

## THE IMPLEMENTATION OF VALUE STREAM MANAGEMENT IN A COMPANY'S STRATEGIC AND OPERATIONAL MANAGEMENT

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### **ABSTRACT**

*Many companies risk millions of dollars on technical developments and improvements without the guarantee of these investments' sustainability. This means that development of strategic management has failed somewhere. Value Stream Management (VSM), implementing Value Stream Costing (VSC) is proving to be an effective strategic management philosophy, leadership structure, and set of tools to foster companies' strategic sustainability. This article will discuss the whole practical approach to develop an eight-step strategic Value Stream Management System. The true value of the system consists in identifying 26 different transactional wastes, many more than are identified by the traditional lean approach, which identifies 7 main lean wastes in transactional processes. Using Value Stream Mapping in production and in the office can set up the full company operational strategy. The first step is the real current state. The next step is to analyze the data and the next major step is to setup the new Value Stream Analysis and Design (VSD) for all processes. This system can instantly react to the internal and external business environment changes. The system can eliminate the internal process's wastes and can increase the company's output and effectiveness. This leads to increased control of the drive of the company's Quality Cost and Delivery. VSM is a modern lean management approach as well as the next opportunity in strategic and operational development for companies and the accounting system.*

Keywords: VSC, VSM, KAIZEN, Management system, TPM, 5S, PDCA, Controlling

### **INTRODUCTION**

Right on the beginning there must be clarified the acronym VSM. In one hand the VSM stands for the operational tool VSM (Value Stream Mapping - tool) and on other hand stands for Value Stream Management (from now I refer as VSMM) as strategically tool and system for future process development and managing the processes. This includes innovation too. The VSMM is a global process planning by linking the lean initiatives through systematic data capture and analysis. In VSMM there are involved all the departments. The mapping purpose to provide optimum value to the end-customer through a complete value creation process with minimum waste in:

- Design (concept to customer)
- Build (order to delivery)
- Sustain (in-use through life cycle to service).

In VSM mapping are made by a cross-functional teams and latter on during the process evaluation will met all participants in the value stream. There are grouped

the products in VS product families and depicted the actual state. The actual state data are recorded visually to a VSM storyboard where the management (and everyone) can see the "big picture". All the steps of production with the VA (Value added), BNVA (Business Non Value Added) Value added (VA) "Value is added only when our action or operation contributes to transform the materials into the product that the customer is willing to pay for." (Mike Rother pg.31.) Continuously monitoring the storyboard gives immediately image over the bottlenecks if they occur. This is the basis for future planning and based on priorities are started the waste eliminations in all departments. It is important to mention that VSM's are an important part identifying the production processes, however it is not enough to make mapping in isolation. Without understanding the lean principles and company strategy in all will bring no closer the company to minimize the wastes.

