IMPROVING THE OPERATION TRAINING PROCESS BY ELIMINATING PROBLEM HAPPENS IN THE TRAINING EXECUTION AREA USING FAILURE MODE EFFECT ANALYSIS METHOD

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An Internship Report submitted to the Faculty of Engineering President University in partial Fulfillment of the requirements of Bachelor Degree in Engineering Major in Industrial Engineering

2015

ACADEMIC ADVISOR

RECOMMENDATION LETTER

This internship report is prepared and submitted by **Priyanda Adwito** in partial fulfillment of the requirements for the degree of Bachelor Degree in the faculty of Engineering has been reviewed and found to have satisfied the requirements for a report fit to be examined.

Cikarang, Indonesia, March 25th, 2015

Herwan Yusmira, B.Sc. MET, MTech

COMPANY'S SUPERVISOR

RECOMMENDATION LETTER

Priyanda Adwito has performed and completed an internship in **PT. HM Sampoerna Tbk**, in partial fulfillment of the requirements for the degree of Bachelor Degree in the Faculty of Engineering. I therefore recommend the report to be examined.

Cikarang, Indonesia, March 25th, 2014

Dedy Hidayat

INTERNSHIP REPORT AT PT. HM SAMPOERNA TBK, CIKARANG, INDONESIA

By

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ABSTRACT

PT. HM Sampoerna Tbk, always looking for improvement in every part of the job. It is found there are problems in the operation training process that can influence the training execution. The problems have to be eliminated and solved to improve the operation training process so that technical training division more efficient. The way in order to improve the operation training process is by finding out the cause and effects of the failure in the process. Identify first the problem in the operation training process by using CEDAC. All the problems have to be analyzed. The Failure Mode Effect Analysis is used as the method to eliminate the failure in the process. In this method all failure mode that coming from training execution will be analyzed. This analysis will become improvement guideline in order to prevent the unexecuted training in the training execution process. At the end, implementing FMEA in the operation training process will decrease the training execution problems.

Keywords: *Operation Training Process, Cause and Effects, Failure, Occurrence, Detection, Severity, Failure Mode Effect Analysis*

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All the praises and thanks to Allah SWT will all the blessing and the strength that He give me until I stand for tenth semester in university. He is the Most Gracious and the Most Merciful, I thank to Him because He always give me the best way until I have done my internship report and the best people around me, such as:

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABELS

LIST OF TERMINOLOGY

DNA	: is a database which contains data or profile of employee who work at a company.
Failure Mode	: A way or more in shich a process or a product may fail, that may cause by any error or defects.
Failure Effect	: A column in FMEA table that is purposed to show the result of the failures that happen in a process of a product.
Failure Causes	: A description of the design or process deficiency (global cause or root level cause) that results in the failure mode. You must look at the causes not the symptoms of the failure. Most failure Modes has more than one Cause.
FMEA	: A risk assessment tool which is used to identify the possible ways in which a product or a process might fail with the main purpose of improving the existing product or process and preventing the reoccurrence of the failure.
Detection Rating	**:** A numerical rating of the probability that a given set of controls WILL DISCOVER a specific Cause of Failure Mode to prevent bad parts leaving the facility or getting to the ultimate customer. Assuming that the cause of the failure did occur, assess the capabilities of the controls to find the design flaw.
Severity Rating	**:** (Seriousness of the Effect) Severity is the numerical rating of the impact on customers. When multiple effects exist for

a given failure mode, enter the worst case severity on the worksheet to calculate risk.

Occurrence Rating : Is an estimate number of frequencies or cumulative number of failures (based on experience) that will occur (in our design concept) for a given cause over the intended "life of the design".

Failure Controls : The mechanisms, methods, tests, procedures, or controls that we have in place to PREVENT the Cause of the Failure Mode or DETECT the Failure Mode or Cause should it occur, Design Controls prevent or detect the Failure Mode prior to engineering release.

Detection Rating : A numerical rating of the probability that a given set of controls WILL DISCOVER a specific Cause of Failure Mode to prevent bad parts leaving the facility or getting to the ultimate customer. Assuming that the cause of the failure did occur, assess the capabilities of the controls to find the design flaw.

RPN : or Risk Priority Number Is the product of Severity, Occurrence, & Detection. Risk= RPN= S x O x D. Often the RPN's are sorted from high to low for consideration in the action planning step (Caution, RPN's can be misleading- you must look for patterns).

Action Planning : A thoroughly thought out and well developed FMEA With High Risk Patterns that is not followed with corrective actions has little or no value, other than having a chart for an audit.

CHAPTER I
INTRODUCTION

1.1 Problem Background

Indonesia is one of country that can produce the best quality of tobacco. This country is the fifth largest tobacco market in the world, and in 2008 over 165 billion cigarettes were sold in the country. Several tobacco companies are dominating the market in Indonesia. The local people in Indonesia are get use to smoking. Smoking cigarettes become addiction for several people in this country; as facts there are approximately 57 million smokers in Indonesia. Kretek manufacturers directly employ over 180,000 people in Indonesia and an additional 10 million indirectly. It is why tobacco industries also become the biggest industries in Indonesia who can give a big economical impact for the country.

PT. HM Sampoerna Tbk is the one sample of tobacco companies that dominating in Indonesia. Producing top quality of cigarettes is not easy, because there are several processes needed to complete if a company want to achieve it. This why PT. HM Sampoerna Tbk become exists they have the quality of their cigarettes. The uniqueness of the cigarettes taste, it makes the customer like the products. Since they have the high demand from customer, they are always wanted to be better the company has to set daily production targets in order to fulfill the demand. To achieve the target of production, every worker needs to work efficiently every day.

Technical training division were made to help the employee gains their knowledge of working and be a better employee. The trainer in technical training division teach appropriate instruction for workers who work in the PT. HM Sampoerna Tbk especially in production division. Technically know how to operate some machine in the proper way. The improper operation can guide the company to some problem. It can create waste, injury, stopping production,

decrease the efficiency, and etc. As the largest tobacco company in Indonesia, PT. HM Sampoerna Tbk will have working instruction that fulfil the standard procedure for a company. The proper working instruction will help the worker to increase the efficiency of working, stay away the worker from injury, and increase the productivity for producing products. Every machine may have different instructions.

Handling the technical training is not easy because it relates with others division and system. Although training for employee needed but some times the training cannot be executed. It cannot be executed because there are problems in the operation process. The delayed or unexecuted training become wasted of time of the operation training because they cannot achieved the target to gains employees knowledge and skills of work.

Operation training processes are the guides of technical training to achieve their jobs. There are several steps to complete the training, which are:
DNA Collection → Training Planning & Scheduling → Training Execution → Training Report and Evaluation.The goal is to make the operation training process become optimal. If the time were used more efficient, so the training can be completed. If the training completed, the employee skill will be increase and it can gain the productivity of employees work. Right now the operation training division find there is problem in their operation training process. In the training execution there are some factors that makes the training execution fail to be executed.

In this research, the problem in the operation training process is determined by using cause effect diagram. The cause of operation training process which not going well and what are the effects. In this research is focusing in implementing FMEA in the operation training process to prevent unexecuted training in Technical Training division; Therefore, they can make some standards about the system operation training process later as the result of conducting the FMEA study. So by implementing FMEA in the operation training process, it can

improve the training process in the technical training division become optimal and prevent the failure which is unexecuted training.

