# "IMPROVING THE EFFICIENCY OF IT HELP-DESK SERVICE BY SIX SIGMA MANAGEMENT METHODOLOGY (DMAIC) – A CASE STUDY OF C COMPANY"

# Introduction

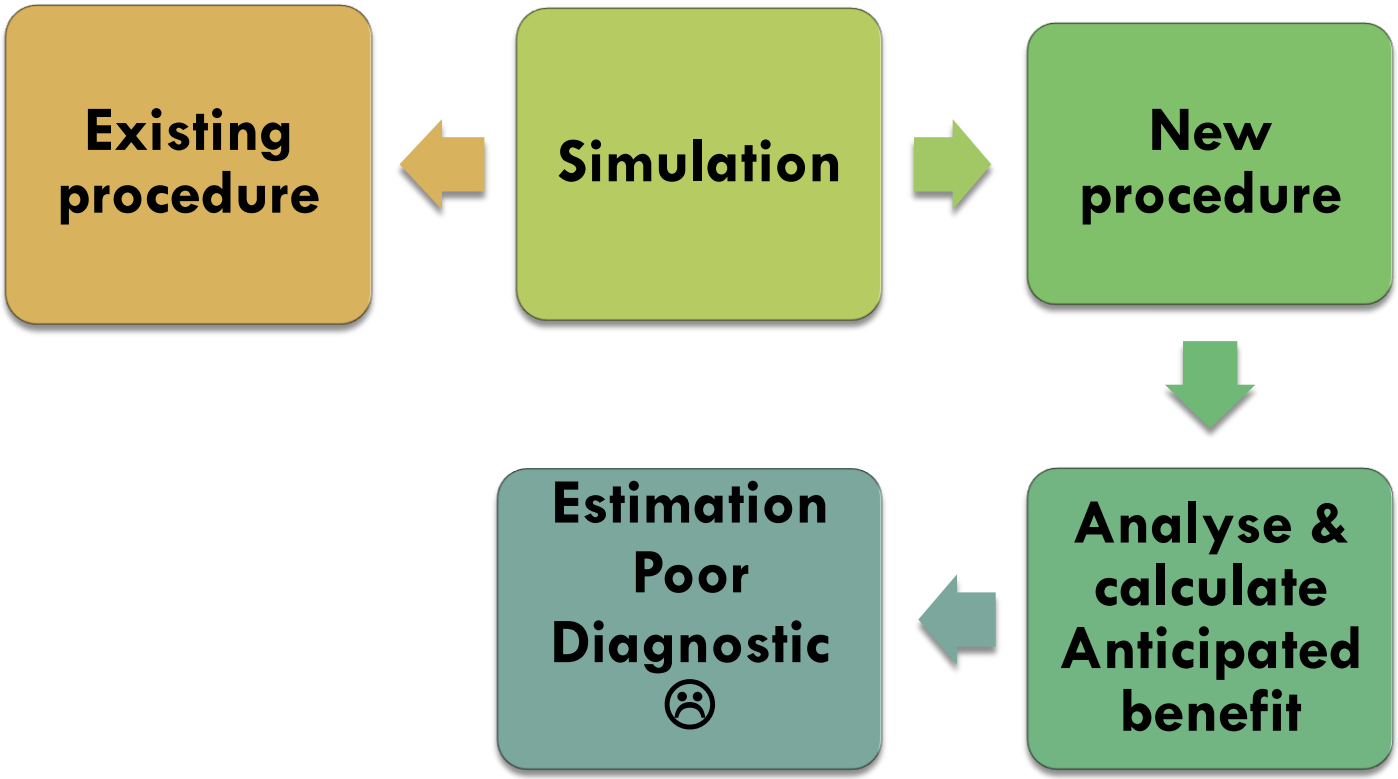


- This research is conducted based on the application of Six Sigma concept, DMAIC quality improvement method.
- It deals with project-related issues to improve the efficiency of information technology (IT) help-desk service through an eHelp-desk system.

