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Synergy between Value Methodology and Continuous Improvement

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Abstract: Every company strives to maximize return on investment by combining distinct industrial engineering techniques, such as value engineering, continuous improvement methodologies, six sigma, theory of constraints, 5s and other industrial engineering techniques. This article emphasizes a comprehensive approach to improve a process by looking at how value engineering and lean six sigma overlap. Despite the limits of value engineering and lean concepts, the integrated approach looks for places where both techniques could be used together to increase the advantages that go beyond what is attainable with a single strategy. Value engineering and lean six sigma research looks at the advantages and disadvantages of both methodologies and identifies places where they might complement one another. The study of these methods pinpoints areas in which value engineering and lean concepts complement each other. Continuous improvement strategies have advanced as evidenced by the formalization of activities, their distribution across disciplines, and the introduction of hybrid approaches. The development of hybrid techniques, in particular lean and value engineering, is the main topic of this study. It is recommended that hybrid techniques be implemented using interchangeable use, concurrent use, and integrated use models; however, the literature neither provides distinct model definitions nor a formal framework to guide model selection. This framework's goal is to make implementation easier and lay a consistent foundation for future growth, which will ultimately lead to better and more successful long-term implementation.

INTRODUCTION

Companies that prioritize performance improvement, customer satisfaction, cost reduction, enhanced efficiency, and organizational and process purity will have an advantage in the marketplace given the degree of competition among enterprises throughout the world. Lean six- sigma strategies can help us with this since they identify waste and eliminate sources of these wastes. Value engineering on the other hand identifies a product's or service's functions and develops them for the cheapest price while keeping the highest standards of quality and safety. Businesses need strong strategies in today's global competitions if they want to survive and flourish. Manufacturing companies must be reorganized in order to succeed in the current unstable economic environment. This calls for new product design, contemporary reconfigurable production technologies, a worldwide strategy-integrated business model, and management techniques leveraging modern management models and tools. The main aim is to innovative ways of identifying wastes in production lines using hybrid methodologies such as value engineering and six sigma. The convergences and divergences of these methodologies when used in conjunction for the continuous process improvement of industrial environments to improve production. This study will depend on how widely firms embrace strategies that place a strong emphasis on continuous improvement; in general, these strategies have already hit their performance threshold given the level of market complexity and competitiveness that exists now. It is also critical to identify the components of various strategies in order to enhance the current approaches that depend on continuous improvement in the face of international competition [1].

VALUE ENGINEERING

We must address these issues if we want the industry to be more competitive in an environment where the market is becoming more demanding and competitive. The tools should provide the necessary support to develop operational strategies that are simple to implement and quick to resolve since the management system needs to be prepared to react appropriately. Value engineering is a problem-solving strategy that aims at improving the value of a product or service and reduces cost. Value engineering is used to inform choices based on an organized multidisciplinary approach and function measurement to optimize the value of a project. By ascertaining the functionalities required to arrive at a desired objective value, this might be achieved. These jobs can also be completed via value engineering with the required performance, for the cheapest price, and with the highest level of consistency in quality. Value engineering (ve) is described as "a systematic application of recognized techniques which identify the function of a product or service, establish a monitory value for that function, and provide the necessary function reliability at the lowest overall cost," by the society of american value engineering. Value engineering technique, often known as the job plan, is a methodical way of thinking about, analyzing, or assessing a process from a functional point of view. It necessitates a thorough evaluation of the functions that costly parts, components, products, machines, procedures, services, and other things play in society. The standard names for the value methodology are value analysis (va), value engineering (ve), and value management (vm). The job plan is a method for figuring out what goes into making a product or service; it entails assessing those requirements and then selecting less expensive alternatives. It is a strategy for achieving the finest results to raise the standard, security, dependency, and convertibility of every financial unit. Ve is frequently utilized to study and design products and services. In its most basic form, ve is

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Amethodical way of considering things from a functional view. Though ve is an effective tool for reduction of cost, there is often a tradeoff between cost and functionality.

