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Impact Phase Defect Detection and Deviation factor Analysis of Scheduling in Project management

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Abstract— *In this research work, to predicting the success of software projects based upon information related to Estimation of planning task and actual task is deemed to be one of the vital activities in software engineering research. In this paper, the six sigma of DMAIC Method can be followed and measures the variance of each task in planning, designing, building, UAT, SIT, Integrating testing and implementation stage based on the estimated and actual value. Finally analyse the scheduling variance from the different stage in the project management. Schedule Variation metric is mainly used as an indicator for capability to meet milestones. The final completion resulting from management actions analysed by impact error in defecting in phases detected statistically.*

Keywords—*Six Sigma, DMAIC Method, Scheduling Variance, Impact defect detection, estimated and actual day*

I. INTRODUCTION

Deviation analysis pertain to the study of time related data that changes in time. Deviation analysis considers differences between measured values and expected values, and attempts to find the cause of the deviations from the anticipated values. It is common that users do not have a clear idea of the kind of patterns they can discover or need to discover from the data at hand. It is therefore important to have a versatile and inclusive data mining system that allows the discovery of different kinds of knowledge and at different levels of abstraction. This also makes interactivity an important attribute of a data mining system [1][2].

A variance is an important metrics parameter which needs to be more focused and optimization of Scheduling variance which gives the significant factor influences internal organization driven and customer driven goals based on estimated value and actual value parameters in each stages could be calculated and analysed in statistical method.

For every business process below indicates the general framework of improve business for identify the success as shown in fig.1. As a rule of thumb, identify success and failure factors in each business process, implement the success factors, take corrective and preventive action for failure factors and bring the business to success.

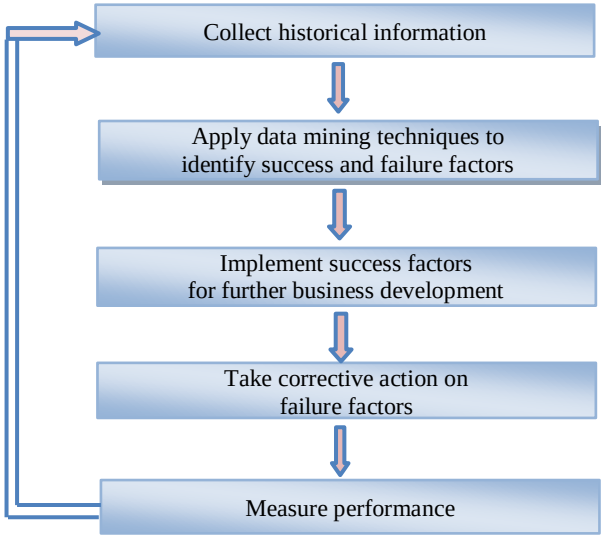

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Fig.1 General Framework

II DATA FOR RESEARCH

From table 1 and 2 represents the training data for finding the variance in scheduling of the project. The research work focuses the schedule variance of project using estimated value and actual value parameters which could be calculated

Table 1 Scheduling Task Value of Planning stage, Designing and Building stage

Projects	Planning		Designing		Building	
	Planning Estimated day	Planning Actual day	Designing_Estimated day	Designing_Actual day	Build_Estimated day	**Build**_Actual day
1	22	22	22	24	38	50
2	22	22	22	24	40	55
3	15	16	74	78	42	43
4	15	15	74	78	45	50
5	8	9	18	25	13	14
6	18	18	11	12	24	25
7	18	18	11	15	25	29
8	11	11	20	21	30	35
9	19	19	47	47	39	52
10	12	12	28	28	90	150
11	16	16	20	20	39	49