# Research Methodology



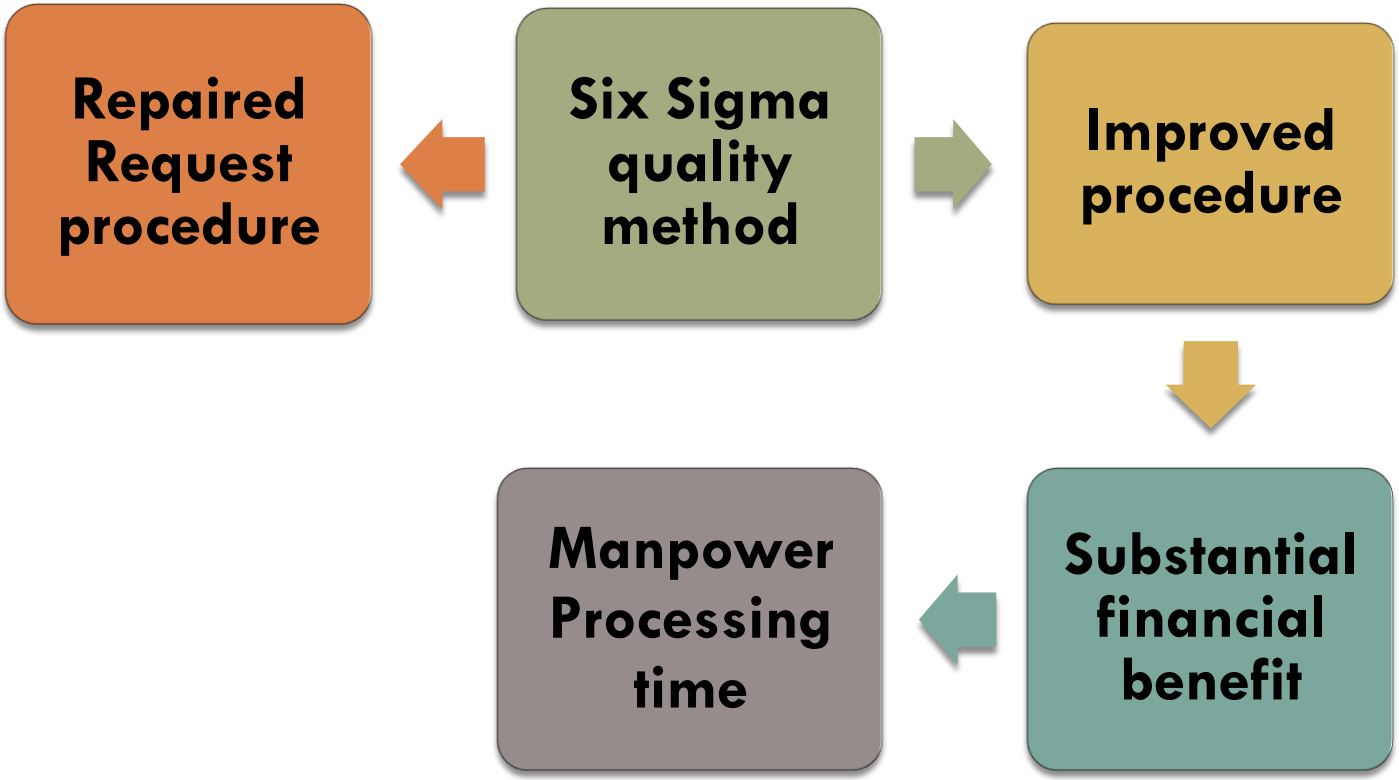
**Past Research**



# Research Methodology contd...

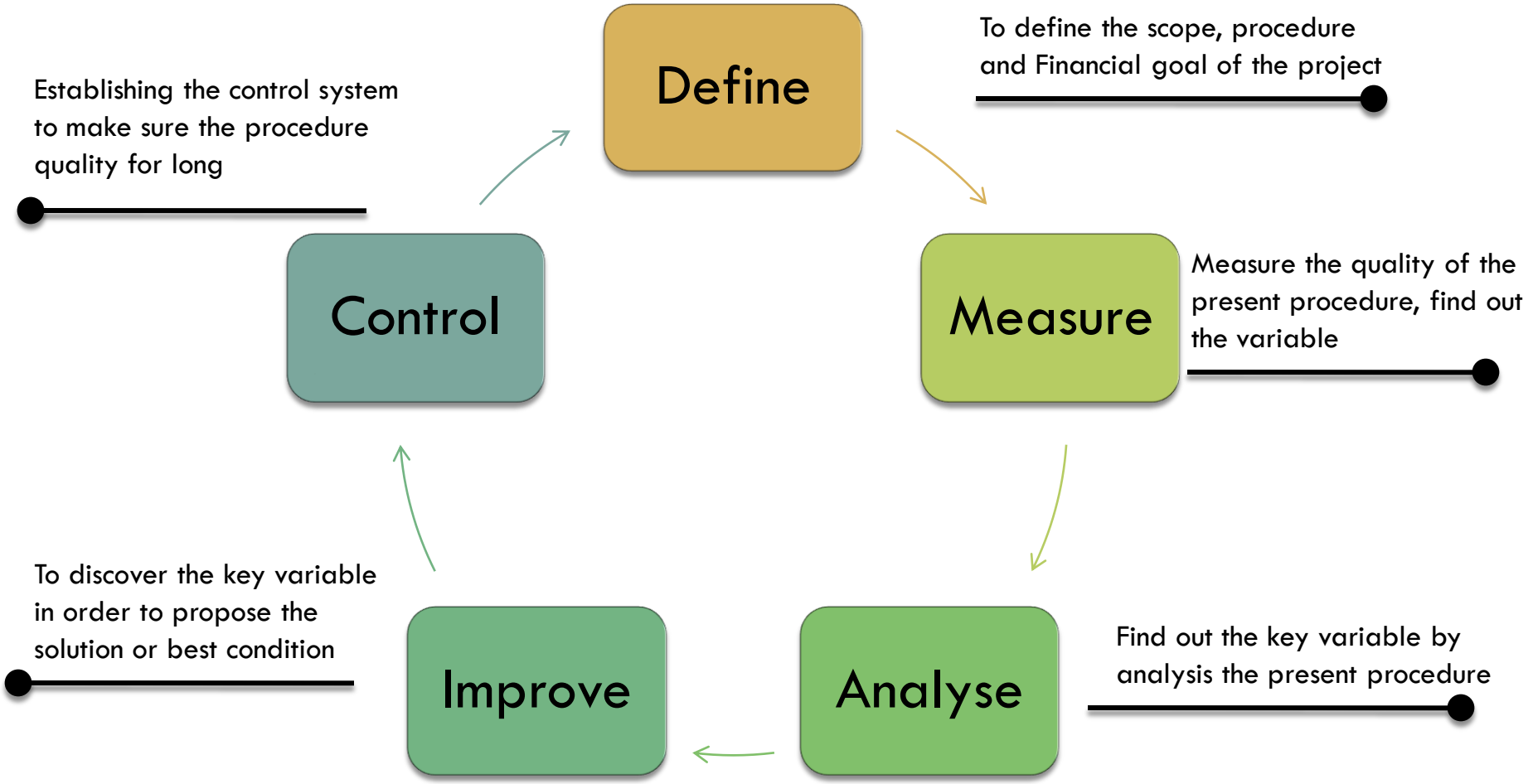


**Current Research**



# Six Sigma DMAIC Methodology





# Case Study

## Compal



- One of the top five original design manufacturers (ODM) manufacturing firms.
- Established : 1984
- Products: Networking products, digital media product, computing devices, mobile devices, cloud platform & service
- Total Capital : NTD 38.8 billion (etd. 2008)
- Total Employee: 3500 (etd. 2008)
- C Company is the one which implements the Six Sigma technique to improve its quality.
- Corporate Headquarters : Neihu District of Taipei

# Case Study





- C Company's corporate headquarters include its administrative and management divisions, sales and sourcing centres, as well as its R&D groups
- Each project is completed in a step-by-step fashion, and executed by seasoned teams
- These projects are also supported by fast and efficient in-house communications and investment in the latest technologies.
- C Company believes that a product's competitiveness is based on quality, cost and on-time delivery.
- No matter whether their product be computer notebooks, monitors or other newly emerging web communication products, C Company can quickly respond to design changes necessitated by a fast changing marketplace.

# Case Study

## The implementation procedure and result



### Define Phase

**Problem description**

(1) According to 2007 statistical data, there are about **22,413** IT help-desk issues that need to be improved.

(2) With 22,413 issues, it will take 3,766,142 min to solve all of them, while averaging **168** min per case.

(3) The processers are unable to handle requests that are raise at the same time, resulting in the congestion phenomenon.

(4) The help-desk has no complete control system to follow.

**Project goal**

(1) It is estimated that the processing time will be reduced by about **46%.**

(2) A NTD **2.01** million reduction in payroll expense.

# Case Study

## The implementation procedure and result



### Define Phase

**Process indicator**

(1) Total manpower equals five people.

(2) IT engineers' average monthly salary: NTD 38,000

(3) Expected improvement: Reduce 46% of the process time

**Financial indicator**

(1) Help-desk repaired about 22,413 requests last year

(2) Present total process time = 3,766,142 min

The expected total process time = Total process time * 54%= 2,033,717 min

(3) we must hire at least 9.26 people. Due to the fact that there is no recruiting plan, we must improve the present procedures by using the Six Sigma quality improvement method.

(4) Hard savings= improvement–before improvement= 9.26 persons–5 persons= 4.26 persons. Reduced payroll cost= NTD 1,942,560 per year.

# Case Study

## The implementation procedure and result



### Define Phase

| | | | Policy | Customer | Related Parties | Data Accessibility | Resource & support | Pattern | Improvement | Goal | Scope |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Related to corporate goal and challenge? | The influence of customer satisfies? | Manager or user? | Can historucal and existence information be obtained? | Appropriate team & members? | Can be migrated? | Improve for 70% | Reduce the cost for NTD1,500,000 at least? | Be managed (4-6 months)? |
| Total Score | Items | Weight | 10 | 10 | 7 | 7 | 6 | 7 | 5 | 8 | 4 |
| 545 | IT help desk process improvement | | 9 | 9 | 9 | 5 | 9 | 3 | 5 | 9 | 9 |
| 237 | Factory layout material reuse | | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 409 | IT application development | | 9 | 9 | 9 | 3 | 5 | 3 | 5 | 5 | 3 |
| 375 | IT reporting system improvement | | 3 | 5 | 5 | 3 | 9 | 3 | 9 | 3 | 9 |

**Figure: Cause and Effect Matrix**

'IT Help-Desk Improvement' is our best choice. It fits the three conditions: it consists of a proper set of team members, it is expected to save at least NTD 1.5 million and it is capable of being managed.

