CHAPTER 1 INTRODUCTION

1.1 Overview Description of Research Objects

This Research object Focus on to Examine operation aspect of Self-Propelled Oil Barge at PT. Faher Hayat Bersatu, the company establish since 2012 and located in Jalan Binawan I No. A-4, Sunyaragi, Cirebon, 45132. PT. Faher Hayat Bersatu Providing Marine supply and Bunker Services to fulfil Customer needs.

Figure 1.1-1PT. Faher Hayat Bersatu Logo (source: Internal Company File)

PT. Faher Hayat Bersatu have 2 Units of Self-Propelled Oil Barge or SPOB which are Faher 01 with 350 ton and Faher 31 with 700 ton, but only Faher 31 is active while Faher 01 is being inactive and docked in one of shipyard companies which located in Tegal, the companies also the sister company of PT. Faher Hayat Bersatu which is PT. Surut Berpantang that are being acquire since the beginning of the construction of Faher 31 back in 2019.

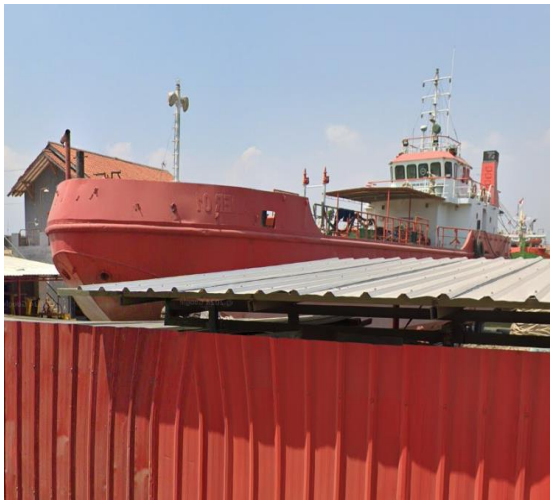


Figure 1.1-2 Faher 01 and Faher 31 Armada (Internal Company Report)

PT. Faher Hayat Bersatu is mainly operating around Patimban through Semarang. With only one active armada and offering service in such wide area there's always be a trouble in having effective and cost optimize operation of the ship as sometimes the ship needs to travel in a long travel distance from one customer to other customer which led into the companies can't maximize the profit due to inefficiency in operation cost.

1.2 Background Research

Indonesia is a nation that is rich in natural resources and have a vast reserved of natural resources such as gas, coal, nickel, sand, etc. Natural resources play a crucial role in Indonesia's economy development and contributing exponentially to nation's GDP, Employment, export. since the colonizer like Netherlands enjoying and exploit Indonesia vast reserved of natural resources in this case with the discovery of oil in Sumatra back in early 20th century led to the birth of Royal Dutch shell (Harnawan, 2023) . After Indonesia gain independence, the natural resources hold and managed by the government under government owned companies such as Antam, Freeport, Krakatau Steel, etc. Management of the natural resources runs

well and then there's a big impact that affected the management not only in Indonesia but also worldwide, all get impact by the covid 19.

According to (PwC Team, 2023) since the recovery of Covid-19 pandemic there's a strong demand uprise of mineral and coal driven by recovery of Covid-19 and also restoration of business activities all around the world, especially in indonesia which cause the increase of coal and other minerals as we can on table 1 below

Table 1-1.2-1 coal and other minerals production from 2020-2022 in Indonesia

	Produksi Barang Tambang Mineral		
Barang Tambang Mineral	2020	2021	2022
Batu Bara	565640928	614058577	687402285
Bauksit	25859895	25781187	28808674
Emas	65890	78996	85203
Konsentrat Tin	65127	52467	57735
Konsentrat Tembaga	2273456	3377023	3321239
Bijih Nikel	48040003	65509854	98187963

Source: *BPS Indonesia*

In Indonesia there are 1.215 WPR or *Wilayah Pertambangan Rakyat* spread nationwide. Nationally, 1,215 WPRs have been designated, with a total area of 66,593.18 hectares. Since 2022 until 2023, the Directorate General of Mineral and Coal has arrange the WPR proposal management with a total of 270 WPR blocks (Kementerian ESDM, 2024). With abudant of WPR area and vast reserved resources Indonesia is one of big global player in mining industry. Indonesia supplying over 37% of the world nickel supply, the second-largest coal exporter after Australia, the second-largest producer of Tin right after People Republic of China and supplying around 20-30% of World's tin supply, have one of biggest cooper mine and rank within top 10 of cooper producer in the world located in papua which is grasberg mining site operated by Freeport-Mcmoran, and lastly Indonesia also rank within top 10 of Gold producers in the world with contributions

from the Grasberg mine which is one of the world's largest gold-producing mines(BPS-Statistics Indonesia, 2021).

