

Chapter I Introduction

I.1 Background

Logistics has become an essential part of the global economy. Nowadays, products from one country can easily be found in other countries, and people from all over the world can travel to their intended destinations. According to Hayaloglu (2015), countries that invest in logistics have a significant competitive edge in international commerce since logistical advancements make manufacturing, distribution, and marketing easier. As a result, the market price for commodities becomes more competitive due to the availability of products from different parts of the world. Industry players compete with each other not only domestically but also internationally. The ease of transporting products from one place to another has a positive relationship with a country's GDP. Mocan et al. (2015) stated that the growth of world commerce is roughly equal to the world's GDP average.

In its history, logistics management has previously been linked to military affairs. Logistics management has been used since ancient times, such as by Alexander the Great, who used logistics management to mobilize his forces for battle. Taylor (2007) stated that Alexander the Great used a combination of logistics transportation to attack his target, such as horses for land transportation to achieve fast movement and ships for large mobility of goods. As a result of these logistics management practices, Alexander the Great succeeded in conquering his target area and/or blockading enemy supplies.

For a country like Indonesia, which is a maritime country with thousands of islands, logistics operations become a significant challenge for the government to ensure the required goods and services are well distributed throughout the Indonesian archipelago. These logistics operations within the country will greatly affect the Indonesian economy and, ultimately, government revenue. The Indonesian government must ensure that all provinces have price stability and no scarcity of commodities, especially critical commodities such as fuel and food. To achieve this, the Indonesian government needs to ensure that all industries are running smoothly,

especially critical industries such as the oil and gas industry. The oil and gas industry has become the foundation of the Indonesian government since a long time ago in providing significant state revenues. Figure I.1 shows that from 2015 until 2020, the oil and gas revenue contribution was declining due to the low oil price at that time.

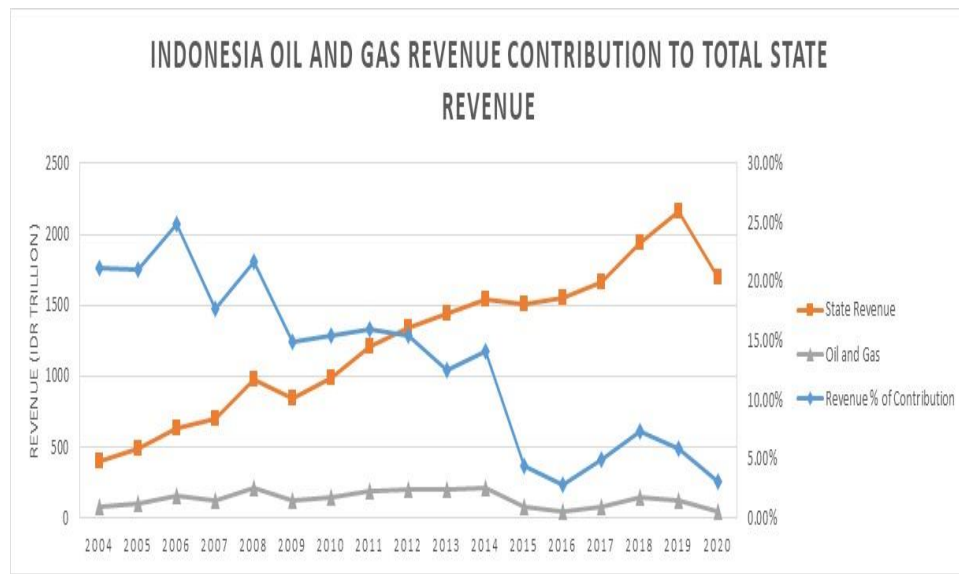


Figure I.1 Indonesia Oil and Gas Revenue Contribution to State Revenue
(Source: PwC, 2020)

One important factor in maintaining the contribution of oil and gas to state revenue is to maintain the production level of oil and gas. This production level can be maintained not only from existing production fields but also through aggressive exploration activities and accelerating new development production fields. This production level is necessary to fulfil domestic demand, which will impact many related industries since oil and gas are used as fuel in some industries, and other industries use oil as raw materials. Figure I.2 below shows a comparison of Indonesia's oil production to domestic consumption.

