

**LEAN SIX SIGMA IMPLEMENTATION FOR IT SERVICE  
DELIVERY - CASE STUDY AND IMPROVEMENT PLAN  
PROPOSAL**

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**LEAN SIX SIGMA IMPLEMENTATION FOR IT SERVICE DELIVERY - CASE  
STUDY AND IMPROVEMENT PLAN PROPOSAL**

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A Master's Project submitted in fulfillment of the requirements for the  
degree of Master of Quality Management


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2021

## DECLARATION

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I hereby declare that this final year project is the result of my own work, except for quotations and summaries which have been duly acknowledged.

Signature: 

Date: 5 March 2022

# **LEAN SIX SIGMA IMPLEMENTATION FOR IT SERVICE DELIVERY - CASE STUDY AND IMPROVEMENT PLAN PROPOSAL**

## **ABSTRACT**

The purpose of this paper is to show the root causes, result, challenges and implementation of lean six sigma implementation in Company D, which is one of the IT service companies in Malaysia. Lean Six Sigma implemented in Company D with the purpose of finding the root causes of bad service, high cost, low morale and productivity. DMAIC methodology was used in this study. Fishbone diagram and survey was used to find out the current issue and a list of improvement plans were proposed to the management. Interview was conducted after the implementation to review its effectiveness. The top 3 root causes found through fishbone diagram and FMEA are, management, operation and engineers. The study shows only minor improvements as there was a lack of support and commitment from the management. However, the study proved that Lean Six Sigma implementation in the IT service sector brings positive outcomes even though there were only minor improvements due to the lack of support and commitment from management. Suggestions were provided for further study in order to optimize the successfulness of Lean Six Sigma implementation.

**Keywords:** lean, six sigma, IT services, DMAIC, Fishbone Diagram, FMEA

# **PELAKSANAAN LEAN SIX SIGMA UNTUK PENYAMPAIAN PERKHIDMATAN IT - KAJIAN KES DAN CADANGAN PELAN PENAMBAHBAIKAN**

## **ABSTRAK**

Tujuan kertas kerja ini adalah untuk menunjukkan punca, keputusan, cabaran dan pelaksanaan pelaksanaan lean six sigma di Syarikat D, yang merupakan salah satu syarikat perkhidmatan IT di Malaysia. Lean Six Sigma dilaksanakan dalam Syarikat D dengan tujuan mencari punca perkhidmatan yang buruk, kos yang tinggi, semangat yang rendah dan produktiviti. Metodologi DMAIC digunakan dalam kajian ini. Fishbone diagram dan survey digunakan untuk mengetahui isu semasa dan senarai rancangan penambahbaikan telah dicadangkan kepada pihak pengurusan. Temu bual dijalankan selepas pelaksanaan untuk mengkaji keberkesanannya. Tiga punca utama yang ditemui melalui Fishbone diagram dan FMEA adalah, pengurusan, operasi dan jurutera. Kajian menunjukkan hanya sedikit penambahbaikan kerana kekurangan sokongan dan komitmen daripada pihak pengurusan. Bagaimanapun, kajian membuktikan bahawa pelaksanaan Lean Six Sigma dalam sektor perkhidmatan IT membawa hasil yang positif walaupun hanya terdapat sedikit penambahbaikan kerana kekurangan sokongan dan komitmen daripada pihak pengurusan. Cadangan telah disediakan untuk kajian lanjut bagi mengoptimumkan kejayaan pelaksanaan Lean Six Sigma.

**Kata Kunci:** lean, six sigma, Perkhidmatan IT, DMAIC, Rajah Tulang Ikan, FMEA

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# TABLE OF CONTENTS

<b>DECLARATION</b>	ii
<b>ABSTRACT</b>	iii
<b>ABSTRAK</b>	iv
<b>ACKNOWLEDGEMENTS</b>	v
<b>TABLE OF CONTENTS</b>	vi
<b>LIST OF TABLES</b>	viii
<b>LIST OF FIGURES</b>	x
<b>LIST OF ABBREVIATIONS</b>	xi
<b>CHAPTER 1</b>	
<b>INTRODUCTION</b>	1
1.1 Research Background	3
1.2 Problem Statement	6
1.3 Research Objective	6
1.4 Research Questions & Hypothesis	7
1.4.1. Research Questions	7
1.4.2 Hypothesis	8
1.5 Scope of Study	8
<b>CHAPTER 2</b>	
<b>LITERATURE REVIEW</b>	10
2.1 Current Issues	10
2.2 Methodology	12
2.3 Benefits of LSS Implementation in Service Sector	14
2.4 Challenges	16
2.5 Literature Review Matrix	17
<b>CHAPTER 3</b>	
<b>METHODOLOGY</b>	26
3.1 Define	26
3.1.1 Research Process Flowchart	29
3.1.2 Establish Problem Statement	31
3.1.3 Fishbone Diagram	31
3.1.4 Failure Modes and Effects Analysis (FMEA):	32
3.1.5 Establish Goals and Objectives	32
3.1.6 Study on Related Articles and Previous Research	33
3.1.7 Define Sample Size	33
3.2 Measure	33
3.2.1 Survey	34
3.2.2 Data Collection	36
3.3 Analyze	36
3.3.1 Survey Result	36