1.2 Problem Statement

As the background of the problem has been stated above, therefore this research is aiming to answer the following question:

- How to identify the problem in operation training process?
- How to eliminate the problem that will cause unexecuted training in the operation training process?
- How can Failure Mode Effects Analysis improve the operation training process by eliminating the problem?

1.3 Objectives

The key objective of this research is to improve the operation training process become more productive. Eliminating the problem in the operation training process to prevent unexecuted training. By implementing Failure Mode Effect Analysis in the process, so it will minimizing or eliminates the problem and improves the process in the future.

1.4 Scope and Limitation

Due to limited time and resource that is available for this project, some limitations should be established, such as:

1. This study conducted in the Karawang plant only.
2. The observation is only focusing on operation training process training execution.
3. The observation was done from September – November 2014.
4. This research will only be focusing on the training planning and executing process failure mode that have 5 biggest RPN in the FMEA table.

1.5 Assumption

In this project also there will be several assumptions used. They are:

- The workers as the sample are work 8 hours per day in 6 working days.

- The employees do not have any knowledge about the waste that occurred in their operation training process.

1.6 Research Outline

Chapter I Introduction

This chapter consists of the background of the study, problem identification, objective, scope and assumption used in the research.

Chapter II Literature Study

This chapter consists of earlier literature that is related, or might provide comprehension for this project, in which the writer used as references and knowledge source for the project. The literature review in this chapter includes the basic principle of Failure Mode Effect analysis, flow chart, and other tools to support this project.

Chapter III Research Methodology

This chapter explains the flow of this research.

Chapter IV Data Collection and Analysis

Data Collection and Analysis will include the collection of data which is used in this research, as well as the detailed analysis of the data. Since the research is about operation training process in a company, some of the analysis about the factors that effects the technical training will also be included in this chapter.

Chapter V Conclusion and Recommendation

The conclusion for this research as well as the recommendation for related future research will be put in the final chapter. The conclusion consists of the answer of the problem statement and the effect of the improvement based on the perspective of the worker.

That is all available to explain in chapter 1. Chapter 1 is the introduction chapter that should be presented in any scientific writing as it could provide fundamental information and perceptions about the research to the readers. Chapter 1 begins with the explanation of the problem background, and continued with the problem statement. After the problem has been introduced and identified, list the objectives, scopes, and assumptions of the research. Finally, close the chapter with the outline of the research to give information about the flow of the research.

CHAPTER II
LITERATURE STUDY

2.1 Cause and Effect Diagram (Fishbone Diagram)

A graphical-labular chart that used to list and analyze the potential causes of given problem. It can be used to identify which causes are most significant and how to take corrective action against them. In application cause and effect diagrams are often developed by worker teams who study operational problems.

The diagram provides a graphical means for discussing and analyzing a problem and listing its possible causes in an organized and understandable way. As a starting point in identifying the causes of the problem, six general categories are often used because they are the factors that affect performance of most production and service processes. They are called the 5Ms and 1P:

- Machines: This refers to the equipment and fooling used in the process
- Materials: These are the starting materials in the process
- Methods: The refers to the procedures, sequence of activities, motion
- Mother Nature: This is for environmental factors such as temperature and humidity that might affect the process
- Measurement: This relates to the validity and accuracy of the data collection procedures.
- People: This is the human factor.

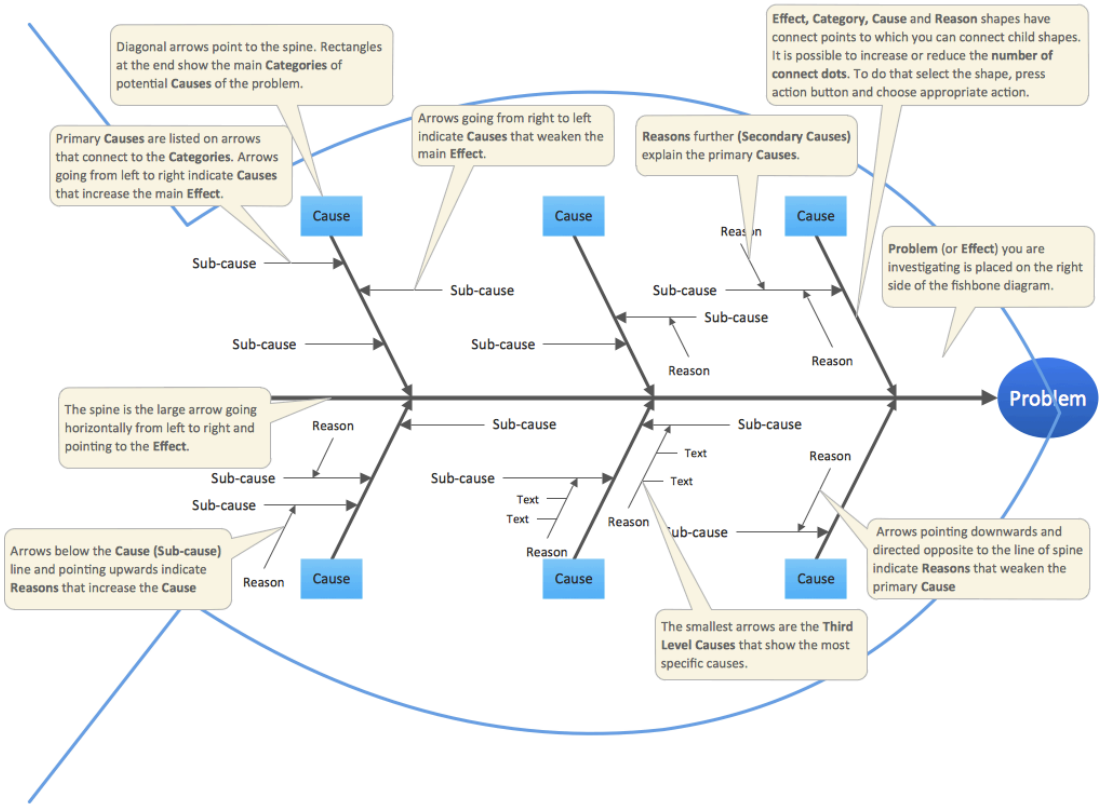

Figure 2.1 Cause Effect Diagram example

2.2 Failure Mode and Effect Analysis (FMEA)

Failure Mode and Effects Analysis (FMEA) was one of the first systematic techniques for failure analysis. It was developed by reliability engineers in the 1950s to study problems that might arise from malfunctions of military systems. An FMEA is often the first step of a system reliability study. It involves reviewing as many components, assemblies, and subsystems as possible to identify failure modes, and their causes and effects. For each component, the failure modes and their resulting effects on the rest of the system are recorded in a specific FMEA worksheet. There are numerous variations of such worksheets. An FMEA is mainly a qualitative analysis. A few different types of FMEA analyses exist, such as:

- Functional
- Design
- Process FMEA.

FMEA is an inductive reasoning (forward logic) single point of failure analysis and is a core task in reliability engineering, safety engineering and quality engineering. Quality engineering is specially concerned with the "Process" (Manufacturing and Assembly) type of FMEA. A successful FMEA activity helps to identify potential failure modes based on experience with similar products and processes - or based on common physics of failure logic. It is widely used in development and manufacturing industries in various phases of the product life cycle. Effects analysis refers to studying the consequences of those failures on different system levels.

Functional analyses are needed as an input to determine correct failure modes, at all system levels, both for functional FMEA or Piece-Part (hardware) FMEA. An FMEA is used to structure Mitigation for Risk reduction based on either failure (mode) effect severity reduction or based on lowering the probability of failure or both. The FMEA is in principle a full inductive (forward logic) analysis, however the failure probability can only be estimated or reduced by understanding the failure mechanism. Ideally this probability shall be lowered to "impossible to occur" by eliminating the (root) causes. It is therefore important to include in the FMEA an appropriate depth of information on the causes of failure (deductive analysis).