# Case Study

## The implementation procedure and result



**Measure Phase**

Table 5. The repaired request record.

| | Process times | Percent | Cumulative (%) | Occurrence times |
|---|---|---|---|---|
| PC | 1,152,870 | 30.61 | 30.61 | 5229 (22%) |
| Network | 1,100,580 | 29.22 | 59.83 | 2739 (12%) |
| E-mail | 532,862 | 14.15 | 73.98 | 4731 (20%) |
| E-form | 448,200 | 11.90 | 85.88 | 208 (1%) |
| User | 358,283 | 9.51 | 95.40 | 4980 (22%) |
| Hardware | 117,030 | 3.11 | 98.50 | 1992 (12%) |
| AP | 56,316 | 1.50 | 100.00 | 2534 (11%) |

Note: The PC, network and e-mail processes account for 56% of occurrence times; please refer to Figure 4.

The PC, network and e-mail processes account for 74% of process time. In order to reduce the request time or process time, the service quality must be increased.

# Case Study

## The implementation procedure and result



### Measure Phase

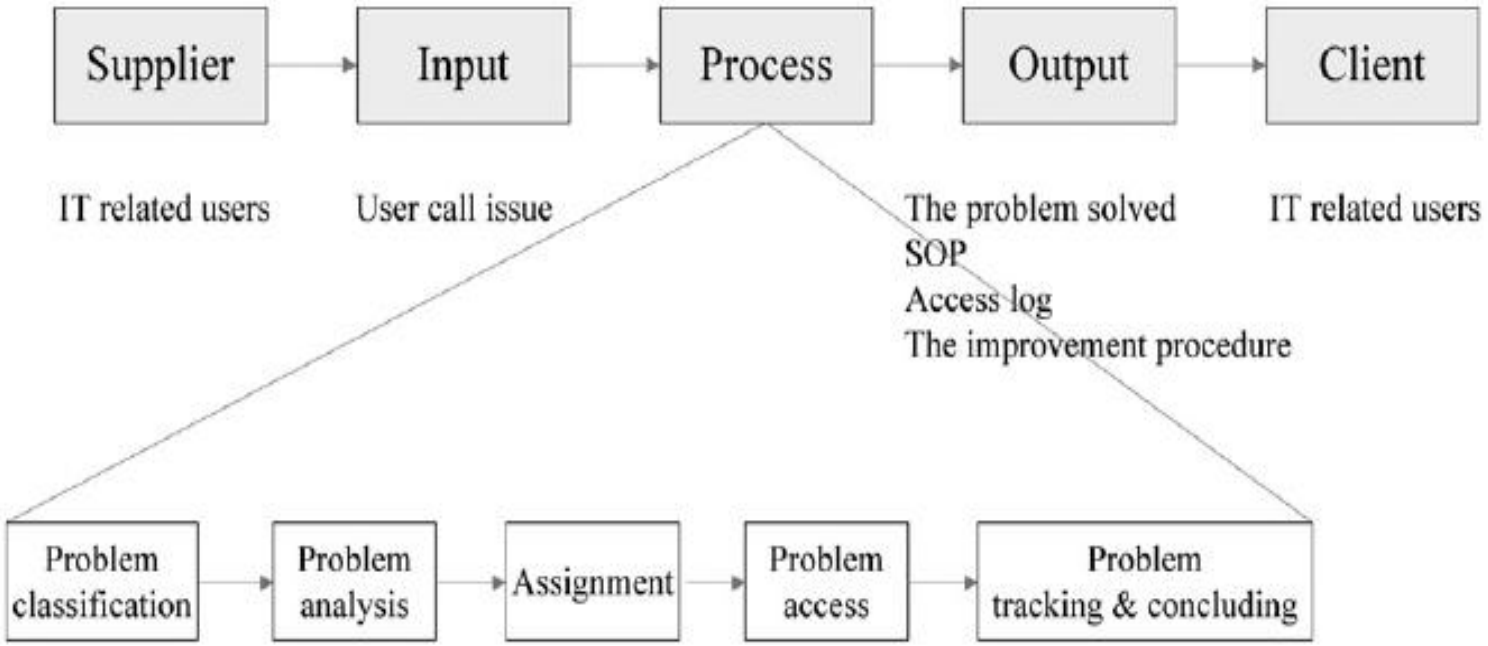



**Figure: Help-desk SIPOC diagram**

# Case Study

## The implementation procedure and result



### Measure Phase

In the suppliers, inputs, process, outputs, customers (SIPOC) diagram it is discovered that:

(1) There is a substantial length in time between the point at which users submit requests and when they are solved. Therefore, in order to reduce this service time, it is necessary to improve IT service quality.

(2) The processes are unable to handle multiple requests at the same time, resulting in the congestion phenomenon.

(3) The results cannot be tracked, because there was a lack of effective working platforms and tools that caused different types of requests with different processing conditions to occur.

(4) The help-desk lacks a complete induction analysis for the knowledge library.