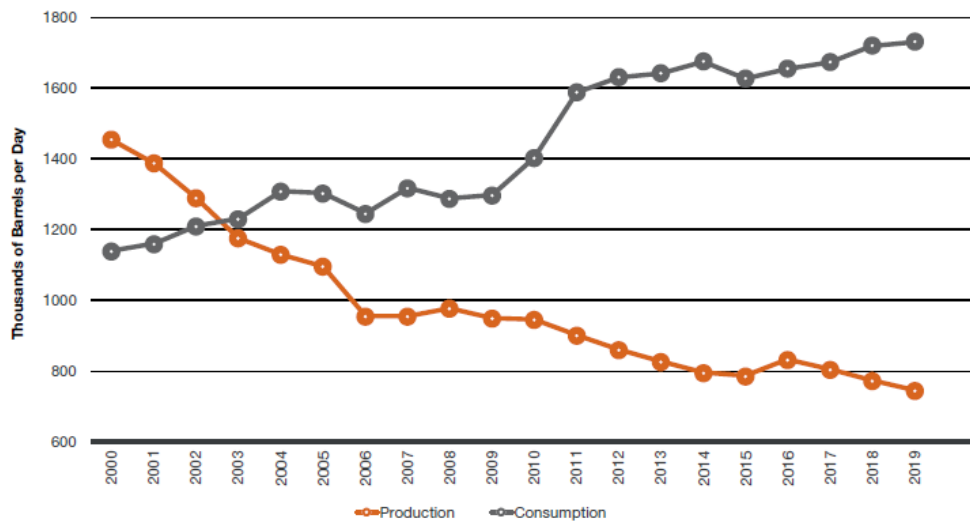


Figure I.2 Indonesia Oil and Gas Production and Consumption
(Source: PwC, 2020)

Figure I.2 illustrates that the Indonesian government has a lot of work to do because oil production is declining while domestic oil consumption is increasing. This gap leaves room for additional costs for the Indonesian government as it needs to purchase oil from other countries. Therefore, the Indonesian government needs to take necessary actions to increase oil and gas production.

To achieve national revenue targets and reduce additional costs in managing the country, optimizing logistics operations can be a key strategy. This is especially important for Indonesia's oil and gas industry, which is critical to the country's economy, and must maintain productivity to prevent loss of production due to ineffective operations. Logistics play important role in supporting oil and gas industry, from upstream sector to downstream sector. According to Diaz et al. (2021), infrastructure including land roads and ports, is one of the logistics requirements that can influence logistics operations performance. Availability of infrastructure can increase transportation alternatives, frequency of transportation, and volume of products delivered. With available logistics networks and alternative logistics activities, logistics operations can be optimized. A country with sufficient infrastructure to support its logistics operations will have better logistics performance than one that lacks required infrastructure. For the upstream oil and gas industry, infrastructure availability is critical for effective logistics operations

to support oil and gas production. An optimal logistics location will help to achieve production targets by providing required goods and services at the right time, place, quantity, and cost. At a macro level, good production performance by oil and gas companies will bring a positive impact on the Indonesian government's revenue.

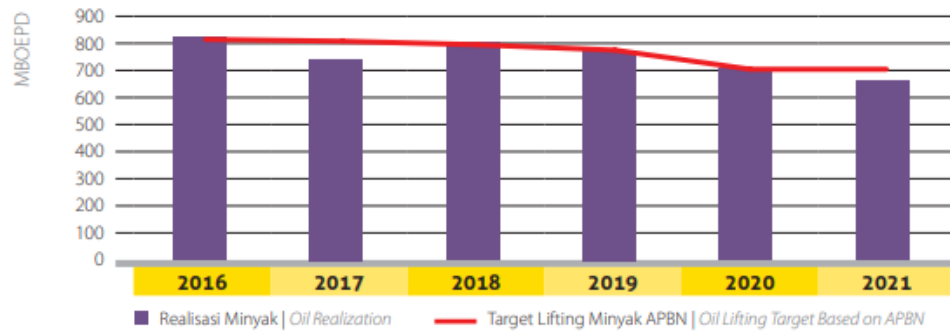


Figure I.3 Indonesia Oil Production Target & Realization
(Source: Directorate General of Oil and Gas Ministry of Energy and Mineral Resources, 2022)

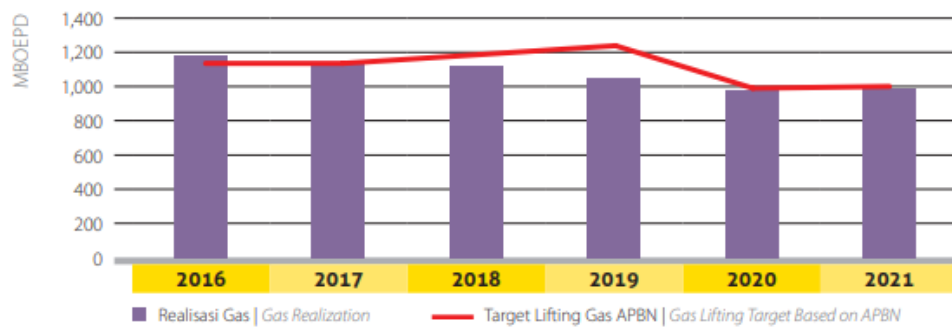


Figure I.4 Indonesia Gas Production Target & Realization
(Source: Directorate General of Oil and Gas Ministry of Energy and Mineral Resources, 2022)

I.2 Company Profile

Husky-CNOOC Madura Limited (HCML) is an energy company that operates in the exploration and exploitation of the oil and gas sector in Indonesia. HCML's operational area is located in the Madura Strait, East Java, Indonesia, and operates under a Production Sharing Contract (PSC) with the Indonesian Government through the Special Task Force for Upstream Oil and Gas Business Activities (SKK Migas), Ministry of Energy and Mineral Resources. HCML's headquarters is

located in the Indonesia Stock Exchange Building, Tower 1, Jendral Sudirman Street, Kavling 25, Jakarta. To support its operation in the East Java area, HCML has a regional office located in the Intiland Tower Building, Panglima Sudirman Street 101-103, Surabaya.