2.2.1 When To Use FMEA

FMEA can be used in several occasions, for example:

- When a process, product or service is being designed or redesigned, after quality function deployment.
- When an existing process, product or service is being applied in a new way.
- Before developing control plans for a new or modified process.
- When improvement goals are planned for an existing process, product or service.
- When analyzing failures of an existing process, product or service.

- Periodically throughout the life of the process, product or service

2.2.2 FMEA Terminology

1. **Failure Modes:** (Specific loss of a function) is a concise description of how a part, system, or manufacturing process may potentially fail to perform its functions.
2. **Failure Mode**"**Effect**"**:** A description of the consequence or Ramification of a system or part failure. A typical failure mode may have several "effects" depending on which customer you consider.
3. **Severity Rating:** (Seriousness of the Effect) Severity is the numerical rating of the impact on customers. When multiple effects exist for a given failure mode, enter the worst case severity on the worksheet to calculate risk.
4. **Failure Mode**"**Causes**"**:** A description of the design or process deficiency (global cause or root level cause) that results in the failure mode. You must look at the causes not the symptoms of the failure. Most failure Modes has more than one Cause.
5. **Occurrence Rating:** Is an estimate number of frequencies or cumulative number of failures (based on experience) that will occur (in our design concept) for a given cause over the intended "life of the design".
6. **Failure Mode**"**Controls**"**:** The mechanisms, methods, tests, procedures, or controls that we have in place to PREVENT the Cause of the Failure Mode or DETECT the Failure Mode or Cause should it occur, Design Controls prevent or detect the Failure Mode prior to engineering release
7. **Detection Rating:** A numerical rating of the probability that a given set of controls WILL DISCOVER a specific Cause of Failure Mode to prevent bad parts leaving the facility or getting to the ultimate customer. Assuming that the cause of the failure did occur, assess the capabilities of the controls to find the design flaw.
8. **Risk Priority Number (RPN):** Is the product of Severity, Occurrence, & Detection**. Risk=** RPN= S x O x D. Often the RPN's are sorted from

high to low for consideration in the action planning step (Caution, RPN's can be misleading- you must look for patterns).

9. **Action Planning:** A thoroughly thought out and well developed FMEA With High Risk Patterns that is not followed with corrective actions has little or no value, other than having a chart for an audit. Action plans should be taken very seriously. If ignored, you have probably wasted much of your valuable time. Based on the FMEA analysis, strategies to reduce risk are focused on:
    a. Reducing the **Severity Rating.**
    b. Reducing the **Occurrence Rating.**
    c. Reducing the **detection Rating.**

2.2.3 FMEA Scoring

Below is the scoring used in FMEA Severity, Occurrence, and Detection rating on the failure modes.

Severity:
Severity ranking is the assessment on how serious the failure mode or in this case, the failure mode will affect the training execution if the training is not executed in the expected day. The rank will be 1 to 5 where 1 is the lowest and 5 is the highest.

Rank	Criteria	Description
1	Neglible Severity	Delay 1 days until 1 week
2	Mid Severity	Delay 2 weeks - 1 month
3	Moderate Severity	Delay 2 months – 11 months
4	High Severity	Reschedule one year or more
5	Very High	Training Cancelled

Table 2.1 Severity Rank

Occurrence:

Occurrence ranking is the probability on how many times the cause of the failure modes will occur. There will be 1 to 5, where 1 is the lowest probability that the failure will occur, and 5 is the highest probability that the failure mode will occur.

Rank	Variable Criteria	Failure Probability
1	Remote, may occur in an exceptional circumstances	1 in 3 month
2	Low, may occur in a very long time	2 in 3 month
3	Moderate, could occur sometimes	1-3 in a month
4	High, big possibility of occurring	1-3 in two weeks
5	Very High, could occur in most circumstances	1-3 in a week

Table 2.2 Occurrence Rank

Detection:

Detection ranking is the assessment the probability on how the current control will detect the failure modes/hazards. The score is from 1 to 5, where 1 is the highest probability that the control will detect the hazards, and 5 is the lowest probability that the current control will detect the hazards.

Score	Description	Criteria
1	Extremely Likely	Control will almost certainly detect
2	High Likelihood	High probability of detection
3	Moderate Likelihood	Control is moderately effective
4	Low Likelihood	Control have low probability of detection
5	Extremely Unlikely	Control have very low probability of detection or cannot detect at all

Table 2.3 Detection Scoring

2.2.4 FMEA Procedure

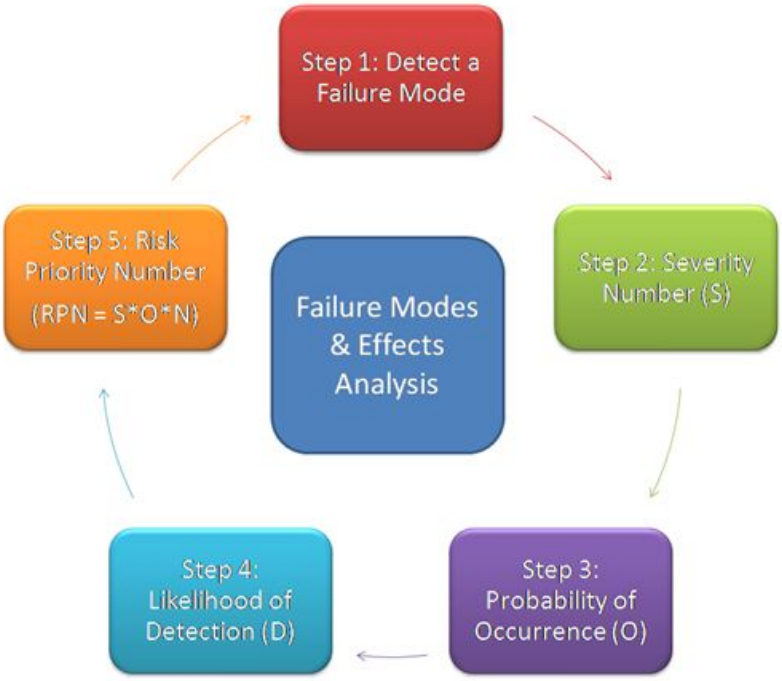

Figure 2.2 Failure Mode Effect Steps

This is a general procedure of FMEA. Specific details may vary with standards of your organization or industry.

1. Assemble a cross-functional team of people with diverse knowledge about the process, product or service and customer needs. Functions often included are: design, manufacturing, quality, testing, reliability, maintenance, purchasing (and suppliers), sales, marketing (and customers) and customer service.
2. Identify the scope of the FMEA. Is it for concept, system, design, process or service? What are the boundaries? How detailed should we be? Use flowcharts to identify the scope and to make sure every team member understands it in detail. (From here on, we'll use the word "scope" to mean the system, design, process or service that is the subject of your FMEA.)
3. Identify the functions of your scope. Ask, "What is the purpose of this system, design, process or service? What do our customers expect it to do?" Name it with a verb followed by a noun. Usually you will break the scope into separate subsystems, items, parts, assemblies or process steps and identify the function of each.
4. For each function, identify all the ways failure could happen. These are potential failure modes. If necessary, go back and rewrite the function with more detail to be sure the failure modes show a loss of that function.
5. For each failure mode, identify all the consequences on the system, related systems, process, related processes, product, service, customer or regulations. These are potential effects of failure. Ask, "What does the customer experience because of this failure? What happens when this failure occurs?"
6. Determine how serious each effect is. This is the severity rating, or S. If a failure mode has more than one effect, write on the FMEA table only the highest severity rating for that failure mode.
7. For each failure mode, determine all the potential root causes. Use tools classified as cause analysis tool, as well as the best knowledge and

experience of the team. List all possible causes for each failure mode on the FMEA form.

