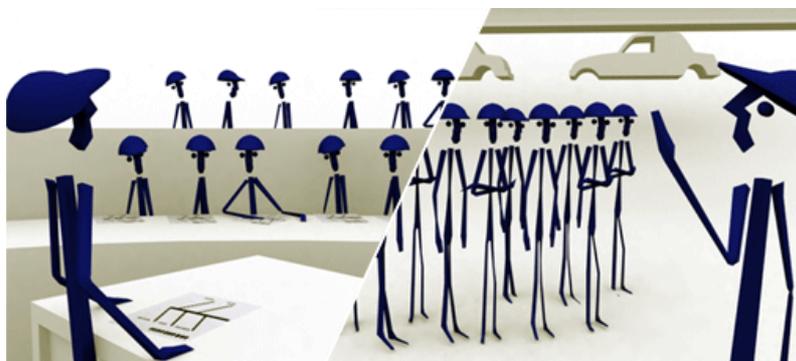


Figure 7: Training multipliers and ensuring the philosophy, the main job of the Director

The multi-departmental group (see Figure 8) is composed of the heads of the supporting areas such as Quality Assurance, Engineering, Planning, Logistics, Purchasing, Maintenance, HR and others, and should provide all the technical help to solve problems in a systematic and consistent manner.

The accompaniment of such support should be done on a daily basis—not necessarily all at the same time, but quickly, especially when the Andon indicates a shutdown in the production area.

Under the coordination of the Supervisor or Director, the group should interact with those problems indicated on the Production Control Board that have not been resolved by the Leader and respective workers, since it will likely be necessary to use scientific or more detailed methods.

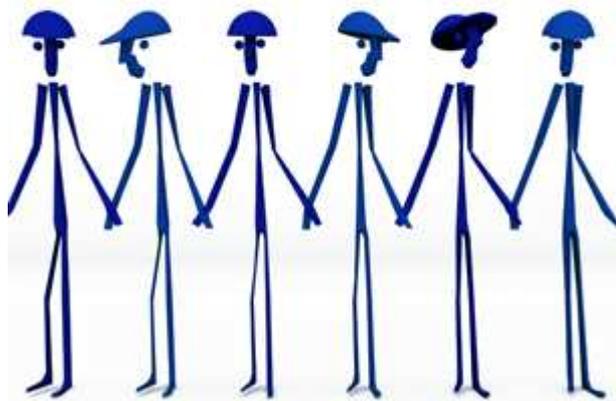


Figure 8: Supporting production to avoid instabilities, the main job of the group

5. THE START OF THE HELP CHAIN AND ITS CONSEQUENCES

The entire process begins when the Leader checks the presence of his/her workers, about 5 minutes before the beginning of the work day. This activity is important to ensure that the company's productivity is maintained, since losses due to workers who arrive late to their area are considerable, and this happens at most companies.

After checking who is present, the Leader uses the Kanri-ban diagram (see Figure 9) to distribute the workers according to their training (Versatility Chart) and the specific needs of each workstation. This is important because when the worker is chosen in the proper manner, it allows him/her to be able to start the Help Chain when a problem arises. This appropriate performance by the worker usually reduces the number of problems, since it is known that one problem will generate many other problems.

The Kanri-ban diagram contains two separate parts, one that identifies the number of work posts needed for each production area to produce within the planned takt time and the specific posts that require people with better performance. The other part shows how many people there are in that sector and their qualification by means of the Versatility Chart, as well as identifying who is absent and the allocation of those who are present.



Figure 9: Kanri-ban diagram

By means of the Kanri-ban diagram, the Leaders can also promote training determined by the Versatility Chart, implement the kaizen planned by the Supervisor, and even move manpower to areas having problems of absenteeism, provided there is the manpower available.