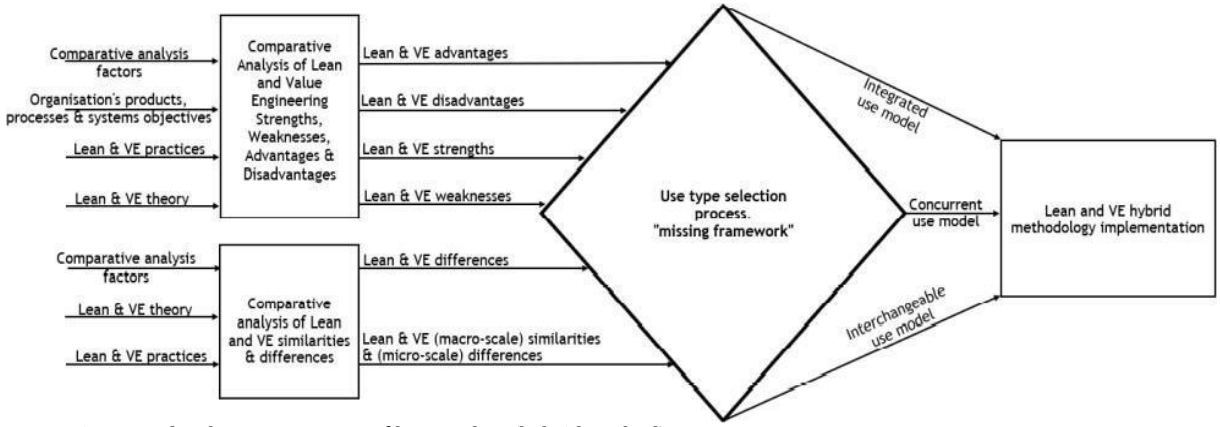

Figure 1: development process of lean and ve (hybrid method)

HISTORY OF VALUE ENGINEERING

Value engineering is a technique for reducing the cost of goods and services by utilizing technical ideas. These solutions seek to offer the bare minimum of quality at the most affordable price. Cost. Ve technique is driven by the function that must be performed and the value that can be realized. Therefore, value engineering is not viewed as A method of minimizing costs by lowering unit costs or by sacrificing quality and appeal.

While certain standards must be met by all designs, value engineering projects shouldn't be made mandatory for all designers. Fix mistakes caused by bad planning

Reduced appearance and quality are two ways to cut costs [2].

Value engineering aims to deliver goods and services that are at least as good as anticipated while minimizing expenses.

Value engineering requires a skilled team to assess and increase the value of goods, services, designs, structures, and technologies. Along with fixing issues and saving money, value engineering can also meet the project's quality standards or increase performance. Based on the relationship between function, quality, and cost, the following value engineering options might be applied during the design process. Saving money without compromising performance or quality