## **DEVELOPMENT OF MANAGEMENT SYSTEMS**

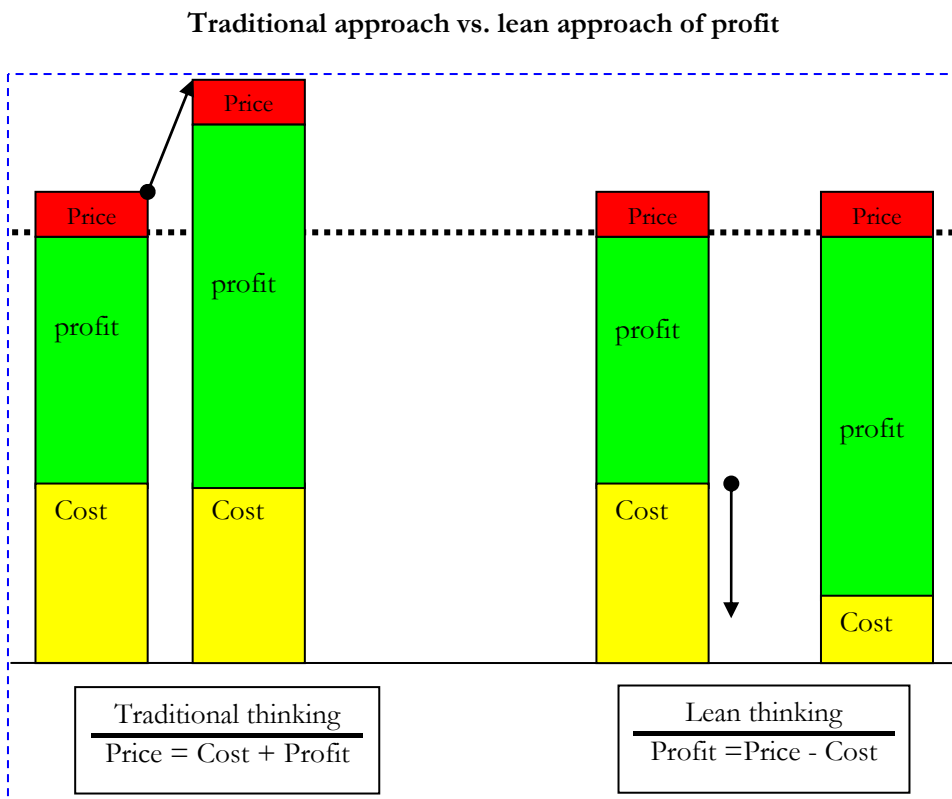
To maintain competitiveness the companies and developing productivity have mainly two approaches, by developing with innovations (or hiring new stuff, knowledge) or by continuous improvement (KAIZEN) and as management tools can be several. This in practice means developing the existing or combining with innovations too and one does not exclude each other. The concurring companies differ in their vision and mission statement by serving the end customer. Companies are using different tool and solution given by the several methodologies to keep in hand the business. These are like strategic management or project management, industrial reengineering, Six Sigma, ISO 9000/QS-9000 DOE/Shainin, Integrated product development enterprise software, Balanced Scorecard (BSC) or restructuring the whole company itself. The transformations unfortunately many cases do not give the great expected productivity and financial results because takes too long time, to people to change their mindset is very hard without understanding their role or the company philosophy (or there are not succeeding). Other reason is that project key persons leave to another company or the planned deadlines are overdue (in 80% of cases of project management). The main problem is also that company is hierarchically too much structured the management is giving commands to lower layers but from down to top do not reach the information. Also companies starts on their own local improvements and do not consider widely the flow of material and information and their interactions. The VSM is a tool of a new business paradigm called lean manufacturing. In these sense there are in this concept two kind of companies those which are practice lean and those which not. Lean is not a gift it must be done day by day and the main difference between these companies is that "somehow" these are more competitive. Competitive not only in sense of serving any end customers need in time but also by the company net realized profit. The secret stays in that they have less waste in their all processes less cost. The cost reduction principle.

## **THE VSM PARADIGM**

This comes with the time because of market changed and the customer needs were changed, customer wants price reduction with less lead times and higher quality.

This is known as “golden triangle”. The lean threats this as the values that the customer can sense in the product or service (Quality Cost Delivery)(Figure 1).

Figure 1



Source: *Tapping et al.*, 2002

The business vision and philosophy is strong related with mission and this defines how all the administrative and production processes are. How people are thinking is the quality of the product. "Good thinking, good product" (Toyota philosophy). Eliminating waste is the basic concept of the workers and realizing in day-by-day results the competitive edge. In everyday production altogether is called company culture. In less good practices in many cases leads companies with short term vision for just surviving, or just getting out the most possible as profit in short term. These do not have proper long term vision and mission as well they do not know how their real processes are, they do not have structural problem solving techniques. This can lead they can not keep their activity for long and they remain unknown for the public or do not have good image and are extracted from the market.

Even it is about a finish good production company or a servicing company of course their goal is to realize and maximize the profit. This is realized by transforming within different processes the material or information to a higher

quality output and by the structure more complex as initially the raw materials. Generally is matter of productivity and quality. Most of the traditional business processes operations are 90% waste and just 10% (or less) are Value-Added work. (Liker, 2003). The Wastes Do NOT add any value to the product or service just consume energy, effort and rise production or service costs.

### **WHERE TO IMPROVE? WHERE ARE OPPORTUNITIES TO RAISE PRODUCTIVITY?**

“Starting without a well based strategy is like sitting in a ship with no rudder.”

The Value Stream Mapping (VSM) is a technical quantitative tool that examines the physical system, processes and interconnections. VSM show the process and its wastes in a graphic representation it is easier to understand by everyone and many of those issues are immediately resolved. It contains all material and information processes and wastes too. VSM is a special type of flow chart, because deal with the time, inventory, material and information and interactions in between these main elements.

Value stream mapping is a lean manufacturing technique used to fully analyze and design the flow of materials and information required to bring a product or service to a consumable state. The daily pace does not give for a company the vision and the time. Value Stream Mapping is an analytical strategy to assess the value we really are adding in the process from the perspective of the customer. First always it has to be considered the customer need. Value-added (VA) defined by lean manufacturing (lean thinking\*) is that the customer is willing to pay for. Waste is all other that than VA which consumer energy or effort and don't realize value. Therefore generates direct and indirect cost not only in the company but in all related external processes too.