# Case Study

## The implementation procedure and result



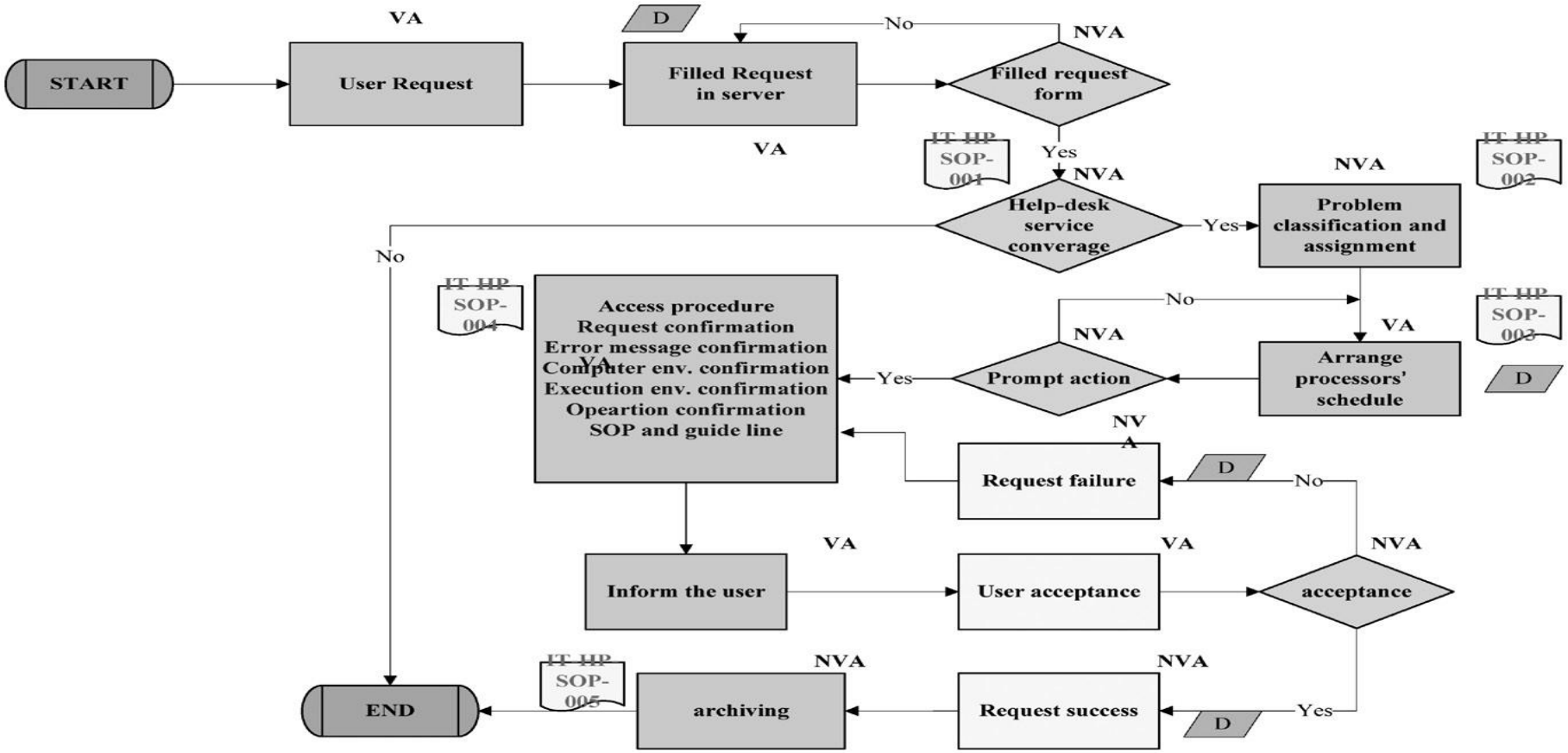


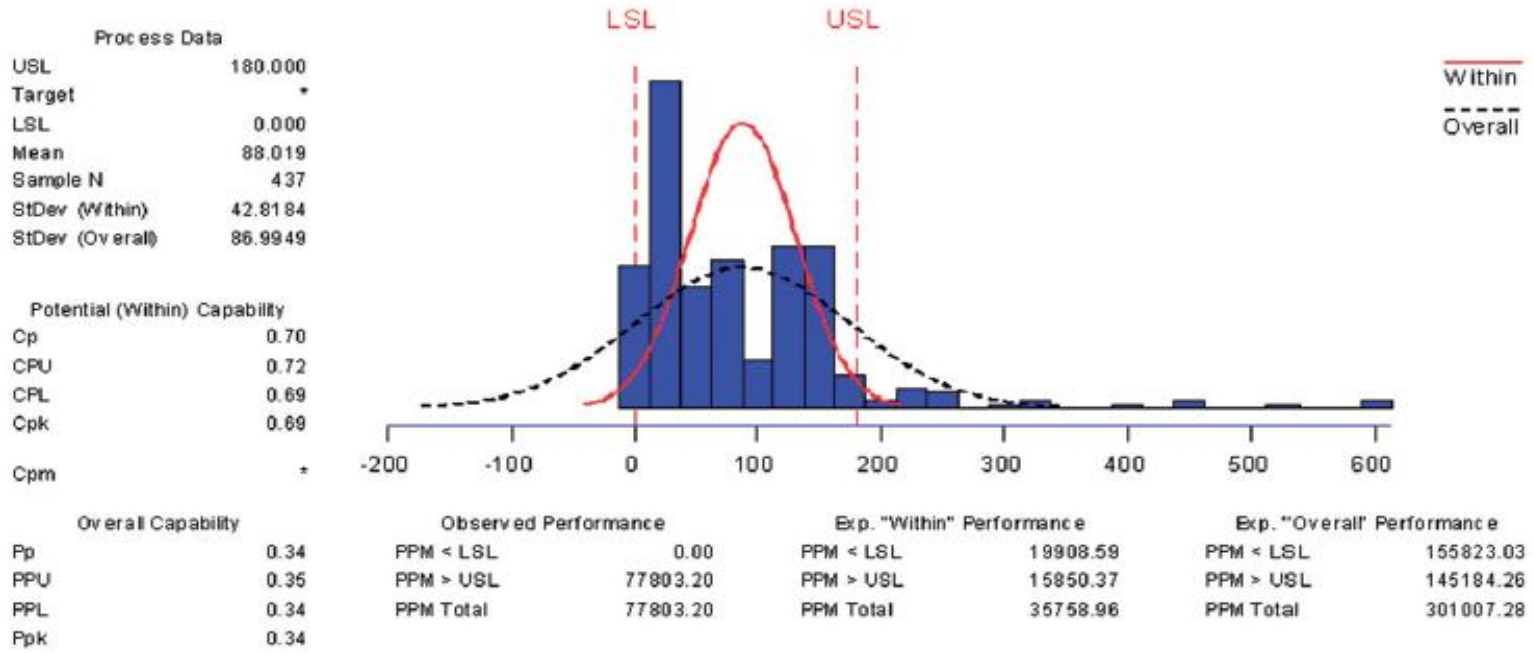

**Figure: Ideal Flow Chart**

# Case Study

## The implementation procedure and result



### Measure Phase




| Process Data | |
|---|---|
| USL | 180.000 |
| Target | * |
| LSL | 0.000 |
| Mean | 88.019 |
| Sample N | 437 |
| StDev (Within) | 42.8184 |
| StDev (Overall) | 86.9949 |

| Potential (Within) Capability | |
|---|---|
| Cp | 0.70 |
| CPU | 0.72 |
| CPL | 0.69 |
| Cpk | 0.69 |
| Cpm | * |

| Overall Capability | |
|---|---|
| Pp | 0.34 |
| PPU | 0.35 |
| PPL | 0.34 |
| Ppk | 0.34 |

| Observed Performance | |
|---|---|
| PPM < LSL | 0.00 |
| PPM > USL | 77803.20 |
| PPM Total | 77803.20 |

| Exp. "Within" Performance | |
|---|---|
| PPM < LSL | 19908.59 |
| PPM > USL | 15850.37 |
| PPM Total | 35758.96 |

| Exp. "Overall" Performance | |
|---|---|
| PPM < LSL | 155823.03 |
| PPM > USL | 145184.26 |
| PPM Total | 301007.28 |

Figure 7. Process capability analysis for ALL.

In order to estimate the efficiency of the solution, we estimated the process capability (Cpk) to be 0.69,and estimated the sigma level to be 2.07

# Case Study

## The implementation procedure and result



### Measure Phase

**Table: Summary of measure phase**

| | |
|---|---|
| Project goal | (1) Reduced present process time by 46% |
| Project goal selection and analysis | (1) According to the type of repairing request, choose the one that needs to be improved the least: (waiting time)<br>(2) Current Z value is 0.84 |

# Case Study

## The implementation procedure and result



**Analyse Phase**

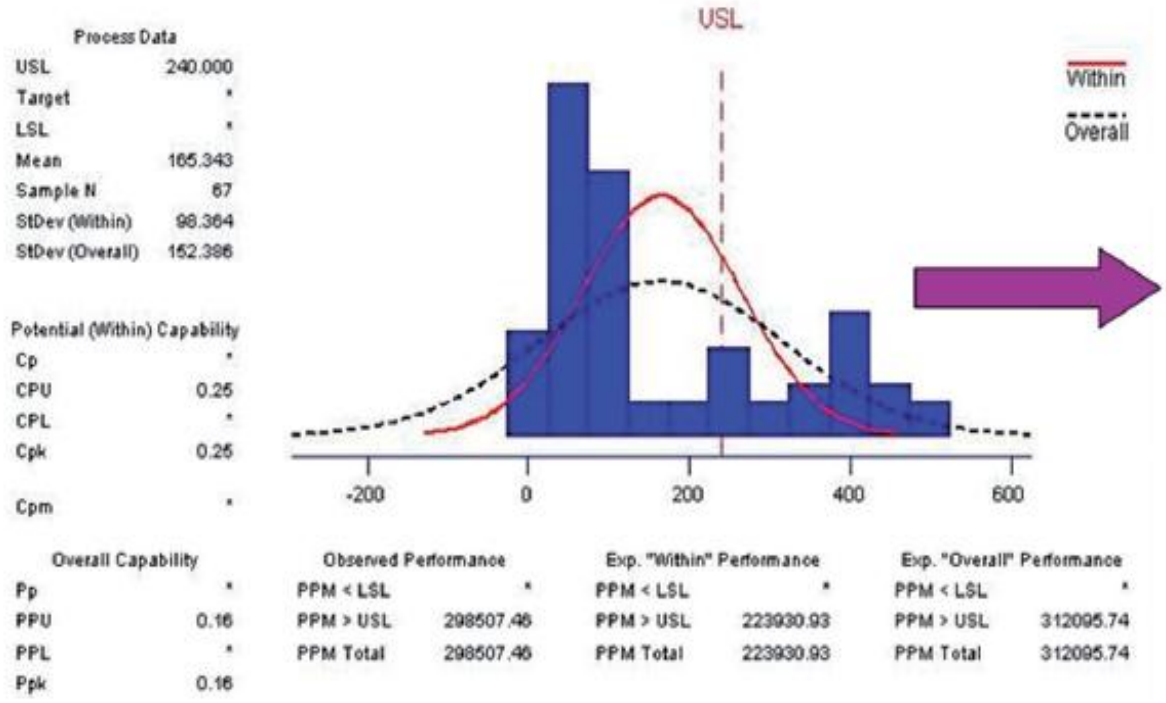



Figure 8. Process capability analysis for processing time.