Table 2 Scheduling Task Value of SIT, UAT and Implementation stage

Projects	SIT		UAT		Integration testing		Implementation	
	SIT_Estimated day	SIT_Actual day	UAT_Estimated day	UAT_Actual day	INT_Estimated day	INT_Actual day	IMP_Estimated day	IMP_Actual day
1	60	60	30	30	4	4	1	1
2	62	65	30	30	4	4	1	1
3	48	52	40	40	8	8	2	2
4	48	48	40	40	8	8	2	2
5	12	21	3	3	1	1	1	1
6	17	17	12	12	4	4	1	1
7	17	19	12	12	4	4	1	1
8	19	20	30	31	9	9	4	4
9	20	28	18	18	10	10	8	8
10	60	65	30	30	9	9	2	2
11	30	35	24	24	5	5	2	2

based on the equation 1. Then the variance can be analysing based on statistical method. An analyzing the scheduled for a 50 project task of performance and variance of estimated
value for planning stage, Designing stage, Building stage, User Acceptance test (UAT) stage, System Integrating Test (SIT) stage, Integration testing and implementation stage.

III RESEARCH METHODOLOGY – SIX SIGMA

In this research work deviation analysis can be analysed in scheduled of project task of performance from the required estimated and actual task of planning stage, Designing stage, Building stage, User Acceptance test (UAT) stage, System Integrating Test (SIT) stage, Integration testing and implementation stage in the project management.

In this research work, methodology can be follow by DMAIC method in six sigma. In Define stage we can collect the project information which can analyse of the level of Business IT process. In measure stage, the deviation analysis can be carried out schedule variance. In Analysis stage, an Statistical analysis can be used for analysing the variance level of project of Business IT in different stage.

In improve stage, the error prediction can be analyse for rectification and follow to control stage for further improvement. The following fig. 2 represents the framework of six sigma analysis; the objective of this metric is to reduce the schedule, effort and cost variation (deviation factor) by tracking it from beginning stage of the project through the end of the project task, thereby reducing time overruns. It can be follow by the methods of DMAIC (Define, Measure, **A**nalyze, Improve, **C**ontrol) in Six sigma.

Define --> **M**easure --> **A**nalyze --> **I**mprove -->**C**ontrol

- **Define**: Define the problem or project goal that needs to be addressed.
- **Measure**: Measure the problem and process from which it was produced.
- **Analyze**: Analyze data and process to determine root causes of defects and opportunities.
- **Improve**: Improve the process by finding solutions to fix, diminish, and prevent future problems.
- **Control**: Implement, control, and sustain the improvements solutions to keep the process on the new course.

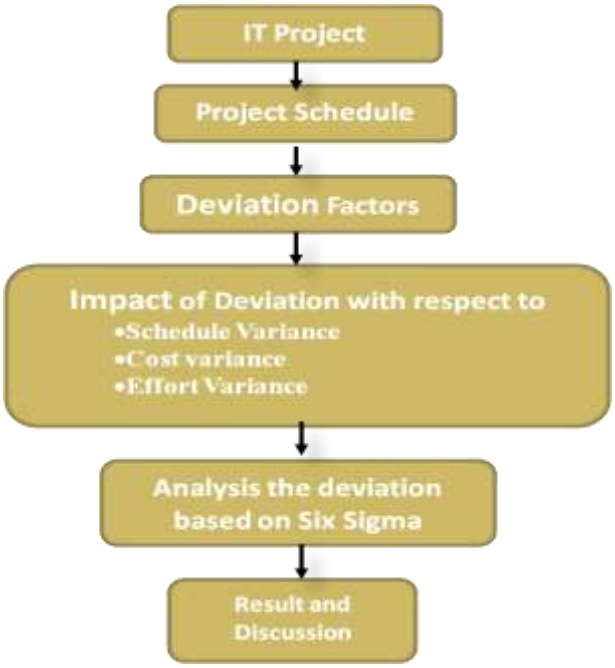

Fig. 2 Framework of Six Sigma Analysis

IV MEASURING THE SCHEDULING VARIANCE IN EACH STAGE

Using Six Sigma of

Define→ **M**easure→ **A**nalyze→ **I**mprove→**C**ontrol (DMAIC) Methodology indicates the metric to improve the methods by identified and controlled so that there is minimal damage from the project management in SDLC.