The process thinking has long history. Henry Ford developed the flow production. TOYOTA developed for many products and implemented as strategically tool of TPS (**T**oyota **P**roduction **S**ystem) (*Figure 2*).

The owner of Toyota raised the simple question: I would like to know what does happen in between the customer make an order and the time when the paid money for product arrive to our bank account? The Toyota started with the Value Stream Mapping and during the time many companies (ex. GM, HP, Bombardier, SAMSUNG, Flextronics, TDK-EPCOS, Knorr-Bremmse, Jabil, GE, Continental, Philips, DENSO, Coloplast, Festo, Honeywell, Nokia, Bosch, Alcoa, Bridgestone ) learned and developed continuously. Few of companies in the World realized really commitment to lean.

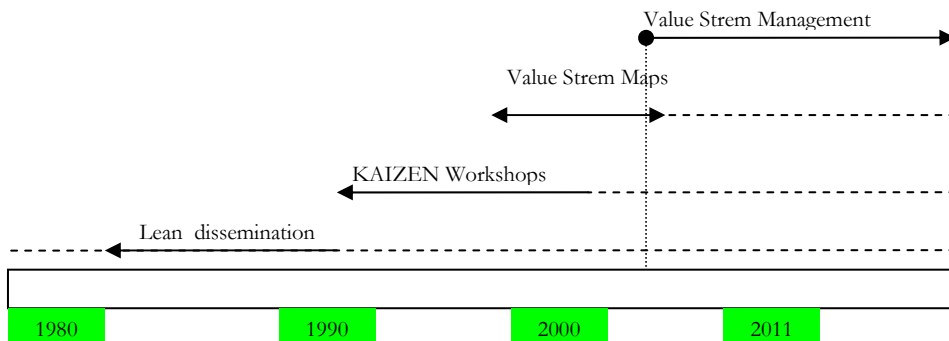
### **THE SEVEN DEADLY WASTES**

In this section will be answered that how to close the gap and follow the Toyota examples.

The true value of the VSM method consist not only in founding the real value-adding places in fact by identifying of the twenty eight (28) different type of transactional wastes getting above the traditional lean approach witch identifies seven (7) main lean wastes in the transactional processes (*Table 1*).

Figure 2

The brief time outline from lean to Value Stream Mapping and Value Stream Management



Source: *Tapping at al.*, 2002

Table 1

The production and administrative wastes

<p><b>Main seven waste</b></p> <ol style="list-style-type: none"> <li>1. Overproduction</li> <li>2. Waiting</li> <li>3. Transport</li> <li>4. Over processing</li> <li>5. Inventory</li> <li>6. Motion and movement</li> <li>7. Defects</li> </ol>	<p><b>Other process waste</b></p> <ol style="list-style-type: none"> <li>1. Scrap</li> <li>2. Rework</li> <li>3. Workarounds</li> <li>4. Inspecting checking and double checking</li> <li>5. Need for approvals</li> <li>6. Variable flow in process</li> <li>7. Incomplete work</li> </ol>
<p><b>Information waste</b></p> <ol style="list-style-type: none"> <li>1. Redundant input and output of data</li> <li>2. Incompatible information systems (interfaces)</li> <li>3. Manual checking of data that has been entered electronically</li> <li>4. Data dead ends(data that is input but never used)</li> <li>5. Reentering data</li> <li>6. Converting Formats</li> <li>7. Unnecessary data</li> <li>8. Unavailable, unknown or missing information</li> <li>9. Incorrect data</li> <li>10. Data safety issues (lost or incorrect data)</li> <li>11. Unclear or incorrect data definitions data discrepancies</li> </ol>	<p><b>Types of people waste</b></p> <ol style="list-style-type: none"> <li>1. Unclear role(responsibility, authority, ad accountability)</li> <li>2. Lack of training</li> <li>3. work or task interruptions</li> <li>4. Multitasking</li> <li>5. Underutilization of talent</li> <li>6. Recruitment errors</li> <li>7. Lack of strategic focus</li> </ol>
<p><b>Physical environment waste</b></p> <ol style="list-style-type: none"> <li>1. Safety</li> <li>2. Movement</li> </ol>	<p><b>The Biggest Waste</b> Unrecognizing the WASTE!</p>

## THE 3MU WASTES

The **MURA**, **MURI**, **MUDA** (3Mu) are another three special waste defined by Toyota and which affect all the elements of productivity specially 6ME (**M**an **M**aterial, **M**achine, **M**ethod, **M**easurement, **M**anagement, **E**nvironment)

**Muri:** Overburdening equipment or operators by requiring them to run at a higher or harder pace with more force and effort for a longer period of time than equipment designs and appropriate workforce management allow.