Increased worth or quality while maintaining the same cost

Increasing the cost will improve the quality and function

Enhancing features and functionality while lowering costs

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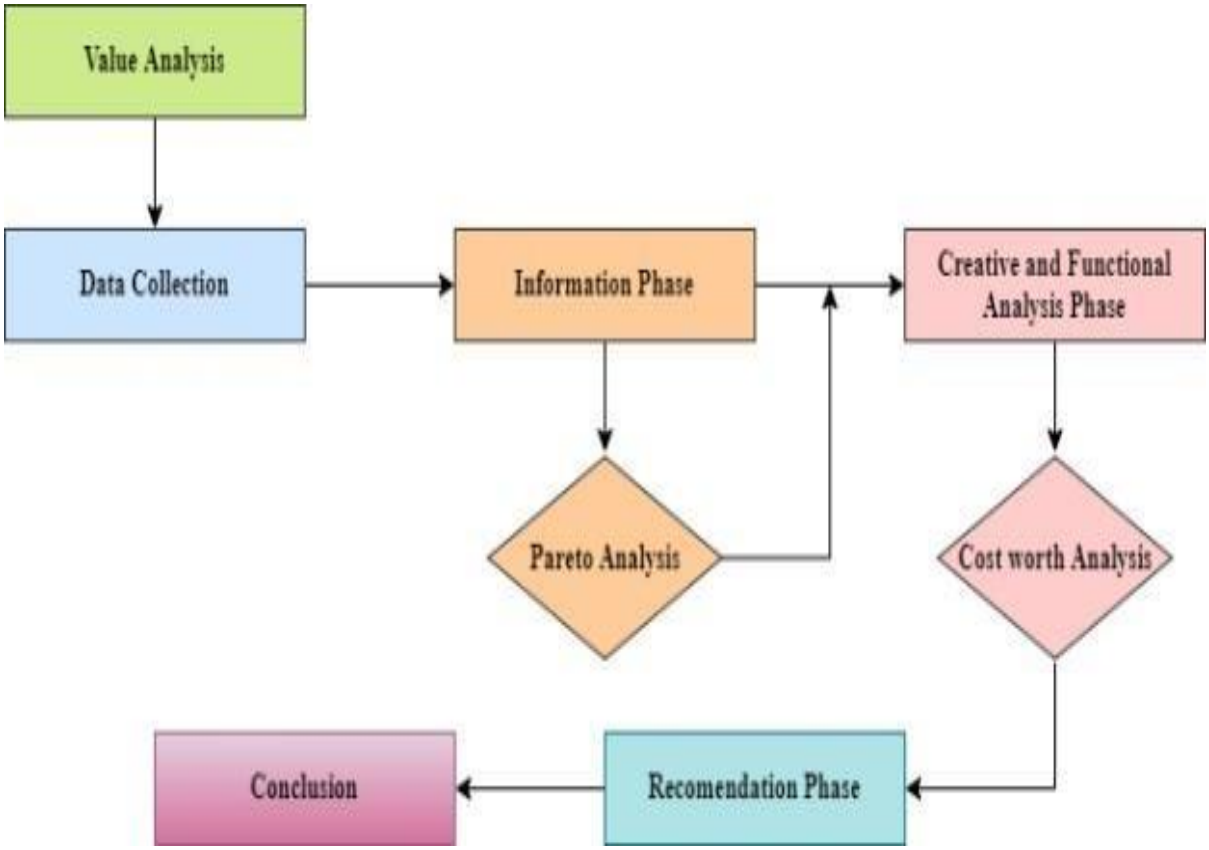

Figure 2: job plan for implementing value engineering

VALUE ENGINEERING METHADOLOGY

Eight phases make up the ve approach, often known as the job plan

Orientation phase

Information phase

Function analysis phase

Creative phase

Evaluation phase

Development phase Presentation

phase

Implementation phase

Value study is the process of using an approach to resolve a problem. A workshop style is typically used for the value study, with the exception of the orientation and implementation phases [3].

ORIENTATION PHASE

Given that the problem has been made obvious, the workshop is ready to start the orientation phase. If adequate time has been allotted to planning which areas of the problem will be handled in detail and getting everything ready for the analysis, the value study and workshop will have a higher chance of success. A good working relationship between the project manager who is funding the study and the study team leader is crucial to a successful outcome throughout these first activities.

INFORMATION PHASE

The information phase gathers and analyzes the data, fosters team cohesion, and creates the precise specifications for the problems that need to be fixed, along with the improvement goals and evaluation criteria. The actions that were started in the

orientation phase are typically finished in the information phase. This task is typically completed in a workshop format, and if a pre- workshop introduction meeting was not arranged, it is frequently the first chance for all team members to get together. Therefore, the information phase should be utilized to inspire the team to concentrate on a single objective. The ideal actions include finalizing the scope of the issues that need to be addressed, the improvement goals, the assessment standards, and the data gathering and analysis initiatives.

FUNCTION ANALYSIS PHASE

The most advantageous study topics are chosen in the function analysis process. The job plan is built on the analytical work completed in this phase. The value approach employs function analysis methodically, which distinguishes it from other improvement techniques.

