

APPLICATION OF ROOT CAUSE ANALYSIS- A SIX SIGMA TOOL – IN DAILY LIFE

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ABSTRACT

Businesses employ Six Sigma concepts in improving operations and achieving higher standards of quality. Six Sigma has been proven effective for the repetitive activities and processes of business. As we perform many repetitive activities in our daily life from the time we wake up to the time we go to bed, Six Sigma Tools can also be applied in analysing and managing the problems of daily life. In this context, the paper selects Root Cause Analysis, a six sigma tool and attempts to illustrate with the help of some examples that apart from the business situations how Root Cause Analysis can be used in our daily life.

Keywords: Six Sigma, Six Sigma tools, Six Sigma methodology, Root Cause Analysis.

INTRODUCTION:

In simplest sense, Six Sigma is a methodology for minimizing mistakes and maximizing value. Every mistake an organization or a person makes ultimately has a cost: a lost customer, the need to do certain task again, a part that has to be replaced, time or material wasted, efficiency lost, or productivity squandered (Gygi, 2007). Businesses employ Six Sigma concepts in improving operations and achieving higher standards of quality. Six Sigma is a total quality management (TQM) technique pioneered by and applied to Motorola processes in the 1980s by Bill Smith, a Motorola engineer who became known as “the father of Six Sigma.” Six sigma is a method that gives priority to preventive measures that remove the root cause of the defects rather than searching for defects after they occur (Rowlands, 2003). A Six Sigma project is designed to improve a process. Each step of the process that needs improving is mapped to analyze where problems exist. The problems are analyzed with many different tools, such as Pareto diagrams, tree diagrams, root cause analysis, and process mapping (Gillett; Fink; and Bevington, 2010). In the pursuit of improved operational performance and higher customer satisfaction, Six Sigma has been recognised as a systematic and structured methodology that attempts to improve process capability through focusing on customer needs (Dasgupta, 2003; Harry, 1998; Linderman, Schroeder, Zaheer, Choo, 2003). Six Sigma measures a process in terms of defects. Statistically, Six Sigma means having no more than 3.4 defects per million opportunities in any process, product, or service (Hoerl, 1998). The Six Sigma standard of 3.4 problems per million opportunities is response to the increasing expectations of customers and the increased complexity of modern products and processes (Pyzdek, 2010).

Most basic six sigma examples are from application in repetitive manufacturing; that is where six sigma has its root, and those are therefore the most illustrative examples of the principles (Neuendorf, 2004). Nearly all human activities are repetitive work process. Since much what we do from the time we wake up to the time we go to bed, is a series of repetitive activity, six sigma really is for life (Alatqi, I.M, 2009). Like the trainers of other subjects, it is not unusual for Six Sigma trainers to utilize examples from daily life to explain the application of the tools under discussion and to illustrate their effectiveness. Also it is very common for Six Sigma trainers and practitioners to apply the six sigma tools in solving various personal (in addition to the business) problems of life. With reference to this background, the paper selects Root Cause Analysis, a Six Sigma Tool and attempts to illustrate with the help of some examples that apart from the business situations how Root Cause Analysis can be used in our daily life.

SIX SIGMA METHODOLOGY AND TOOLS:

The standard Six Sigma methodology, also known as DMAIC Method is simple. It consists of five phases (i) Define: a problem or improvement opportunity, (ii) Measure: or collect relevant information, (iii) Analyze: the information (Determine the root causes), (iv) Improve: the process by attacking root causes, (v) Control: the improved process to sustain the gains (Gygi, 2007).