**Current CPK?**

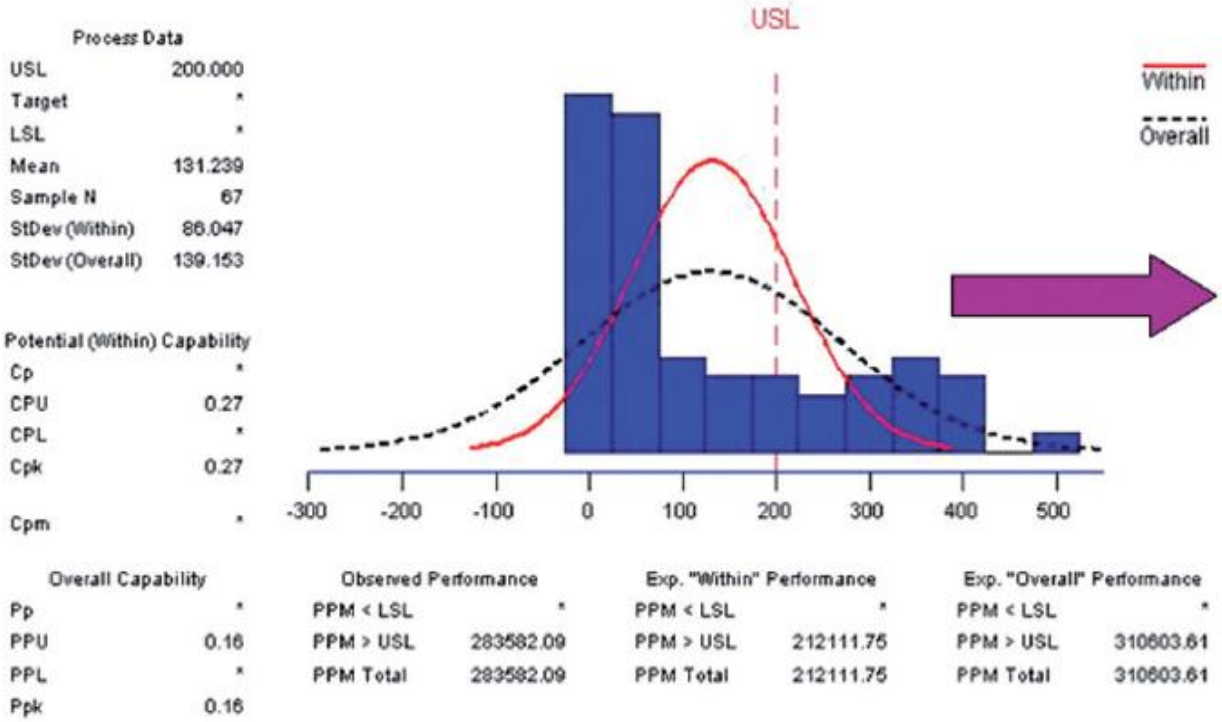
**Processing Time:**
variance=98
mean=165

# Case Study

## The implementation procedure and result



**Analyse Phase**




**Current CPK?**

**Waiting Time:**
variance=86.047
mean=131
The variance is too high, need to be improved

Figure 9. Process capability analysis for waiting time.

# Case Study

## The implementation procedure and result



**Analyse Phase**

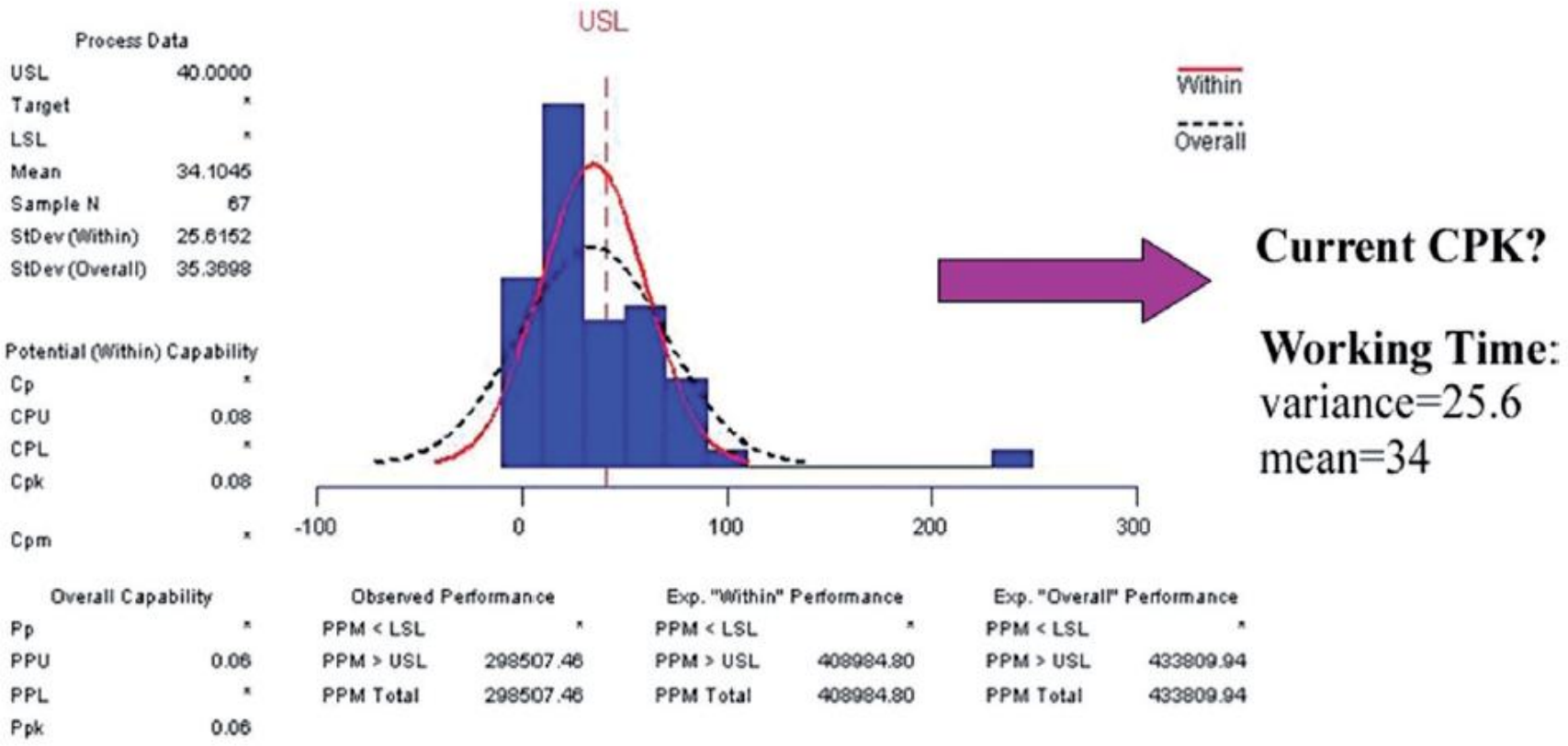



Figure 10. Process capability analysis for working time.

