

# PERFORMING A RISK ANALYSIS STUDY FOR IMPLEMENTING A BIODIESEL PLANT

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***Abstract-** Risk as, an uncertain event, or condition that if it occurs, has a positive or negative effect on a project's objective. Risk analysis is done via interviews and brainstorming considering the available and extensive experience of the involved stakeholders. Each identified risk is prioritized through a qualitative risk analysis process considering the probability of occurrence and the impact by project stakeholders. The results of risk management planning processes are used to update/re-plan the project management plan to consider the risk effect on the project. The biodiesel project is very profitable, the economic indicators for the project are very high, and the execution of such a project will strengthen the national economy. Therefore, a biodiesel risk analysis is performed to achieve security for the plant. The depletion of fossil fuel forces the world to look for alternative ways for energy production. The most common way is the production of biodiesel from waste cooking oil. This paper presents a detailed cost analysis for a biodiesel plant with capacity 100,000 ton/year.*

***Keyword:** Risk, Risk analysis, Biodiesel.*

## 1. INTRODUCTION

Business risk is the factors that a company or organization will face and will lower its profits or lead it to fail. Anything that threatens a company's ability to achieve its financial goals is considered a business risk [1]. In some cases, the cause of risk is external to a company. Because of this, it is impossible for a company to completely protect itself from risk. However, there are ways to mitigate the overall risks associated with operating a business; most companies accomplish this through adopting a risk management strategy [2, 3].

Business risks arise from uncertainty about the profit of a commercial business due to unwanted events such as changes in tastes, changing preferences of consumers, strikes, increased competition, changes in government policy, obsolescence etc.. Business risks are controlled using techniques of risk management. In many cases, they may be managed by intuitive steps to prevent or mitigate risks, by following regulations or standards of good practice, or by insurance. Enterprise risk management includes the methods and processes used by organizations to

manage risks and seize opportunities related to the achievement of their objectives [4, 5]. Economically, biodiesel is more profitable than petrodiesel as biodiesel plants does not cost more money like refining plants, in addition low cost of biodiesel feedstock rather than expensive crude oil the feedstock of petro-diesel [6]. Production of biodiesel is a simple process that does need neither a license nor a complicated technology [7]. Environmentally, biodiesel is better as it does not contain sulfur so sulfur emissions is eliminated [8]. It is renewable as biodiesel is produced from renewable resources such as used cooking oil or biological organisms while petro-diesel made from finite sources [9, 10].

## 2. DEFINITIONS

- **Risk Assessment:** a systematic investigation and analysis of potential risks, combined with the assignment of severities of probabilities and consequences. These are used to rate risks in order to prioritize the mitigation of high risks.
- **Risk:** A negative effect of uncertainty.
- **Opportunity:** A positive effective of uncertainty
- **Risk Mitigation:** a plan developed with the intent of addressing all known or possible risks and preventing their occurrence.
- **Interested parties:** Institutions and individuals who may influence or be influenced by operations of the organization.

## 3. RISK ANALYSIS FOR BIODIESEL PLANT

Table 1 shows the risk analysis applied to predict the risk of biodiesel plant. Table 2 explains the risk characteristics. Table 3 describes the probability of event. Table 4 describes the impact of risk.

**Table 1: Project Risk Register**

Category	Risk	Prob.	Impact	Risk Value	Accept risk
<b>Operation and Maintenance</b>	Large scale oil/ Fluid spill incident in populated area	3	4	12	Y
<b>Operation and Maintenance</b>	Small-medium scale oil spill incident in populated area	5	2	10	Y
<b>HSE</b>	High LEL	4	4	16	N
<b>Operation and Maintenance</b>	Internal corrosion	3	3	9	N
<b>Construction</b>	Construction accident	2	4	8	Y
<b>Construction</b>	New construction activities affecting existing pipeline	4	2	8	N
<b>Force Majeure</b>	Major earthquake	2	4	8	N
<b>Operation and Maintenance</b>	Increased tanker traffic	4	2	8	N
<b>Design</b>	Land use and acquisition risk	2	3	6	N
<b>Financial</b>	Interest rate risk	3	2	6	N
<b>Labor risks</b>	Operational accident	2	3	6	N
<b>Operation and Maintenance</b>	External corrosion	3	2	6	N
<b>Operation and Maintenance</b>	Large scale oil spill incident in unpopulated area	3	2	6	N

<b>Financial</b>	Defaulting on debt (bonds)	1	5	5	N
<b>Operation and Maintenance</b>	Small-medium scale oil spill incident in unpopulated area	5	1	5	N
<b>Construction</b>	Inferior quality materials or equipment	1	4	4	N
<b>Construction</b>	Ground composition/unstable ground	1	4	4	N
<b>Construction</b>	Erosion - Mudslide - Landslides	1	4	4	N
<b>Construction</b>	Fire in construction site	1	4	4	N

- Y: the risk is accepted
- N: the risk is not accepted.

**Table 2:** risk characteristics

Category	Name	Characteristics
5	Catastrophic	Disastrous impact on success of the project. Debilitating financial and temporal impact. Certain injuries or fatalities
4	Critical	Considerable impact on success of the project. Major financial and temporal impact. Probable injuries or fatalities.
3	Significant	Noticeable impact on success of the project. Significant financial and temporal impact. Possible injuries or fatalities.
2	Minor	Minimal impact on success of the project. Some financial and temporal impact. No injuries or fatalities.
1	Negligible	No impact on success of the project. No damage to the system. No injuries or fatalities. Negligible financial impact.

**Table 3:** probability of event

Category	Name	Characteristics
5	Very high	Almost certain to occur
4	High	Can be expected to occur in the life of the project
3	Medium	As likely to occur as not occur
2	Low	May occur occasionally
1	Very low	Unlikely to occur, but possible

**Table 4:** Risk Impact

Probability	1	2	3	4	5
5 - Very high					
4- High					
3 - Medium					
2 - Low					
1 - Very low					

#### 4. CONCLUSION

Explored the range of risks that organizations may be exposed. We have not only introduced ourselves to the main financial risks but also to the other risks which may indirectly impact on the finances of organizations – such as operational, reputational and legal and regulatory risk. Examined how the process of risk management should be implemented within

organizations – thereby providing the structure for examining each type of financial risk in detail. It is important that the individual risks be not looked at entirely in isolation from each other. Doing so is what is known as a silo approach to risk management. Instead, managers must develop a holistic view of risk. Organizations may have small exposures to the individual risks, but when these are aggregated, they may have, in total, substantial financial and non-financial risks that require careful management. What we do certainly know – given the recent catalogue of high-profile financial calamities – is that the failure to manage risks can have devastating and, on occasion, terminal outcomes for organizations.

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## NOTES ON THE AUTHORS

**Abdallah El-gharbawy** is Research and development engineer for three years, process engineer for two years. Eventually, my current profession is a project engineer for three years and it is lasting. For my graduates and postgraduate degrees, I have a BSc in petroleum refining and petrochemical engineering. In addition, I have an MSc in chemical engineering. I have Ph.D. in material science.