CREATIVE PHASE

The creative phase generates suggestions for alternate methods of performing each function chosen for further investigation. Techniques for solving problems analytically and creatively are the two options. The analytical technique presents the issue and resolves it in a clear, step-by-step manner. Frequently, an analytical problem has simply one viable solution. It is inappropriate to use an analytical approach throughout the creative process. A multitude of answers might come from using the creative process. There is only one that is the best, notwithstanding the possibility of each choice. Out of all the options, it is the best choice. After developing a list of prospective solutions, it is required to analyze them, and this is accomplished in the latter stages of the work plan.

EVALUATION PHASE

The best concepts are chosen and enhanced during the review phase to produce accurate recommendations for value improvement. The decision-maker should then be given a finite number of options—possibly no more than six—by the group. Throughout the entire creative

Process, it was purposefully avoided because judgmental thinking stifles originality. In order to find the finest prospects for value improvement, every choice must be carefully analyzed during the evaluation process. There is still time to postpone ideas after this. A thorough cost-benefit analysis carried out throughout the development phase results in the decision-maker being given with a final set of possibilities.

DEVELOPMENT PHASE

The "best" alternative(s) to suggest to the decision maker are chosen throughout the development phase. In-depth technical studies of the surviving options are performed in this step. These investigations serve as the foundation for removing choices that fall short.

PRESENTATION PHASE

A promise to pursue a course of action and start an alternative is made during the presentation stage. At the end of the session, the ve team presents a presentation to the decision-maker (or research sponsor). To inspire dedication, the only action allowed at this time is creating a presentation. The best approach to market a concept is through an oral presentation. It ought to have an effect and keep management and other stakeholders satisfied. The ve team gets the opportunity to assess whether the written proposal is accurately comprehended and whether the parties involved are effectively communicating during this presentation.

IMPLEMENTATION PHASE

The implementation phase's goals are to carry out the proposal and get final approval. The team should be aware of the elements that support successful change during this phase (da silva de santis sh).

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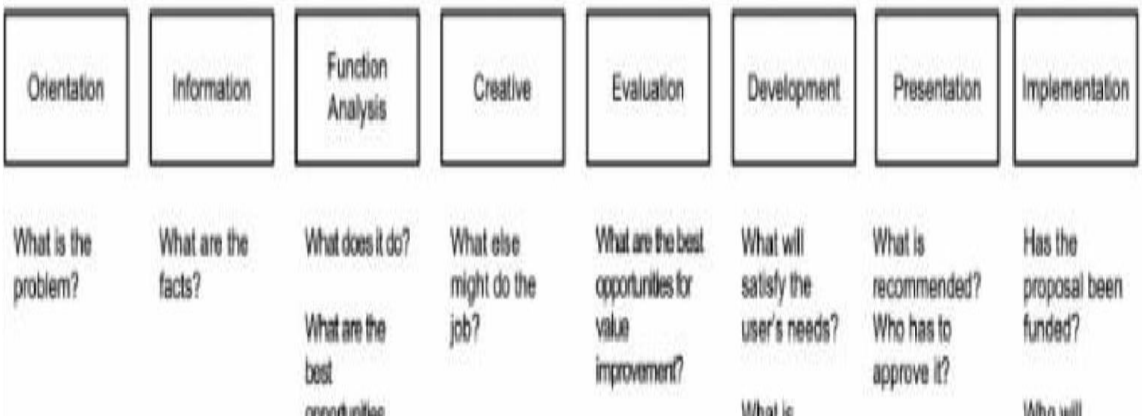

Figure 3: multiple phases of job plan (value engineering, 2011)

JOB PLAN TECHNIQUES

The value approach is a rigorous, organized process that aims to increase value. This process is referred to as the job plan. Instead of a collection of differing viewpoints, the job plan provides a series of tasks that must be carried out to encourage team cohesion within a structured procedure [4]. The tasks carried out at each stage of the job plan will inspire the group to come up with concepts

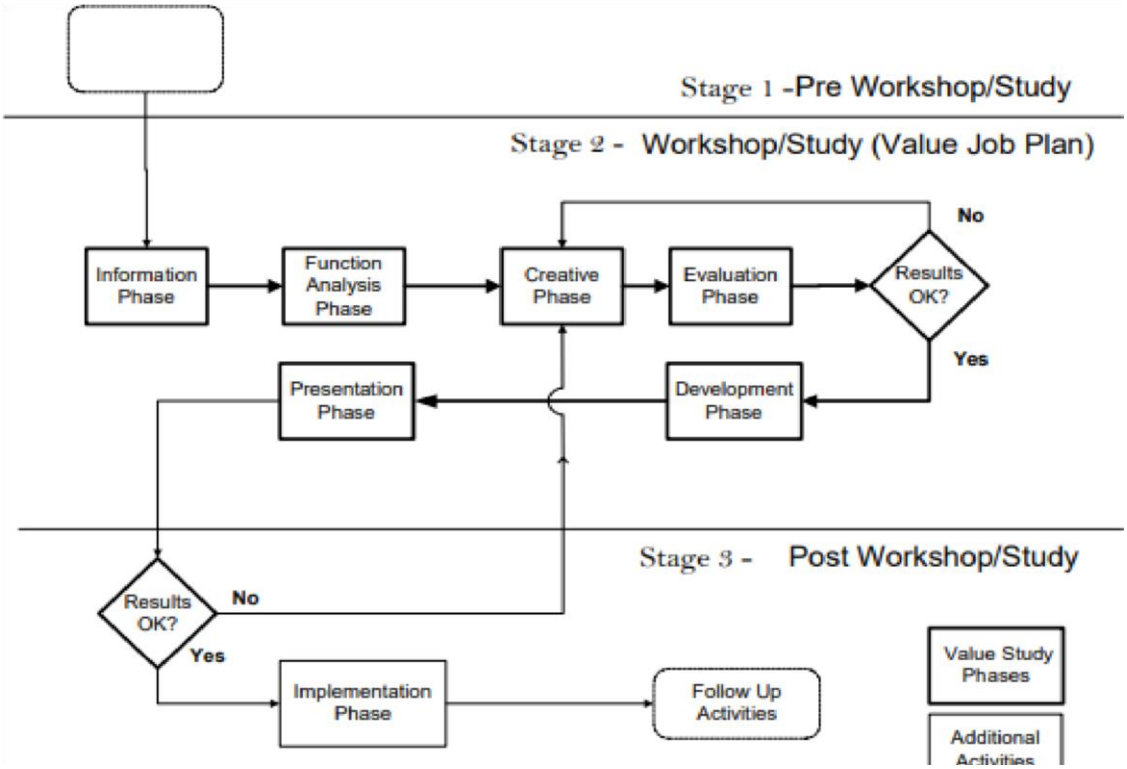

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Figure 4: techniques of job plan

And then refine them into variations of the original concept or design. The team and other project stakeholders should be aware of and identify the principal and supporting functions of the project. If fundamental operations are not preserved, the intended study objectives cannot be accomplished. The project's objectives are analyzed in relation to the contributions of secondary roles. Businesses can manage innovation to give a persistent competitive advantage that results in success by clearly communicating functionality (using function analysis and fast). The picture below is an example of a task plan's process flow. Since each step of the task plan provides the knowledge and understanding required for the succeeding stage to be effectively completed, each stage must be completed in order. A prior phase might be reviewed when the team learns more about the undertaking.

BENEFITS OF VALUE ENGINEERING IN LEAN

When evaluating what should be changed, ve's function analysis shows regions that cost more than they are worth. Engineers are responsible for understanding and delivering the requirements because in ve, function and implementation are separated. In order to come up with alternatives for important chores that are more expensive than valuable, ve uses methodical brainstorming. Lean brainstorming to identify and address the underlying causes. Since functional thinking is not frequently employed to analyze products or services, the structured invention process is enhanced by ve in a way that produces a lot of ideas. By assessing the viability and efficacy of the alternatives, ve develops solutions. Finding linkages, parallels, and differences among the diverse improvement methodologies under discussion, such as ve and lean, is essential.

