



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**THE IMPLEMENTATION OF RISK MANAGEMENT AT
AEROSPACE MANUFACTURING COMPANY: CASE STUDY 2
(PROCESS)**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Management) with Honours.

By

MOHD AMINUDIN B. ABDULLAH

FACULTY OF MANUFACTURING ENGINEERING

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(TANDATANGAN PENYELIA)

Alamat Tetap:

3222, KG. GONG NANGKA, 22000
JERTEH, TERENGGANU

Cop Rasmi:

EFFENDI BIN MOHAMAD
Lecturer
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka

Tarikh: 25/5/2010

Tarikh: 25/5/2010

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.....

DECLARATION

I hereby, declared this report entitled “The Implementation of Risk Management at Aerospace Manufacturing Company (Process)” is the results of my own research except as cited in references.

Signature :

Author Name : MOHD AMINUDIN B. ABDULLAH

Date : 12/4/2010

ABSTRACT

This study presents the “Implementation of Risk Management in Aerospace Manufacturing Company (Process)”. The process of risk management is carry out in XYZ Sdn. Bhd, Batu Berendam, Melaka. This company in the process of implementation risk management to avoid any potentials risk that will affect the company mission, vision, and daily operation. Since there are several sections in XYZ Sdn. Bhd’s production floor, the processes in Cleanroom and Autoclave was selected because both sections are exposed with risk. The objectives of this study are to study the risk management, to implement risk management, and to measure the effectiveness of the implementation at this company. This report focuses on the process of managing risk in Cleanroom and Autoclave section using FMEA tool by followed the standard rating value for risk assessment from XYZ Sdn. Bhd. Besides that, methods such as training, brainstorming, and survey been used during the implementation of Risk Management. After analyzed the risks, the treatment plan were proposed in order to reduce the risk that in high and medium level to the low level. From the treatment plan, those risks had been analyzed for the second time in order to make sure whether the treatment plan is effectiveness or not. Lastly all the risks that had been treating are in low level that mean those risks in acceptable level and need to be monitor in the future.

ABSTRAK

Kajian ini membentangkan “Pelaksanaan Pengurusan Risiko dalam Syarikat Pembuatan Aeroangkasa (Proses)”. Proses pengurusan risiko ini dilaksanakan di Syarikat XYZ Sdn.Bhd, Batu Berendam, Melaka. Syarikat ini di dalam proses pelaksanaan pengurusan risiko untuk mengelakkan sebarang risiko yang akan terjadi yang mana akan menjejaskan misi, visi dan operasi seharian syarikat. Memandangkan terdapat beberapa bahagian di dalam tempat pengeluaran di XYZ Sdn Bhd, proses di Cleanroom dan Autoclave telah dipilih sebagai tempat melaksanakan pengurusan risiko kerana kedua-dua bahagian tersebut terdedah kepada risiko. Objektif kajian ini adalah untuk mengkaji tentang pengurusan risiko, melaksanakan pengurusan risiko dan mengukur tahap keberkesanan pelaksanaan pengurusan risiko untuk syarikat ini. Laporan ini juga menekankan proses mengurus risiko di bahagian Cleanroom dan Autoclave dengan menggunakan kaedah “Failure Mode and Effect Analysis (FMEA)” yang mana mengikut standard nilai penilaian untuk menilai risiko daripada XYZ Sdn Bhd. Selain daripada itu, kaedah seperti latihan, berkongsi idea dan tinjauan telah digunakan ketika melaksanakan pengurusan risiko. Selepas risiko tersebut dianalisis, rancangan pencegahan dikemukakan untuk menurunkan risiko yang dalam tahap tinggi dan sederhana kepada tahap yang rendah. Daripada rancangan pencegahan, risiko tersebut dianalisis untuk kali kedua untuk memastikan rancangan pencegahan tersebut berkesan ataupun tidak. Terakhirnya, kesemua risiko yang telah dicegah berada di dalam peringkat yang rendah, bermakna risiko tersebut berada dalam peringkat yang boleh diterima dan memerlukan perhatian di masa hadapan.