# Case Study

## The implementation procedure and result



**Analyse Phase**

***Y (processing time) = Y1 (waiting time) + Y2 (working time)***
***Y (processing time): μ=165; Y1 (waiting time): μ=131;***
***Y2 (working time): μ=34***
***Y=f (Y1:79%, Y2:21%).***

**We discovered that processing time causes a great deal of variation and accounts for 79% of the total waiting time. Therefore, the goal is to decrease the variation in waiting time.**

# Case Study

## The implementation procedure and result



### Analyse Phase

Table 7. Summary of analysis phase.

| Summary of analysis phase | |
|---|---|
| Cpk baseline | $Y$(processing time) = $Y1$(waiting time) + $Y2$(working time) = $Y1(\mu = 131) + Y2(\mu = 34)$<br>$Y(\mu = 165) = f(Y1{:}79\%,\ Y2{:}21\%)$ |
| Goal | $Z$: 1.5; DPMO = 16,7725 (DPMO, Defects per million opportunities) |
| Indicator | USL = 200, $\mu = 70$, $\sigma = 86$ |
| Description of goal setting | $Z = (X - \mu)/\sigma = (200 - 70)/86 = 1.5$, promote the $Z$ value from 0.81 to 1.5 |
| Variable | Waiting time |

# Case Study

## The implementation procedure and result



**Improve Phase**

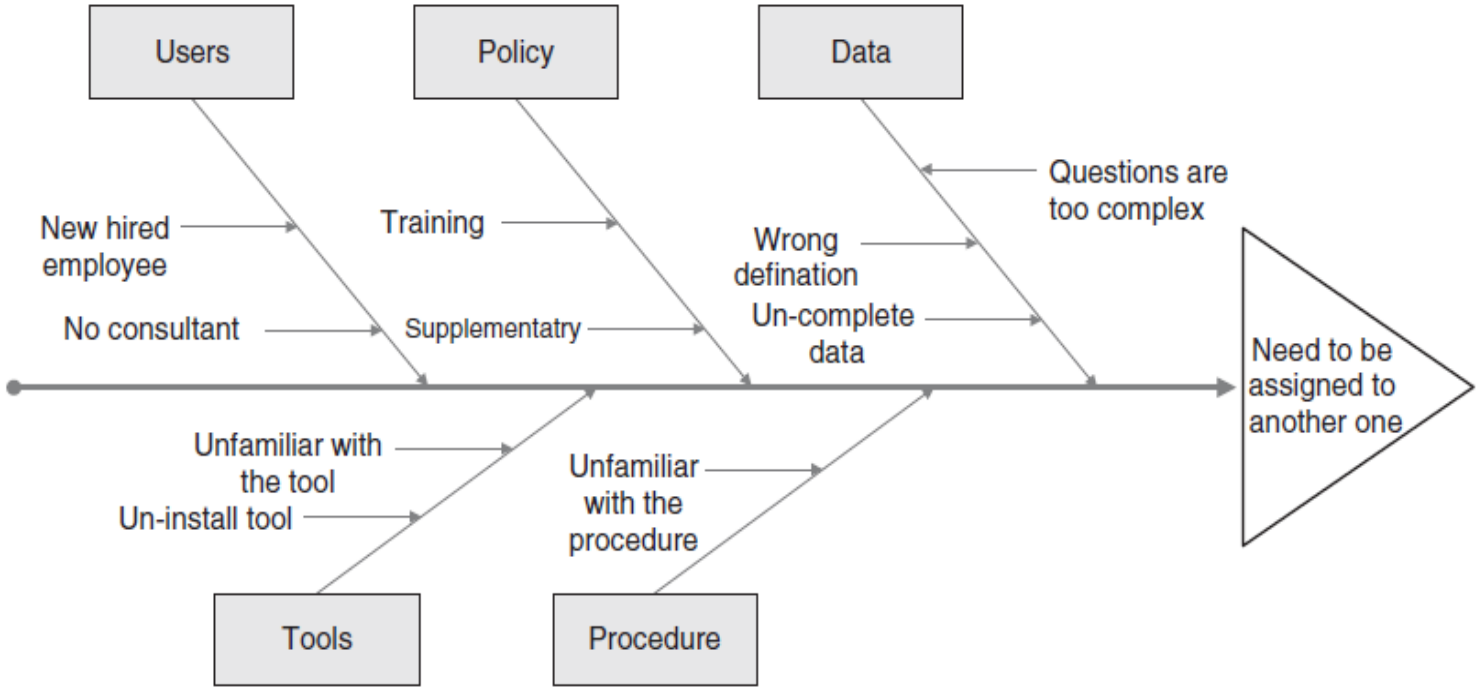



Figure 11. The solution conception – cause and effect diagram.