The greatest advantage, though, comes from spotting where any two strategies might overlap. For example, the graphic below depicts a dmaic process that can be enhanced utilizing the value engineering function analysis approach.

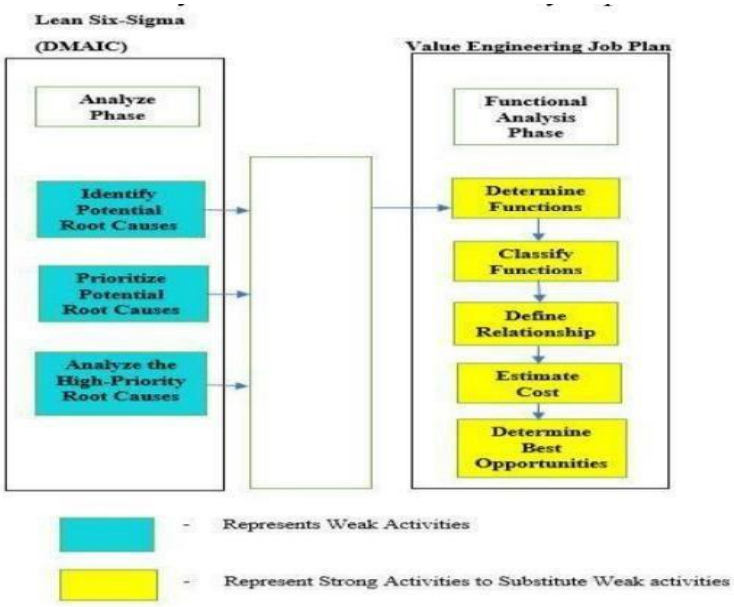

Figure 5: dmaic process enhanced using ve

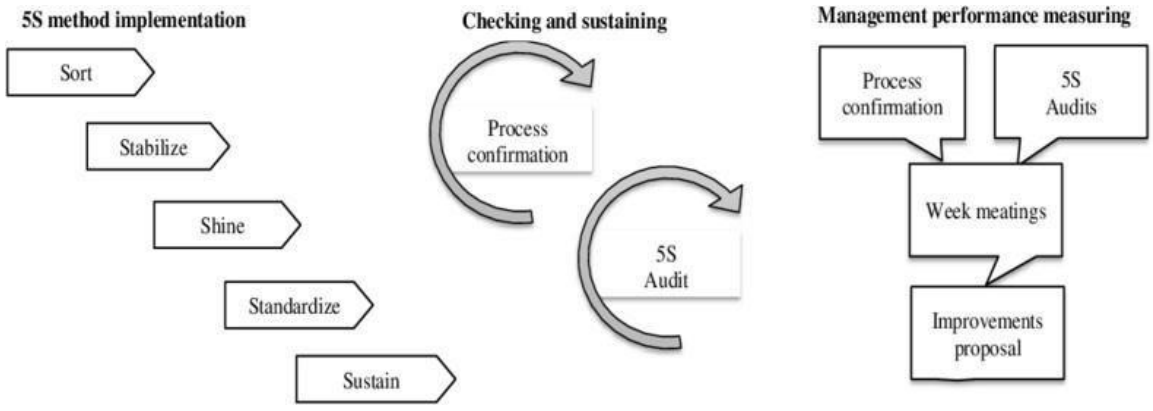

Figure 6: 5s in development or creative phase

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Five powerful actions from the functional analysis phase of the ve methodology could replace three potential activities from the analyze phase of the lss dmaic methodology, including finding potential root causes, prioritizing potential root causes, and analyzing high priority root causes. Additionally, by swapping three powerful activities from the evaluation phase of the ve approach and one powerful activity from the development phase, the improve phase of lss dmaic, which includes three potential activities, can be improved. This includes finding ways to make processes leaner, figuring out how to get rid of waste, and figuring out how to keep getting rid of waste [5].