HCML's shareholders are Husky Oil Madura Partnership (HOMP), China National Offshore Oil Corporation (CNOOC) Southeast Asia Limited, and SMS Development Limited (Samudra Energy). HOMP is a subsidiary of Husky Energy, a Canadian energy company. CNOOC is the largest offshore oil and gas producer in China, and Samudra Energy is an Indonesian energy company. In 2021, Husky Energy was acquired by Cenovus Energy, also a Canadian energy company. In HCML, HOMP owns 40% of shares, CNOOC Southeast Asia Limited also owns 40% of shares, and Samudra Energy owns the remaining 20% of shares. The Madura Strait PSC was established in May 1982 and previously operated by Husky Oil Madura Limited (HOML), with HOMP owning 100% of its shares. In October 2011, the company name was changed to Husky-CNOOC Madura Limited (HCML) after CNOOC Southeast Asia Limited and Samudra Energy acquired shares. Although CNOOC Southeast Asia Limited and HOMP own the same amount of shares, CNOOC Southeast Asia Limited is responsible for HCML's operations.

I.2.1 Vision, Mission, and Strategic Pillars

HCML's vision is to become the largest gas producer in East Java and the preferred operator in Indonesia. Its mission is to create value for stakeholders through excellent operations in the oil and gas business, with a strong commitment to ethics, health, safety, and the environment. To achieve its vision and mission, HCML has identified strategic pillars to guide its operations, as illustrated in Figure I.5 below.

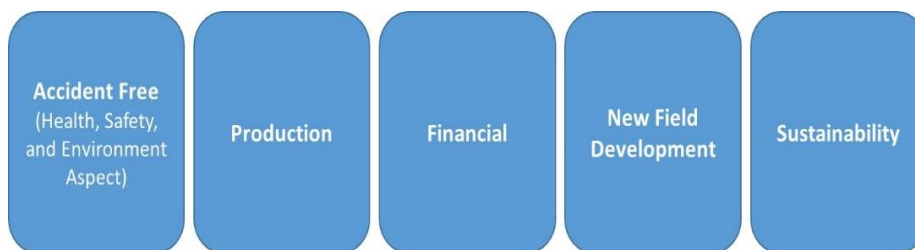


Figure I.5 HCML Strategic Pillars
(Source: Company's Internal Data)

HCML's pillars are designed to guide its operations and performance. The first pillar, "Accident Free," emphasizes the importance of ensuring the health and safety of employees, as well as protecting the environment from pollution. The second pillar, "Production," focuses on achieving specific production targets to generate income for the company and deliver oil and gas to buyers. The third pillar, "Financial," sets expectations for income and maximum allowable costs in company operations. The fourth pillar, "New Field Development," targets the completion of new field development projects that will bring additional production volume to the company, including the construction of new production platforms and wells through EPCI projects. Finally, the "Sustainability" pillar aims to maintain and improve company revenue through the development of new additional production fields.

I.2.2 Working Operation Area

HCML working operation area under Madura Strait PSC stretches along the Madura Strait, East Java, from its left side until right side as shown in Figure I.6. The working area contains several prospective fields that divided into 4 blocks, which are block A, block B, block C, and block D. HCML initial hydrocarbon production was coming from BD field which located in block A. BD field is a gas field, but the gas stream contains condensate as the side product in volume that economic to be sold. BD field hydrocarbon was discovered in 1987, however, the wet gas production was just begin in 2017. BD field production gathered from Kujung formation with estimated reserved that can be recovered as much 441.7 billion cubic feet of gas and 18.7 million barrels of condensate. Those BD reserves estimated can be produced for up to 13 years. In daily basis, BD field average gas

production is around 110 million standard cubic feet per day (MMSCFD), and along with the gas production it also produce average condensate around 6.000 barrel oil per day (BOPD). From these production, in 2021 HCML listed as 15th biggest oil and condensate producer in Indonesia as shown in Table I.1 among 81 oil and condensate producers. While for the gas production, HCML listed as 12th biggest gas producer in Indonesia in 2021 as shown in Table I.2 among 69 gas producers.