The Versatility Chart (see Figure 10) is a visual way to verify where we have a problem of unskilled labor and where we have deficient processes. With this chart, we also have the proper conditions to create multi-functionality, which is fundamental for starting the Help Chain.

| Instant action | | ⊕ Unskilled | ⊖ Needs help | Plant: | | Responsible: | | | | | | | | | | | |
|----------------|------------------|---------------|--------------|--------------|----------|-------------------|-------------|---------|---------|--------|---------|----------------------------|---------|--------|---------|--|--|
| | | ⊕ In training | ⊖ Skilled | ⊖ Specialist | By: | Date: | | | | | | | | | | | |
| Nº | Name of Operator | Pressing | Modeling | Ref lux | Cleaning | Visual Inspection | Corrections | Welding | Coating | Curing | Sealing | External Visual Inspection | Barcode | Verify | Packing | | |
| 1 | Operator A | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | | |
| 2 | Operator B | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | | |
| 3 | Operator C | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | | |
| 4 | Operator D | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | ⊖ | | |

Figure 10: Versatility Chart

At this moment during the Leader’s Daily Meeting, we have the “First Level of the Help Chain,” and the ones who normally take part in this meeting are the workers and their Leader (see Figure 11), and the Supervisor may also attend. The worker’s are then allocated to the respective work stations, and receive other information on wide-ranging subjects.

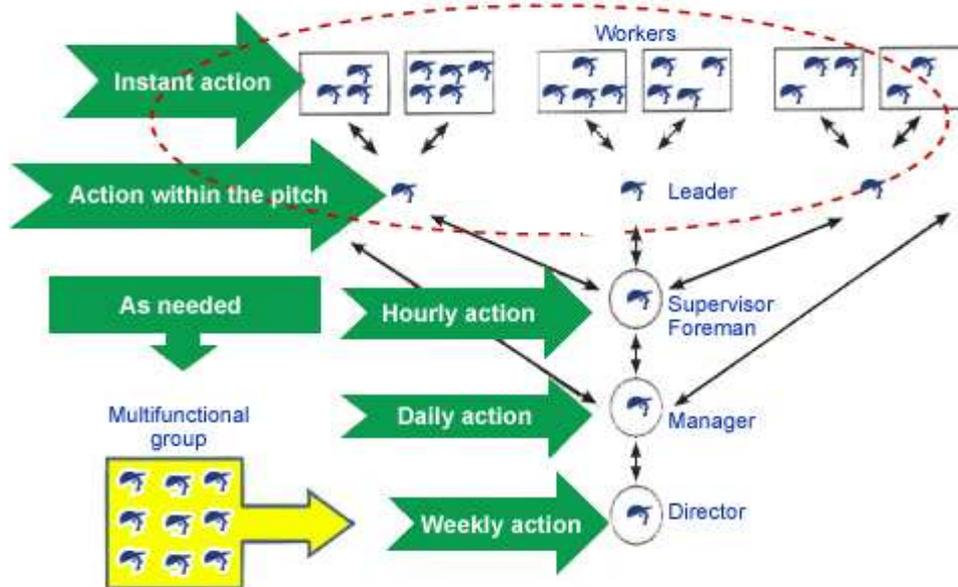


Figure 11: First Level of the Help Chain, the Daily Meeting x Kanri-ban

After distributing the workers, the work should begin strictly on time, because—at a company that implements lean thinking and all areas related thereto—it is important that the processes work as a chain.

Occasionally problems will occur during production and we need to give the system a manner to warn *where* and *when* waste will happen. There are two ways to identify waste, before it occurs, or after.

The set of tools comprised of Ando, Jidoka and Pokayoke is important to detect and identify a possible abnormality in the process, as certain actions must be started.

In Figure 12, we see that every time a worker detects an abnormality, he/she should trigger the Andon or other type of light-sound alarm to call the attention of the Leader, while attempting to correct the process. The activated Andon (with the yellow lamp lit) informs various sectors of the plant regarding the abnormality of the client process, and both the worker and the superiors (Leader and Supervisor) should, within the pitch, resolve the problem and prevent a shutdown.