Most of the Six Sigma tools are not new, that is so because Six Sigma adopted many pre-existing quality tools. It is relevant to quote from the book titled, *Quality Beyond Six Sigma*, edited by Ron Basu, J. Nevan Wright, Six Sigma or Lean Sigma tools are not original. For example, the focus on variation is historically known as the control chart of Deming (1982) and Shewhart (1931). Design of experiments can be linked to Taguchi's methods. Likewise, the proactive use of Pareto's 80/20 analysis and Ishikawa's 'fishbone' diagram in Six Sigma is laudable, but these are scarcely new. The flow process chart of Lean Six Sigma is also a classic industrial engineering tool. Thomas Edison once said, 'your idea has to be original only in its adaptation to the problem you are currently working on'. The adaptation of existing tools is 'appropriate Six Sigma' (Basu 2004)

Keller Paul in his book "Six Sigma Demystified" has listed 66 six sigma tools. isixsigma lists 33 tools. Most of the authors would list around 20~90 tools, some of the most popular tools are - Affinity Diagram/KJ Analysis, Analysis of Variance (ANOVA), Analytic Hierarchy Process (AHP), Business Process Mapping, Brainstorming, Capability Indices/Process Capability, Cause & Effect, Control Charts, Cost-benefit analysis, Design of Experiments (DOE), Failure mode and effects analysis (FMEA), Five S, Histograms, Kaizen, Kano Analysis, Measurement Systems Analysis (MSA)/Gage R&R, Quality Function Deployment (QFD), Pareto chart, Poka Yoke, Process Mapping, Project Charter, QFD/House of Quality, RACI Diagram, Regression analysis, Risk Management, Root cause analysis, Run charts, SIPOC analysis (Suppliers, Inputs,

Process, Outputs, Customers), Taguchi methods, Taguchi Loss Function etc.

Root Cause Analysis or RCA, is one of the Six Sigma Tools. This paper attempts to explain with the help of some examples that apart from the business situations how RCA can be used in our daily life to arriving at solution/s. Root Cause Analysis, also sometimes called “The 5 Whys” is a technique used in the Analyze phase of the Six Sigma DMAIC methodology. According to the experts the concept of RCA is based on the belief that most of the problems are merely symptoms, the real cause is hidden multiple layer underneath, by repeatedly asking the question "Why" multiple times, the layers of symptoms are peels away leading to the root cause of a problem. If this root cause is corrected, it can be hoped that the likelihood of problem recurrence will be minimized. isixsigma points out that Root Cause Analysis is one of the simplest tools; easy to complete without statistical analysis, it further suggests that RCA can be applied: (i) when problems involve human factors or interactions, and (ii) in day-to-day business life; within or without a Six Sigma project. According to Hambleton (2005) a Root Cause Analysis is a process designed for investigating what, how, and why something happened and to figure out how to prevent the same thing from happening again. The RCA process involves defining the problem, isolating issues that caused the problem, identifying the root cause, developing actions to address the root cause, implementing the actions and conducting follow up assessment of the actions to ensure their effectiveness (Bacalu, 2007).

APPLICABILITY OF ROOT CAUSE ANALYSIS IN DAILY LIFE:

The RCA or "5 Whys" tool involves asking why at least five times, which would then normally lead to the root cause of a given problem. The process of RCA can be represented by the following flow chart (Figure 1). In this context, the authors have tried to explain through following case studies that how Root Cause Analysis can be applied in daily life and how it can enables to frame a problem and then find solutions.