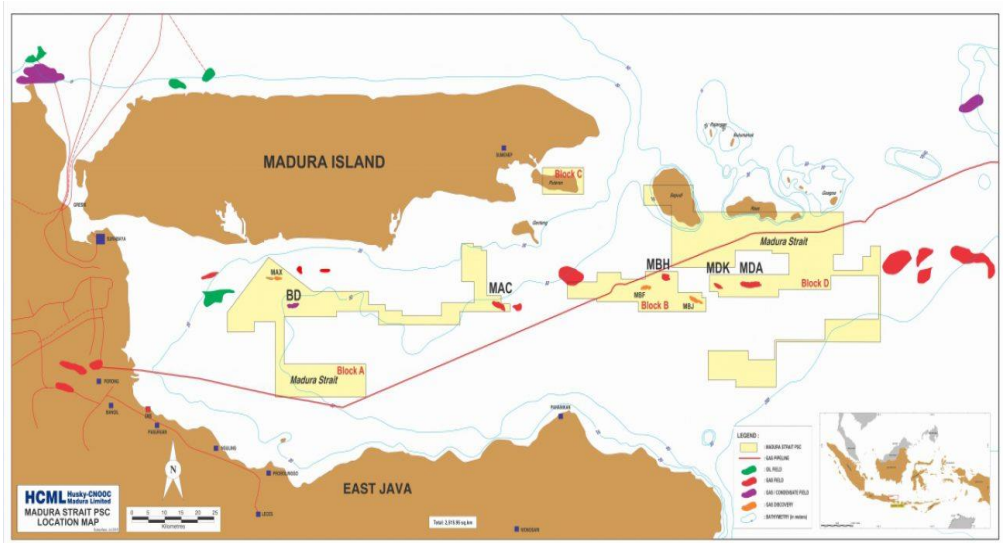


Figure I.6 Madura Strait PSC Working Area
(Source: Company's website)

Table I.1 Indonesia 15 Biggest Daily Oil Production

No	Contractor Name	Average Daily Oil & Condensate Production in 2021 (BOPD)
1	MOBIL CEPU LTD	202,894
2	PERTAMINA HULU ROKAN	160,103
3	PT PERTAMINA EP	71,386
4	PERTAMINA HULU ENERGI ONWJ LTD	27,136
5	PERTAMINA HULU MAHAKAM	24,922
6	PT PERTAMINA HULU ENERGI OSES	24,338
7	PETROCHINA INTERNATIONAL JABUNG LTD	15,438
8	MEDCO E&P NATUNA	13,715
9	PT PERTAMINA HULU SANGA-SANGA	12,241
10	PT PERTAMINA HULU KALIMANTAN TIMUR	9,303
11	BOB PT BUMI SIAK PUSAKO - PERTAMINA HULU	8,521
12	PETRONAS CARIGALI (KETAPANG) LTD	7,050
13	CONOCOPHILLIPS (GRISSIK) LTD	6,929
14	JOB PERTAMINA - MEDCO TOMORI SULAWESI LTD	6,907
15	HUSKY-CNOOC MADURA LTD	6,593

(Source: Directorate General of Oil and Gas Ministry of Energy and Mineral Resources, 2022)

Table I.2 Indonesia 12 Biggest Daily Gas Production

No	Contractor Name	Average Daily Gas Production in 2021 (MMSCFD)
1	BP BERAU LTD	1,312.48
2	CONOCOPHILLIPS (GRISSIK) LTD	988.95
3	PT PERTAMINA EP	889.79
4	PERTAMINA HULU MAHAKAM	528.14
5	ENI MUARA BAKAU B.V	326.71
6	JOB PERTAMINA - MEDCO TOMORI SULAWESI LTD	296.22
7	PETROCHINA INTERNATIONAL JABUNG LTD	270.54
8	ENI EAST SEPINGGAN LTD	251.68
9	PREMIER OIL INDONESIA	211.75
10	MEDCO E&P NATUNA	169.38
11	KANGEAN ENERGI INDONESIA	161.21
12	HUSKY-CNOOC MADURA LTD	111.28

(Source: Directorate General of Oil and Gas Ministry of Energy and Mineral Resources, 2022)

BD field's gas production is generated through 4 wells. The field produces sour and toxic gas with an H₂S concentration of around 4500 ppm, making it one of the highest H₂S fields and one of the most challenging operations in Indonesia. To produce gas from BD field, HCML operates three major facilities: one unit Wellhead Platform (WHP), one unit Floating Production, Storage, and Offloading facility (FPSO), and one unit onshore Gas Metering Station (GMS). The Wellhead Platform functions to produce gas from the reservoir through the wells. After reaching the surface, the gas is transferred to the FPSO for separation of gas, condensate, and water. Once separated, the gas is purified on the FPSO to produce sweet gas before being transferred through a subsea pipeline. The BD field subsea pipeline is owned by HCML and connects the production facilities offshore (FPSO) to the HCML Gas Metering Station onshore in Pasuruan, East Java. At the GMS, the gas is split and sold to gas buyers. As for the condensate, once it is separated from gas and water on the FPSO, it is stored for a while in FPSO tanks. Periodically, a vessel tanker from the condensate buyer arrives at the BD field location to offload the condensate from the FPSO to the buyer's tanker. The sulphur generated from gas purification is then collected and offloaded periodically for further treatment.

Apart from BD field, HCML also has several prospective fields to generate hydrocarbon, such as MAX field and MAC field located in block A; MBF field, MBJ field, and MBH field located in block B; and MDA field and MDK field located in block D, as shown in Figure I.6. These fields are spread along the Madura Strait, and some of them have been confirmed for future development plans.

I.3 Existing Operation

I.3.1 Logistics Operation Scope in HCML

Logistics operations in HCML are performed under the responsibilities of the Logistics Department, led by the Logistics Department Manager. The Logistics Department's operation scope in HCML can be segregated into the following groups: Warehouse/Shore-base Management, Transportation Management, and Material Management.