Variance can be measures based on the equation 1. Scheduling Variation metric is the difference between Estimated and Actual day as compared against the estimated day.

$$\%\text{Scheduling variance} = \frac{\text{Actual day - Estimated day}}{\text{Estimated day}} * 100 \quad (1)$$

Statistical Analysis of Cost Variance and Effort Variance

In this research work, the scheduling variance of project using estimated value and actual value parameters which could be calculated based on the equation 1. Then the variance can be analysing based on statistical method [3][4].

From the fig. 3.15 to fig. 3.26 illustrates the variance of cost and effort of the project which can be analysed based on the equation 1. The outlier of the graph represents the more variance from the planned / estimated scheduling value in the project.

Fig. 3 Scheduling Variance of Planning Stage

From the planning stage, an average of 3.09% of deviation in scheduling task, which can be shown in the fig 3.

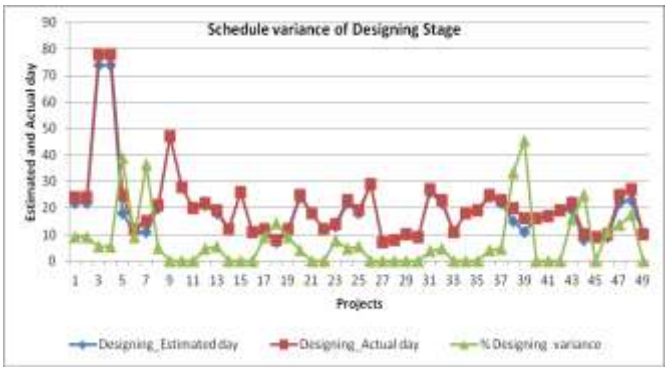

Fig. 4 Scheduling Variance of Designing Stage

From the Designing stage, an average of 7.3 % of deviation in scheduling task, which can be shown in the fig 4.

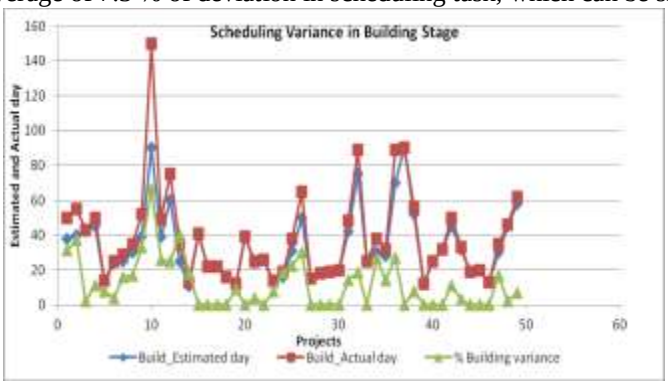

Fig. 5 Scheduling Variance of Building Stage

From the Building stage, an average of 11.7% of deviation in scheduling task, which can be shown in the fig 5.

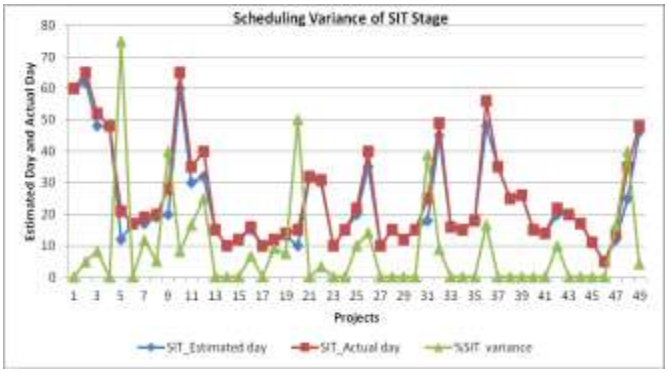

Fig. 6 Scheduling Variance of SIT Stage

From the SIT stage, an average of 8.8 % of deviation in scheduling task, which can be shown in the fig 6.