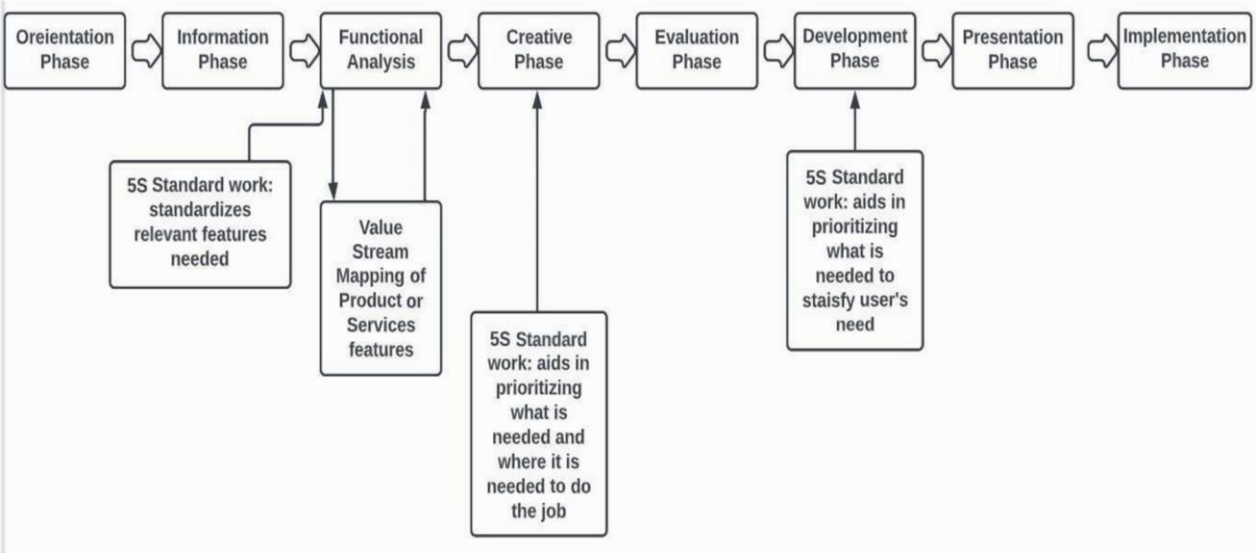

Figure 7: the synergy of ve and 5s

BENEFITS OF LEAN PLAN IN VE

Lean concepts uses a variety of improvement tools, including as ishikawa diagram, 5s, pfmea, 3 legged 5 whys, while determining root cause of an underlying waste in production. Ve functional analysis stage and creative phase can be made more robust by adopting one or more of these techniques to achieve potential advantages and practicality of execution. On the one hand, the front-end data collection process used by lean concepts is more extensive, on the other hand, ve method only focuses on cost information. The lean concept framework gives an insight on the overall procedure and points out the location that needs improvement. Value stream mapping could be localized to a product and its functionalities to provide additional insight to the function analysis phase of the job plan.

In addition, the lss dmaic methodologies improve phase and three control phase activities can be combined to enhance the implementation phase of the job plan, which consists of three activities. These three activities are
Increase probability of approval

Monitor progress

Expedite implementation

CONCLUSION

The hybrid of value engineering and lean thinking is a force to reckon in a fast paced and an ever-changing world in dire need of continuous performance improvement. Though research has been conducted and is still on going on merging of value engineering and lean thinking in industries such as construction, health, hi-tech companies etc. Some organizations have adopted the hybrid of these two methodologies which yield high performance improvements. Value engineering and lean methodologies are excellent for addressing a range of issues that businesses face. Each of them possesses some skills that could be applied in different sectors of a company. 5s standard work is an improvement tool that can be applied not just on the production or manufacturing floor but also in the administrative and planning processes. When applied to these sectors in the industry, it will give room for continuous process improvement as the process will be standardized and with the standards (5s) put in place, maintaining the process will be easier, faster and cost less.

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FUTURE WORKS

It can be noted that value stream mapping which is a powerful tool in lean, can be localized to a particular product or process, to illustrate the flow of usage of its features and information. This will be useful during the design phase of a product or process [6].

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