As the one who responsible for warehouse management, Logistics Department is responsible for storing the goods purchased from suppliers. When the goods arrive at warehouse location, the goods will be placed in receiving location first, so the Logistics' personnel can conduct goods receiving activity, such as goods physical check and documents verification. If the goods delivered are in accepted condition and the delivery documents is match with the order documents, then Logistics' personnel needs to update the administration system that the goods order has been delivered by supplier and received by Logistics' personnel in charge. Sometimes, the goods might not be delivered in full quantity. In this case, Logistics' personnel needs to check whether it is allowable by the order document to receive the goods in partial quantity. If not allowed for partial delivery, then Logistics' personnel will take action whether not to receive the goods or to receive the goods with note and hold the administration receiving documents so the supplier cannot submit their invoice later on for the incomplete goods. After the receiving process and administration completed, the goods then move out to the storage location. The Logistics personnel then arranging the goods storage in good order as per the goods characteristics. There are some storage option, which are covered warehouse, open yard, roofed warehouse, and cold storage. The goods with big dimension and not

sensitive material with temperature can be stored in open yard, the good that have small to medium dimension and not require for open air can be stored in covered warehouse, the good with small to medium dimension and require for open air can be stored in roofed warehouse, and the last one is for goods that have sensitivity with high temperature, it can be stored in cold storage. If there is a requirement for the inventory to be sent to the field for operation usage, Logistics personnel needs to prepare the material to be ready to be delivered to the field location, including its packaging if required. The material to be issued out of the warehouse need to be segregated in issuing area for further processing such as checking, labelling, etc.

The warehousing process also require good administration for goods storage and its movement. Logistics personnel that in charge in warehouse shall update in timely manner the goods or inventory data for any movement to make the company record always actual. The movement is including material coming or receiving, both from supplier or return back from field, material issued to field location or to other designated location, and the last one is the movement in internal warehouse if any. For the returned material from field to shore base, the Logistics personnel need to segregate which the material with new condition and which material with used condition or even categorized as junk materials. This process will determine for further action required by warehouse personnel. For the new material, then it needs to be returned to its storage, while for used or junk material there should specific location for its storage. In HCML, warehouse management usually called as shore-base management due to its wider scope than only warehousing activity. Shore-base management is an integrated operation management located in shore location to accommodate offshore requirements, such as warehousing activities, and lifting material activities that conducted not only in warehouse area, but also at jetty area for handling the materials to or from offshore location. Furthermore, shore-base management also include 3rd party contractor operation that required to succeed the offshore operation, such as storage and handling of oil spill combat equipment, fuel and water bunkering for the vessels. The shore permits to perform such activities also include in shore-base management activities.

In terms of transportation, Logistics Department's scope is to provide transportation modes to transfer the materials and personnel from shore location to field location and vice versa. Sometimes, Logistics Department also in charge in delivering materials to 3rd party location or to transport materials from 3rd party location to HCML location. The transportation modes including land, air, and sea transportation. The materials from warehouse in shore location is transported through supply vessel, while the personnel is transported through crew boat. The supply vessel will deliver materials to support offshore operation and maintenance of Wellhead Platform and production unit. In project based operation like drilling campaign, the supply vessel will deliver the material to support drilling rig. Personnel whose work on Wellhead Platform and production unit will be transported through crew boat in regular basis. Besides material supply and personnel transfer, logistics operation also required in crisis and emergency support if an accident happen in offshore facilities such as blowout firefighting support at offshore location, medical evacuation and emergency evacuation for offshore personnel.

To make smooth logistics operation in supply the material and transfer the personnel, Logistics Department need to select the best option of transportation modes. As the several types of vessel available in the market, Logistics Department require to consider all issue from stakeholders in determining transportation modes, such as safety issue, cost issue, and operational issue. The other logistics activity in HCML is material management. Logistics Department is responsible to manage the material to support oil and gas production for all fields. The goals is to ensure availability of the materials required to make fast response for program implementation or problem solving at production location. To fulfil the needs, Logistics Department need to develop the system for material registration and standardization, material recording, material replenishment, and material reporting. This system requires Enterprise Resource Planning (ERP) system to make it integrated to other department activity, such as finance department and the operation department as the user function.

According to the operation activity, logistics operation scopes in HCML are to support drilling and production operation. Drilling operation is an operation to make a bore hole from surface to the subsurface target in order to achieve company target. The drilling operation divided into two categories, exploration phase and development phase. In exploration phase, company conduct the drilling only to gather data from subsurface to indicate the availability of oil and gas reservoir. Once the reservoir is found and it economically to produce, then development drilling will be conducted to exploit oil and gas from the subsurface reservoir to the surface for further treatment. Drilling operation is project based operation that conducted in a specific period of time with clear defined activities to reach the target from the beginning until the end of project. Logistics operation put critical role in supporting drilling operation through material supply and personnel transfer to drilling rig and other specific activities such as survey, permit handling, etc. HCML has conducted exploration drilling for some fields, the latest one was in 2013 for MBF and MAX fields. Since then, HCML focused in development drilling to achieve company target to produce the oil and gas. BD field development drilling was conducted in 2016 and now the field is in production phase. In December 2021, HCML started MDA-MBH drilling operation and continue with MAC drilling operation to add its oil and gas production volume. For production operation, logistics operation also support for the material supply and personnel transfer to the field location. Different with drilling operation, production operation is routine operation and take longer time operation depend on the field reservoir production life. Not only to supply the material and personnel transfer from shore location to offshore location, logistics operation also required to support crisis and emergency condition that happen at offshore location at all time. Crisis and emergency support required such as medical evacuation for personnel who had injuries or illness, personnel emergency evacuation, firefighting support, and oil spill combat support when emergency condition happen due to accident or other causes. Emergency condition that usually happen at offshore location are hydrocarbon blowout from reservoir that can cause fire and explosion at offshore facilities, toxic gas leak from reservoir, or oil spill from transferring activities that can pollute the sea waters. In order to support the crisis and emergency condition, the response time from the

