



A SIX SIGMA ANALYSIS TECHNIQUE FOR EVALUATION OF CHRONIC LOSSES IN AN INDUSTRY OR CONSTRUCTION WORKSHOP

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ABSTRACT

Many industries are bestirred for their production improvement in competitive environment. Here several old processes are still diminishing the cycle time for their production. Various industries or construction workshop are using the Group decision support system (GDSS) process for envisaging the useful function of product and service. Some of them are implementing Function analysis system technique (FAST) for better enrichment of construction workshop. In this paper the author has developed the six sigma analysis technique (SSAT) which could be better approach for evaluation and reduction of chronic lossess. The six sigma analysis techniques (SSAT) is a statistical approach of six sigma. Here the technique has been used for restoration of previous results of the construction workshop and this six sigma analysis technique has been integrated with Group decision support system (GDSS).The author developed elaborated corrective action for the construction workshop. The Six sigma analysis technique (SSAT) has been used as a hierarchy action for the analysis which could be a useful approach for real time execution of progress in construction workshop or an industry.

Key words: Function analysis system techniques, Group decision support system, define-measure-analysis-improve-control, upper control limit, lower control limits

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1. INTRODUCTION

Major implementations have been adopted in Group decision support system. The Six sigma analysis technique is a systematic approach for the testing performance in several workshops.

The outcome has been suggested for construction workshop. Here outcome has been gathered by each team expert's from value management (VM) workshop and the manipulated results have been processed by using six sigma analysis technique. This is very useful effect to yield the action of workshop. Earlier the Value Management workshop had adopted Function analysis system technique (FAST) for the test performance [15]. Here the six sigma analysis techniques (SSAT) play a role action as a major stream to minimize the rework. It can be used as an effective tool to reduce error. It is a dynamic way to assist the team member by using the previous data. Slam et al. reviews the methods in decision-support systems for crisis management. While much research has been conducted in this field, little emphasis has been placed on the uncertainty representation, reasoning, learning and real time decision-making capabilities of system [11]. Stiel et al. described the current life cycle assessment software landscape contributes not sufficiently to the dynamic behaviour of manufacturing and transporting systems. This work presents a conceptual framework as well as conceptual software architecture to foster the integration of life cycle assessment software tools with dynamic manufacturing and transporting decision support tools. The results reveal interfaces and overlap between the existing life cycle assessment and decision support concepts as well as starting point to bridge this existing gap between static and dynamic approaches [4]. The Group decision support system (GDSS) support to communicate their functional performance of job while the six sigma analysis technique (SSAT) approach helps the team member for reducing the time management activity. At this stage the six sigma analysis technique (SSAT) approach used the data from group memory of collected information from value management workshop. A situation awareness support system (SASS) has therefore been developed to handle (Two times repeated has therefore been developed to handle) uncertain situation [7]. The evaluation benefits and challenges of six sigma practice and identifies the key factors influencing successful six sigma project implementation [16]. Yue et al. develops a theoretical base for the effect of six sigma projects on innovation and firm performance [8].

In the present scenario we simulate a situation of deviation in completion of work or process such as chronic losses. It supports to control of deviation in manufacturing process of job in workshop the aim of control action is preventing the deviation in the goal of workshop.

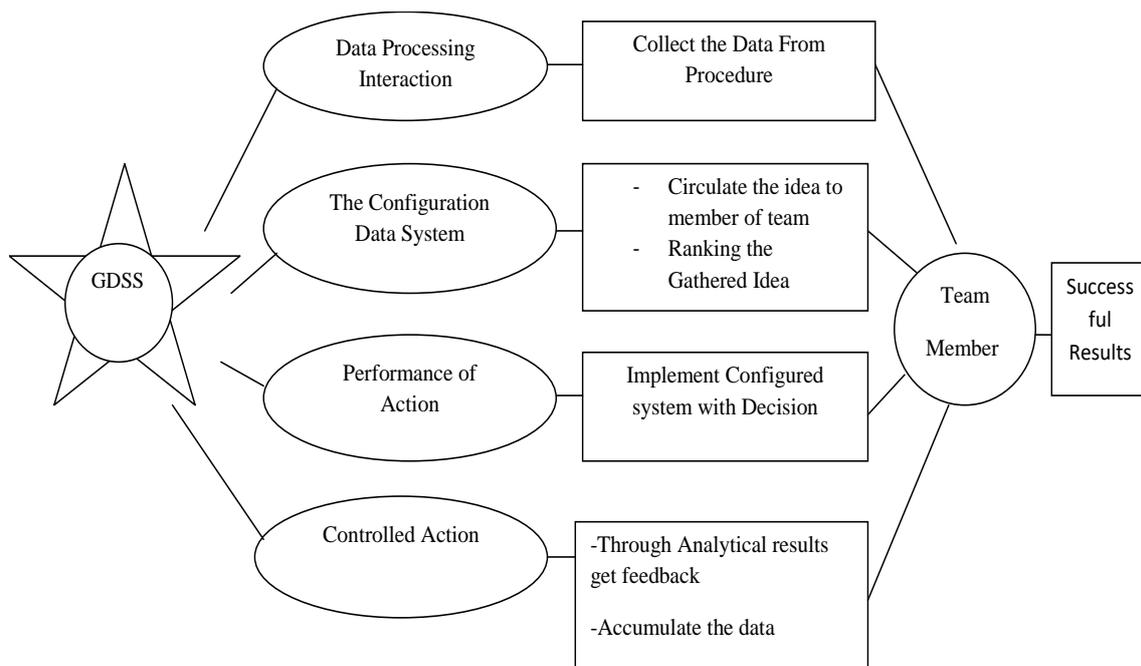


Figure 1 Working process of Group decision support system

2. METHODS

The method consists in three processes. Here the procedural action initiates with Group decision supports system, and then it has been complied with model assessment and finally accommodated with six sigma approach

2.1. Group Decision Support System (GDSS)

Data processing Interaction -It is a step to collect the data for particular unit. The team members recently develop a cognition driven decision support system. Data's are processed to unify in management system. At the real time execution the management team takes action to get the idea. The process helps to communicate with experts in the particular areas. The gathered information incorporates with Value Management workshop through analysed working process.

Configuration data system – The Hired data's are circulated to the team member. Restoration of large units is of the most importance. Here data's are incorporated with previous idea [17]. This stage has more duration of time that can be tackled by team member. The team members handle the situation and reduce the previous unutilized function and then it has been manipulated through various techniques to support the ranking of circulated ideas.

Performance of action – Managing team member take the brainstorming for restoration of assembled idea and information. More attention is paid to restoring important substation. It gives anticipation of situation to control the function analysis and this can be taken in liable condition [17].The situation assessment unit generates unit generates an assessment level of risk for every situation and shows whether or not the risk level is acceptable [7]. For these conditions the brainstorming helps to give the exact solution of function of component

Controlled Action – In this stage the accumulated data's implemented to analysis, the feedback can be developed to assist the management system. Synchronization of subsystem and interconnection assistance is the most significant. Through planning paradigm it makes precise performance. It validates the evaluation of analysed data management action. As for coordination of subsystem, it is responsible for analysing synchronization condition and available capacity of subsystems, and it makes decisions on synchronization and interconnection assistance [17].

2.2. Models Assessment

The Value Management (VM) experts from the Hong-Kong Institute of Value Management has been adopted two team i.e. traditional team, GDSS support team. They proposed the functional ideas to evaluate the component. Group decision-making eliminates communication barriers and excessive domination of leaders, and makes a good disposition of errors caused by human fallibility simultaneously the Six Sigma Analysis Technique (SSAT) controls the variation of gathered possible ideas. The technique will make the huge support action to workshops team member [18]. The improved performed action develops the good decision

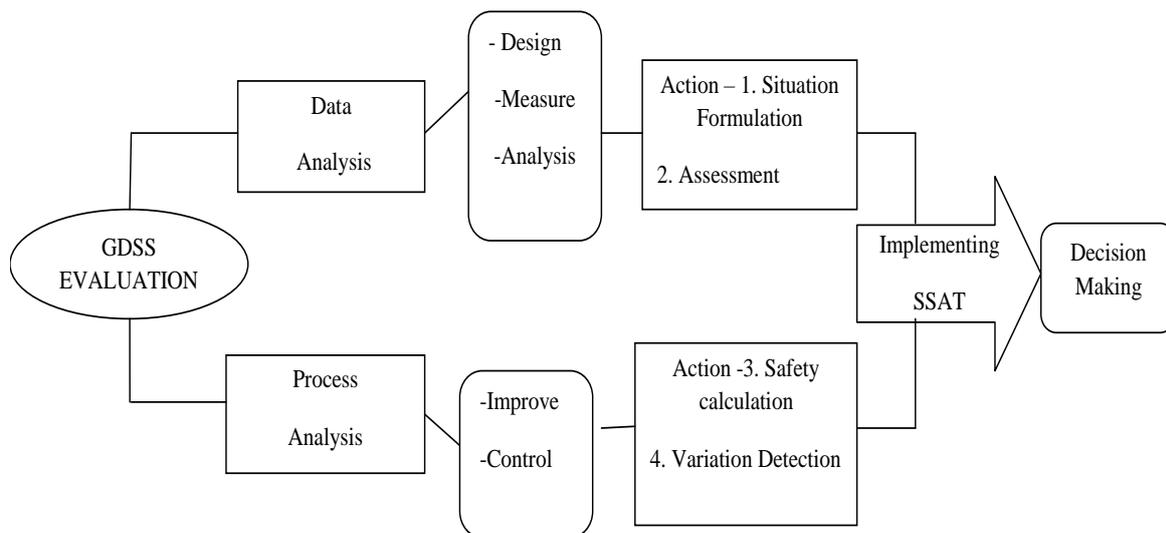


Figure 2 Structural action of six sigma analysis technique

2.3. Six Sigma Approach

The Six Sigma is a broad research and analysis method. It uses a set of quality management methods, mainly empirical and statistical methods [13]. One of the crucial methods of six sigma is DMAIC (Define, Measure, Analysis, Improve, Control). The method is very affordable strategy which has been supported by GDSS. Here DMAIC is data driven process which can be a payroll for six sigma analysis technique (SSAT). Six sigma is a powerful business improvement strategy which enables companies to achieve and sustain operational excellence by using simple but powerful statistical method [13].

Define – The starting step of this method will give initialization of target and goal of the process. The major concentration for this process is selection of projects. It takes informational data from the knowledge of projects.

Measure – After define, the goal of the organisation is observation of the collected data. The innovative logics can be implemented for getting response at the observation process.

Analysis – In this step the ideas of team members proceed to be analysed. Here through the FAST tool the root cause of the problem has been detected. For this step the experts of the team member adopt the FAST technique. The above three steps could eliminate the gap between desired goal.

Improve – This step can improve the efficiency of resolved solution of process. It is a big potential for SSAT. This step simultaneously attached with Control process.

Control - This step give achievement for tracking in the error of variation. There can be variation in the feature of primary and secondary function or in the respectable similarities in job. Mainly it is statistical approach to support the GDSS process. These involve replacing missing data with more sophisticated models, such as maximum likelihood, multiple imputation and machine learning technique such as support vector machine (SVM) [10].

3. MATHEMATICAL FORMULATION

3.1. Six Sigma Analysis Techniques (SSAT)

Assessment and formulation - The statistical approach can be used to assess the process. The control level strategy leads the action of six sigma approach. The Control level has been divided in two levels that are Upper control level and lower control level. This assessment gives clear view of control in the process.

Variation and safety consideration – It takes the variation charts by taking process mean (\bar{X}) and Range (\bar{R}). A control Chart which has already exists in random data gives the results of characteristics performance of the tests. It predicts the errors in variation of the tests performance.

Parameter of measurement – it takes the indication of the rational size of the group is “n” dependent parameter of statistical control i.e. related to Mean (\bar{X}) and Rang (\bar{R}), It gives the calculation of \bar{X} and \bar{R} by using the following equation:

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n} \quad (1)$$

The Mean Range (\bar{R}) Can be given as per the equation

$$\bar{R} = \frac{R_1 + R_2 + \dots + R_n}{n} \quad (2)$$

Improved function of job can be processed through DMA (define, measure, analysis). The Data's are taken to calculate the control process [15]. The statistical calculation is based on the upper control limit (UCL) and lower control limit (LCL). It can be detected by two ways.

3.2. Formulations

7.1 When Mean has been considered in control level (CL)

$$CL = \bar{X} \quad (3)$$

$$\text{Then UCL} = \bar{X} + A_2 * \bar{R} \quad (4)$$

$$\text{And LCL} = \bar{X} - A_2 * \bar{R} \quad (5)$$

7.2 When Rang has been considered in control level (CL)

$$CL = \bar{R} \quad (6)$$

$$\text{Then UCL} = D_4 * \bar{R} \quad (7)$$

$$\text{And LCL} = D_3 * \bar{R} \quad (8)$$

4. CALCULATIONS

The Value Management experts from Hong-Kong Institute of VM workshop categorized each unique function of job. The experts of team members find the root cause of function through FAST tool. All Ideas were reviewed and categorized into three group F₁ as number of primary function, F₂ as number of secondary function, P₁ as realistically possible idea [15]. Calculation has been completed in two phase.

Table: 2.1 Phase -1: when traditional team has been considered

Item	Traditional Team				
	Expert- 1	Expert -2	Expert- 3	Mean(\bar{X})	Range (R)
Function (F ₁)	9	12	11	10.67	3
Function (F ₂)	17	22	19.7	19.5667	5
Possible Idea (P ₁)	54	61	57	57.3334	7
Total				29.1900	5

Table 2.2 Phase – 2: when GDSS team has been considered

Item	GDSS Supported Team				
	Expert -1	Expert -2	Expert -3	Mean(\bar{X})	Range(R)
Function (F ₁)	16	13	19	16	6
Function (F ₂)	43	35	49	42.3334	14
Possible Idea (P ₁)	97	72	84.3	84.4334	25
Total				47.5889	15

Phase 1- when traditional team has been considered

(A) $CL = \bar{X} = 29.1900$

Then UCL = $29.1900 + 1.023*5$
 = 34.3050

And LCL = $29.1900 - 1.023* 5$
 = 24.075

(B) $CL = \bar{R} = 5$

Then UCL = $2.574*5$
 = 12.87

And LCL = $0*5$
 = 0

Phase 2 – when GDSS team has been considered

$CL = \bar{X} = 47.5889$

Then UCL = $47.5889 + 1.023*15$
 = 62.9339

And LCL = $47.5889 - 1.023*15$
 = 32.2439

$CL = \bar{R} = 15$

Then UCL = $2.574* 15$
 = 38.61

And LCL = $0*15$
 = 0

5. RESULTS

It shows the variation of the functional values. The improvement and the control can be analysed by formulated value. Experts can be observe and predict the error in the analysis of function. The bar charts shows the graphical presentation of mean and range of team member idea which can be used in the production of job in workshop, it gives interpretation between statistical range or control level.it indicate the variation of the time of production process within the limits.it detect that our production process is coming to the completion of variable level whether it is upper control limit or lower control limit.

6. DISCUSSION

In this study the DMAIC process has been implemented. The model and formulation are based on the statistical algorithms. A questionnaire's based data's are adopted in this scenario and it has been extended model further processed by DMAIC [15]. This study suggests the need of improvement for the construction briefing workshop. Here the measurable data's has been adopted for the workshop. The Validation of SSAT technique develops the real time execution of procedure. The graphs are the evidence to indicate that there might be less probability of chance of variation in error in function of the job. The approach encounters the production process. The man, material and machines handling that can affect the process and to overcome such type of repetition can be prevented up to some circumstances.

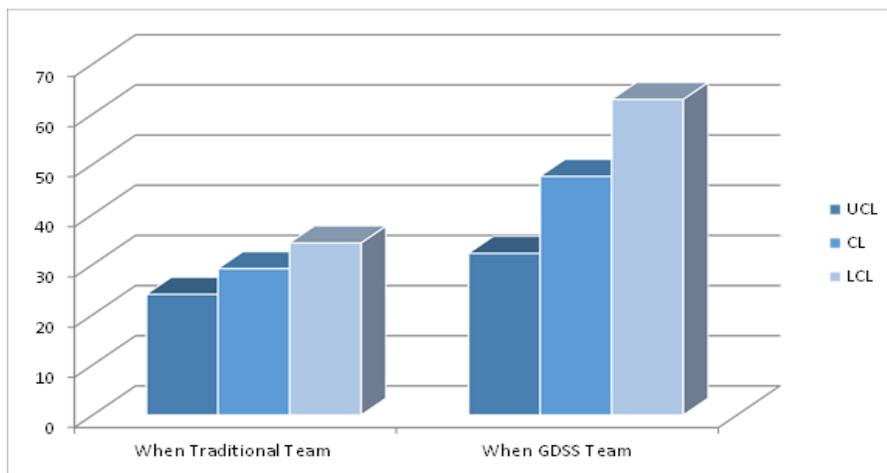


Figure 3 Comparisons of both teams for control value

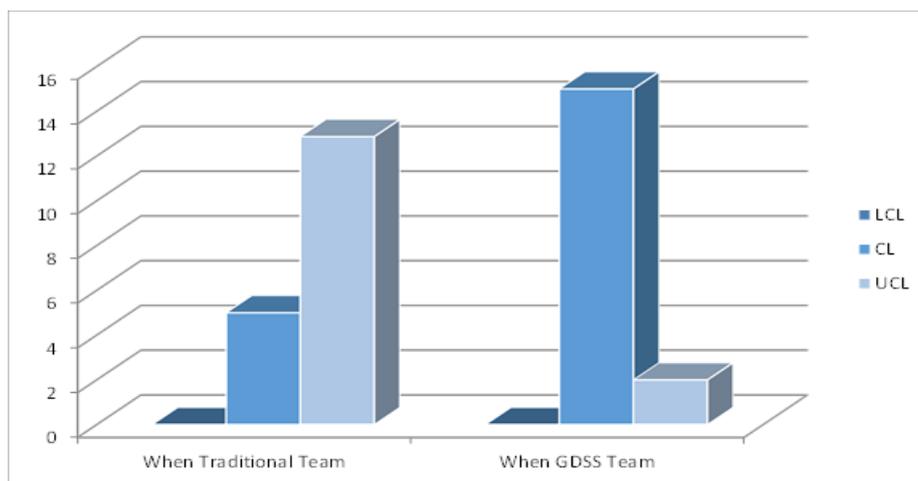


Figure 4 Comparisons of both teams for Range value

For this action the six sigma statistical approach could reduce this type of problem so it need control action. And for it the six sigma analysis technique (SSAT) can be preferable.

7. CONCLUSIONS

The Group decision support system collects data and implement into further action. It has been described GDSS was assessed through a field study and on experimental study. In the field study the GDSS was used to facilitate a Value Management workshop. Many attempts have gathered where Six sigma methods was incorporated with the Group decision support system. The value engineering method has been implemented in the value management workshop. Explains three value management experts evaluated the function and ideas have been produced by two team [15].

This study extends the process of value management workshop. The Six Sigma Analysis Technique (SSAT) approach distinct the formulated performance. The technique develops the multi-purpose solution to control in chance of variation. Describe situation awareness(SA) measures determine the degree to which design concept and new technologies improve or degrade on operators SA. A Information of variation needs a preparation to control the process in the workshop[5]. Upper control levels (UCL) define the higher fluctuation and lower control levels (LCL) define the lower fluctuation of variation in function of the job in workshop.

The controlled action has been formulated in this study. The value management workshop can use this tactic technique for evaluation of function of job. The Six Sigma Analysis Technique (SSAT) is supporting technique to aware in presenting various situations. The Six Sigma Analysis Technique (SSAT) supports the data which are used in the Decision support system (DSS). The control in the process creates a major stream for the response in analysis. This study can be useful as organisation oriented model for their technical and simulation. The model can be traditional research technique for future project of other organisations.

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APPENDIX A1

The Values of A_2 , D_3 , and D_4 for the calculation has been taken from A.M. Jogleker (2003) [1] and the value are $A_2 = 1.023$ and $D_4 = 2.574$ and $D_3 = 0$