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LIST OF ABBREVIATIONS

AM	-	Autonomous Maintenance
AS/NZS	-	Australia and New Zealand Standard
CuFt	-	Cubic Foot
EWO	-	Engineering order work
FACP	-	Fire Alarm Control Panel
FMEA	-	Failure Mode and Effect Analysis
IRMA	-	Integrated Risk Management Application
ISO	-	International Organization of Standardization
KPI	-	Key Performances Indicators
NASA	-	National National Aeronautics and Space Administration
OPL	-	One Point Lesson
RFMEA	-	Risk Failure Mode and Effect Analysis
RM	-	Risk Management
RPN	-	Risk priority numbers
SOP	-	Standard Operating Procedure
SWOT	-	Strength, Weakness, Opportunities, and Threats
TC	-	Thermocouple
VESDA	-	Very Early Smoke Detection Apparatus

CHAPTER 1

INTRODUCTION

1.1 Introduction

In times of increasing global competition, the success of operational planning becomes important to any industry's business performance. However, many industries still not have any preparations to face with any uncertainties condition that may happen to them in anytime. One of it is industrial risks, which are present in every corner in daily operations. Therefore, the study of risk management will be done in order to see how the risk can be managed in proper way.

1.2 Overview of the Study

This study is about the implementation of risk management in aerospace manufacturing company. In Malaysia, one of the aerospace manufactures is XYZ Sdn. Bhd. which is the place where the study is conducted. To be more competitive in aerospace industry, XYZ has implemented Lean Manufacturing to eliminate wastes and at the same time to increase the productivity in their production. Apart from that, the company needs to make sure that all risks that might occur during daily operation are manageable in order to sustain the implementation of lean manufacturing. Risk management is one of the approaches to manage the risk and it is a new thing in this company and thus become essential to study about it.

1.2.1 Risk management

Risk is a combination of threat and opportunity. Threat can be described as losses in the organizations while opportunity is more towards the benefits for the organization. Risks cover all aspects of organizational activities and it is included in all management levels (Lubka, 2002). Generally, risk management is a process to manage risk in effective way by applying tools and techniques to reduce or prevent the threats from occur and maximizing the opportunities. Risk management is a continuous process that depends directly on the changes of the internal and external environment of the organization (Lubka, 2002).

Risk management can be categorized into three main categories, such as risk in business planning, risk in process or product, and risk in safety. In business planning, risk associated with the marketing strategy and uncertainty about the demand for the products while risk in safety associated with the hazards environment in the workplace. In this study, it focuses on risk in process which associated with the process that impact the organization, product and customer.

The implementation of risk management follows the Risk Management Standard AS/NZS 4360, (2004). In the standard, there are seven elements involved which are establishing the context, identifying the risk, analyzing the risks, evaluating the risks, treating the risks, communicating and consulting, and finally monitoring and reviewing. To support those elements, there are numerous techniques provided for examples; brainstorming, fault and event tree analysis, checklist, risk ranking, cause-and-effect diagram, Failure Mode and Effect Analysis (FMEA), Strength, Weakness, Opportunities, Threats (SWOT), and so on.

1.2.2 Failure Mode and Effect Analysis (FMEA)

In this study, FMEA was selected as one of the techniques in risk assessment. It is an analytical technique in identifying foreseeable failures modes of the product or process and then planning for its elimination. There are several types of FMEA such as design and process. But for this study, FMEA in type of process is used in order to assess the risk in the selected process. Further explanation of the FMEA can be reviewed in Chapter 2 and 3.

1.3 Problems Statement

Recently, XYZ Sdn. Bhd. has implemented risk management in its daily operation, but it is still in progress. The purpose of this implementation is to ensure all the risks in their process and operation are managed effectively so that the company mission and vision are not affected and all company KPIs (Quality, Cost, Delivery, Accountability, and Continuous Improvement) is achieved.

There are two case studies conducted in this company. Since there are several sections in XYZ Sdn. Bhd.'s production floor, the processes in Cleanroom and Autoclave were selected because both sections are exposed to risk, it is important to assess and manage risk effectively so that defect and rework costs would be reduced and production efficiency would be increased. Because of that, risk assessments towards process and operational in selected areas will be conducted by using FMEA technique.

1.4 Objectives of the Study

The objectives of this study are:

- i. To study about risk management.
- ii. To implement risk management at selected company.
- iii. To measure the effectiveness of the implementation of risk management at selected company.