**Mura:** Unevenness in an **operation**; for example, a gyrating schedule not caused by end-consumer demand but rather by the production system, or an uneven work pace in an operation causing operators to hurry and then wait. Unevenness often can be eliminated by managers through level scheduling and careful attention to the pace of work.

**Muda:** Any activity that consumes resources without creating value for the customer. Within this general **category** it is useful to distinguish between type one muda, consisting of activities that cannot be eliminated immediately, and type two muda, consisting of activities that can be eliminated quickly through kaizen. An example of type one muda is a rework operation after a paintbooth, which is required to obtain a finish acceptable to the customer from a paint process that is not highly capable. Because a completely capable paint process for fine finishes has eluded manufacturers for decades, it is not likely that this type of muda can be eliminated quickly. An example of type two muda is multiple movements of products and inventories between steps in a fabrication and assembly process. These steps can be quickly eliminated in a kaizen workshop by moving production equipment and operators into a smoothly flowing cell (*Figure 3*).

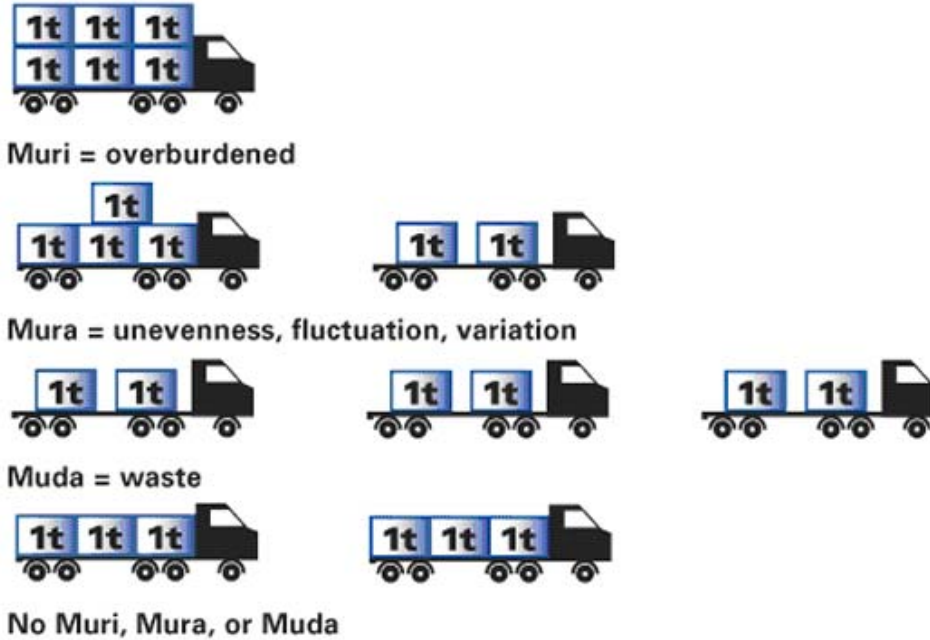
Eliminating waste means increasing value-added during lead-time and workday too. But first it must be considered the 3Mu because they are correlated like shown in *Figure 4*.

Means not much work, and not harder and not quicker. With these actions is shifted the ration between waste and VA so we will serve the customer quicker in better quality and with less cost of production (*Figure 5*).

Many times the management does not recognize that the biggest waste is not to recognize the waste. To start to change the business and manufacturing paradigm first of all means to change the mindset. Management must decide and participate 100%. Lean manufacturing itself is not a miracle tool can be done well or can be done wrong. The Toyota succeeded to see clear what is happening in the factory, by setting up the necessary tools to see the real manufacturing and administrative processes. It is called "The big picture".