3.4 Improve	38
3.4.1 Knowledge Base & SOP	38
3.4.3 Staff Replacement	46
3.4.4 Data Collection after Implementation	40
3.5 Control	40
3.5.1 Daily result monitoring	40
3.5.2 Monthly SLA Performance Review	40
<b>CHAPTER 4</b>	
<b>DATA ANALYSIS AND RESULTS</b>	41
4.1 Define	41
4.2 Analyze	50
4.2.1 Survey Result & Analysis:	50
4.2.2 QMS Data Analysis after Implementation:	65
4.2.3 Hypothesis Analysis	67
<b>CHAPTER 5</b>	
<b>DISCUSSION AND CONCLUSION</b>	74
5.1 Summary of Main Findings	74
5.2 Discussion and Implications	74
5.3 Challenges and Limitations of the study	77
5.4 Improvement Proposal and Directions for Future Research	78
5.5 Conclusion	79
<b>REFERENCES</b>	81



## LIST OF TABLES

Table 1.1: SLA Requirements from Customer H & C	5
Table 1.2: Causes of Bad Service, High Cost and Low Morale and Productivities	46
Table 2.1: Overview of DMAIC Framework	12
Table 2.2: Literature Review Matrix	17
Table 3.1: Project Charter	28
Table 3.2: Survey Questions - Feedback on Direct Superior	34
Table 3.3: Core Values of Company D	35
Table 3.4: Survey Questions - Feedback on The Management	35
Table 3.5: Response and Resolution SLA before LSS Implementation	31
Table 4.1: FMEA to Identify Top 3 Root Causes	48
Table 4.2: Root Cause Impact Severity	50
Table 4.3: Survey Result on Satisfaction on Direct Superior - Central	51
Table 4.4: Survey Result on Satisfaction on Direct Superior - Southern	52
Table 4.5: Survey Result on Satisfaction on Direct Superior - East Malaysia	53
Table 4.6: Survey Result on Satisfaction on Direct Superior - Northern	54
Table 4.7: Survey Result on Satisfaction on Direct Superior - East Coast	55
Table 4.8: Survey Result for Overall Satisfaction on Direct Superior	56
Table 4.9: Survey Result on Satisfaction on The Management - Central	57
Table 4.10: Survey Result on Satisfaction on The Management - Southern	58
Table 4.11: Survey Result on Satisfaction on The Management - East Malaysia	59
Table 4.12: Survey Result on Satisfaction on The Management - Northern	60
Table 4.13: Survey Result on Satisfaction on The Management - East Coast	61
Table 4.14: Survey Result for Overall Satisfaction on the Management	62
Table 4.15: Average Satisfaction Rate by Questions	62
Table 4.16: Feedback from FE on Direct Superior and The Management	63
Table 4.17: Before and After Implementation SLA Performance from QMS	66

Table 4.18: Comparison SLA Performance Before and After LSS Implementation	66
Table 4.19: TAT rate Before and After LSS Implementation	67
Table 4.20: p-Value for Failed to Meet Response SLA - Before Implementation	68
Table 4.21: p-Value for Failed to Meet Response SLA - During Implementation	68
Table 4.22: p-Value for Failed to Meet Response SLA - After Implementation	68
Table 4.23: p-Value for Failed to Meet Resolution SLA - Before Implementation	69
Table 4.24: p-Value for Failed to Meet Resolution SLA - During Implementation	69
Table 4.25: p-Value for Failed to Meet Resolution SLA - After Implementation	70
Table 4.26: p-Value for Failed to Meet Response SLA by Region - Before Transition	71
Table 4.27: p-Value for Failed to Meet Response SLA by Region - During Transition	71
Table 4.28: p-Value for Failed to Meet Response SLA by Region - After Transition	72
Table 4.29: p-Value for Failed to Meet Resolution SLA by Region - Before Transition	72
Table 4.30: p-Value for Failed to Meet Resolution SLA by Region - During Transition	72
Table 4.31: p-Value for Failed to Meet Resolution SLA by Region - After Transition	73
Table 5.1: Summary of Hypothesis Results	75