supporting personnel and equipment including logistics become very critical issues. For medical evacuation, there are golden time that need to be reach to stabilize the patient condition or to prevent the illness become worse. The time required from the incident happen until the patient arrive at the hospital will have big impact to the personnel health and at the end will impact to company reputations. When emergency condition happen, the response time for evacuation, firefighting, and oil spill combat will determine how much losses that company will receive. If the oil spill pollutes sea waters and reach shore location, it will destroy sea ecosystem will impact to many stakeholders such as fisherman community and at the end will impact economy of shore area.

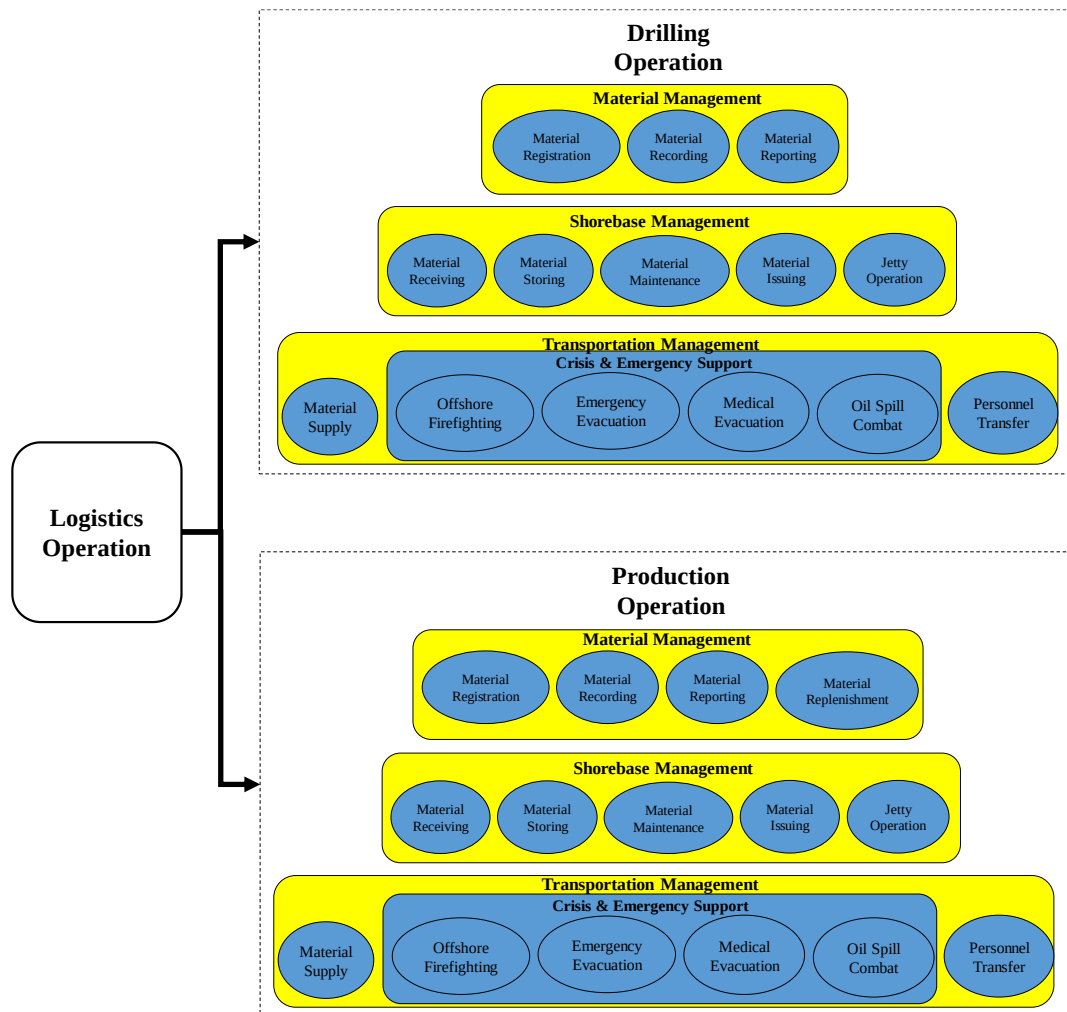


Figure I.7 HCML Logistics Operation Scope
(Source: Company internal data)

Figure I.7 shown the summary of logistics operation scope of work in HCML. Logistics operation has become HCML backbone in drilling operation and production operation. To support the production operation, longer logistics operation plan is required to make the required supports are always available when needed and sustainable in every condition. To achieve this condition, Logistics Department need to ensure that logistics operation strategy is selected properly.