Figure 3

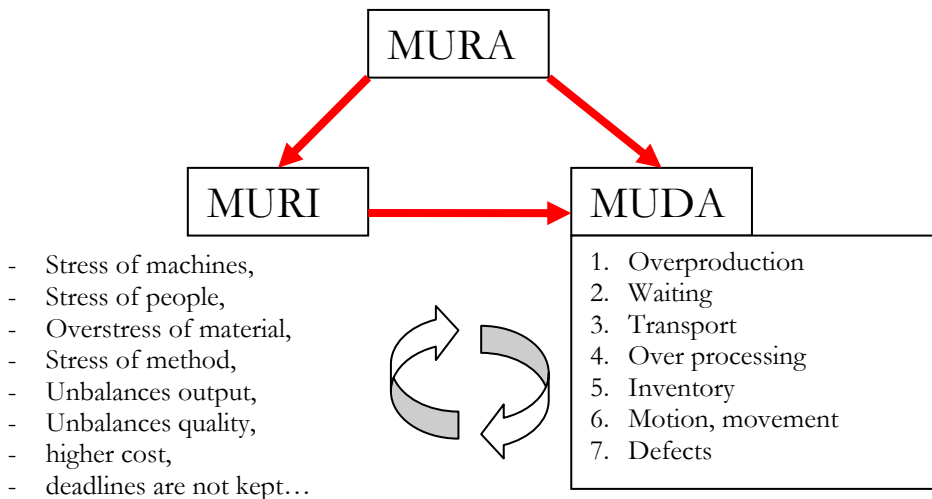
The 3Mu as a special type of waste defined by Toyota



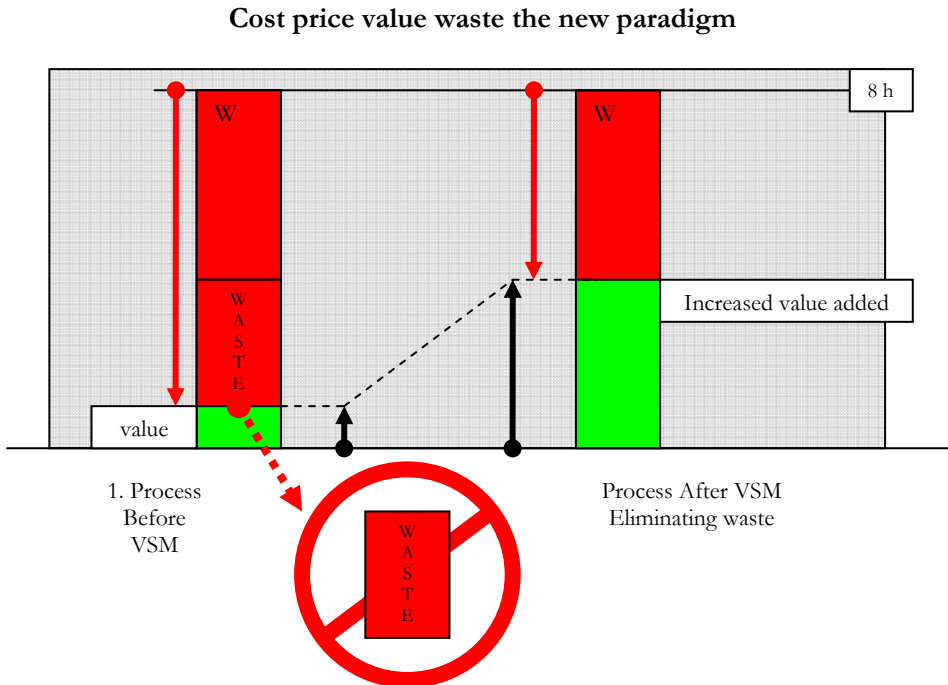
Source: [www.lean.org](http://www.lean.org)

Figure 4

The relation between 3 MU



**Figure 5**



**THE FIVE LEAN PRINCIPLES IS THE BACKBONE OF VSM**

The very first step in a company starts with the commitment to the lean. This means full understanding the principles the customer demand thoroughly and depicting the actual state and continuously communicate. Top management must also believe and ensure the power for all employees. VSM is the interface to communicate with the employees too. VSM is an improvement strategy that links the needs of top management and the needs of the operations group. In the practical experience the western type managing companies or those who do not have developed strategically company culture accept very hard the Asian type philosophy like Hoshin management which is connecting three or more PDCA circles together. The VSM tool used as strategically and operational management tool is much closer. In fact the essence is the same. Is a quick adaptive management system which implements the modern quality and productivity tools (Visual management, TPM, Poka-yoke, Chaku-Chaku, LCA) in daily operations and strategy. To set up a VSM management every company must decide and build is own quality house and leads to better understanding between the members of the management. The VS Champions are selected from in-house, they are learned and trained to lean tools within a pilot project. Lather the achievement and the standards of the model area are generalized. This is one of the main tasks of the champion and to generalize the knowledge and to sustain and develop the whole VSM system. The basic principles are the five lean principles.