## LIST OF FIGURES

Figure 1.1: Six Sigma Bell Curve	1
Figure 1.2: Lean Six Sigma	2
Figure 1.3: Malaysia GDP From Services	3
Figure 1.4: Percentage Changes by Quarter	3
Figure 1.5: Performance by Segment	4
Figure 1.6: Relationship between Company D, Customer H & Customer C	5
Figure 1.7: Fishbone Diagram	41
Figure 2.1: Course Mapping of Six Sigma Phase and Tools Typically Applied	14
Figure 3.1: Research Process Flowchart	30
Figure 3.2: Knowledge Base for Account Customer H	39
Figure 5.1: Coefficient	76
Figure 5.2: Correlation	76

## LIST OF ABBREVIATIONS

2BD	Two Business Days
CC	Call Centre
CTQ	Critical to Quality
DMAIC	Define, Measure, Analyze, Improve and Control
DOE	Design of Experiments
DPMO	Defects Per Million Opportunities
FE	Field Engineer
FMEA	Failure Mode and Effect Analysis
HQ	Headquarter(s)
LSS	Lean Six Sigma
NBD	Next Business Day
OM	Operation Manager
PM	Project Manager
QFD	Quality Function Deployment
QMS	Quality Management System
SDM	Service Delivery Manager
SIPOC	Suppliers, Inputs, Process, Outputs, Customers
SLA	Service Level Agreement
SOP	Standard Operating Procedure
SQ	Service Qualification
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAT	Turn Around Time
TL	Team Lean
TS	Technical Specialist
VSM	Value Stream Mapping

## CHAPTER 1

### INTRODUCTION

Lean Six Sigma is the integration of Lean and Six Sigma. Lean management was first introduced by Eli Whitney in 1850. Later, Toyota invented the Toyota Production System inspired by the Lean production flow developed by Henry Ford (Hessing). Lean is a management approach that helps reduce non value added activities, unnecessary cost, resources and time by eliminating waste (Rastogi, 2020).

Six Sigma was introduced by Bill Smith, an engineer from Motorola (Shmula, 2021). Sigma  $\sigma$  is a Greek symbol which is used for measuring deviation from mean or target based on statistical terms (Kumar.P, 2020). Six Sigma was developed by a German mathematician, Carl Friedrich Gauss back in the 18th century (Bhargav, 2019). Six Sigma is a data driven methodology to ensure continuous improvement by reducing the occurrence or probability of error. Six Sigma is to control the defect within 3.4 defects per million opportunities.

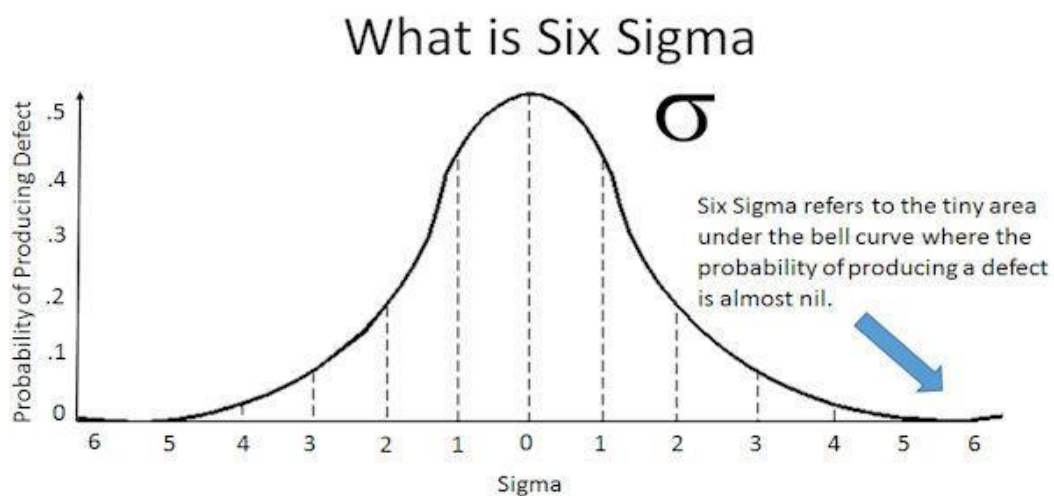


Figure 1.1: Six Sigma Bell Curve (Patricia O'Rourke et al)

Lean Six Sigma (LSS) is a combination of both Lean and Six Sigma principles. This research is to focus on LSS implementation in IT service management which is to reduce cost and resources utilization while maintaining or improving the service quality at the same time.