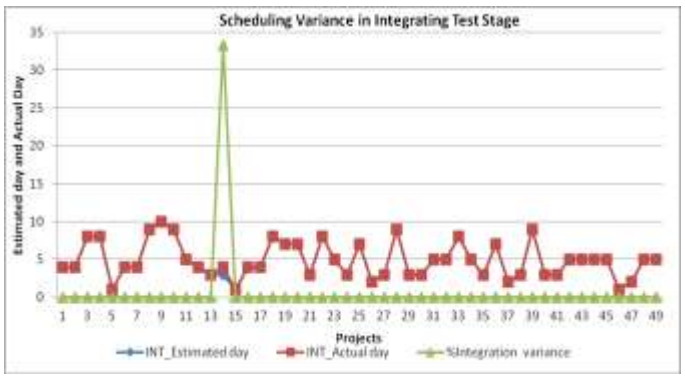

Fig. 7 Scheduling Variance of Integrating Stage

From the Integration stage, an average of 0.8% of deviation in scheduling task, which can be shown in the fig 7.

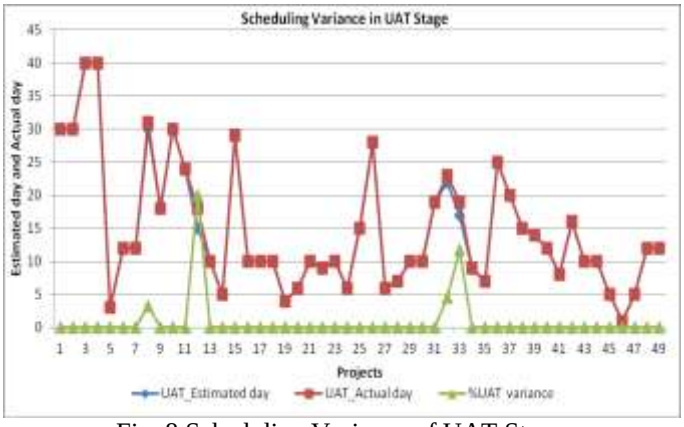

Fig. 8 Scheduling Variance of UAT Stage

From the UAT stage, an average of 0.6% of deviation in scheduling task, which can be shown in the fig 8.

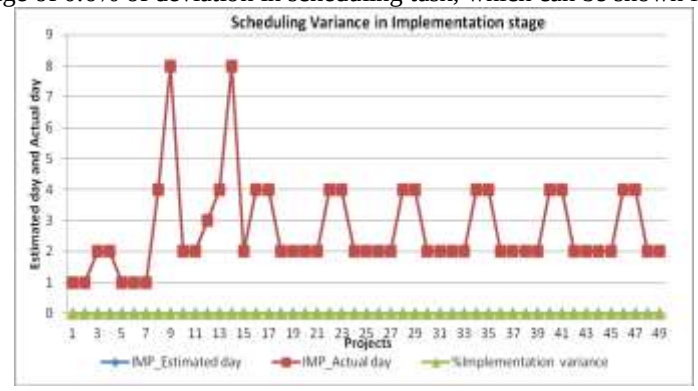

Fig. 9 Scheduling Variance of Implementation Stage

From the implementation stage, an average of 0% of deviation in scheduling task, which can be shown in the fig 9.

V ANALYSIS AN IMPACT OF DEFECTS IN PROJECT DEVELOPMENT PHASES

From Table 3 represents, the collection of defects in project development phases for analysing the impact of defect in each phase. The statistical analysis of defect stage can be analysed in requirement phase, designing phase and coding phase. From fig 10 represents the impact of phase detected defect in requirement phase where X axis represents the Defect from phase detected such as ambiguous requirement defect detected requirement, design review, code review and unit testing, system testing and user acceptance testing. Simultaneously inadequate requirement, incorrect and missing requirement can be detected under impact error in percentage wise shown in Y axis.

From this analysis, user acceptance testing, implementation and post implementation can be shown as highly impact defecting phase in the project development.