# Case Study

## The implementation procedure and result



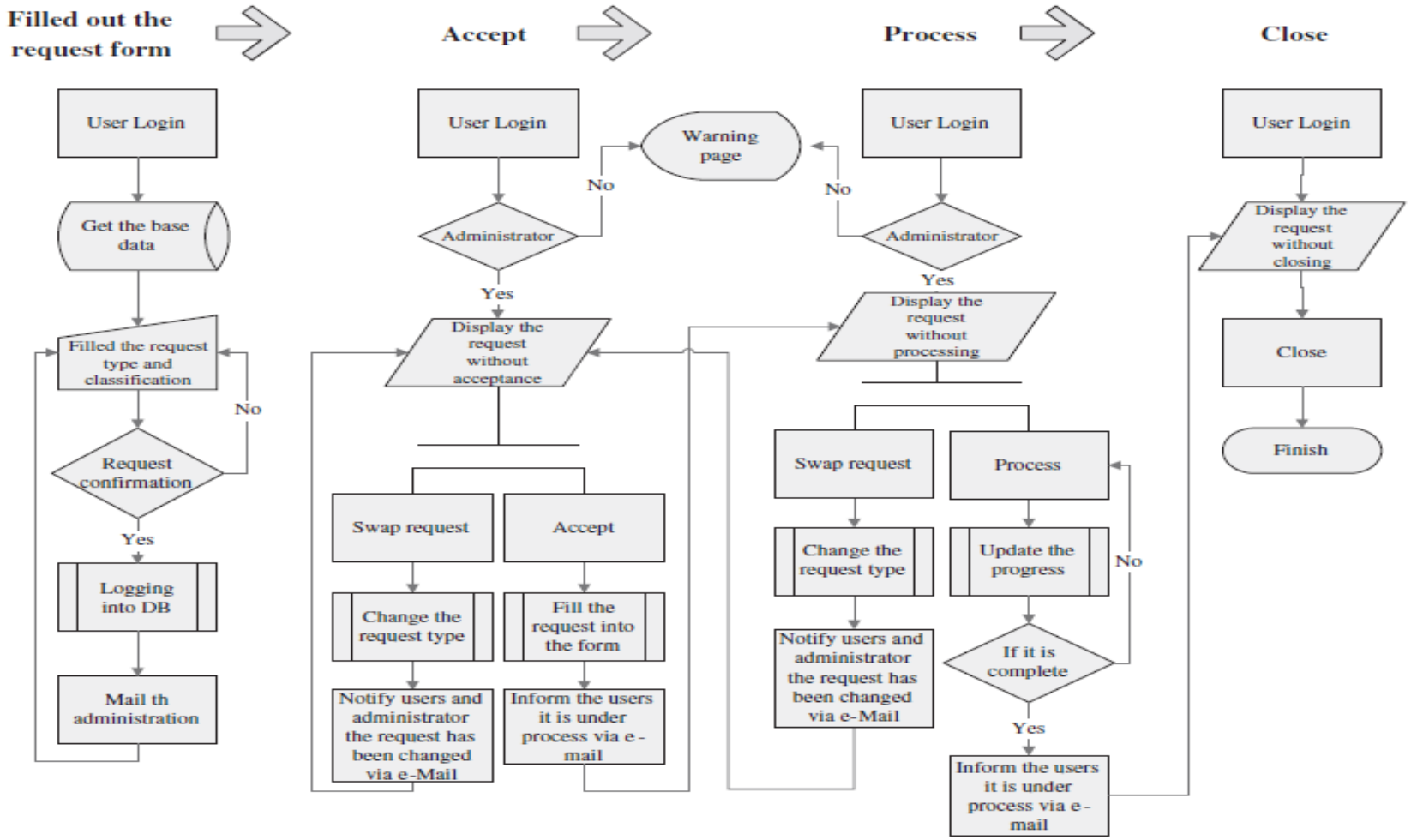



Figure 12. eHelp-desk flowchart.

# Case Study

## The implementation procedure and result



### Improve Phase

**Table: Summary of Improved phase**

| | |
|---|---|
| **Generate the solution:** | **(1) Generate the solution conception.**<br>**(2) Produce and decide the solution.**<br>**(3) Implement the solution.** |

# Case Study

## The implementation procedure and result



### Control Phase

Table 9. The optimisation procedure indicator.

| | AS-IS | TO-BE |
|---|---|---|
| Zst | 0.81 | 1.5 |
| Sigma level | 0.84 | 2.07 |
| DPMO | 310,603 | 167,725 |

# Case Study

## The implementation procedure and result



### Control Phase

Table 10. The benefit appraisal of finance.

| | AS-IS | TO-BE | Difference |
|---|---|---|---|
| Avg. wait time (min) | 131 | 71 | 60 |
| Manpower | 9.26 | 5 | 4.26 |
| Sigma level | 0.84 | 2.07 | 1.23 |
| Hard saving (month) | | | NTD 199,800 |
| Potential saving (month) | | | NTD 26,856 |

# Case Study

## The implementation procedure and result



### Control Phase

**(1) Hard savings: reduction of manpower cost NTD 199,800/monthly**

**Hard savings= Reduction of manpower (MP) x average salary (NTD/MP x month)**

**=(9.26-4)(MP) x 38000(NTD/MP x month)**

**= NTD 199,800/month**

**(2) Potential savings: reduction of waiting time cost NTD 26,856/monthly**

**Potential savings= improvement time (min/call) x number of issues (call/month) x average salary (NTD/min) x influenced percentage**

**= 60 (min/call) x 600 (calls/month) x 3.73 (NTD/min) x 20%**

**= NTD 26,856/months**

# Case Study

## The implementation procedure and result



### Control Phase

**Table: Summary of control phase**

| | |
|---|---|
| **Procedure control plan** | **Using the important factor (e.g. The question submission method, processes tool and so on), to generate the procedure control plan.** |