8. For each cause, determine the occurrence rating, or O. This rating estimates the probability of failure occurring for that reason during the lifetime of your scope. On the FMEA table, list the occurrence rating for each cause.
9. For each cause, identify current process controls. These are tests, procedures or mechanisms that you now have in place to keep failures from reaching the customer. These controls might prevent the cause from happening, reduce the likelihood that it will happen or detect failure after the cause has already happened but before the customer is affected.
10. For each control, determine the detection rating, or D. This rating estimates how well the controls can detect either the cause or its failure mode after they have happened but before the customer is affected. On the FMEA table, list the detection rating for each cause.
11. (Optional for most industries) Is this failure mode associated with a critical characteristic? (Critical characteristics are measurements or indicators that reflect safety or compliance with government regulations and need special controls.) If so, a column labeled "Classification" receives a Y or N to show whether special controls are needed. Usually, critical characteristics have a severity of 9 or 10 and occurrence and detection ratings above 3.
12. Calculate the risk priority number, or RPN, which equals S × O × D. Also calculate Criticality by multiplying severity by occurrence, S × O. These numbers provide guidance for ranking potential failures in the order they should be addressed.
13. Identify recommended actions. These actions may be design or process changes to lower severity or occurrence. They may be additional controls to improve detection. Also note who is responsible for the actions and target completion dates.
14. As actions are completed, note results and the date on the FMEA form. Also, note new S, O or D ratings and new RPNs.

2.2.5 Benefit of Using FMEA

Here are the benefits of applying FMEA in the:

- Captures the collective knowledge of a team
- Improves the quality, reliability, and safety of the process
- Logical, structured process for identifying process areas of concern
- Reduces process development time, cost
- Documents and tracks risk reduction activities
- Helps to identify critical-to-quality (CTQ) characteristics
- Provides historical records; establishes baseline
- Helps increase customer satisfaction and safety

FMEA reduces time spent considering potential problems with a design concept, and keeps crucial elements of the project from slipping through the cracks. As each FMEA is updated with unanticipated failure modes, it becomes the baseline for the next generation design. Reduction in process development time can come from increased ability to carry structured information forward from project to project, and this can drive repeatability and reproducibility across the system.

CHAPTER III
RESEARCH METHODOLOGY

This chapter will explain briefly on how to conduct the research, from the beginning until the end where the project is finished.

3.1 Research Flow

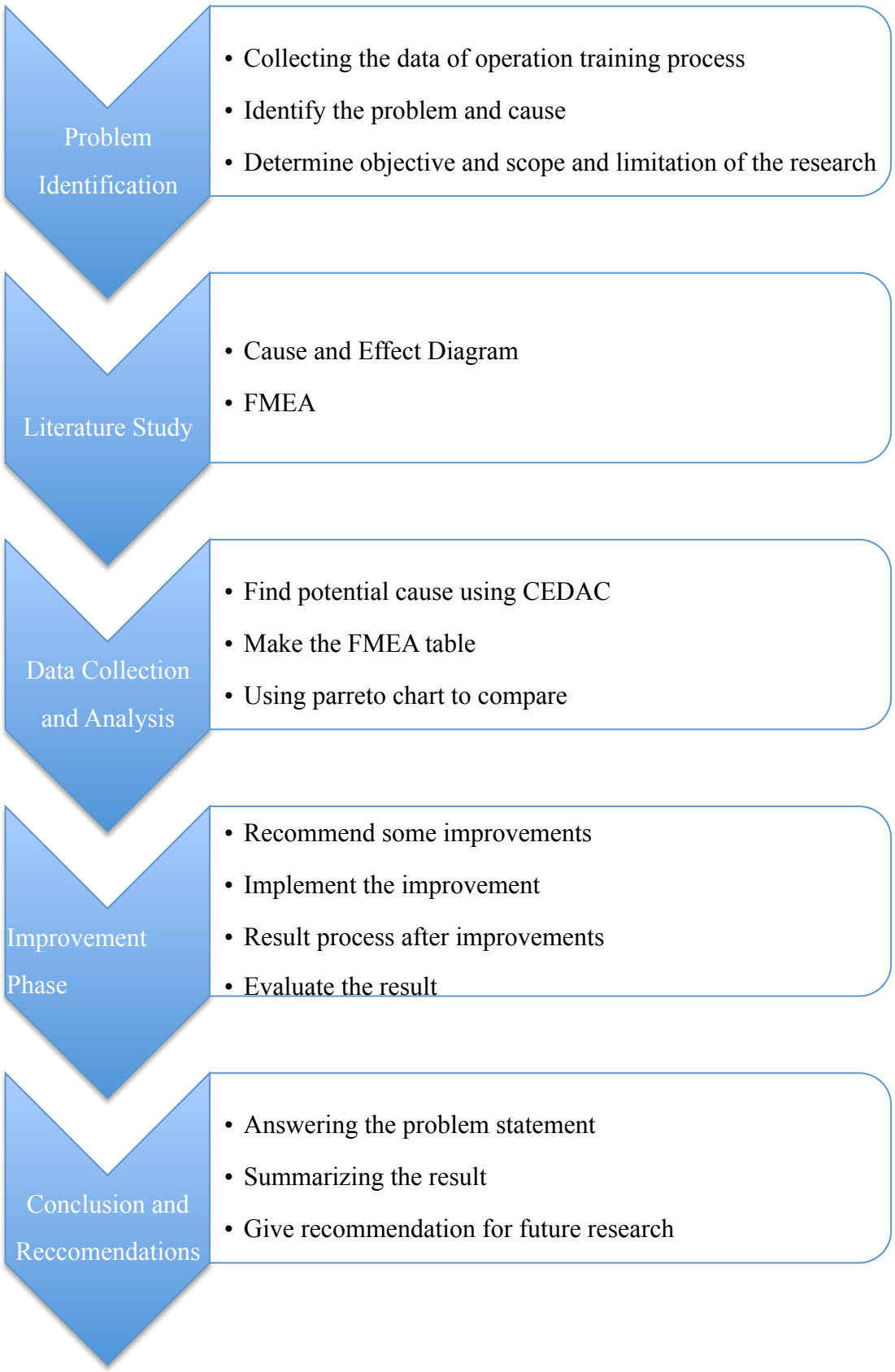

Figure 3. 1 Research Methodology

3.2 Problem Identification

In the Technical Training division there are several problem, especially in the operation training process. Some times operation training process not working well, that lead to training canceled or training unexecuted. As the team, technical training wants to improve their works. It is found that the operation training process still lack of effectiveness. So by looking to the operation training process flow and asking to the team leader how the process works, the problem that appears in the process can be reveal with the reason it self.

3.3 Literature Study

The next section of this study is collecting the method or theory from the expert that might be applied for the study. The theory or method from the expert will guide the research activity. The literature review in this chapter includes operation training process. Another literature review that would be used CADAC as the method to determine the cause of the problem in operation training process. FMEA will be the last method will be implemented in this research to improve the training process in the technical training division, so it can prevent the unexecuted training in the process.