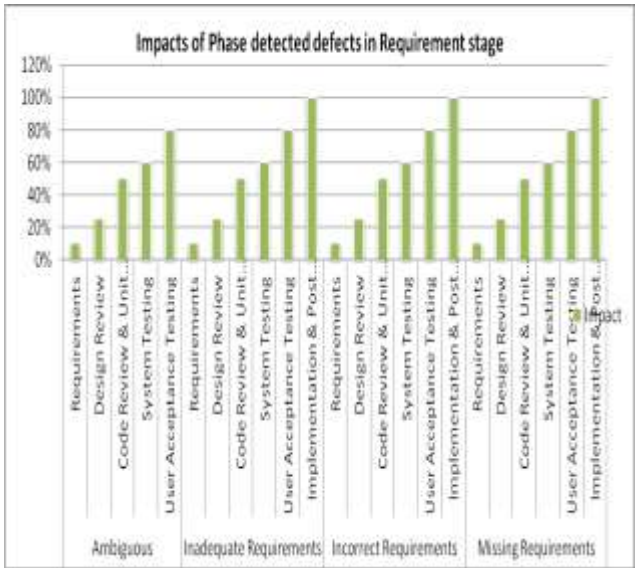

Fig 10 impact of phase detected defect in requirement phase

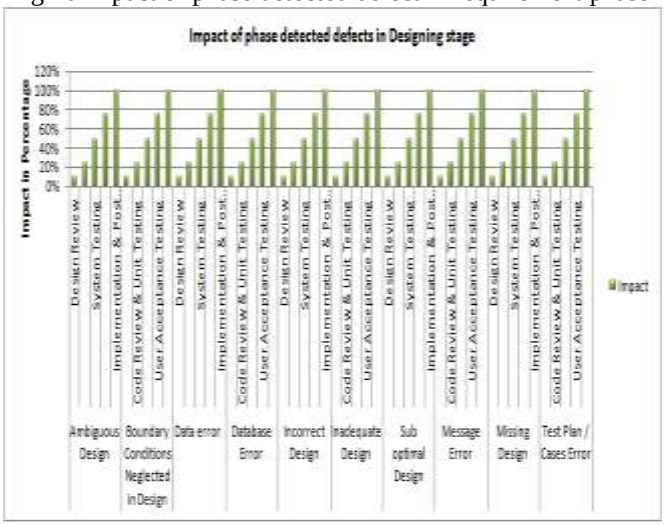

Fig 11 impact of phase detected defect in designing phase

From fig 11 represents the impact of phase detected defect in designing phase where X axis represents the Defect from phase detected such as ambiguous design, Boundary condition Neglected in Design, Data error, Database error,
Incorrect design, inadequate design, Sub Optimal design, Message error, missing design, Test plan can be detected under impact error in percentage wise shown in Y axis.

From this analysis, system testing, user acceptance testing, implementation and post implementation can be shown as highly impact defecting phase in the project development.

Table 3. Impact of Defects in Project Development of Each Phases

Defect	Phase Detected	Phase Attributed	Impact
Ambiguous Requirements	Requirements	Requirements	10%
Inadequate Requirements	Requirements	Requirements	10%
Incorrect Requirements	Requirements	Requirements	10%
Missing Requirements	Requirements	Requirements	10%
Ambiguous Design	Design Review	Design	10%
Boundary Conditions Neglected in Design	Design Review	Design	10%
Data error	Design Review	Design	10%
Database Error	Design Review	Design	10%
Incorrect Design	Design Review	Design	10%
Inadequate Design	Design Review	Design	10%
Sub optimal Design	Design Review	Design	10%
Message Error	Design Review	Design	10%
Missing Design	Design Review	Design	10%
Test Plan / Cases Error	Design Review	Design	10%
Ambiguous Requirements	Design Review	Requirements	25%
Inadequate Requirements	Design Review	Requirements	25%
Incorrect Requirements	Design Review	Requirements	25%
Missing Requirements	Design Review	Requirements	25%