First is to understand fully the five lean principles:

1. Understand and define the value from the end customer side (Value).
2. Understand the value stream. Depicted the actual state current VSM (Value Stream).
3. Ensure the flow. Develop your processes and the whole organization to ensure the smooth and continuous flow of information and material (Flow)
4. Introduce pull system. (Pull)
5. Improve continuously your organization through perfection (Perfection)

Sounds nice and those companies who are devoted and think seriously can achieve results which we are going to show in a case study besides explaining the practical approach of building VSM system. Many companies make the “failure” and tend to build up their organizations by department and functions (Mike Rotter pg. 17.). So in this way departments are responsible for themselves and manager is responsible for “his” department. They will operate to their point of view regarding costly and productivity fulfilling the quarterly or yearly plans or not and this means past things that already happened. The correction of the mistakes and errors is too late. There is no customer vision on the middle and lower operation levels. No one is responsible for a product family the whole value stream perspective. This means that is very-very rare to find a person in a factory to know deeply the material and information flow.

Based on the Value Stream Mapping in production and office can be set up the full company operation and strategy where the BNVA is minimal. Lean Manufacturing through a VSM – Value Stream Map Analysis can help discover these wastes of resources and bring the process to a higher performance in just a few days or weeks depending on the company and process complexity. This system focus on flow and processes together building in processes the quality. Introducing in company the VSM as tool and strategy and operation in management VSm brings in the flexibility to handle the customer needs, to handle structured the problems playing “catch-ball” from bottom to top and inverse. People at all levels as administrative and production are involved in their daily operation in personal KAIZEN, team KAIEZN, Management KAIZEN. This means that information flows in all direction (top-down, bottom-up) and all problems are handled as short is possible. The VSMM support the organization to become a real lean enterprise (Don, pg 8.) providing structure to implement functions based on team thinking. The structure as a model runs as storyboards and any transformation or operation or modification is made consciously by any member of the company. The visual management encompasses the strengths of proven problem solving methods, like:

- Clear and concise communications between management and workers (storyboard)
- Proven tools are used for implementation
- Team recognition and ownership are includes from the beginning to end
- Management review and reporting are incorporated
- It provides a good form if visual communication (implementing IT technologies too)
- Changes and updates can be reflected as there occur
- Link together people
- Ensure the lean is sustained
- Allows everyone to understand and continuous improve his or her understanding of lean concept

- Makes possible controlled process flows on the floor
- Generates an actual lean design and also an implementation plan
- Require lean coordinator and VSM managers to keep process smoothly
- VSM managers are fully responsible to the whole VSM from head to tail

What does not mean does not involve:

- Just forming Kaizen teams and waiting for results
- Just mapping to show the material and information flow
- Just forming self-directed work waiting for results
- Appointing VSM coordinators to make them responsible for improvements

The model of VSMM in Hungary is implemented by Hungarian experts as in national and multinational companies. This proves that VSMM is not related by culture or any pre-existing company culture. Of course it is much more smooth where do exists a positive acceptance and the new things are not strange. The implementation is successful and it is shown in a case study. The VSMM is not about telling to people how to do their jobs more effectively it is about a systematic approach that empowers people to plan what, how, when there are going to implement their improvements that make easier to meet customer demand.

## **STEPS OF IMPLEMENTING AND RUNNING VALUE STREAM MANAGEMENT**

The implementation of project usually depends on the complexity of the product or the numbers of VS-s. First it is recommended to execute on a simple VS, where the main steps are considered to be are no more then seven (VA). In our case study the VSMM on the model area was introduced within 20 days and results could objectively measure on the next day after implementing the VSD in the new layout on the shop-floor. After the first action productivity increased 10.5. The lead-time was reduced from the 1600 minutes (and variable) to 150-153 minutes. After following up the project after one year with the KAIZEN implementations increased twenty-seven times as the initial stage.

