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THE COMPARISON OF THE DIFFERENT WAYS OF THE INTRODUCTION OF THE 5S METHOD IN PRACTICE AND THE EFFECT ON THE PRODUCTIVITY AND THE ACCOUNTING INFORMATION

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Summary: High quality can be realized only in a highly organized business work environment. The 5S method is the method for developing workplace and mind-set of the people. As everything the 5S is changing and developing in methodology too. Several productivity development methods in production or administrative processes lay on the 5S optimization. The 5S optimization of the workplace is based on the combination of work elements and functions used by peoples in their daily activities. 5S has well-structured steps. The highest impact and productivity increasing result will be realised if the method is proper introduced and all employees understands the theory and practice involved effectively. The 5S introduction in practice always differs from the type size of the company of the shop floor. Wrong introduction of the 5S can lead to negative result and dissatisfied customer and demotivated people. The effect of the 5S system influences the type and the value of the accounting information, what are used by the management in their daily activity. The 5S system influences of the costs and returns structure and value. Our research presents the comparison of two 5S introduction method and effect on daily management in point of view of accounting information and productivity.

Keywords: 5S, Standardized Work, Productivity, Human resource development, accounting information

1. Introduction and methodology

The globalization emerged all companies to revise their activities. The companies which were leading for long time on the market there no more leaders or even does not exist. The cause is the quick information change and business rush. Business is very much a team sport. (Takashi, 1991) Every team has their members, peoples are managers, some are players, some supporters, but all have to do their job well if the team expects to win. Nowadays those teams can win which can react promptly to the changes of the business needs. The shorter delivery times the higher quality needs of the customer to lower prices is no more luxury nowadays it is a basic need of many. These were just the three elements of productivity (QCD) that the customer is willing to pay for and the other is the productivity (P) safety (S) and morale (M). The difference in competitiveness of the companies is well defined on the bottom line/bottoms and operated by methods and rolled through processes down to micro operations. The way that how management thinks, how management acts or top-down, or bottom-up it is nowadays may be not the best approach to lead the company. These are relative merits are discussed but the role of managers in process development, operation and sustainability is definite. Top-down approach doesn't work because people don't understand always the orders and jobs requested by the bosses. Even when the orders from bosses are not clear to workers the response are closed responses answering yes. The problems remain hidden or being hided because workers have fear from management. The problem solving is "very loud". The problems with time accumulate on the workplace and cause process and financial wastes

because the costs of wastes are embedded in the variable and final in the total costs. This reduces the competitiveness. The bottom-up management system will be also not effective unless the people on the top are not committed to make working. The Gemba reflects the attitude of managers. Tacit knowledge remain hidden explicit knowledge is variable that results variable output. The real cause is the lack of standardization. (SDCA) The One of the key success in business of the Japanese companies is the well organized and prepared workplace, where the work can be performed smoothly and effectively. This is not the only one positive effect of the 5S thinking and organized companies also help to detect as quickly as possible the abnormalities. The visualisation is the "brother tool of 5S" to keep in hand the process parameters and overall productivity. With a good introduction and set-up of the visual tools can be immediately identified if is something is running normal or abnormality occurred. The 5S workplace environment helps to run the company to the calculated operation cost. If problems happen needs problem solving which needs extra resources investment and more time so this raise the variable costs. The daily operation and production control can be also effectively performed in 5S environment workplace. If a company can't do 5S than can't do anything. "If you can't do the 5S, you can't do the other work." (Takashi,1991), The company's ultimate goal is to enhance productivity PQCDSM and raise the profits. The 5S has direct and indirect effect on all the six elements of the productivity PQCDSM. If there is business environment change need to react as soon as possible. The root cause is the "change" because everything is always changing that we can't stop. Change is normal, always happen in our everyday lives like changing the weather, the temperature, the mood of a person, day and night, light and shadow, wind, speed, geometry, taste, need, sound, space or time. The winners are not those companies which are the most powerful those that can adapt successful to the changes and to respond to high challenges. In practice this includes all element of raising the productivity completed with the problem-solving. Those companies which apply the 5S method successfully are more stable and profitable and the product quality is stable (Table 1). Also in these companies the innovation ability is higher, because people are willing to give their constructive ideas more spontaneous, there are motivated financially and morally (5S idea and contest).