1.5 Scope of the Study

This study stresses on the implementation risk management in XYZ Sdn. Bhd. that only focuses on risk that might be occurred in the process at the selected section in the production floor. First risk assessments are conducted in Cleanroom and the second assessment are conducted in Autoclave section. In this study the main technique used to analyze the risks is Failure Mode and Effect Analysis (FMEA) in terms of process. Other types of risk management approaches in the safety, financial, and business will not be discussed in this report.

1.6 Significance of the Study

At the end of this study, the impacts and benefits of risk implementation will be shown in both of the case studies; Cleanroom and Autoclave section. Moreover, the techniques of managing risks will be defined clearly by using FMEA tool which suit the selected process.

The case studies in XYZ Sdn Bhd simply show how the risk management was implemented in the aerospace industry and the study also can be used as a reference for future work of risk management implementation.

1.7 Research Methodology

Risk management is a process where the risk was managed properly through communicating, identifying, evaluating, treating, monitoring, and reviewing. The techniques used to perform each process are training, brainstorming, survey and semi-structured interview, and FMEA. Further explanation of methodology can be reviewed in Chapter 3.

1.8 Organization of the Report

This report is structured in six chapters. In chapter 1, an introduction of the report contained the background of the study, problem statement, objectives, and scope of the study. Besides that, the significance and the methodology of the study are also presented in this chapter. Chapter 2 comprises the literature review of the study that covered the theory of risk management and some useful information that relates to this study. Chapter 3 is about the methodology of the study which contained the tool and techniques used for this study.

Chapter 4 is an overview about the selected section which is Cleanroom and Autoclave sections. Chapter 5 is about the results and discussion where an analysis towards the results and data from the conducted study. Besides that the discussion of the results with the risk treatment is explained in detail in this chapter. Chapter 6 is the final chapter of this report that described the conclusions of in the study, suggestions and recommendations for future work.

1.9 Gantt Chart

The Gantt chart is used to display the project planning and scheduling accordingly. The chart illustrated the activities planned in one year duration from start to finish. The chart can be reviewed in Appendix A.

CHAPTER 2

LITERATURE REVIEW

Several studies have been done about risk management from the selected journals, articles, case study, and books. The purpose of this reviewing is to gain more knowledge about the implementation of risk management and how it is been implemented.

2.1 Risk Management Overview

There are several of definitions of risk management. Risk management is an ongoing process for managing the identifiable risk of an organization and determining appropriate managerial strategies in order to preserve and insure the assets of the organizations (Ashley and Pearson, 2001), while according to Perera and Holsomback (2004), risk management is a continuous, iterative process performed to reduce the probability of adverse threats, in other words, increase the probability of successfully completing the project.

The Australian/New Zealand Standard on Risk Management (AS/NZ 4360:2004) describes risk management as „an iterative process consisting of well-defined steps which, taken in sequence, support better decision making by contributing a greater insight into risks and their impacts.“ Risk management is all about being aware of what may happen as you go about your business and taking steps to limit the chances of it occurring, or deciding that you accept that something may occur and that you are prepared for the consequences.

According to Smith (2006), there are many techniques available for risk analysis and different meanings for risk analysis. Risk analysis is about analyzing the identified

risks that might be occurred and have high impact on an organizations. So there are two type of risk analysis, which are quantitative and qualitative techniques. Kendrick (2003), mentioned that Risk analysis attempts for deeper understanding of potentials problems ,to do this effectively it required to provide either qualitative or quantitative techniques.

Qualitative techniques are easier to apply and generally required less effort. Qualitative risk assessment is enough for ranking-ordering risks, allowing the risk management committee to select the significant ones. Quantitative methods strive for greater precision and they concern about each risk in its own. These methods require more work, however, as Kendrick, (2003) said that adding to allowing risk management committee to sequence the risks form the most to the least important.

In construction field, risk management has become a main part in the decision making process. It can affect productivity, performance, quality and the budget of a construction project (Mills, 2001). But, in pharmaceutical industry, risk management is the process of minimizing a drug's risk during the product life cycle and also maximizing the drug's benefits by doing risk assessment and risk minimization.