Other than Mineral and coal, Indonesia has been a long time producers of oil and gas with the first well being founded in Sumatra dated back 130 years ago in dutch colonial era with first exploration was being conduct in 1912 which led into the discovery of the *talang akar* field, south sumatra. In which become the largest oil field before world war 2 era (1921)(Harnawan, 2023) and also former member of OPEC (Organization of the Petroleum Exporting Countries). Even though indonesia can't supply or export petroleum like it was before due declining production in oil and also ever increasing demand for petroleum which led Indonesia into becoming a net oil-importer (PwC Team, 2024), Indonesia is still an active oil and gas producer even though statisticly the production in crude oil and refined oil can't fulfill the domestic demand, Indonesia is still one of big producer of natural gas producer and rank 14^{th} in term of natural gas production (PwC Team, 2024).

With ever increasing demand for petroleum and maturing oil field in which mean the field experiencing a natural slowly decline of the production rate as the remaining oil is often harder to reach and may require more advanced extraction technique and almost all of the easily accesible oil has had already been extracted. Not to mention with limited succes of founding new reserved. This is challenge that Indonesia has faces since the declining of production since early 2000s which we can see at graph below from SKK Migas Annual Report (2022)

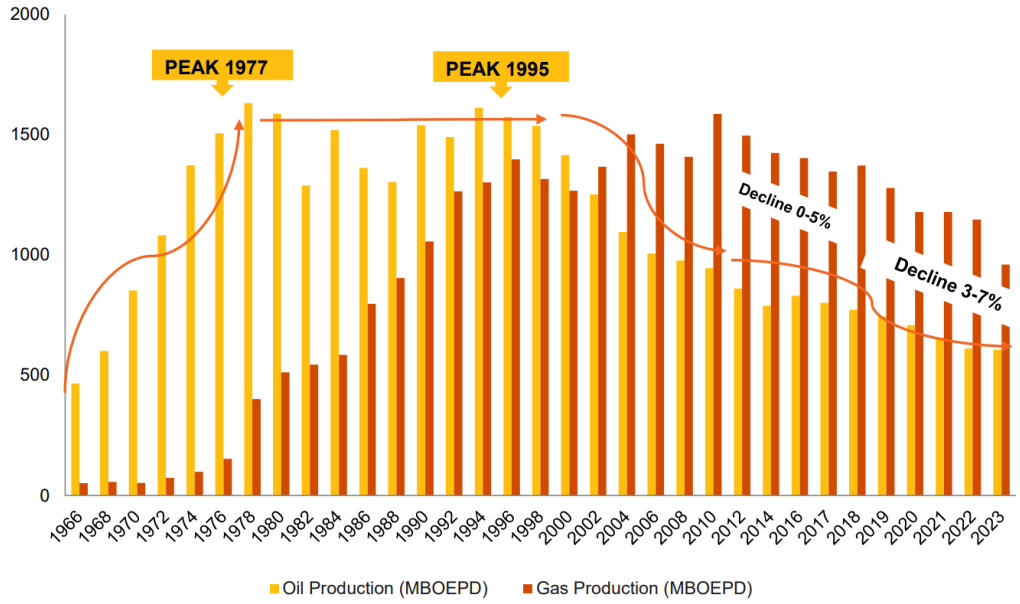

Figure 1-1.2-1 Indonesian oil and gas production profile

In order to fulfill the needs of petroleum, crude oil, and refined oil. with estimate amount of demand close to 1.5 million barrels per day (bpd) which the demand comes from transportation sector, industry sector, and domestic needs sector for fuel, meanwhile the average domestic production only about 700,000 to 800,000 barrels perday (bpd) meaning Indonesia does not meet its oil needs solely through domestic sources. Indonesia imported from some of nations from South East Asia such as Malaysia and Middle East Nation such as Saudi Arabia and Iraq in which the import accounted almost 45% of Indonesia daily needs (BPS-Statistics Indonesia, 2021). Indonesia, as the biggest archipelago states in the world with 2.012 million square kilometers of land and 5.8 million square kilometers of sea (75.7%), 2.7 million square kilometers of which fall within the Exclusive Economic Zone (Bambang Suswantono, 2024). Indonesia, the geography present with additional obstacle in fulfilling Indonesia's daily needs of fuel, with over 17,000 island spread across from sabang to merauke and from miangas to rote island, the needs of have a robust and dependable transportation network to distributre petroleum product to even the most remote place on Indonesia is a must.