3.4 Data Collection and Analysis

There will be several data that are needed to be collected for the research. First is the historical data of the number of the unexecuted training. The next is analyze the potential cause of the problem using fish-bone diagram. The next is do Aspect Impact Hazard Identification and Risk Assessment activity to determine current situation. The result of the assessment would be used to determine the priority of the improvement action and also the recommendation of the improvement.

3.5 Improvement Phase

After the assessment done, there is several recommendations of improvement and also the priority for the improvements. Since the goal of study is decreasing the number of unexecuted training. Improvement phase consists of the improvement action that already done in last 3 months after the assessment activity. Whether

the assessment is effective or not could be seen from the incident number after the assessment and improvement done.

3.6 Conclusion and Recommendation

Conclusion can be extracted from the result of the improvement phase, which can be done once the improvement has been finished, implemented, and evaluated. The recommendation for the research will also include the recommendation for both the company where the research is initiated.

CHAPTER IV
COMPANY PROFILE

4.1 Brief History

PT Hanjaya Mandala Sampoerna is an Indonesian tobacco company. Sampoerna is one of largest Indonesian tobacco company. They have produced many kretek-type clove cigarettes that have been famous in Indonesia, such as Sampoerna Kretek, A Mild (Its most popular brand is Sampoerna 'A' Mild, a filter cigarette in white paper). Along with variations on the Sampoerna Brand (filterless (known as Hijau, or green), menthol, etc.), introduced in 1968 the company's other key brand is "234" (pronounced Dji Sam Soe), an unfiltered cigarette with 39 mg of tar and 2.3 mg of nicotine per stick. Dji Sam Soe is the most premium cigarette in Indonesia. Its retail price per pack is the same with Marlboro Red (20 sticks), whilst 234 is packed 12 sticks.

The company was founded in 1913 by Liem Seeng Tee, a Chinese Indonesian who immigrated to Surabaya from the province of Fujian, in China. In the 1930s, he adopted the Indonesian name Sampoerna meaning "perfection" as his family name, thus becoming the company's namesake. Right now PT HM Sampoerna is the affiliation of PT Phillip Morris Indonesia and a part of Phillip Morris International, which is known as one of big manufacturer cigarettes in the world.

PT HM Sampoerna Karawang Plant is one of Sampoerna Industry they had in Indonesia. In Karawang Plant there are producing cigarettes and it is not only Sampoerna Cigarettes also the Phillip Morris cigarettes. This building consists of two area, west plant and east plant. East plant area is the area, which produced kretek cigarette while the west plant is producing white cigarette.

Kretek means cigarettes that contain of clove and tobacco, while the white cigarette is cigarette that contains only tobacco. There are two productions floor, which are the primary and secondary production. The primary production is the

production of the tobacco while the secondary is the production of the cigarettes it self (from the tobacco until become the one big pack of cigarettes).

The market of PT HM Sampoerna Tbk products it self are the people all over the world who smokes cigarettes. Because the products of Sampoerna it self already famous around the world, so the customer not only from Indonesia but also in every country.

The company has vision which is contained in “Falsafah Tiga Tangan”.

1. Produce the high quality cigarette with the affordable price for the adult smoker
2. Give the compensation and good working environment to employee and have good relationship with the business partners
3. Give the contribution to public

Mission of PT HM Sampoerna Tbk. is to offer the best smoking experience to adult smoker in Indonesia. This objective we do to know the want and needs of the consumer and give the product that can satisfy their hope.

Vision of PT HM Sampoerna Tbk. is contained in “Falsafah Tiga Tangan”.

4. Produce the high quality cigarette with the affordable price for the adult smoker
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6. Give the contribution to public

Mission of PT. HM Sampoerna Tbk. is to offer the best smoking experience to adult smoker in Indonesia. This objective we do to know the want and needs of the consumer and give the product that can satisfy their hope.

4.2 Organizational Structure

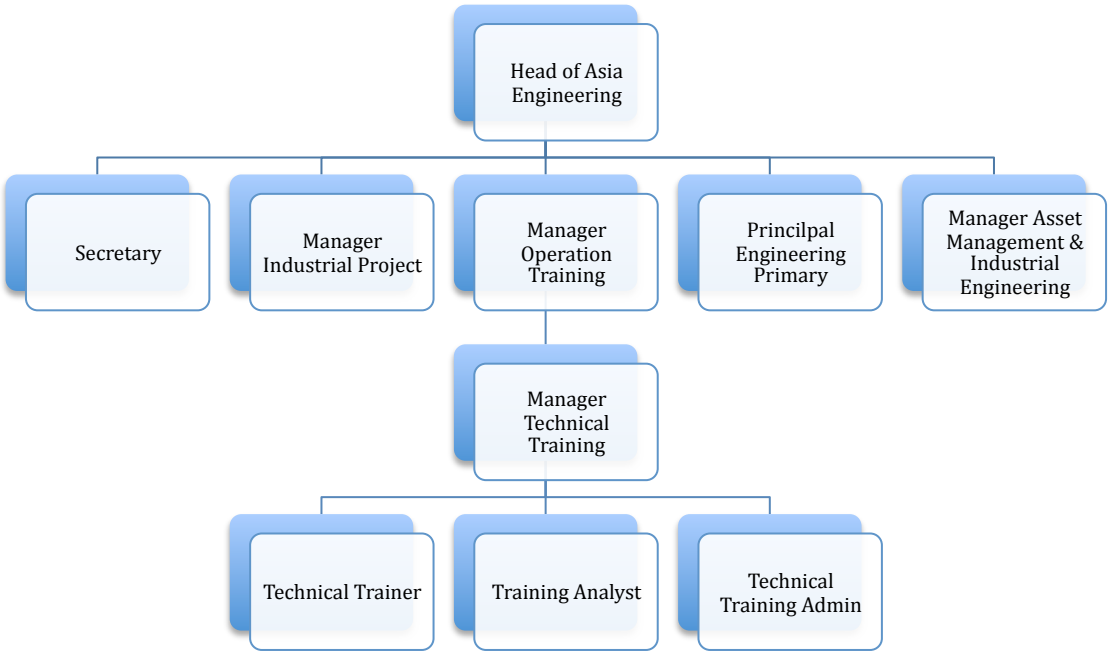

Figure 4.1 Structure Organization Sampoerna

4.3 Technical Training

In PT. HM Sampoerna technical training division is under Manager Operation Training. Basically technical training division function is to gain the workers skill by trained them. Technical Training division will provide test, presentation for the labour in the company who wants to improve their position in the company in production floor only or to improve the worker skill so than the production in the production floor will be increase to.

This company is a company with mass production of cigarettes, so they will always looking for improving their productions become higher. When the demand is high, to achieve the demands the company will buy a new machine. To runs the machine is not easy, operator needs to understand every detail of that machine, how to operate it, how to handle the problem in the machine, what are the terminology used in the system, etc.

So the technical training makes the operation training process to fulfil all the needs in the production floor. The technical trainer job is to tech the operator or

new employee who work in the production floor how to use some machine. Start from maintaining a machine by repairing, so that the operator can use that machine. The technical training analyst function is to analyze the training is productive or not. Technical training administrator is the one who handle the entire request training, planned the schedule; reserve the training room and making the certificate. Administrator in TT is the one who handle all the preparations of the training it self.