Other than that, in project management, risk management attempts to recognize and manage potential and unexpected trouble spots that may occur when the project is implemented. Risk management identifies many risk events as possible, minimizes their impact, manages responses to those events that do occur, and provides possibility funds to cover risk events that actually occur (Gary and Larson, 2008).

2.2 Benefits of Risk Management

Before exploring more about risk management, we need to know the benefits of it first. According to Kasagala (2008), the benefit of risk management is to protect the property, earnings and personnel of the organization against losses and legal liabilities that may be incurred due to several of risks. Besides, it can minimized cost of the risk and maximized the profitability of the organization.

In context of project management, there are many benefits of risk management. It is very useful in order to increase the probability and the impact of positive events and to reduce negative events in the project. Therefore, risk management become essential in to supplement project management practices by investigating project structure, organizational environment, external environment, products, processes and procedures in detail (Ahmed *et al.*, 2007). Other than that, the benefit risk management in the project can assist the project manager to mitigate against both known and unanticipated risks on projects of all kinds (Carbone and Tippett, 2004). They said that, if the risk management failures to implement, it can cause the projects to exceed budget, fall behind schedule, miss critical performance targets, or exhibit any combination of these troubles.

According to Mills *et al.* (2001), risk management has become a main part in the decision making process and it can affect productivity, performance, quality and the budget of a construction project. Other than that, the goal behind the risk management process is to obtain understanding by all parties and agreement around what the risks really are and how they will be managed (Hamimah *et al.* 2008). Apart from that, it is also intended to improve project performance through early risk identification, mitigation and project life cycle management.

2.3 Basic Requirements for Effective Risk Management

According to Wells *et al.* (1999), it stated that successful risk management is based on a comprehensive and detailed hazard mapping and a full understanding of possible accident consequences. Risk analysis methods should be chosen carefully based on strengths of each technique, as each may provide different outputs leading to different prevention measures.

In project management, effective risk management requires open, clear, and ongoing communication within the project team and it should not be a separate set of risk practitioner that are responsible for identifying and mitigating risks (Perera and Holsomback, 2004). This is because it is important for the project team to express all

the risk without left it behind even it is just a small risk. Besides that, risk management is most effective when it is integrated into the organization's strategic and operational plans and management practices, rather than being seen as a separate program (Anonymous, 2006). When this integration occurs, the responsibility for risk management is shared across the organization, rather than becoming an additional responsibility for one or two people.

2.4 Basic Process of Risk Management

Risk management process is a guide for any organization in order to manage risk in effective way. There have a standard that had been developed by Dr Dale Cooper for risk management process that is Australian and New Zealand Standard, AS/NZS 4360:2004 as shown on Figure 2.1.

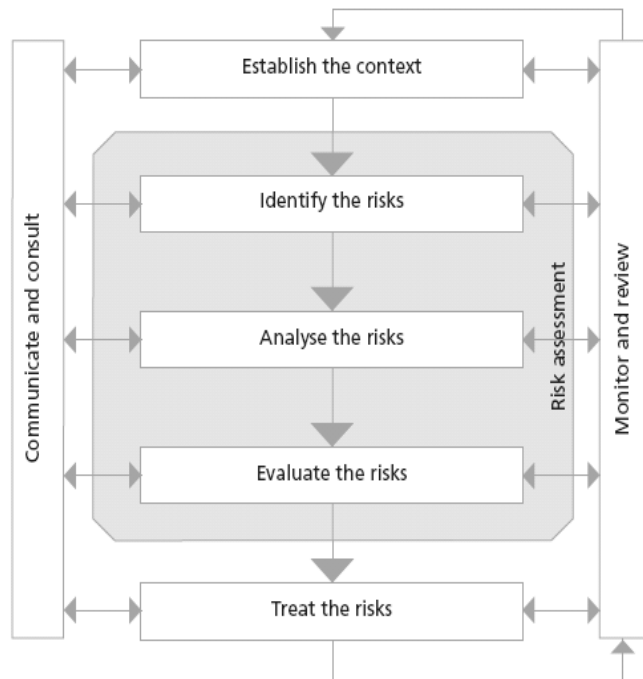


Figure 2.1: Risk Management Process (AS/NZS 4360: 2004)

Below are the basic explanations for risk management process according to (AS/NZS 4360:2004) for each step: