

Implementation of Standard Work in Healthcare Industry

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Abstract

Standard work is an effective method for the continuous improvement of manufacturing systems. It is a useful tool to document the most efficient method to create a product or service and describes how tasks are executed consistently by anyone. Standard work helps to maintain the quality, provides efficient operations, and ensures the proper use of tools and equipment. It finds application in various organizations to manage their tasks effectively and efficiently. Standard Work helps to train employees to identify and eliminate non-value-added activities such as unnecessary motion, waiting, and defects, thus significantly reducing the time to complete the task. Standard work acts as a diagnostic tool, by exposing the issues and promoting continuous improvement. Even though this is a very helpful tool, it is often overlooked and underutilized. The purpose of this paper is to demonstrate the utility of this Lean Manufacturing tool. In this paper, a lifecycle management project in the healthcare sector is used as an example of application. The Healthcare sector consists of various critical manufacturing processes and defects that require critical attention and quick solutions. The main findings are, that lead time can be decreased by approximately 22-25% with the implementation of Standard work and is effectively a good tool to train the employees easily and to normalize the work procedures with increased flexibility and production, and decreased waste, errors, and lead time.

Keywords

Standard Work, Lean Manufacturing, SIPOC and Swimlane.

1. Introduction

Any of the healthcare industry, which is leading in the marketplace today, understands the significance of basic standards, what is acceptable and what is not acceptable in quality of service, safety of patient, policies for employees, etc. Standard work characterizes such an organization, in both its management activities and daily operations. The standardization-practicing organisation has systems in place for developing standards and the standard work, conveying them clearly, adhering and maintaining to them, and supporting their continuous improvement. Standard work is critical in healthcare operations for reducing waste, maintaining patient's safety, optimising flow, attaining balanced and synchronous healthcare service production (Thomas 2012).

We spend a lot of time in healthcare debating which norm to follow since there are many instances where "expert opinion" reigns supreme, and everyone is an expert. It's significantly more necessary to agree on standard practise first, then follow it and enhance it. A standard is an example or a rule that sets clear expectations. Continuous improvement method depends on setting, improving and identifying the standards. Without any initial standard, we can't measure the effectiveness of the improvement to achieve a standard, we can't improve the standard, we can't set additional goals and can't achieve the goals. Standards are foundation of all improvements, and new standards defines the revolutionary goals you pursue to achieve the continuous improvement (Shingo 1989).

Standard work is the depiction and documentation of the current most effective way to create a good or service (Sundara, Balaji and SatheeshKumar 1989). It separates the project into the qualities and components required to comprehend and repeatedly carry out a procedure. One of the most effective tools at our disposal in our never-ending quest to apply the Toyota Production System is Standard Work. System (Shingo, 1989). Taiichi Ohno developed the lean production system known as "Standard Work" in 1950 (Ohno 1988). Standard Work consist of the three key elements (Monden 1998):

- Standard Lead Time: Lead time is the amount of time that elapses between the beginning and end of a procedure.
- Standard work sequence: a group of tasks performed in a specific order that reflect the best and safest approach to complete the assignment. The personnel reliably and frequently complete these jobs throughout time.
- Standard work-in-progress: This is the very minimum amount of inventory that should have been kept on hand to enable uninterrupted production and a steady flow.

Standard work is a set of processes included in a project which is called as a standard routine has the aim to establish the methods and a particular sequence in which everyone works. Processes should be followed in the same manner they are documented with no improvisation, sometimes it is called inflexible standard work (Arezes, Carvalho, and Alves 2010). Standard Work is a document which defines how activities in a project must conducted which prevents the workers to perform the processes randomly in any sequence which, reducing the chances of variability, as with changing the people ways of doing the task changes, which then leads to mistakes(Feng and Ballard 2008) This methodology do not indicate that all the work should be done in the same way but there should be a particular way in which any process should be done even if the employee changes, so that the preferences of the individual are eliminated(Wigglesworth and Wood 2012).

This reduced randomness in performing the processes in manufacturing operations can decrease the lead time as the waiting time is reduced. It means that the use of these restriction relates to Mura elimination. Mura means Variability. Due to reduced variability safety, planning, quality and efficiency can be increased (Womack and Jones 1996). Standards in a work is the base of continuous improvement. Documenting the standard work it is possible to implement the Kaizen Methodology. Standard work do not indicate that this sequence of doing project cannot be changed but it indicates that "this is the best way we know how to do this type of work today" (Wigglesworth and Wood 2012) and (Duggan, K. 2012). This methodology may require time as well as efforts to keep the documentation maintained. But, implementing the standard work can change the culture of the organization (Duggan, K. 2012). It assures identification of value add activities, i.e., it shows the activities that maximize the quality and minimize the waste (Spear and Bowen 1999).

Without standards, it is quite difficult to differentiate between normal and aberrant behavior, and there are few opportunities for ongoing development. Things will be in a chaotic state, and we will be responding to future fires without understanding the underlying source of the first issue. Once there is strong standard work, it is simple to spot "exceptions," resolve the problem, and take preventative actions to stop the issue and rework from happening again. First of all, we must comprehend that standardization does not restrict our flexibility but rather serves to uncover opportunities for growth and lower variability. A suitable standard of work makes it simple to train people, resulting in a flexible workforce that produces high-quality work at a lower cost (Feng and Ballard 2008)

Regular events stay undifferentiated if there are no standards. Standard Work consists of a predetermined series of repetitive operations that are balanced to lead time, allocated to a certain task owner. The employee will find the safest and easiest method when the Standard Work is properly applied. It is a valuable and cost-effective method for the business to guarantee the consumer receives a high-quality product or service (Brent 1998). By establishing consistency through Standard Work, the line for anomaly detection is created. Possible improvements are established once there is a set of criteria that are uniform. Utilizing efficient procedures, regular operations and processes enable productive manufacturing with minimal waste. Personnel become even more versatile if they have a good understanding of how tasks are to be carried out. They also have more time to be creative, which increases the quality of their work and reduces waste(Hani, Haitham and Hassan 2018).

1.1 Benefits of Application

Standard processes produce efficiently with minimum amount of waste, using the effective methods. With proper description of the processes to be done, employees become multivalent as they have sufficient information. (Losonci, Demeter and Jenei 2011), According to Emiliani (Emiliani 2008), Standard Work has number of advantages such as:

- Continuous improvement
- Reduced Lead Time
- Reduced variability
- Train employees easily
- Improved quality and flexibility
- The stable results
- Abnormalities can be predicted

Standard work improves performance immediately after implementation by boosting productivity and cutting down on lead times. By providing them with a standard against which to compare their suggestions for improvement, the work standardization enables operators to increase their inventiveness and entrepreneurialism. Additionally, it is feasible to have increased internal visibility, involved and organized operators, and management staff who pay closer attention towards the operations (Brent 1998).

The most fundamental and efficient strategy for sustaining manufacturing system improvement is standard work. Therefore, employees from the top down should be able to identify routine tasks. The right use of tools and equipment, efficient operations, and the maintenance of constant quality are all benefits of standard work. Many firms use standard work to successfully and efficiently handle their tasks. In order to characterize distinct types of waste, the staff should be taught and trained to reduce system waste by recognizing and removing non-value-added tasks including excessive motion, waiting, and errors. Inevitably, standard work lowers overall development expenses and raises the degree of work control (Emiliani 2008).

2. Methodology

In order to employ the Action-Research approach, the researcher must be actively involved and follow a five-stage cycle (O'Brien 1998):

- **Diagnosis:** First, the company's present method for documenting the processes involved in projects was examined. Following this, a few issues were found, such as the absence of a paper outlining the precise steps to finish a project.
- **Action planning:** An action plan is created using the three key elements. Accountable person for each process, activity, or task (Who), description of the process, activity, or task to be completed (What) and the sequence of processes, activities, or tasks (When).
- **Action taking:** The Standard Work tool was implemented, with the creation of two distinct documents: (a) Swimlane Diagram (b) SIPOC Diagram
- **Evaluation:** The project managers on the team and all the stakeholders in this project studied and discussed the outcomes brought about by the application of Standard Work.
- **Learning specification:** The project's key lessons were recognized, and some reflections on the project's results were carried out.

2.1 Case Study

The Implementation phase of the Standard Work, which involves using research methods, is elaborated in this section. All documents in the case study will have samples available. To preserve consistency, these examples will be linked to the same project.

2.2 Swimlane Diagram

Understanding how the industry functions and what has to be done is the first step in implementing standard work. To help comprehend this, we provide swimlane diagrams that are a straightforward visual representation of the project procedures. The order in which the procedures must be carried out in order to finish the project must be specified before a swimlane diagram can be created. Swimlane diagrams are regarded as a crucial tool when testing Project processes to stakeholders as they are seen to effectively and efficiently communicate information regarding process

models (Anand and Vicki 2014). A swimlane diagram is a type of flowchart that shows what each step of a process entails. A swimlane diagram, which places process stages inside the horizontal or vertical "swimlanes" of a specific employee, group, or department, promotes clarity and accountability by using the analogy of pool lanes. It highlights waste, repetition, and inefficiency in a process (Aldin and de Cesare 2011) by illuminating linkages, communication, and handoffs between various lanes. This swimlane diagram shows the changing of the a common part in an X-ray machine project (Figure 1).

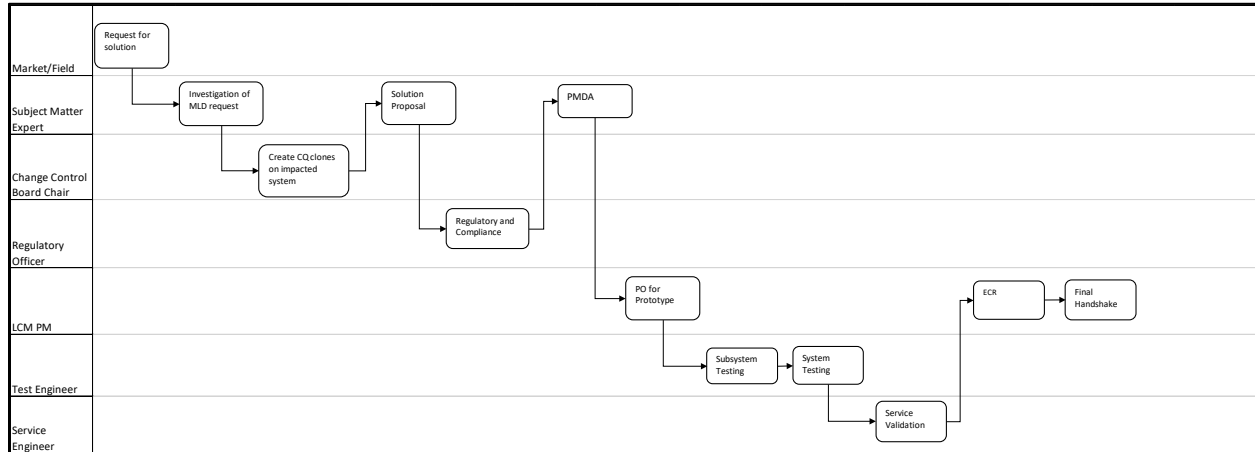


Figure 1 Swimlane Diagram

SIPOC Diagram: We must thoroughly research the process to comprehend the suppliers, inputs, outputs, and customers involved in order to develop a SIPOC diagram. Here, the exchange of information between participants in a process is displayed, and this information is frequently utilised to analyse or enhance customer experience processes. SIPOC diagrams provides stakeholders a higher-level process map to assist in decision-making and the generation of improvement suggestions; they are not intended to provide details (Figure 2). SIPOC diagram are one tool for business management system in this sense (BPM). BPM include analysing processes, formulating improvements, and putting those improvements into practice (Yuli and Ong 2019).

Supplier(S)	Input(I)	Process(P)	Output(O)	Customer(C)
Market or Field	CQ and SCR	Request for solution	Accepted CQ	DHF Owner
DHF Owner	CQ	Investigation of MLD request	CQ Investigated	LSD
Mechatronics CCB	CQ	Create CQ clones on impacted system	CQ Clones	LSD
LSD	Impact Assessment	Solution proposal	Solution Proposal	LSD
LSD	Solution proposal	Regulatory Documentation	Regulatory Documents	LSD
Service Engineer/PE and Regulatory	FCO Manual and upgrade manual	PMDA	Released PMDA	LSD
PM	PMDA	PO for Prototyppe	PO	Procurement
Test engineer	Solution proposal	Subsystem testing	Subsystem Test Plan	tester
System Test engg	Solution proposal	System testing	System Test Plan	System Tester
Customer service	Solution proposal	Service validation	Service Validation Plan	Service
LSD	Regulatory document and manuals PMDA	ECR	Released ECR	LSD
LCM PM	Released ECR	Final Handshake	Handshake Acceptance	Best Factory

Figure 2. SIPOC Diagram

3. Results

Swimlane diagram gives an easier visual representation of the processes involved in the project. Who should do what work and in which sequence is presented in a simple format. From the data obtained from the previous projects the lead time is determined for each activity.

Table 1., shows the lead time required for each activity before using the standard work and after using the standard work. From the data available percentage reduction in lead time is obtained (Table 1).

Table 1. Lead time analysis

Process	Before SW(Days)	After SW(Days)
Request for solution	3	2
Investigation of MLD request	10	7
Create CQ clones on the impacted system	5	3
Solution Proposal	16	12
Regulatory Documentation	11	8
PMDA	13	10
PO for Prototype	12	9
Subsystem testing	17	14
System testing	21	18
Service validation	9	7
ECR	8	5
Final Handshake	15	12
Total	140	107
Percentage reduction in time to complete the project= 23.57%		

By eliminating waste like waiting times, searches, and information corrections that result in rework, both in the project area and later in manufacturing, the application of standardisation in product development also significantly reduces lead time. With the calculations it is found that there is 23.57% reduction in lead time to complete the project.

4. Conclusion

When used properly, seemingly basic methods can occasionally result in significant breakthroughs at cheaper prices. Lean production's central tenet, which encourages making more with less, is taken into account when implementing the standard job. Because of this, the corporation need not make a significant investment. The company now has a foundation for documenting the numerous project-related procedures thanks to the standardisation of the processes through Standard work. These documents are crucial for giving staff more flexibility, as well as for boosting productivity and reducing variability to the point where they can reduce a variety of wastes and manufacturing failures. Thus the advantages of applying Standard Work proved to be:

- Train employees easily
- Reduce lead time
- Reduce variability in process
- Better control on project processes
- Reduce rework

Standard Work is useful for simply documenting the Project procedures contained in projects. It is more interactive and simpler to grasp when typical work is documented using a SIPOC (Supplier, Input, Process, Output, Customer) diagram and a process flow chart with swimlanes. Employees can quickly comprehend the project process by standardising the job instead of constantly asking someone who is familiar with the procedure for assistance. By employing standard work, waste and rework can be decreased. Because there can be no improvement without a standard, standard work can be utilised as a tool for ongoing improvement.

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Biographies

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