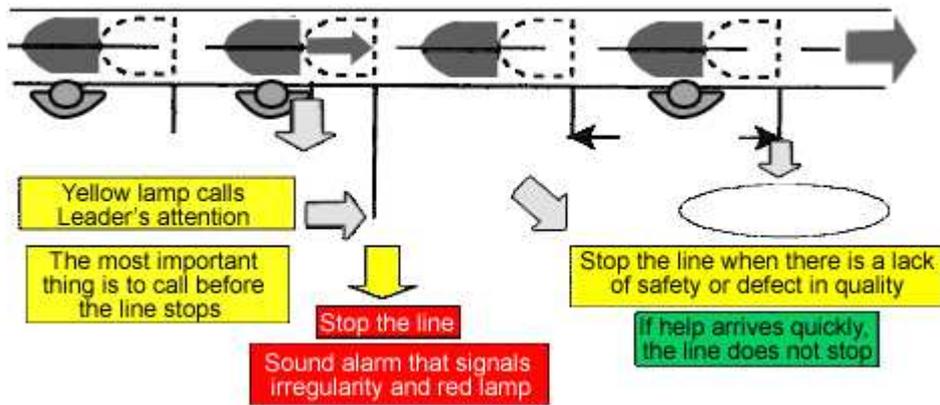


Figure 12: Actions taken based on the Andon

In Figure 13 we see the “Second Level of the Help Chain,” and who should be involved in this activity, from detection of the problem, warning by the Andon, to the involvement and action by appropriate personnel.

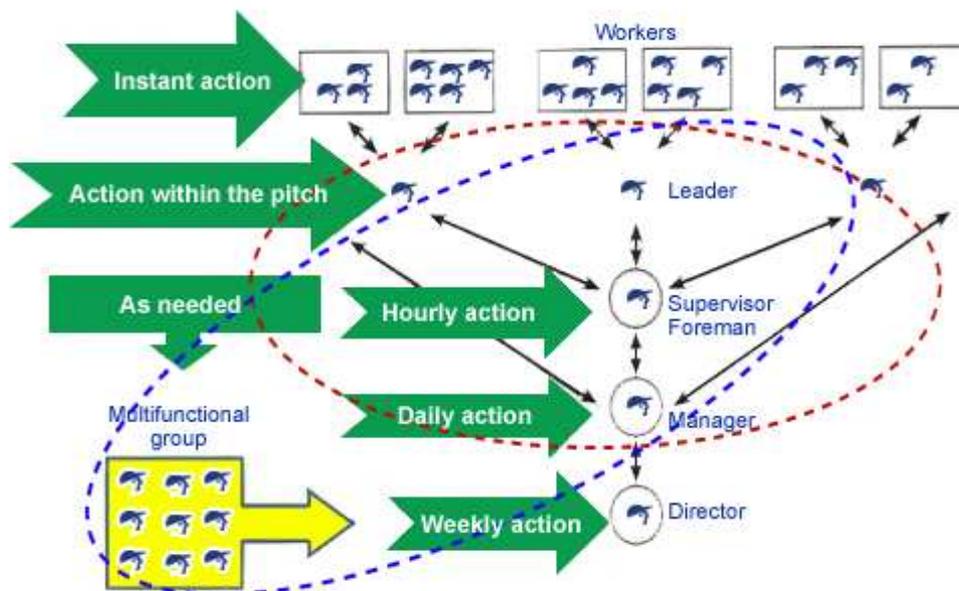


Figure 13: Second level of the Help Chain, the Andon x action by leaders

The warning generated by the Andon in the area where the problem is occurring subsequently generates warnings for the areas that supply components or inputs, and even the areas that provide services.

In Figure 14, we show an example of a problem that caused a production shutdown on the “Assembly Line,” with its Andon triggering the red signal. Consequently, the Assembly Line Andon will trigger the Andon of the “Transmission” area (a process that supplies the Assembly Line), which will trigger the Andon in the “Machining” area (a process that supplies the “Transmission” area), and will sometimes trigger the Andon in the “Engineering” and “Maintenance” areas, in the cases when these are areas of support to resolve the detected problem that caused the Assembly Line to stop (client process).

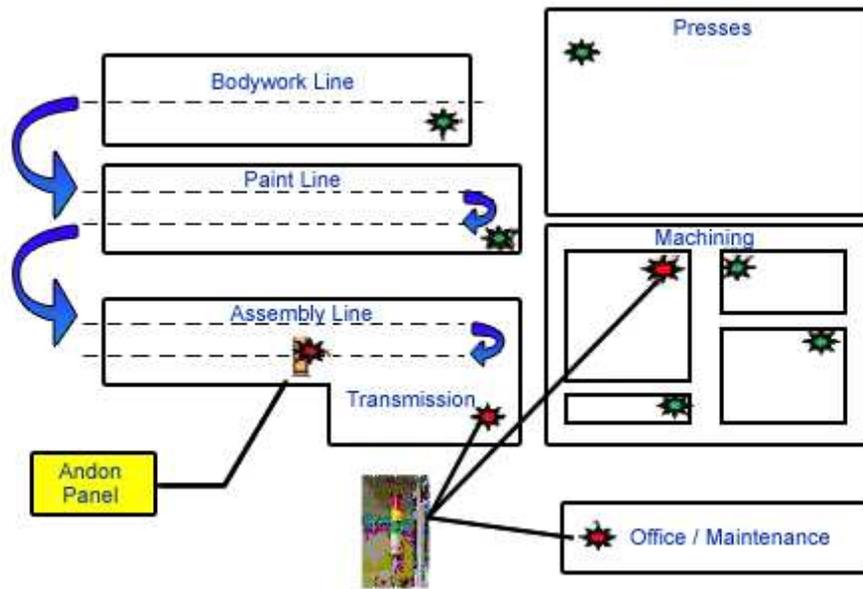


Figure 14: Andon System triggering areas of support

In the event of problems that wholly or partly shut down the production area during the day, the losses are recorded on the Production Control Board and the problems are identified (see Figure 15).

Hence, in this stage we have the “Third level of the Help Chain” (see Figure 16), where the Leaders should, on an hourly basis, analyze and resolve the problems encountered under their responsibility; the Supervisor should, on a daily basis, analyze and resolve anything what the Leader failed to address; and the multi-departmental group should, during the day, intervene and help whenever the Supervisor needs it.

The Director has the obligation, during his/her time on the Gemba, to verify whether the systematic process of the Help Chain is working properly, checking the actions of the “First”, “Second” and “Third” levels.

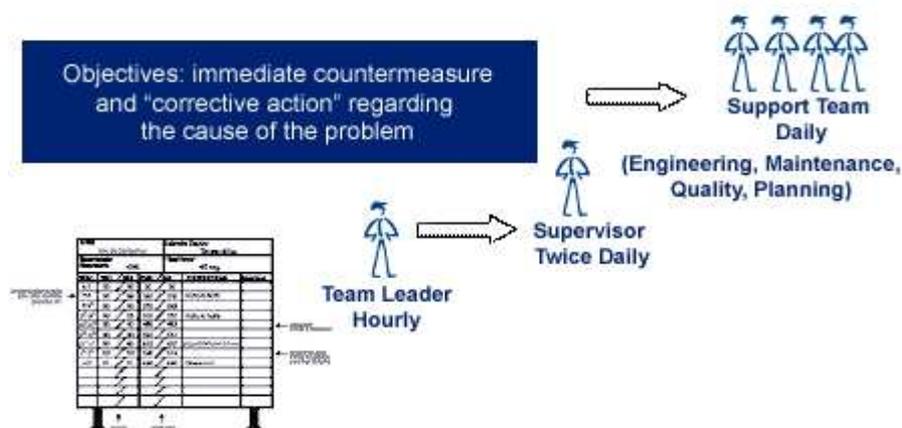


Figure 15: Production Monitoring Chart

In Figure 16, we see the “Third level of the Help Chain” and who should be involved in this activity, from detection of the problem by the Control Board to the involvement of the multi-departmental group.

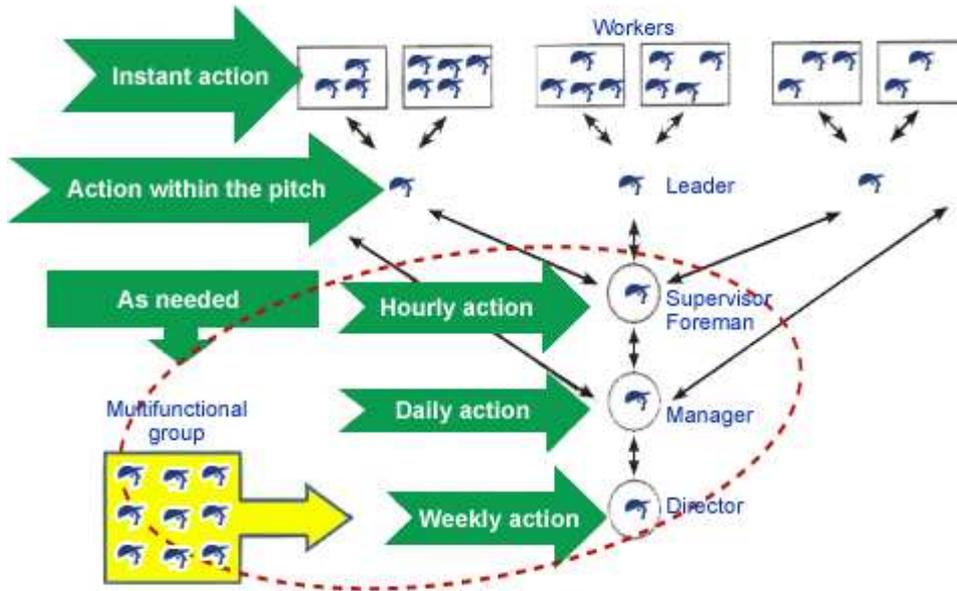


Figure 16: Third level of the Help Chain, Production Monitoring Chart x frequency

6. WHICH PROBLEM-SOLVING METHOD TO USE

The problem detected on the Production Control Board should be addressed more efficiently and rapidly, and we must therefore determine which method should be used for each level. Our suggestion is shown in Figure 17.

The leader and his team must resolve whatever is under their responsibility, and thus tackle the easier problems, using methods such as the “5 Whys.” For each problem noted, a form is filled out, inducing the respondent to ask the “why” questions until reaching the root cause, to take counter-measures, and to place the form on a panel next to the Board.

The Foremen and Supervisors must resolve whatever the Leader has not resolved, by adopting a more comprehensive method, such as Ishikawa diagram with the 5 whys, or PDCA.

Whenever there is the need for more complex methods, the multi-departmental group may use statistical methods (6 sigma), since technically it will have greater availability and more time to determine the actions.

The appropriate technical training for each level of the organizational chart is a major factor to streamline the “Help Chain,” in addition to being a factor of respect toward workers: we cannot request anything without providing proper working conditions.

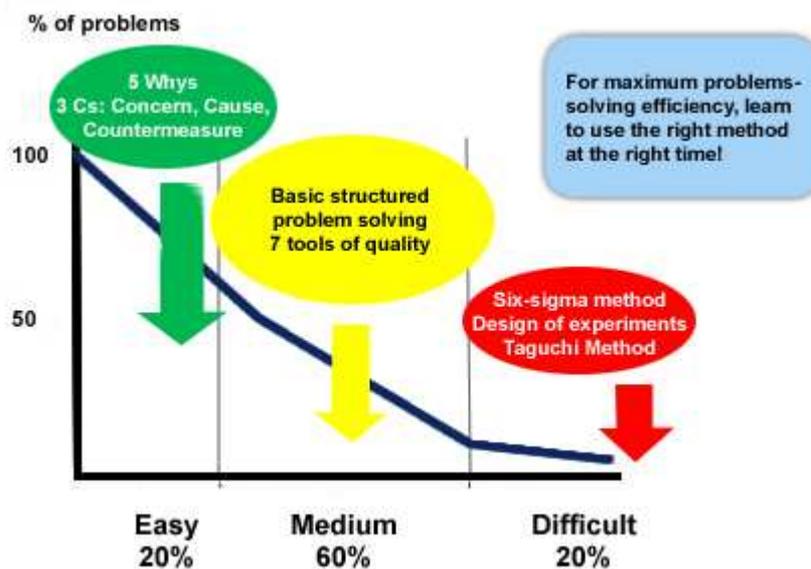


Figure 17: Definition of problem-solving methods

An important tool to support the Help Chain is the Kamishibai Board, which can be used as a regulator for management audits and assistance in the autonomous maintenance. On this board we can determine the prioritization of improvements identified by the Production Control Board and observations/remarks from all levels of the Help Chain.

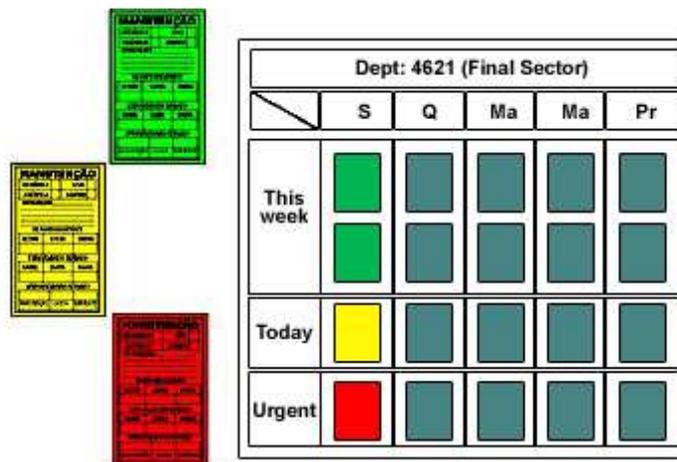


Figure 18: Kamishibai Board

There are other good practices to support the Help Chain, such as the implementation of the “Suggestion Plan” culture (Kaizen Teian) and the QCC–Quality Control Circle or Kaizen Circle (see Figure 19).

Some of the problems identified in the Production Control Board may be addressed by the Leaders, so that the workers themselves in the area can accept the challenge to resolve the problem, with the aid of the area Leaders. This way, after implementation, the worker will be able to elaborate the suggestion and send it for analysis and future awarding.

The other way of worker interaction to resolve one of the problems indicated by the Board is through the activity of the Quality Control or Kaizen Circle. Basically, this action is the result of the formation of groups of workers in the same area or even with people from other departments, which identify and eliminate the root causes of the problem by applying "PDCA."

Both the Suggestion Plan and the KC/QCC are types of problem-solving methods that support the Help Chain, and also serve as a way to stimulate the involvement of the workers and the improvement of their knowledge.



Figure 19: Kaizen Culture and the Quality Control Circle

7. CONCLUSION

The stability of the 4 Ms is a fundamental requirement to start the lean journey, and maintaining the 4 Ms is what determines the possibility for us to have the foremost pillars of the Toyota House: “Jidoka” and “Just in time.”

This manufacturing stability is achieved only by identifying and solving problems with defined methods and responsibilities, and the “Help Chain” is essential as a working routine (standard) for people, acting whenever abnormalities arise.

Discipline is the main factor for maintaining the “Help Chain” systematic process and thus become a habit for everyone involved, with the participation of the Directors as agents of aid and qualification of the works.

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