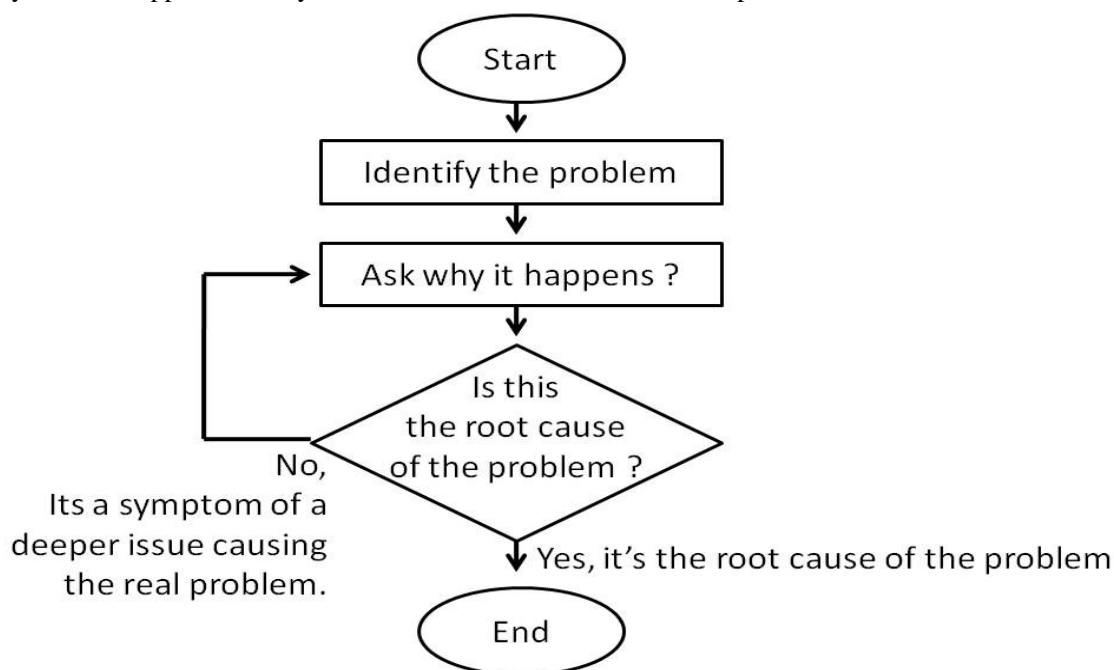


Figure 1: Flow Chart of Root Cause Analysis

CASE 1 :

In a casual social interaction between a mother and her new neighbour, who happens to be a child specialist, the problem of formers conical headache was discussed and the following was revealed.

Problem: Mother has a headache today.

Why ? ...Because : It's evening, she usually has headache every evening.

Why ? ... Not sure, may be because : Almost every evening she has a fight with her young son.

Why ? ... Because : She would ask him to have milk and he would refuse.

Why ? ... Because : He does not like people to control him... refusing milk is his way of taking control of the situation.

Why ? ... Because : He is growing up and he has ego and he wishes to control his life rather than allowing people to control him.

The Root Cause is Young Son's ego ... resolving this is likely to solve recurring headache of his mother.

Solution : Rather than commanding him to have milk, ask, if he would like to have milk or milk-sugar or milkshake or bournvita? Giving him a choice and opportunity to make a decision, might satisfy his ego. In this case, root cause is deep down and it can be graphically represented as:

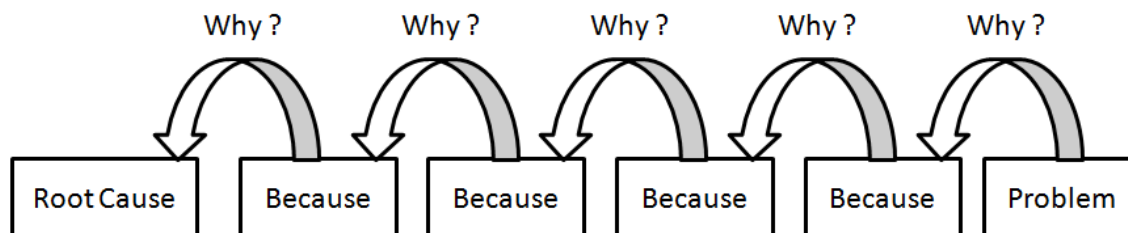


Figure: Procedure of Root Cause Analysis (Source: <http://www.thinkreliability.com/Root-Cause-Analysis-CM-Basics.aspx>)

CASE 2 :

The problem of increasing stress taking toll in health, quality of life and work performance. When analysed, why this happens? There were many problems, which could be broadly classified in three categories.

Category 1: Mismanaged personal finance - Frequent cases of late charges due to delayed payment of credit cards and utility bills.

Category 2: Poor performance in work life – Frequent needs of working late in office, cases of late arrivals in office, missed a flight.

Category 3: Deteriorating quality of personal life – No time for exercise, unable to provide quality time to family.