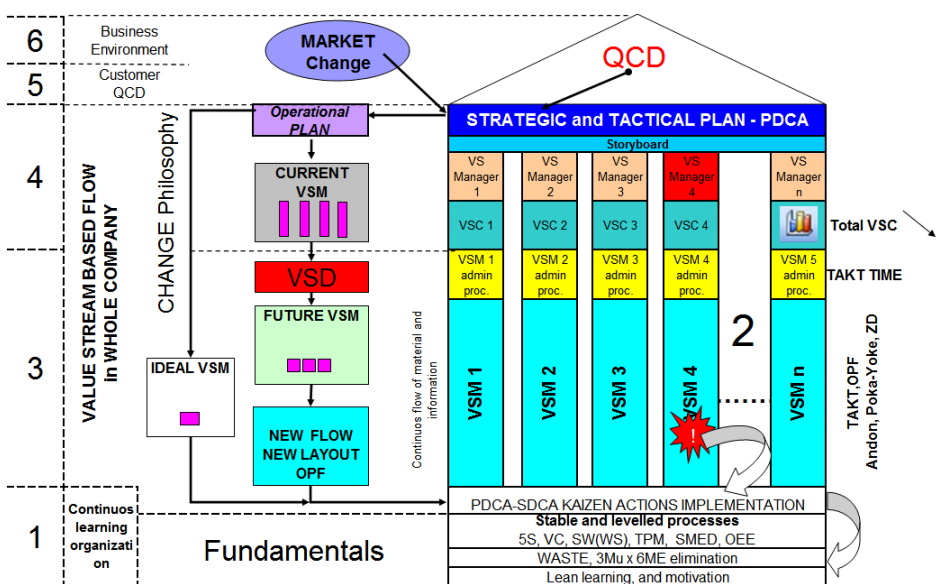
In the fundamental stage (INPLEMENTING VALUE STREAM MANAGEMENT–FUNDAMENTALS) ensure for the continuous learning organization to have stable production by revising the vision, strategy, paradigms, actions, behavior, knowledge if any problem occur. It was possible to do with VSM and lean training. It was trained to lean basics all the members of the project including management and shop-floor workers together.

All people must deeply understand and learn lean. They participated in a production where eliminating waste is basic productivity concept and requirement. (WASTE, 3Mu elimination)

They understood that the problems are their problems and the possibilities too. It is a must to understand the principles to cooperate for success. To create a continuous flow it is necessary to identify the product families and VSM and bring to surface the problems. One product family was chosen. Initially the engineering and all the management known that their products forms eleven product families. Lather by VSM analysis was proven that all the products can fit into four product families (*Figure 2*). This eliminates a lot of bottlenecks which will be presented (*Figure 6*).

Figure 6

The model of VSMM system



The view of the management and the perspective of the workers are different. To approach this two views was formed the storyboards which shows the material and information flow design. The data are collected partly manually and by management information system. It was promoted in this way the catch-ball. This promotes two-way communications and feedback. Both workers and management can initiate strategically and operational changes that support strategy and QCD. Motivation of people is a must. It is the management role to set up a well operating motivation system. As the shop floor workers and middle management has realized that the problems means possibilities. Also understand that quality can be realized only with stable basic processes. There are set and run stable balanced processes by implementing methods like 5S (Seiri, seiton, seiso, siketsu, shitsuke - the ultimate shop floor environment in production and office), Vc (visual control) ensure anyone to see production related events positive or negative (+ or -) and if any abnormality occur. By TPM (Total Productive Maintenance) and SMED-Single Minute Exchange of Die ensure the equipment to work with maximum efficiency less waste increasing OEE (Overall Equipment Efficiency). The TPM is set to stage three TPM III where are set the standards of cleaning, checking-controlling and lubrication. The OEE of automatic machines were increased with 40%. With the SMED actions it was possible to reduce the changeover from 66 minutes to 42 minutes after the first run. This was a 55.9 Mill HUF saving in one year. The reduction continued and within the one year reached to 30 minutes reduction. In the foundation happened the KAIZEN (The continuous improvement) and it is done and can have real effect. The ECRS (Eliminate, Combine, Rearrange and Simplify) four Kaizen principles are daily used

for reducing waste and improving processes. By applying also the Deming cycle to standardization process the SDCA-PDCA (Standardize, Do, Check, Act - Plan, Do, Check, Act) is ensured the development of all standard processes defined in Standard Work (SW) procedures and all Work Standards (WS) for all work steps where value added was done.

In production (2) figure \* which includes of course the basics too are set up the VS. Each VS is managed by one Value stream manager. This make possible to ensure and work in reality the flow concept and is ensured. There were defined the four VS. PRODUCTION (2) Is grouped in product families and organized and running conform one piece flow (OPF) the best flow conform variable TAKT TIME value streams (VSM1-VSM n) in production and office (VSM 1 admin proc.) too. These are managed by Value stream managers, who are full responsible for head-to-end value stream activity result and cost (VSC). In this way in any moment of production can be exactly estimated the cost of production and cost of MUDA. The production steps in VS are well designed by the 3.-4 elements. These are the made or modified or revised the current VSM conform strategy or operational change. Change induced by customer or market environment. After deep calculations and analysis are made the new Value stream is set up and the VSD (Value Stream design) the new layout and actions are designed. The production processes are strong redesigned with the administrative processes. This results the new future VSM's or Ideal VSM. The Ideal VSM is designed, if needed a totally new concept for production implementing innovation. Both generate strong Kaizen actions. The next step is followed by introduction immediately and other PDCA and/or KAIZEN actions so running the changes. Even on the normal operational all data are collected (online). In this way the production deviations, problems, bottlenecks can be immediately detected and (KAIZEN) or corrective action can be started (CAPD-PDCA). The PDCA has strong regulation regarding the time. This regulation must be set up by management from the very beginning. These VSM production data (Qty, Q) are shown on the VSM Storyboard and top management also can see the status and modify the strategy the operation or the tactics. The value stream cost is known so the total VSc is also can be followed online. Initially where is no possible to collect data by computer is reported as the management orders by 2-4-6-8 hours. Also the reaction is much more prompt to external factors as QCD change or market. There are used ZD (Zero Defect) tools to control quality like Andon systems and installing Poka-yoke devices many time invented by operators. Of course this takes time and it must be accepted also by maintenance stuff too. The role of maintenance also changes with VSMM introduction leading through PM (planned maintenance direction) and their efficiency is calculated conform OEE. The VSMM is fully "cross-functional" system involving with the possible best competence and attitude of work all the members who understand the lean concept.