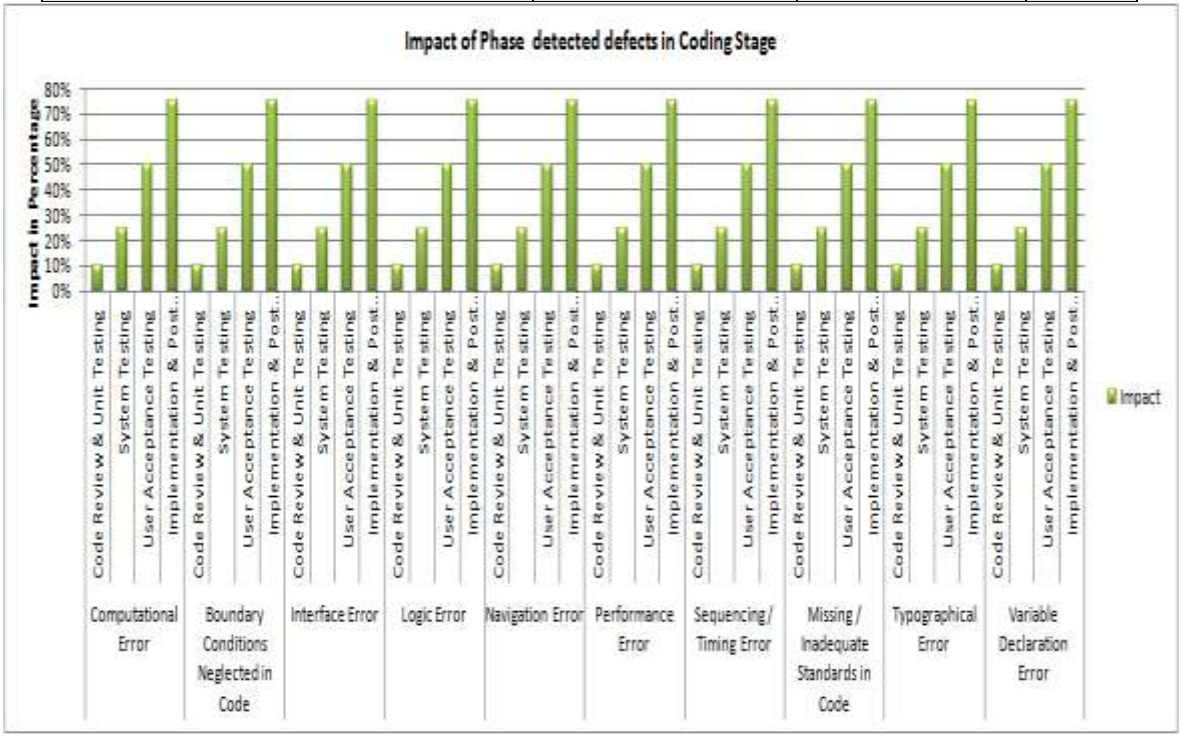

Fig 12 impact of phase detected defect in coding phase

From fig 12 represents the impact of phase detected defect in coding phase where X axis represents the Defect from phase detected such as computational error, Boundary condition Neglected in code, Interface error, Logic error, Navigation error, performance error, sequencing or timing error, typographical error, variable declaration error can be detected under impact error in percentage wise shown in Y axis.

From this analysis, user acceptance testing, implementation and post implementation can be shown as highly impact defecting phase in the project development.

VI CONCLUSION

In this paper, it can be concluded that the variance of project using estimated day and actual day parameters task which could be calculated for analyzing the deviation of work of 50 projects of performance and variance of estimated day in planning stage, Designing stage, Building stage, User Acceptance test (UAT) stage, System Integrating Test (SIT) stage, Integration testing and implementation stage. The project control process consists of monitoring estimated task and actual task performance analyzing in difference stage of project development.
The final outcomes at completion resulting from management actions analysed by impact error in defecting in phases detected statistically.

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