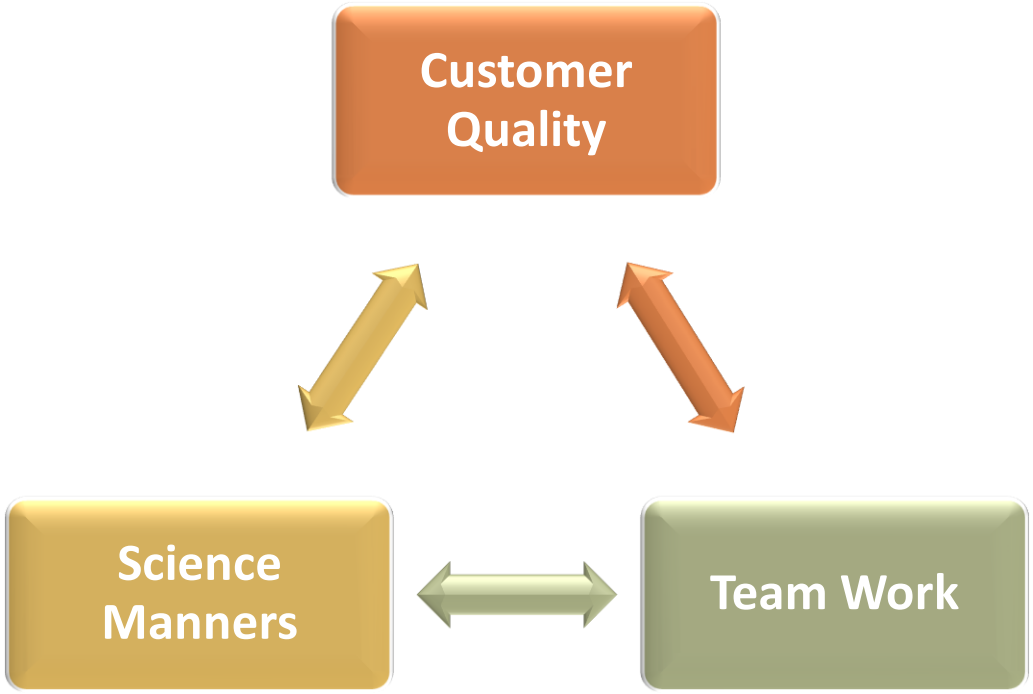
# Case Study





**Triangle Relationship**

**Research Conclusion**



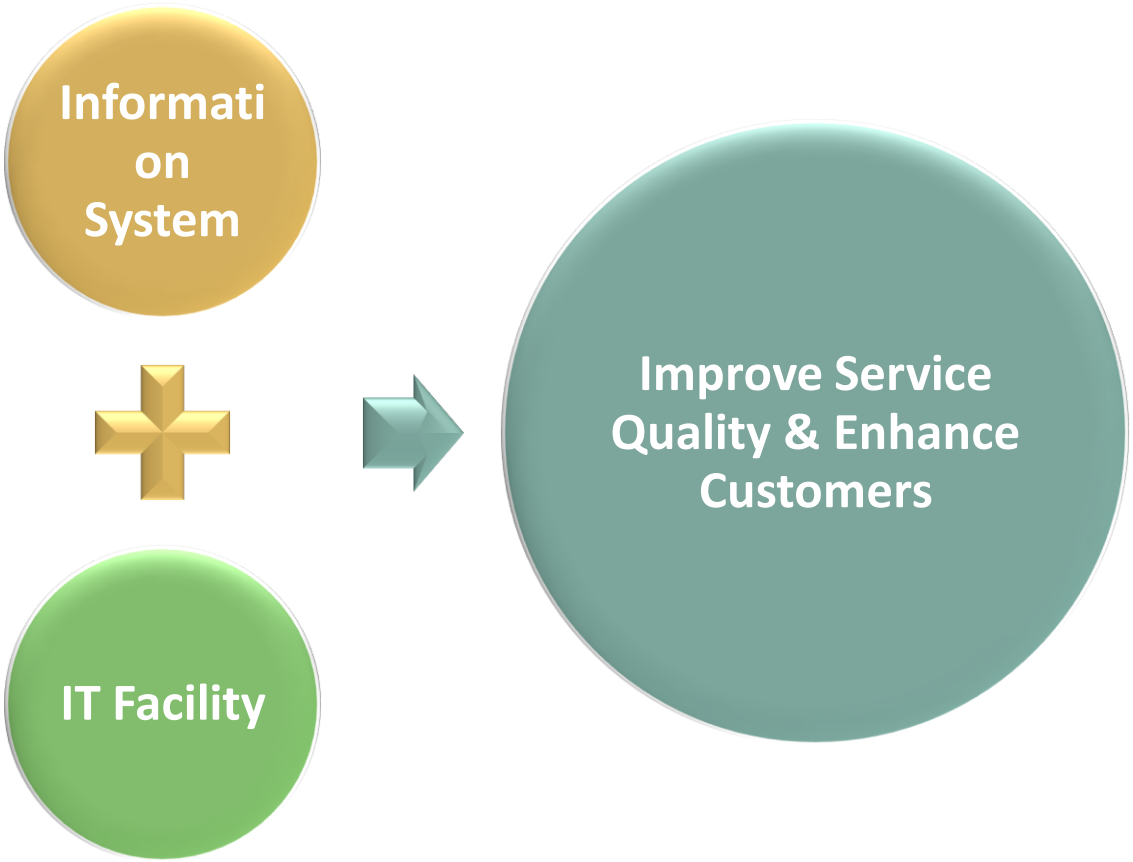

**The case company indeed gained a substantial financial benefit and also the dramatic improvement to service quality.**

# Case Study





**Research Contribution**

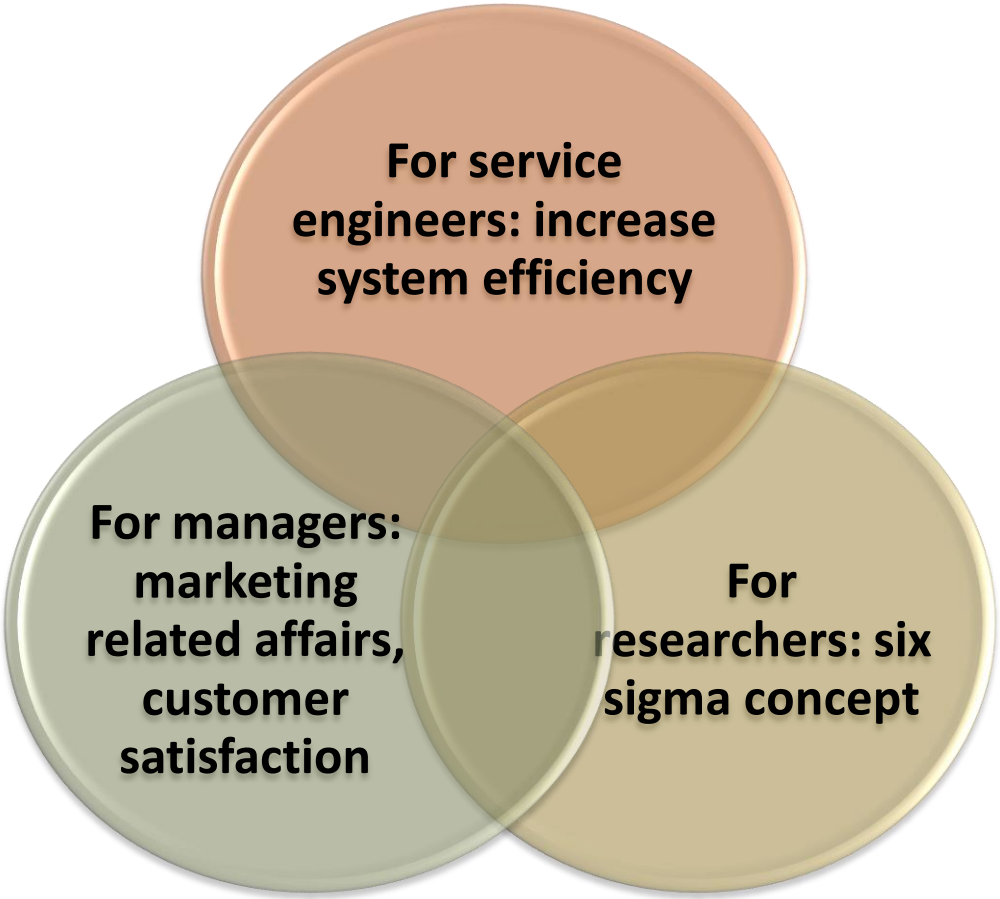


# Case Study





**Research Contribution**

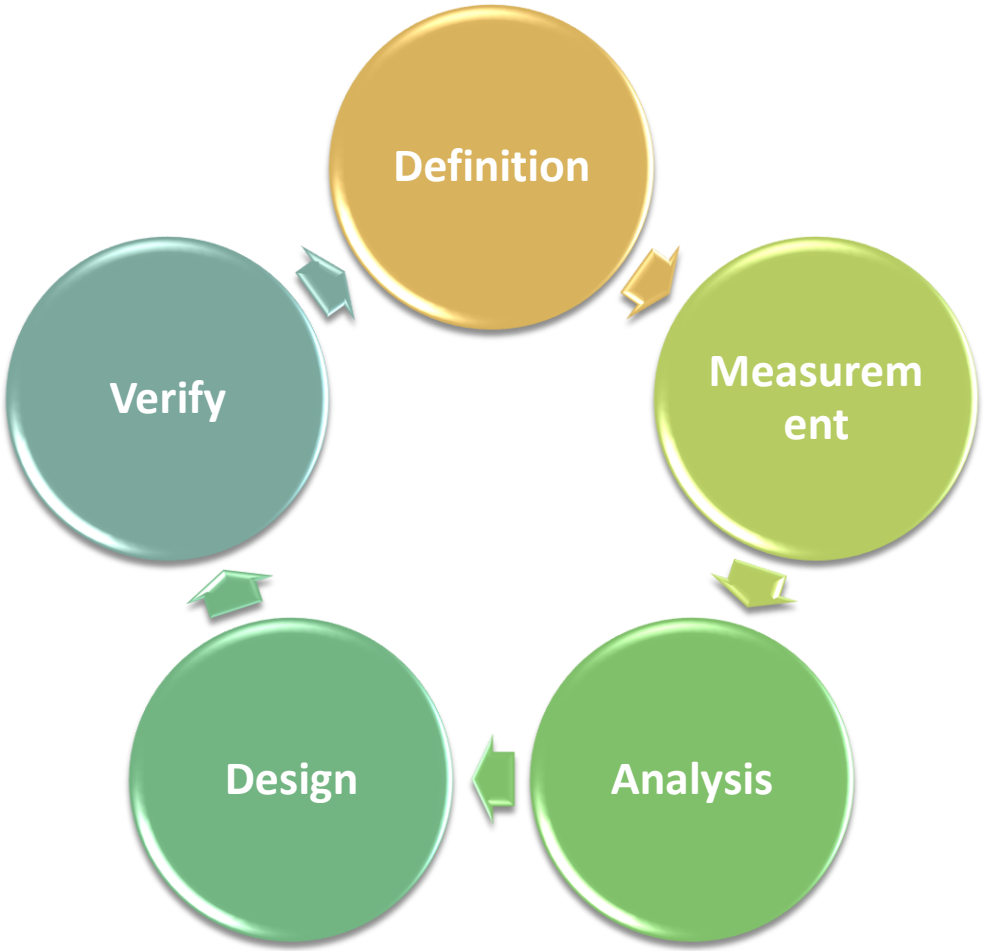


# Case Study





**Six Sigma: DMADV**



# THANK YOU!