With 45% of indonesia daily needs of fuel is imported(BPS-Statistics Indonesia, 2021), it was clear that to get the 45% amount to be distributed across nation from oversea which means a large portion of logistics involves transporting oil from international suppliers and distributing it domestically and it was not an easy job. With more than 75% of indonesia cover in water (Bambang Suswantono, 2024) which means A large sum of ship will needs to be operates daily to supply the fuel either to another ship or transport it into one of many government owned or private owned silos to be stored. And this is where the third party logistic especially the one who provided sea logistic plays a role in ensuring that the distribution of oil is done and efficient between indonesia vast island.

A large amount of ship fleet needs to be operates 24/7 in order to fulfill the indonesia daily needs of oil making reliable marine logistics vital to maintaining the continuous supply of oil key sectors like transportation, industry, and domestic needs. One of marine third party logistic, PT. Faher Hayat Bersatu have two SPOB ship even though only one that is active serving the customer and transport precious fuel to the customer with the operation area spread from patimban into semarang bringing fuel to the customer both in ship and industry that in needs of fuel.

In doing of daily operation especially when covering huge vast area of operation, there will always be a problem occurs not to mention that the ship operate 24/7 it would be a normal assumption to expect that there's always be a problem occur during operation and not to mention that as a company, generates revenue always been a goal and it would be great if the operation expenses can be cut without reducing the operation performance or even dangerin the entire operation because of uncenessary cuts on day to day operation.

According to Vidmar & Perkovič, (2023) "The risk evaluation process described in the recent IMO (MSC) report is used to assess the acceptability and tolerability of risk. The evaluation is primarily based on three key elements: accident statistics, risk control options (RCOs), and

cost-benefit assessment." The risk evaluation process described in the recent IMO (MSC) report is used to assess the acceptability and tolerability of risk. The evaluation is primarily based on three key elements: accident statistics, risk control options (RCOs), and cost-benefit assessment (Vidmar & Perkovič, 2023) in achieving absolute zero risk may not be feasible, but ensuring that safety practices are maximized to prevent as many incidents as possible. The objective of a zero-accident approach is to establish an operational environment in which the likelihood of accidents is reduced to the lowest feasible level. This is done in order to support a range of objectives, including those related to human, environmental, operational, financial, and reputational considerations.

The marine fleet budget consists of daily fuel expenses, wages, day to day supply operation, maintance, etc.(Nuur Afiif & Okdinawati, 2024). Since fuel cost always been a major component of operational expenses, a cost optimization program is highly needed to reduce the yearly budget and ensure business can make revenues and continue serving the client. In order to optimize the cost to reduce the operations expenses, evalutation and optimization need to be study to determine which cost can be optimize and which cost should be keep or increase to not only aim to optimize the budget but also to increase the efficiency of the ship operation.

In simple term, Fuel consumption typically really hard to be optimize as every ship has it owned spec and their own fuel consumption. Not to mention weather also plays an important role in determininig the fuel consumption, reducing the fuel amount can led into the lower performance of delivery activities.

The optimization program needs to be managed carefully so the implementation of the program does not affect badly in company profitability. A change in the cost structure and network operation may affect the whole operation for sometimes. Thus, doing risk assement can be proven crucial to determine supply chain risk management in order to mitigate any risk that may happens in the future that may affect the company operation

and financial in the future. Risks cause disruption, which disrupt the whole supply chian and need to be mitigate to ensure the supply chain function properly, hence the supply chain risk management is essential to ensure the smoothness of supply chain distribution(Gurtu & Johny, 2021)

In this research, we propose impelemnting a combine method of the Analytical Hierarchy Process (AHP) and Failure Mode and Effect Analysis (FMEA) in order to help companies in understanding more fully the risks in their supply chain, prioritizing risks effectively, and allocating resources to minimize the most serious threats. By carefully managing these risks, the organization may improve operational efficiency, d ecrease costs, and assure seamless supply chain operations, despite the challenges given by Indonesia's unique topography and logistical complexities.

1.3 Problem Formulation

Ensuring cost effectiveness and operational reliability is crucial for Indonesia's maritime fuel logistics, particularly with the difficulties presented by the nation's large territory and high gasoline consumption. PT. Faher Hayat Bersatu, a marine third-party logistics provider, operates in the wide area, where reliable fuel transportation is vital for oil and gas companies.

However, the company is confronted with considerable operational expenses, logistical difficulties, and potential risks that could disrupt the fuel supply chain. The objective of this research is to optimize the fuel distribution network and reduce operational costs without compromising service quality and safety. The objective is to analyze and improve the efficiency of PT. Faher Hayat Bersatu operation by considering couple of criteria which are: operational expenses, service reliability, value creation, and health, safety & environment (HSE).