### **THE CHANGE PHILOSOPHY**

If any change is planned in production in very early design faze is immediately known the positive or negative effect. The change may come from of business environment or

customer Discipline is a strong criteria at all levels and modifications can be done with common understanding only. Strategy can be initiated by anyone (top-down, bottom up.) which leads to better customer service. Starting from the strategy or tactics, there is set the Current State (a.) for material end information flow. By VSD (Value Stream Design) made the Future State (b.) or Ideal state(c) and is followed by the new layout change(d.) plans design and implementation action plans (Table 2) (Figure 7).

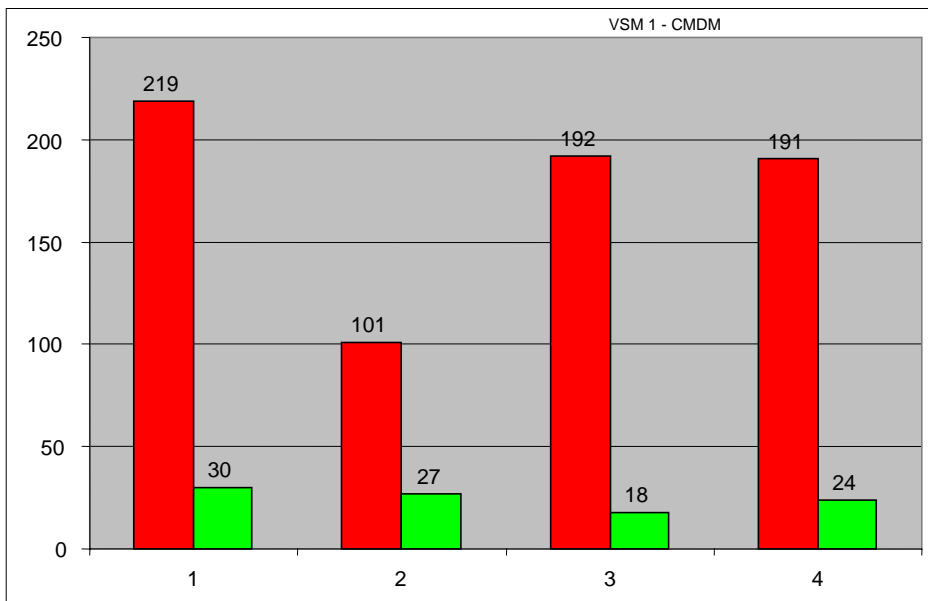
**Table 2**

**The result of VSD**

	VSM 1	VSM 2	VSM 3	VSM 4
Current state	219	101	192	191
Future state VSM	30	27	18	24

**Figure 7**

**The result of VSD**



**CONCLUSIONS**

The Value Stream Management as system has been proven its potentials. The VSM made possible to drastically reduction of Leadtime which improves quality. Costs also were drastically reduced and the cost structure can be optimized. The Cost of labor can be optimized. The case study results in Table 2 and Figure 7 show the efficiency of VSMM.

- Initially the production has been run in 11 VSM instead of 4 VSM.
- Lead time (LT) was reduced from instable 1600 min to 152 min ✓.

- Space freed 20%, ✓
- Scrap decreased from 1.13% to 0.67%. ✓
- The development totally took 20 days.
- The results came in the next day after the new layout introduction. ✓
- Production is stable. ✓ After one year the LT is reduced 27 times. ✓
- The quality of the people increase

These effects can be presented in the managerial accounting and controlling system and with their methods the planning and organization of production can be quickly optimized. Also contributes to the improvement of efficiency of the management information systems such is controlling, accounting, financial planning and information technology.

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