I.3.2 Existing Production Operation

In 3rd quarter of 2022, BD field is the only one production field operation for HCML. It is located in Madura Strait offshore area in Sampang district and has been operated since 2017. BD field has 1 floating production unit which located near the BD field Wellhead Platform, named FPSO-KAS (Floating Production Storage and Offloading - Karapan Armada Sterling) III. The operation management of FPSO KAS III is not directly operated by HCML, it is operated by 3rd party contractor. BD field produce wet gas. The gas from BD field reservoir is processed in production facilities on FPSO for separation and purification prior transported to the gas buyer. After separation and purification, the natural gas transported to the shore location through subsea pipeline. BD pipeline has a length of 53 kilometer which stretches from FPSO to shore location facility. At the shore location, the gas will go to HCML Gas Metering Station (GMS) in Pasuruan, East Java, to be handed over to the gas buyers.



Figure I.8 HCML Existing Logistics Operation
(Source: Company internal data)



Figure I.9 FPSO KAS III at BD Field
(Source: Company internal data)

Logistics operation to support BD field production operation conducted from Trunojoyo Port in Sampang district, East Java. From Trunojoyo Port, material from warehouse delivered to offshore location and vice versa. Personnel transfer from

shore location to offshore facilities also going through Trunojoyo Port. Trunojoyo Port was chosen due to its distance to BD field location is only about 9 Nautical Miles (NM), which for crew boat can sail about 40 minutes from port to FPSO and for supply vessel can sail around 1 hour from port to FPSO and vice versa. To manage the material supply operation and personnel transfer, currently HCML has 1 shore-base that located also in Sampang district near Trunojoyo Port, called Sampang Shore-base. To perform material supply operation, Sampang shore-base equipped by warehouse facilities (including covered warehouse, roofed warehouse, and open yard), heavy equipment for material handling, required personnel, and office. Sampang shore-base also equipped by marine radio to conduct coordination between shore-base personnel with offshore personnel. Personnel who will go to offshore facilities will transit in Sampang shore-base for safety briefing and security check. After that, the onboarding personnel will be mobilized to Trunojoyo Port to be transported to offshore location through crew boat. The scope of work for the logistics vessels to support BD field production operation are as following:

- a. Supply vessel
 - i. Material supply from port to offshore facilities and vice versa
 - ii. Fire sighting support at offshore location
 - iii. Oil spill combat support for offshore location
 - iv. Tanker vessel positioning support during oil lifting at offshore location
- b. Crew boat
 - i. Personnel transfer from Port to offshore facilities and vice versa, also between offshore facilities
 - ii. Personnel evacuation support in case of emergency condition at offshore facilities
 - iii. Medical evacuation support for personnel who work at offshore facilities

According to vessel scope of work above, the utilization of logistics vessels has close relationship with other function or other department within HCML such as Health, Safety, Security, and Environment (HSSE) department, BD Field

Production department, and Maintenance department. The specification criteria to select the logistics operation vessels and also the location of warehouse and port shall involving those departments. Currently Sampang shore base area has been occupied around 65% for only BD field operation. This occupancy will getting higher when FPSO and BD Wellhead Platform has shutdown maintenance period which there will be a lot of materials stored and occupied the storage area, especially in warehouse which the area is not so big.

I.3.3 Multi Field Production Operation (Forward Plan)

In order to increase company revenue and also provide additional income to Indonesian Government, HCML requires to add its oil and gas production volume. As one of the action to add the production volume, HCML require to add the production capacity by looking for another oil and gas resources in the Madura Strait working area. HCML has been conducted several exploration drilling campaigns in some fields to have additional oil and gas resource to add its production. From the result of exploration drilling campaign, HCML has found several additional gas resources that potential to be produced in the future. Table 1.3 shown the list of HCML fields with oil and gas resources discovered.

Table I.3 HCML Multi Field Production Status

Field Name	Production Status	Production Unit
BD	Production	FPSO (Floating Production Storage and Offloading)
MDA	Production Development in Progress	FPU (Floating Production Unit)
MBH	Production Development in Progress	
MDK	Plan for Production	
MBF	Plan for Production	
MAC	Production Development in Progress	MOPU (Mobile Offshore Production Unit)

(Source: Company internal data)

From Table 1.3 above, besides BD field, HCML plan to add its revenue by producing some discovered gas resources in MDA, MBH, MDK, MBF, and MAC fields in the future. Some fields such as MDA, MBH, and MAC fields has more advance stage in production progress, which is currently the production development is in progress. While for MDAK and MBF fields, the status currently is still plan for production which the production development have not started yet. From all the production fields in the future, HCML plan to have only 3 production units, which are FPSO for BD field, FPU for MDA, MBH, MDK, and MAF fields, and the last one is MOPU for MAC field. These production units were chosen based on the field location and production volume from each field. From MDA and MBH fields, expected additional gas volume is 120 MMSCFD (Million Standard Cubic Feet per Day). The gas from MDA and MBH fields will be transported to FPU for further treatment, then from FPU the gas will be transported through tapped-in gas pipeline to existing gas pipeline (East Java Gas Pipeline) owned by PT PERTAMINA to the shore location. From MAC field, expected additional gas volume is 54 MMSCFD. After treated on MOPU, the gas from MAC field will also be transported to existing East Java Gas Pipeline for further transported to shore location. Different with BD field, the gas from MDA, MBH, and MAC fields will not enter Gas Metering Station. The gas will be handed over to the gas buyer at the offshore location.