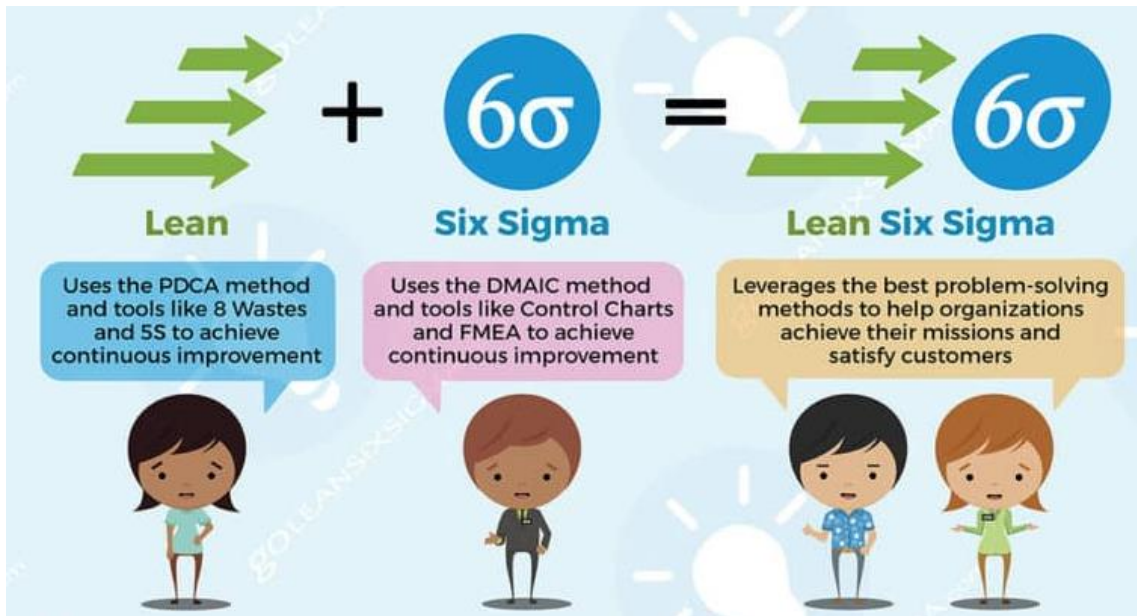


Figure 1.2: Lean Six Sigma (GoLeanSixSigma.com)

There are many models and approaches which are in use by most of the IT companies like ITIL, Agile for service management, PMP and Prince II for project management. ITIL is the acronym for Information Technology Infrastructure Library which is widely used in the IT industry to align IT with business values and to deliver IT services (Hertvik, 2020). On the other hand, Agile is always related to software development. In Agile it is about interactions between people in order to understand the user's expectations and fulfilling customer varieties expectations (EDUCBA). Agile focuses more on bringing value instead of documentation (Brasel) whereas standardized work, documenting the standard operation procedure is part of Lean principles.

## 1.1 Research Background

In view that the service sector has gradually increased over the years in Malaysia (Figure 1.3), by increasing the service value in the market can help boost the country's economy. As seen in Figure 1.4 and Figure 1.5 the Information & Communication and Transportation & Storage sector contributed 14% to the country compared to other service sectors.

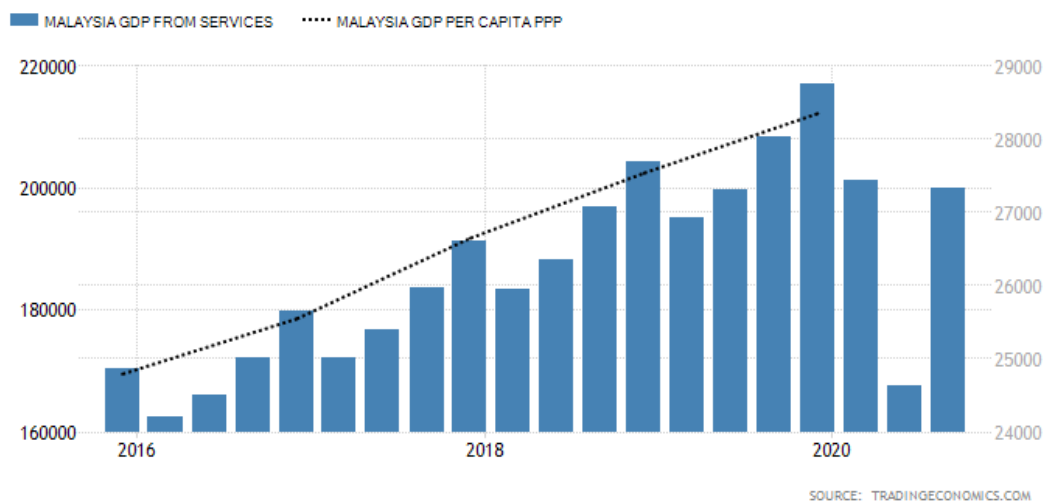


Figure 1.3: Malaysia GDP From Services (Trading Economics, 2020)



Figure 1.4: Percentage Changes by Quarter (Department of Statistics Malaysia Official Portal, 2020)

**Performance by Segment**

	Weight	Original Volume Index			Seasonally Adjusted Volume Index		
		Volume Index	% Change QoQ	% Contribution	Volume Index	% Change QoQ	% Contribution
<b>Services Sector (2015=100)</b>		123.3	24.3	100.0	122.7	22.9	100.0
<b>Segment 1</b> Wholesale & Retail Trade, Food & Beverages and Accommodation	45.2	123.7	31.0	55.6	123.8	30.7	59.5
<b>Segment 2</b> Business Services and Finance	26.8	123.6	19.6	21.4	122.7	15.5	17.0
<b>Segment 3</b> Information & Communication and Transportation & Storage	21.9	128.2	15.2	13.2	127.3	15.5	14.0
<b>Segment 4</b> Other Services	6.1	101.6	38.6	9.8	99.3	35.4	9.5

Figure 1.5: Performance by Segment (Department of Statistics Malaysia Official Portal, 2020)

It is a challenge for service productivity as it always encompasses both efficiency and customer satisfaction ([Sanchez, 2012](#)). With the growth of the IT service industry, the pressure of competition has been high in the IT service industry. In order to stand out among the competitors the company has to be able to provide quality service that increases customer satisfaction but at the same time not increasing the cost.

This paper focuses on a Lean Six Sigma methodology implementation and proposal done on Company D. Company D is an IT service company in Malaysia. The company had been in service since 1971. The company provides various IT solution services to various sectors and projects, such as banking sector, IT sector, government projects and so on. However, in recent years many customers had decided not to renew



their contract due to poor service quality provided. Hence, in order to improve the service quality, Lean Six Sigma methodology was proposed in hope to gain back the confidence of the customers with service quality improvement. The pilot test was conducted on one of the customer accounts, which is the Customer H. Customer H is an IT equipment provider who provides IT equipment to various customers. One of their customers is bank C whose Customer H engages with Company D for their service to maintain the IT equipment in use by Customer C. Referring to the relationship figure 1.7 below shows that Company D represents Customer H to provide IT maintenance service to Customer C.

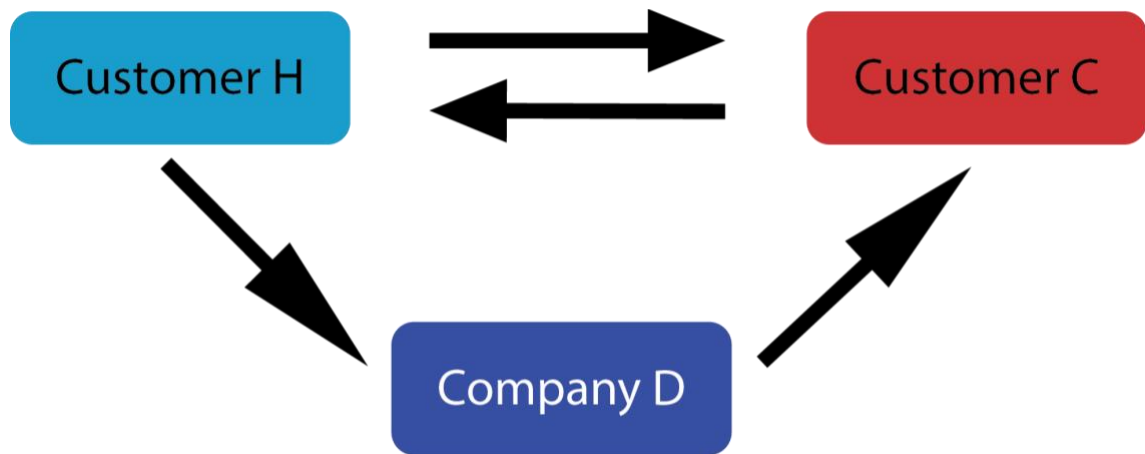


Figure 1.6: Relationship between Company D, Customer H & Customer C

SLA requirements from Customer C are quite stringent as any breakdown of the IT equipment brings great impact to the bank’s operation. The SLA requirements are 98% achievement of onsite within 30 minutes and resolved by next business day (NBD) for all Headquarters (HQ) and same day onsite for the remaining sites and resolved within two business days (2BD).

Sites	Target	Response Time	Resolve Time
HQ	98%	30 min	NBD
Branches	98%	NBD	2BD

Table 1.1: SLA Requirements from Customer H & C

## **1.2 Problem Statement**

The current issues with the IT service company is bad service quality, high cost, low morale and productivity. There were many complaints from the customers that the service provided is very bad, such as breach of SLA by attending to the customer late without informing the customer for the delay, issues not being resolved within SLA which affects the operation of the customer. Other than that, the increase of cost due to multiple trips required to resolve the case. The issue of bad employee attitude towards the customer also increased customer dissatisfaction and complaints. Problem with increasing number of backlog cases due to low productivity.

Seven possible root causes were identified by using Fishbone Diagram (refer to Figure 1.7) which led to the problems stated above are, the management, operation, engineer, call center, competency, processes, and tools.

## **1.3 Research Objective**

Customer satisfaction plays an important role in an organization's performance. Therefore, providing good service is crucial as it is the key to increase customer satisfaction. Additionally, a high workplace morale is essential to any organization in order to retain talent and for the business to run smoothly as employees are the important asset of the organization.

According to HR Daily Advisor (2018) employee satisfaction can lead to organizational success. The benefits to ensure employee satisfaction are higher productivity, higher morale in the organization, better service performance and so on. As mentioned by Picincu.A (2021), low staff morale can actually affect the company's profit,

performance and productivity. Hence, it is important to identify the root of it in order to resolve the issue and improve service performance.

Since there are many LSS tools and techniques available, however not all tools and techniques are suitable to be used. A list of LSS tools and techniques will be selected and reviewed based on the issues identified. Only the highest effective tools and techniques that suit the organization will be suggested to the organization.

Lastly, improvement plan design based on the issue and pilot test results and propose to the management for further improvement.

Below are the objectives of this paper:

- Identify the root causes that are impacting the service quality performance
- Identify the impact severity of each root causes listed
- To recommend the improvement plan for the management to overcome current issues and to increase service performance
- To validate the recommended improvement plan

## **1.4 Research Questions & Hypothesis**

### 1.4.1. Research Questions

Referring to the objectives of the research, below are a few research questions to aid in this research.

1. What are the impact severity from all the root causes found?
2. What are the suitable Lean tools and techniques that can be used to reduce lead time in order to meet the SLA target and to improve operation processes?
3. Who from the organization should be involved in the LSS implementation?

### 1.4.2 Hypothesis

Below are the hypotheses based on the research questions.

#### *Hypothesis 1:*

**H1:** There is a significant relationship between the way the management manages the company causes employees dissatisfaction which impacts the company service performance

**H01:** There is no significant relationship between the way the management manages the company causes employees dissatisfaction which impacts the company service performance

#### *Hypothesis 2:*

**H2:** There is a significant relationship in assigning the right person to the right position resulting in smoothness of the operation and the ability to deliver the job better.

**H02:** There is no significant relationship in assigning the right person to the right position resulting in smoothness of the operation and the ability to deliver the job better.

### **1.5 Scope of Study**

This study is focused on all possible factors that are impacting the service performance for one of the IT companies using one of their customer accounts which is Customer H as an LSS implementation pilot test. All employees that are involved in services and customers facing including Field Engineers (FE), Service Delivery Manager (SDM) and Project Manager (PM), employees that provide backend support such as Call Centre (CC), Operation Managers (OM) and the one who has the authority to make the call on any decision such as the top management will be involved in this study as well. Performance data will be collected from the system before the implementation for

analysis to determine the current performance. Another set of data will be collected again to determine the LSS effectiveness after the implementation. Apart from that, surveys and interviews conducted on relevant parties as well to collect the required information.

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