4.4 Operation Training Process

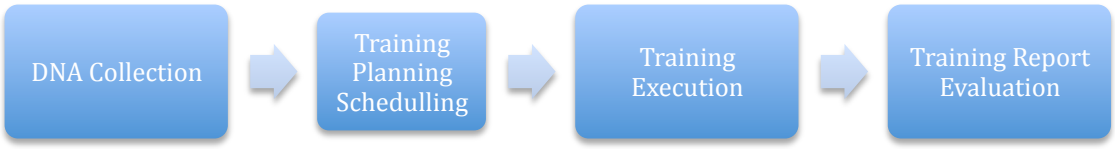

Figure 4.2 Operation Training Process

The graph above shows how the training process works. The training process starts from DNA collection. DNA collection is where the all data of the employees can be found. So the data request training will be collected and checked in the DNA collection. The name of employee, division, genre, track work records, everything about employee can be found in the DNA.

After the data of the trainee already being checked by the admin, it will goes to the training planning and scheduling. All the needs for the training will be prepared in this process. Like checking schedule that available for the trainer, trainee, and place for training.

When all the preparation is already complete, it is time for the training execution. The employees will be trained by the trainer to gain their worker skills. In the training execution process sometimes the technical training division find problems that lead to training cancelled.

To know the training is working or not is determined by training reports evaluation. In this process the trainees that have been trained will be test to know is the training working or not. With the goal to gain the employees working skills and knowledge, by using this process the technical training division can evaluate is the trainee learned in the training or not.

CHAPTER V
DATA ANALYSIS

5.1 Current Problem

In the Technical Training division there are several problem in the operation training process. The operation training process is not working well, which lead to training canceled or training unexecuted. As the team, technical training wants to improve their works. It is found that the operation training process still lack of effectiveness. The problem is found in the training planning scheduling and in the training execution process. This problem makes the training cancelled or unexecuted although the admin already book the place, arrange time with the trainer and trainee but it has to be cancelled because of some problem. This makes the operation training process not works optimal and effective becomes waste of time.

5.2 Cause Analysis

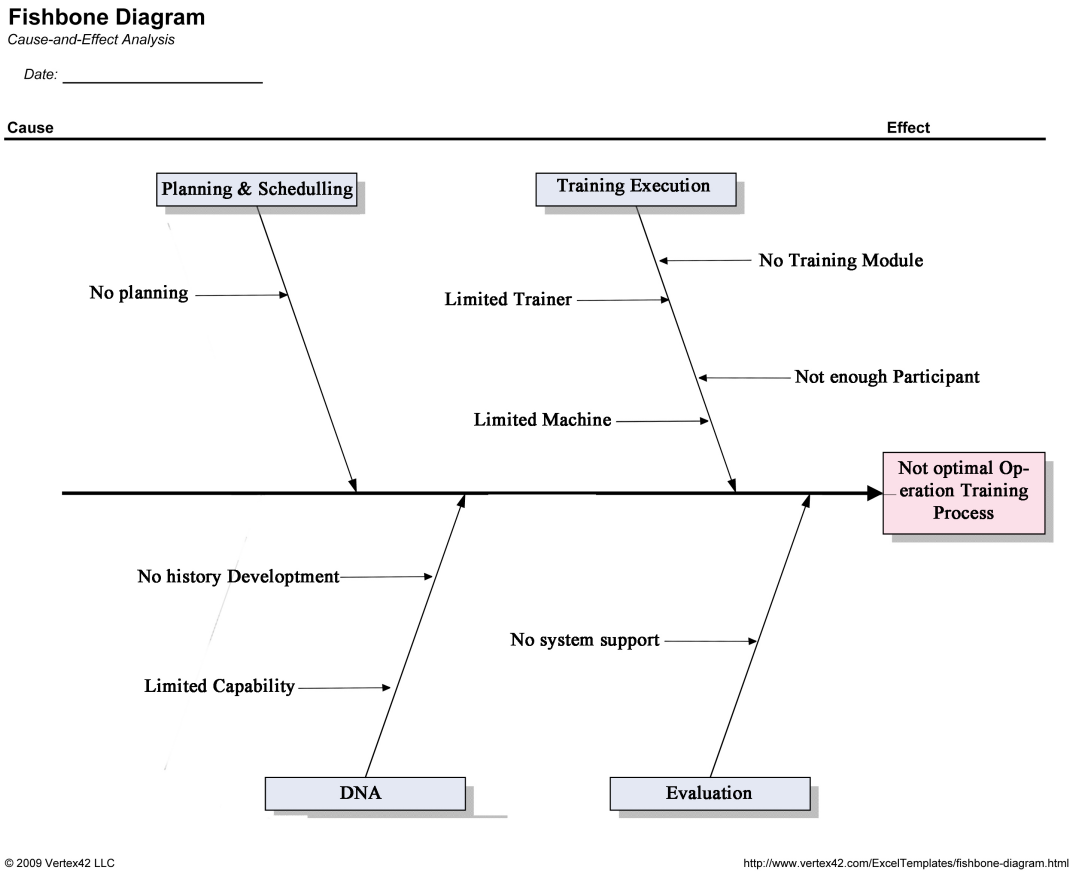

Figure 5.1 Cause Effect Diagram

In the chapter 4 it is already explained the operation training flow process in technical training. It is found that the operation training process not works optimal, sometimes there are problem in the process that makes the training execution cancelled.

The process starts from DNA Collection. In this process the all data of the employees can be found. So the data request training will be collected and checked in the DNA collection. The name of employee, division, gender, track work records, everything about employee can be found in the DNA. But there are problems found in this process. It has limited capability. The system only can sort data of the employee, job, works, and gender but there are no history developments for the employees who already took some training. It makes the administrator hard to find the right participant to be invited or when the

administrator already decide the participant not all participant have not take the training. There is no data update of the employee who just work in the company or the employee who already quit the company.

This kind of problem makes the training administrator not work efficiently because he has to work twice to clear one simple thing. In the planning and scheduling of training process because to afford a good training, it has to be planned well. If the training preparation and scheduling is well prepare, the training it self will be works well and there is no trouble in executing training. But sometimes, there is a sudden request for the training and makes the training unprepared. The unprepared training and sudden request usually cannot be granted. If it can the implementation training will be hurry and it will not be maximal.

Training execution process is the day where the training executed. In the training day, the trainee, trainer, module and training room are needed to be ready. It is why to do the training; every employee needs to pass the first two process of the operation training. But, not all training can be executed. By asking the employee in the technical training, I found the reason why the training cannot be executed. Limited training resource was found in this process, and it makes the training cancelled. Although the training already scheduled, the training can be cancelled that day because of no module available, trainer is not available, limited machine and not enough participant.

This is the problem found in this process. Because of that reason the training cannot be executed. For example, when the day of training machine A before the training will be executed, the TT division check the availability of the module and the module for machine A is not available. So the training for machine A has to be cancelled. Limited trainer and machine also found when the training want to be executed. The machines that will be used by the trainer to train the trainee are not available, so the training has to be cancelled that day.

The last problem is when the participant is not enough to take training. There is a case which a sudden request for training machine that has to be done in certain week or month. Because it is request from manager to have training for some of employees, so the technical training division accepts the implementation training. When the administrator checks the availability of training participants, which in this training needs minimum 10 people to be open the training class but the participant is does not meet the demand. So the training has to be reschedule until the participants sufficient.

5.3 Data Analysis

5.3.1 Current State of FMEA

After find out the causes and problem in the operation training process chart especially in the training execution, the next step to do is determining the RPN for each failure in the operation training process, by implementing FMEA in the training execution process analyze all the data and looking for improvement. To do this, the failure mode in the process should be put in the FMEA table, then, determine the Severity, Occurrence, and Detection ranking for each failure mode.