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1. How can FMEA and AHP be utilized to asses and optimize the operational expenses in fuel supply network operation?
2. How can FMEA and AHP help evaluate and enchained service reliability in the fuel supply network?
3. How can the application of FMEA and AHP contribute to identifying and maximizing value creation opportunities within the fuel supply network for an oil and gas company?
4. How can FMEA and AHP assessing health, safety, and environmental in the selection of the fuel supply network operation?

1.4 Research Objective

The objective of this study is to leverage the combined application of FMEA and AHP to address key operational areas, including cost optimization, service reliability, value maximization, and HSE compliance. The following research objectives have been established to guide this investigation:

1. The objective is to analyses and optimize operational expenses in a fuel supply network through the application of FMEA and AHP, with the aim of identifying the key cost drivers and risk factors.
2. The objective is to evaluate and improve service reliability in the fuel supply network by applying FMEA and AHP for systematic risk assessment and prioritization.

3. The aim is to explore how FMEA and AHP can be utilized to identify and maximize value-creation opportunities within the fuel supply network of an oil and gas company.
4. The objective is to evaluate health, safety, and environmental (HSE) considerations in the fuel supply network selection process through the application of FMEA and AHP techniques, with the aim of minimizing potential risks.

1.5 Research Benefit

1.5.1 Theoretical Aspect

From an academic standpoint, this research represents a contribute to the enrich the literature on supply chain risk management. The study illustrates the practical use of AHP and FMEA methods for optimizing logistics and addressing operational risks. By establishing a connection between theoretical concepts and real-world applications, the study presents a comprehensive framework for cost and risk management that can serve as a foundation for further studies by other researchers. The combine application of AHP and FMEA is particularly worthy to explore more, because it illustrates how these methods can be applied in tandem to strike a balance in logistics management between cost-effectiveness, dependability, and safety. In this way, the study makes a significant contribution to the academic field of operational research and serves as a valuable reference for future research on cost optimization and risk assessment in the supply chain sector. This research contributes to the body of knowledge that supports informed decision-making in industries facing complex logistical challenges.

1.5.2 Practical Aspect

This research has significant practical value for PT. Faher Hayat Bersatu is designed to deliver insights that can improve operational efficiency in the company's fuel supply logistics. By concentrating on cost

optimization through the incorporation of the Analytical Hierarchy Process (AHP) and the Failure Mode and Effect Analysis (FMEA) methodologies, the study aspires to point out areas where operational expenditures can be reduces without sacrificing the quality or dependability of the service. This will assist PT. By optimizing its logistics processes, Faher Hayat Bersatu can reduce operating costs while maintaining client expectations for timely and secure fuel deliveries. Furthermore, these findings have the potential to serve as a model or guideline for other marine logistics companies in Indonesia that face similar logistical and operational challenges, thereby making this research broadly relevant within the industry.

1.6 Systematics of Mini Thesis Writing Mechanism

A. CHAPTER I INTRODUCTION

This chapter is a general, concise and concise explanation that describes the content of the research. the content of the research. The contents of this chapter include: General Description of the Research Object, Background of Research, Problem Formulation, Research Objectives, Research Benefits, and Systematics of Final Project Writing. Systematics of Final Project Writing.

B. CHAPTER II LITERATURE REVIEW

This chapter contains theories from general to specific, accompanied by previous research and followed by a research framework that ends with a hypothesis if the hypothesis. followed by a research framework that ends with a hypothesis if needed.

C. CHAPTER III RESEARCH METHOD

This chapter emphasizes the approaches, methods, and techniques used to collect and analyze findings that can answer the research problem. collect and analyze findings that can answer the research problem. This chapter includes a description of: Type of Research, Variable Operationalization, Population and Sample (for quantitative) / Social Situation (for qualitative), Data Collection, Validity and Reliability Test,

and Data Analysis Techniques. Validity and Reliability, and Data Analysis Techniques.

D. CHAPTER IV RESEARCH RESULTS AND DISCUSSION

The results of the research and discussion are described systematically in accordance with the formulation of the problem and research objectives and presented in sub

problems and research objectives and are presented in separate subtitles. This chapter contains two parts: the first part presents the research results and the second part presents the discussion or analysis of the research results. discussion or analysis of the research results. Each aspect of the discussion should start from the results of data analysis, then interpreted and followed by the conclusion. conclusion. The discussion should be compared with previous studies or relevant theoretical foundations.

E. CHAPTER V CONCLUSIONS AND SUGGESTIONS

The conclusion is the answer to the research question, then becomes a suggestion related to the benefits of the research, related to the benefits of research.