Table 1: The relation between 5S flow of production and quality of items

5S DETERMINES AND INFLUENCES THE FLOW & QUALITY OF PROCESSES ELEMENTS UP TO MICRO LEVEL	
Flow of production -speed	Quality level of production
Availability (machines, tools, people, materials, information)	Quality of data and information
Lead time - production capacity	Eliminate process waste, reduce waste in the plant
Changeover effectiveness and frequency	Detect quality problems
The information flow	Basic of visualization
The work in process, stocks, costs	Scrap rate
Visualization of the flow	Visualization by andon of the errors in processes
Visualization of processes	Reaction time action if error occur
Visualization of takt time	Visualization of actual quality rate
Visualization of actual production rate	The focused quality problemsolving
Visualization of morale	Making possible the zero monitoring
Visualization of knowledge	Quality kaizen activities
Prevent accidents	Reduce finally costs, increase profit

Source: own

In 2007 Toyota Motor Company became the biggest car manufacturer in the world. TOYOTA developed in his business practice the 4P (philosophy, people, process, problem solving), and TPS (Toyota Production System.) (Liker,2004). All the basis of TOYOTA Production System lays on 5S and visualisation. Their goal is to realize the ultimate visual factory. The 5S method influence all process factors namely the speed (flow) of production and the flow of the quality (QR). The 5S is one of the methodologies for realizing organized change to be more effective or to use less energy to perform any actions during the work time. The 5S needs human interaction and concentration, discipline. All elements of the production (4M=Man, Material, Machine, Method) or service use machines, materials by methods operated by human intelligence and power. The flow and quality of the information between the persons-to-persons machines-to-persons in any process strongly determines all activities and their output (PQCD). On the organized workplaces all the activities in production or in office goes much smoother. There are many questions about what method to use to manage change. How to react to a change? How many time we need to perform change or do haw many do we have? What to change and what not? When to change? Who will change? Rationalization is a sociological event that everywhere can happen, that can be a family or a workplace. Rationalization refers to the change of traditions, and values and emotions, motivations as well motivators for the behaviour in a group with rational or by calculated ones. The managed workplace change by rationalising is doing by 5S method. 5S is a JAPANESE Method it is true, but the roots go back earlier and to USA. Henry Ford in their workplace management also used mosaic word to define the rules of the workplace effectiveness. Henry Ford introduced workplace development in five steps and gave a strong message “CANDO” that anyone can do, no exceptions accepted (Table 2). The 5S method is really a Japanese method for the good housekeeping. It is also called the method for organizing the highest quality workplace and for maintaining it. By the Japanese work philosophy good and high quality product can be produced only in a well organised high quality workplace. This is obvious if someone listening outsider, but it is hard to do in practice. 5S introduction is one of the most challenging and responsible development action in a company that defines the improvement capability and morale on long term.

Table 2: Comparison of the CANDO method with Japanese 5S

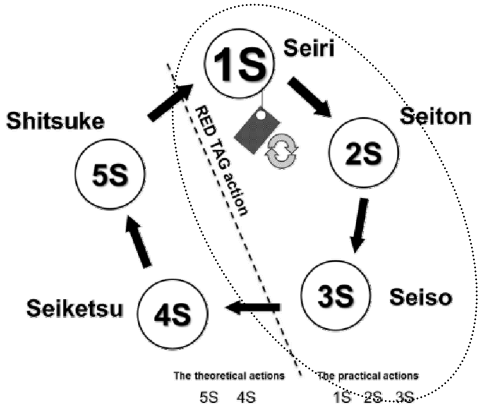
Ford's CANDO+5C	**Japanese 5S**	**in Japanese**	**Actions / Meaning**
Cleaning Up (clear out and clarify)	Sort	Seiri	Sort and set in order sort and set in order Red tag action
Arranging (configure)	Straighten	Seiton	Everything is labelled and visualized. Identify, find, take & put back rule.
Neatness (Clean)	Sweep	Seiso	Clean. Make shine everything.
Discipline (Conformity)	Standardize	Seiketsu	Standardize the 5S.
Ongoing Improvement (Custom and practice)	Self-Discipline	Shitsuke	Make discipline

Source: own

Even in Japan not every company knows or practices 5S. Therefore 5S introduction is always new, but also as everything has developed. In this research we compare the difference

between the introductions of 5S in Traditional way with two new way based case studies (Figure 1), 1S, 2S, 3S change in Gemba. 4S, 5S change in information and human behaviour.

Figure 1: The graphical scheme of 5S process



Source: own

The Accounting is an information source for the outsiders and for the internal entities of a company. The information for the outsiders (investors, creditors, authorities etc.) is basically about the value of the property about the income statement of the company's whole activity. The internal users of the accounting information are mainly the managers and the workers. We can say that they utilize the managerial accounting information in their everyday practice. The accounting system is not alone and not for itself. The accounting data are used in the controlling system, too. One of the main questions by a producer or service company is the efficiency and the profitability. The answers and the causes are coming from the controlling and the accounting.

The efficiency can be influenced by the cost side, too. The accounting and controlling system can provide the data about the cost of a product or of a service. There are two methods for cost calculation: traditional cost calculation and the Activity Based Costing (ABC). The traditional cost calculation focuses on the product or service unit and the information is not so detailed and do not support the internal decisions. Mainly these costs are used for the financial statement as a cost of the sold product (income statement) and the value of the self production (balance sheet).

The ABC system focuses on the production flow and provides more detailed information for the managers for the decision making inside the company related either to the improvement possibilities. By this system is it available to calculate the overheads and spread them in different way onto the product cost (Harmon, 2010).

The productivity improvement methods like the 5S influence the cost of the product. The ABC system can show the effect of the 5S activity, because the cost of the 5S activity and the effect of the 5S modify the overheads, too. We can measure the productivity improvement methods step by step and their influences on the cost pools.

2. Comparison of the traditional and new way of the introduction of 5S

Contracting, preparation and 5S campaign phase: Company **decide** the introduction of 5S by own or consultant company. Decision was taken over the 5S introduction date. The goal of the first action is communicated. In our research we highlight the vital importance of communication and to be defined well and included in 5W2H steps. We show the 5S introduction is important, because this is a method, a lean tool to reach the company goals and make work easier. More important is to make people to understand and on the end to get the

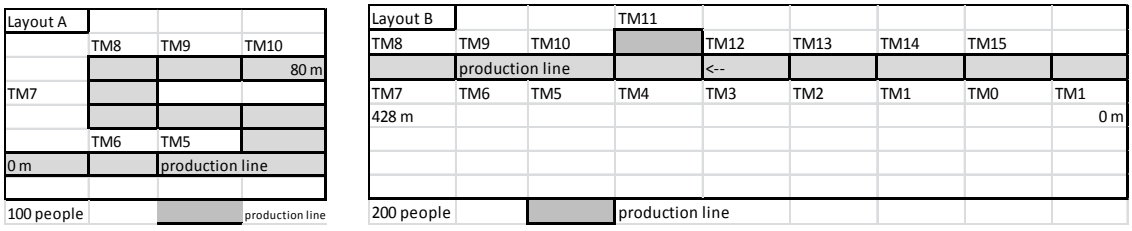
answer from themselves to the question why 5S? If not further training needed. In the summarize part of the results we show by numbers the activity and result rate of people (revealed problems / solved problems). Without 5S standard work (SOP) cannot be run properly or will not sustainable.

Human preparation: In the preparation phase is selected a champion the most probable candidate to become the "5S leader". This person is the PIC (person in charge) responsible for all activities from introduction to "running" the 5S.The 5S campaign is announces officially on production board / before shift changes by 5S PIC and local supervisors.

Equipment tools preparation: The necessary tools for 5S are preliminary purchased the 5S work standards are posted by consultants and PIC prepare and is printed out in the necessary volume. Training material is printed. All employees are trained. Training was held in small groups 20/group in 4hour sessions. In traditional the training takes 5 days.

The study of the design of the layout of the workplace is essential for the 5S introduction success. Layout is vital in 5S introduction. Also can cause disadvantages in people handling during the introduction process if is not enough designed the action. Actions differ in result when it is functional design or line or cell type, or if it is mixed design. The number of people in one team is important for the 5S activity (recommended 2-5-6) and how they are isolated physically by others. In our case study we demonstrate two cases. One was performed in food industry and the other in construction. Both layout designs are line type and its combination un "S" shape. One is 80m long and the other was 428 m long.

Figure 2: The layout of the food industry layout A and layout B in the construction



Source:own

The technological requirements did not allow to act only on a model area because the hygiene standards denied, on other case if one equipment is not developed could cause breakdown too. The new way of the introduction 5S method differs from the traditional one in several items. The **preparation** and run was made by 5W2H and OPPDCA x PQCDSM combination (Imai, 1986). The preparation phase took two times more as in traditional way. The "P" hase was longer but the whole "DC" was only 5 days. 100 and 200 workers were trained. In traditional method this last sometimes 3-6 months or more to catch up to the same level everyone. The stabilization as the 4S, 5S of course needs most the same time. This differs from culture and technology. During our development was used the formalism to introduce the standard of the 5S. The Y generation has less practical approach. Every 5S step of the action and progress was controlled by visualisation on board and A0 papers, and colour coding. In every 90 minutes the team leaders made their reports. The original sequence of 2S, 3S was interchanged. New sequence was 1S, 3S, 2S, 4S, 5S. All the employees were trained in one session in one day. In the construction industry from 200 employees was selected 30 to became 5S area responsible. Only one person was done exceptional performance he identified alone 51 red tags. In total 357 red tags were set and in 5 days 304 were solved. The tools were prepared to the workplace. The 5S map was divided not by location but rather equipment and material flow. There was determined identified all equipment. The 3S action was performed by "clock wise rule" and reverse "contra clock wise rule" that means the identification and

cleaning was perform by moving in that direction. The physical orientation of the machines sides was assigned like NSEW.
A sketch was done that everyone to understand. The delegation of persons to the machine was based on NWSE and complexity and statement. The problems were registered in the same logic.

3. Results

The problems were identified during observation and 1S, 2S, 3S activities in case of the construction and food industry (Table 3).

Table 3: Results of the 5S Red tag activity performed during the five day Gemba action

RED TAG actions in food industry	**psc**	**%**
Total Red tags in 5 days	310	100,00
Solved	233	75,16
Registered red tag by one person from total	25	8,06
Remaining to be solved	77	24,84
Average card/ person	1,55	0,50
**one "red tag" can stop the production*		

RED TAG actions in construction industry	**psc**	**%**
Total Red tags in 5 days	375	100,00
Solved	304	81,07
Registered red tag by one person from total	51	13,60
Remaining to be solved	71	18,93
Average card/ person	1,875	0,50
**one "red tag" can stop the production*		

Source: own

To reduce the daily management time by searching the identified red tags hanging on the equipment would take too much time. The problem solving would be slower as expected. It was set up the 5S Red tag board with identical layout of the machines and names (ID) as in production. The red tags were hanged on hooks by the operators when was doing job near the board. In this way was eased everyone's job during of a RED tag identification-delegation and solving PDCA cycle. In this way the daily management activity time was reduced with 50 minutes compared to traditional way. To discuss and prioritize the jobs needed just 15 min per day. Tools searching time was reduced from 5 minutes to 30 seconds and 2 seconds. Lead time was reduced during half year with 20%. The change over time was reduced from 90 to 10 minutes. Unsolved active Red tags number on the shop floor was limited to 20 pcs.
Standard work can be performed conform established by production engineering. 5 new improvements were introduced within 2 month.
In the new way of introduction of 5S in the PDCA cycle the "P" phase was 2 times longer than the traditional 5S method, but the whole "DC" was only 5 days. 100 and 200 workers were trained. In traditional method this last sometimes 3-6 months or more to catch up to the same level everyone.
To be effective in the 5S introduction it was a must to change the traditional operation approach because of technological restriction like hygiene and machine availability due to line design (Table 4).
By the two 5S activity the companie's production flow and the 5S method was optimized, too. The cost of the improvement system was reduced. The training time was less and the parallel improvement of the production lines caused faster introduction of the system. The cost and the time waist of the introduction were only single and after the improvement the production could be started on the maximum capacity and it increased the output and the revenues.
The cost pools of the ABC analysis got less both cost pool numbers of and the value of cost pool.

Table 4: The new approach of 5S

"Classic" 5S	**Explanation of the developed 5S approach**
1S: Seiri	Separate, eliminate the necessary from unnecessary (do it in SDCA) repeatedly. Red tag
3S: Seiso	Clean and inspect→red tag action Inspect to detect→, Detect to repair→,Repair to prevent. No reoccurrence of the same problem
2S: Seiton	Everything has fix place and everything is in the place. 6R Rule Right item (own, common) Right place,(Where) Right quality,(Good – bad) Right quantity, Right time Rule of the item use: 2"-30"-2'
4S: Seiketsu	Set up rules for the best operation, Standardize (SDCA)
5S: Shitsuke	High discipline and morale Everyone is involved in KAIZEN activities and this is natural.

Source: own

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