No	Process	Failure Mode	Failure Effects	SEV	Causes	OCC	Controls	DET	RPN
1	Training Execution	The training room for the execution is used by others	Have to find a new room available on that day	1	Miss communication to the room user	3	Checked by technical training admin	2	6
2	Training Execution	There is no module available for specific machine	Training delay up to 2 months	3	no reminder to the trainer about a new machine available	3	Checked by technical training admin	4	36
3	Training Execution	There is no available machine to be used on the expected day	Training delay up to 2 weeks	2	The machine is used for production	2	Checked by the technical training administrator	5	20
4	Training Execution	The module is not ready to used	Training canceled	5	No historycal data update of the module available	2	Checked by the technical training admin	4	40
5	Training Execution	There is no available trainer to train on the expected day	Training canceled	5	No reminder to the trainer	1	Checked by the trainer admin for the confirmation of trainer	2	10
6	Training Execution	There are not enough training participant on the expected day	Training delay up to 2 months	3	Miss communication to the user	3	Checked by technical training admin	2	18
7	Training Execution	The training room is not available on the expected day	Training canceled	5	Forget to reserved the training room	3	Checked by technical training admin	3	45

Table FMEA 5.1

In the table FMEA 5.3.1 it is only focusing on the training execution failure process, because in that process there are failure modes found and cause the unexecuted training.

For the severity ranking, the score is from 1 to 5, where 5 are the most serious effect on the process, and 1 is for the lowest effect on the process. The failure mode in number 1 is given the score of 1 for the severity ranking. This because the worst effect from this failure mode is only training execution that delayed only for a day or neglible severity, and it cannot be serious impact on the time efficiency on operation training process.

For failure mode number 3, the worst-case condition of the future effect from these failure are only minor severity, therefore, severity ranking are given the score of 2. The effect of those failures is training delay from 2 weeks until 1 month. For the failure in number 2 and 6, they are given the score of 3 for the

severity ranking, because the failure can effect the operation process moderate severity in the future which is make the training delayed from 1 month until 11 months. This makes the client request to be trained and gain their skills delays and also makes the technical training works twice to arrange training and the last request become waste of time. Although it is just re arrange time but this failure quite serious for the operation training process. The rank 4 in the severity in operation training is very rare because it is more possible the training cancelled than delay for one year or more.

In the table above there are two operation training process will be implemented FMEA, which are in the training execution and training planning and scheduling. This two process is the main factors that can affect the training execution. The failure mode numbers 4,5,7 have the biggest severity score because of the effects on the failure mode that can make the training cancelled.

When the training cancelled it means all the process on the operation training have been pass from DNA Collection until Training Planning & Scheduling become waste and the times used for the training preparation become nothing or waste. If there is training cancelled means the operation process become not optimal and the operator that should already gain their knowledge to operate some specific machine become not gain.

For the occurrence ranking, the score is from 1 to 5, where 1 is for the rarest to happen, and 5 are for the most common to happen. For the failure mode in number 5, the score is given 1 for the occurrence ranking, since the probability of the training failure is to happen only be one in a the three months.

The failure in number 3 and 4 only have a low probability of failure that will happen in a long time, the failure will not happen many times during three months, that is why the failure mode are given the score of 2 for the occurrence ranking. For the hazards in number 1,2 6 and 7, they have a fair probability of

becoming “active” in the future, not few, but not that much also, but it is moderate that occur sometimes abut 1 – 3 failure mode can be found in a month.

There are no failure mode occur in the rank 4 and 5, because this kind of failure will be hard to see. The training will rarely held twice or more in each week or every two weeks.

For the detection ranking, the score is from 1 to 5, where 1 means the control method is very effective in detecting the failure, and 5 means the control method is not effective to detect the failure mode. In the current state, all of the control method for each failure almost the same, which is through the technical training administrator to detect the failure mode that is performed on operation training process of the company. This method is not really effective for detecting some failure, therefore, the ranking of the failure mode that need to be detected by the technical training administrator are different with each other.

The reason behind that, is because the checking by technical training is only focusing on the preparation scheduling of the training, the inspection technical training admin checking is only seeing whether the day of some day is available for training by the trainer, contacting to the room user for booking room and coordinate with the training request user of the participants name and numbers. It is why, when There is no available trainer to train on the expected day, There are not enough training participant on the expected day and The training room for the execution is used by others it is easy to detect by the technical training admin checking it self. On the other case when the failure mode comes from machine or module training, it is hard to detect by the admin. The system that company provide it self is not support the admin to reach that part, and also the technical trainer is know the machine and module better than admin because it is their area. So the failure mode number 2 and 4 it have higher rank detection, which is 4.

Only the failure mode number 3 has the rank 5 for detection. In the training process, detection of new machine is very hard because there is no system support

for update and no historical data for the module available. It is proven from doing direct interview to the technical training admin. The admin cannot book the machine for training especially when the production floor in the busy time.

After all severity, occurrence, and detection of the hazards have been determined, the RPN are calculated by multiplying the severity, occurrence, and detection ranking of each failure. Then, the top 5 hazards with the highest RPN scores are chosen.

No	Process	Failure Mode	Failure Effects	SEV	Causes	OCC	Controls	DET	RPN
1	Training Execution	The training room for the execution is used by others	Have to find a new room available on that day	1	Miss communication to the room user	3	Checked by technical training admin	2	6
2	Training Execution	There is no module available for specific machine	Training delay up to 2 months	3	no reminder to the trainer about a new machine available	3	Checked by technical training admin	4	36
3	Training Execution	There is no available machine to be used on the expected day	Training delay up to 2 weeks	2	The machine is used for production	2	Checked by the technical training administrator	5	20
4	Training Execution	The module is not ready to used	Training canceled	5	No historycal data update of the module available	2	Checked by the technical training admin	4	40
5	Training Execution	There is no available trainer to train on the expected day	Training canceled	5	No reminder to the trainer	1	Checked by the trainer admin for the confirmation of trainer	2	10
6	Training Execution	There are not enough training participant on the expected day	Training delay up to 2 months	3	Miss communication to the user	3	Checked by technical training admin	2	18
7	Training Execution	The training room is not available on the expected day	Training canceled	5	Forget to reserved the training room	3	Checked by technical training admin	3	45

Table FMEA 5.2

The 5 highest RPN are 36, 20, 40, 18, and 45. From now on, the research will be focusing on minimizing and eliminating these 5 failures mode. The failure number 1 and 3 will be eliminated because this failure is lower than other and the RPN score is not to high. That means this problem is not too dangerous. Failure number 5 has the lowest occurrence rank, which means this problem happens rarely and it is why the scoring in the RPN is not high.

No	Process	Failure Mode	Failure Effects	SEV	Causes	OCC	Controls	DET	RPN
1	**Training Execution**	There is no module available for specific machine	Training delay up to 2 months	3	no reminder to the trainer about a new machine available	3	Checked by technical training admin	4	36
2	**Training Execution**	There is no available machine to be used on the expected day	Training delay up to 2 weeks	2	The machine is used for production	2	Checked by the technical training administrator	5	20
3	**Training Execution**	The module is not ready to used	Training canceled	5	No coordination with the techincal trainer	2	Checked by the technical training admin	4	40
4	**Training Execution**	There are not enough training participant on the expected day	Training delay up to 2 months	3	Miss communication to the user	3	Checked by technical training admin	2	18
5	**Training Execution**	The training room is not available on the expected day	Training canceled	5	Forget to reserved the training room	3	Checked by the user request	3	45

Table FMEA 5.3

After the FMEA has been developed, now it is time to take actions for minimizing and eliminating the hazards in the future.

5.3.2 Eliminating Problems (Failure mode)

Each failure mode has different action to be taken to eliminate the problem. Since these 5 failures mode have the biggest Risk Priority Number (RPN) from other hazards, it means that these problems have the prioritized to be eliminated first.

1. *There is no module available for specific machine*

   This kind of situation sometimes happens in the technical training execution. When the training wanted to be executed, the training modules for specific machine are not found. This failure mode become moderate severity because it causes the training execution delayed 2 up to 11 months. Making training module is not easy. It takes time minimum 2 months to complete one module electrical for a machine.

To minimize this failure the technical training admin need to request to the technical training division if there is a new machine update directly to the system information and directly make the module electrical. If there is the system information for available training module, every training requested for specific machine can be checked first; if the module available than the training request is accepted and there will be no more modules not available in the training execution.

2. *There is no available machine to be used on the expected day*

   If this situation appears in the training execution, it will make the training delayed, at least up to two weeks. It is why, the severity level is mid severity. This situation appears because the machine is used for production and there is no machine available to be use as the training practice.

   This kind of situation can be maintain by request to the production floor for available machine to be used for training operator not to sudden or if the machine is cannot be used because of the company needs, so arrange simulate training in the training room, so the training still can be executed.

3. *The module is not ready to used*

   This kind of situation sometimes happens in the technical training execution. When the training wanted to be executed, the training module is not ready to used. This failure mode become moderate severity because it causes the training execution delayed 2 up to 11 months. Making training module is not easy. It takes time minimum 2 months to complete one module electrical for a machine.

   To minimize this failure the technical training admin need to request to the technical training division if there is a new machine update directly to the system information and directly make the module electrical. If there is the system information for available training module, every training requested

for specific machine can be checked first; if the module available than the training request is accepted and there will be no more modules not available in the training execution.

4. *There are not enough training participants on the expected day*

   This is the situation mostly found in the training execution. When the training wanted to be executed in a week, the technical training will do rechecking the participant availability. This is crucial, because if the participant not fulfil the training minimum the training has to be delayed until the participants meets the minimum number of participants but finding another participant is not as easy as finding a room for training, because only specific employee needs that specific participants. It is why the severity is moderate which is can be delayed 2 months until 11 months.

   To solve this problem the technical training admin has to communicate with the user about the procedure of training request first. The user have to already make sure that the participant for the training is already fulfil the minimum criteria for a specific training. If that procedure is performed in the training planning and scheduling the situation of "not enough participant" will not be appears again.

5. *The training room is not available on the expected day*

   This kind of situation sometimes happens in the technical training execution. A lot of training schedule that have to be handled makes the technical training admin hard to maintain. The users that already request the training schedule remind the admin for the preparation of the training. The admin forget to make appointment to reserved room for the training, and when the training wanted to be executed, the there is a confirmation of training room that the room is not available. It makes the training cannot be executed because not enough preparation of the training. It is why the failure mode level is 5 " very high".

Making training module is not easy. It takes time minimum 2 months to complete one module electrical for a machine.

To eliminate this failure, the technical training admin have to make a reminder identification of a new training request due to the preparation of the training. Do the recheck schedule of the training that will be held in the future so the preparation of training will be well prepared and failure mode can be minimized. No body perfect but this kind of action will help the training execution process to avoid the failure.

5.3.3 FMEA For Future State

After the recommended actions have been implemented, the new score for the future severity, occurrence, and detection ranking should be determine. Then, calculate the RPN and compare it with the current state to see whether there are improvements or not.

Failure Mode	SEV	OCC	DET	RPN	Recommended Actions	PSEV	POCC	PDET	PRPN
There is no module available for specific machine	3	3	4	36	Request for the new machine update that still don't have a module	3	2	1	6
There is no available machine to be used on the expected day	2	2	5	20	Ask to the production floor for available machine to be used for training operator or simulate training in the training room	2	2	1	4
The module is not ready to used	5	2	4	40	Request to update the list of module available for training	5	1	1	5
There are not enough training participant on the expected day	3	3	2	18	Make sure the participant for the training is enough before the training is schedulled	3	2	1	6
The training room is not available on the expected day	5	3	3	45	Make a reminder for Identification of the new training request	5	1	1	5

Table FMEA 5.4 Future State

For all of the failure mode, the severity score will stay the same even after the recommended actions have been implemented, because if the failure mode become happens the effects are still the same, that is why there is no changes in the severity rank.

For the hazard in number 1, the score of the future occurrence ranking becomes 2, and the detection ranking becomes 1, from the current condition of 3 and 4 for the

occurrence and the detection ranking. After the RPN is calculated, the score is 6, clearly improving from the current state which have the score of 36.

For number 2, the score for both of the future occurrence and detection rankings are 1 and 2, where in the current state, the failure mode has the score of 2 and 5 for the occurrence and detection rankings. For the future RPN, the failure has the score of 4, which is improving from the score of 20 in the current state RPN.

For failure mode number 3, the future score for the occurrence and detection rankings are both 1, where in the current state, the scores are 2 and 4 for the occurrence and detection rankings. After calculating the RPN, the score in the future state is 5, where in the current state, the RPN score is 40, which is improving.

In number 4, the failure has the score of 3 and 2 for the occurrence and detection ranking in the current state, where in the future state after the actions have been implemented, the occurrence and detection ranking become 2 and 1 for the occurrence and detection. In the current state RPN, the score is 45, where in the future state, the RPN score becomes 6.

For the failure mode in number 5, the future score of the occurrence and detection ranking are both 1, where in the current state, the scores are 3 and 3 for the occurrence and detection rankings. The RPN score in the current state for this hazard is 45, where in the future state, the score of the RPN becomes 5, which is improving.

CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Based on the results from the previous chapter, some conclusions can be made:

- Unexecuted or canceled training on the expected day makes the operation training process become not optimal. Limited training resource is the main cause of the unexecuted training. Such as limited machine, module, trainer, trainee participant and training room are the problem found in the training execution.
- The solution to the problem is to take a new action of handling limited training resource in the operation training process especially in training execution, so the problem will not appears again in the future. The detection of usual processes in the operation training makes it hard to detect and without realizing that problems will effect the operation training process become not optimal. By using Failure Mode Effect Analysis in the operation training process, the problem appears in the process can be eliminate or minimize by the action suggest to the failure so the process will be improve in the future.

6.2 Recommendations

PT. HM Sampoerna is one of largest Indonesian tobacco company that needs to be organized in a high standard; this company gives the intern opportunities to learn how to deal in the work environment and also opportunities to apply their knowledge that they have learned before, so the company and the intern are both developing and improved. President University also has a huge influence in the development of the students and the companies as the bridge that connects developing companies and the students who are ready to experience the work environment. There are some recommendations that can be made:

- The University: The University has been a great help in making the developing company to be improved by sending their students and also developing the knowledge of the students. It is recommended for the university to offer the internship students developing companies rather than big companies, so that the internees have more opportunities to implement their knowledge.
- The Company: For the company, they have provided a good experience for the internee and is recommended for them to look for internees more, so they can develop their company better and further by the minds of young people like the interns
- The Interns: The future interns are encouraged to be active, diligent, cooperative, and friendly to the coworkers. Also to be neat and careful in doing the research.

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