When analysed further, it was concluded that, all of these problems are related with the issue of punctuality. For example, with reference to the problem of delayed payment, there was no crisis of the funds; bills were paid, but they were paid “late”. With reference to the poor performance of work life, all professional responsibilities are taken care by working late; the problem was not failing on responsibilities but failing on reporting in time at office and at airport. Things were done, but not in time.

It's known that when works are not completed when they are important but only when they become urgent, it takes longer time, more effort and causes stress. If arrival is on time, there will be no need of working late, which means time for exercise and family, thus the problem category 3 would be resolved. In this example multiple intermediate causes have a single root; it can be graphically represented as:

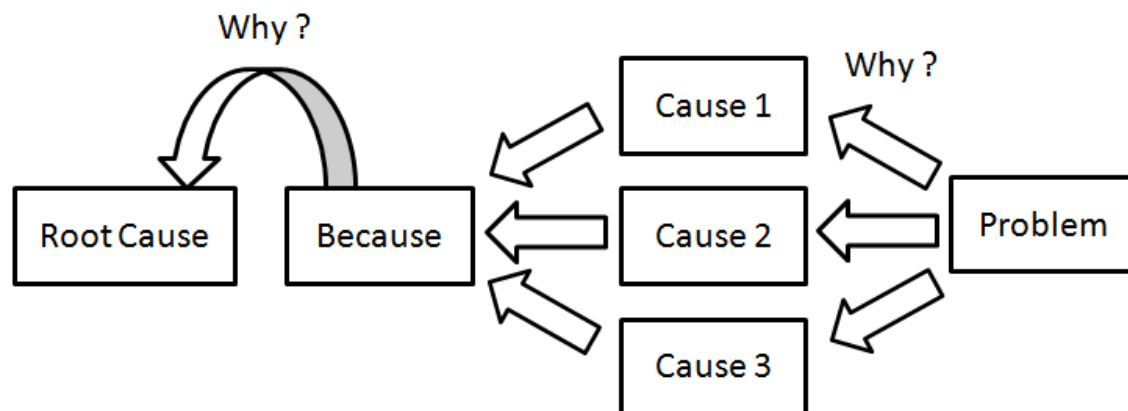


Figure 2: Procedure of Root Cause Analysis

CASE 3 :

The above two examples were simple in nature, however in real life relatively more complex problems might have more than one causes, for example -

Problem : Around end of July there is a need to file income tax return, and it becomes hectic and last minutes job every year. It's a recurring problem for last 15 years. Root Cause analysis can be represented in graphical form as below:

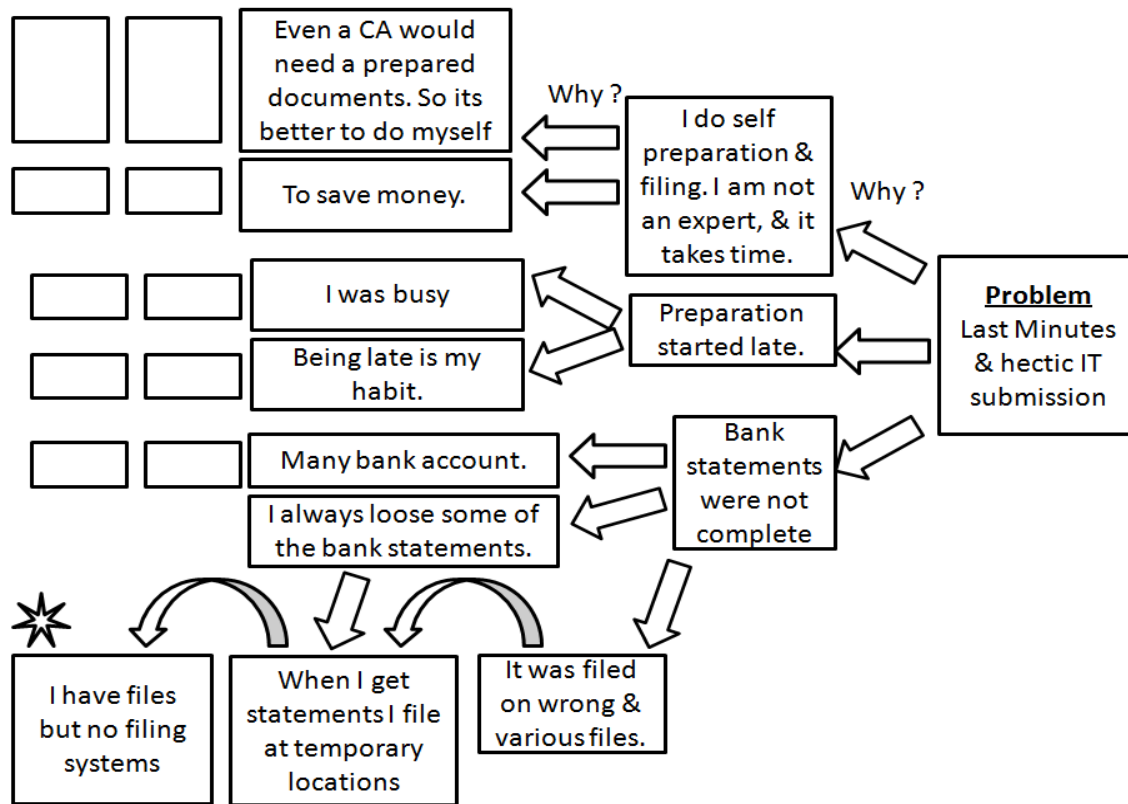
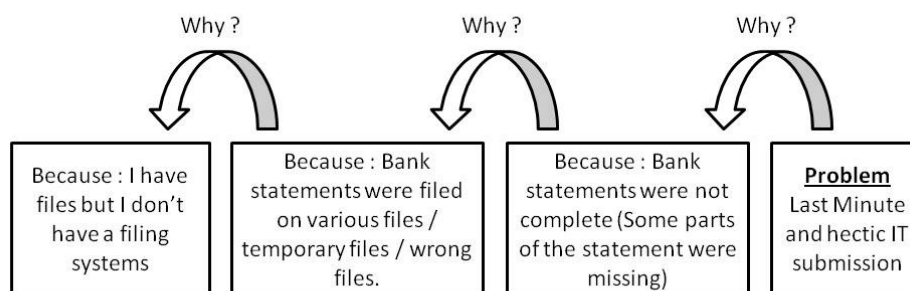


Figure: Procedure of Root Cause Analysis

In such complex situation, where problem have more than one causes, the effectiveness of solution depends on –

1] Asking right questions: According to Edward Hodnett, If you don't ask the right questions, you don't get the right answers. A question asked in the right way often points to its own answer. Asking questions is the ABC of diagnosis. Only the inquiring mind solves problems.

2] The merit of path selection: Even after asking right questions, there are multiple paths; in that case, effectiveness of solution depends on the merit of path selection. In the above example, the selected path is marked with a star. Accordingly, the same problem can be re-represented in a simpler form as below.



Solution : Create a filing system ... “Every thing has a place and everything in place”. This slogan is popular amongst various six sigma organizations and practitioners. This concept is very simple yet it is very effective. This simple concept has been proven rewarding in many organizations and the same can be expected to be beneficial for the case under discussion, “income tax return filing”

CONCLUSION:

Six Sigma has been proven effective for the repetitive processes of business. As we perform many repetitive activities in our daily life, many Six Sigma Tools can also be applied in analysing and managing the problems of daily life. It is common for Six Sigma trainers to utilize examples from daily life to explain the application of the tools and to illustrate their effectiveness. Also it is very common for Six Sigma trainers and practitioners to apply the six sigma tools in solving their personal problems of life. In this context, the paper selected Root Cause Analysis, a six sigma tool and attempted to illustrate with the help of some examples that apart from the business situations the Root Cause Analysis can be used in our daily life. Though Six Sigma Tools are not developed to manage daily life, many of these tools can be effectively utilized in daily life, and this effectiveness justifies that attempt should be done to explore its application in daily life.

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