Figure I.10 Future HCML Production Fields
(Source: Company internal data)

From figure I.10 above, HCML production fields in the future will spread along the Madura Strait area. As the impact of these additional production fields and the area occupancy of existing storage is close to reach maximum, HCML need to consider additional storage and arrange the logistics operation location to support the production operation from many fields. These separated production fields location will cause different cost of operation, different infrastructure availability, different time to location, different social issues, and others. As the backbone of the production operation, the choice of logistics operation location become very important to ensure multi field production needs are well supported.

I.3.4 Logistics Operation Stakeholders

According to previous explanation, the requirements of logistics operation to support production operation has close relationship with other function or other department within HCML, such as Health, Safety, Security, and Environment (HSSE) department, Production department, and Maintenance department. The specification criteria to select the logistics operation vessels and also the location of warehouse and port shall involving those departments. The concern of those departments with logistics operation and also in relation with this research are described in Table I.4 below. External stakeholders will play role in budget support and also permit support to make logistics operation can be performed smoothly. The external stakeholder mapping shown in Table I.6 below.

Table I.4 Internal Stakeholders Mapping

Stakeholder	Requirement	Concern of the Research
Production Department	Personnel movement and material supply support (including 3 rd party's personnel and	Availability of required personnel and material through timely manner personnel movement and material supply support

Stakeholder	Requirement	Concern of the Research
	materials) from shore to offshore location	
Maintenance Department	Personnel movement and material supply support (including 3 rd party's personnel and materials) from shore to offshore location	Availability of required personnel and material through timely manner personnel movement and material supply support
Health, Safety, Security, and Environment Department	Medical evacuation, emergency evacuation, and oil spill combat response	Timely manner support for medical evacuation, emergency evacuation, and oil spill combat response

(Source: Company internal data)

Table I.5 External Stakeholders Mapping

Stakeholder	Relationship	Concern of the Research
Local Government/Agency/Institution	Permit support for logistics operation	Local contribution from HCML operation
Shareholders (HOMP, CNOOC Southeast Asia Limited, Samudra Energy)	Budget approval support for logistics operation	- Accommodate health, safety, and environment aspect - Cost effective
SKK Migas related function department	Budget approval support for logistics operation	- Accommodate health, safety, and environment aspect - Cost effective

(Source: Company internal data)

I.4 Business Issue

To add the hydrocarbon production volume, HCML will have 5 additional production fields (MDA, MBH, MDK, MBF, and MAC) in upcoming years. These 5 additional fields located in different location than existing one (BD field). HCML working area in Madura Strait spread from left side to the right side of the strait. BD field location (existing operation) is located at the left side of Madura strait, where the upcoming additional production field will take place at the right side of the strait with long distance from existing logistics operation location. Current logistics operation location is designed to support BD field production only. In addition, current Sampang shore base occupancy is around 65% in normal operation and 80% in FPSO and BD Wellhead Platform shutdown period. It is necessary for HCML to make evaluation of current logistics operation location to support upcoming additional field production operation, whether the location is the best location for additional storage to support all upcoming production fields or there are other locations that can provide better performance to support multi field production operation.

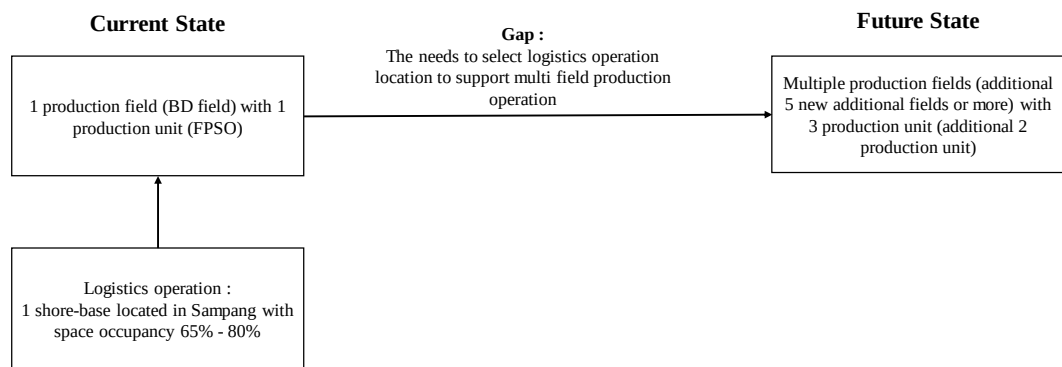


Figure I.11 Business Issue

The research's business issue coverage including related aspects to performs required logistics activity from warehouse or shore base to field location or vice versa. The business issue's scope will exclude the activities outside material supply and personnel transfer from warehouse or shore base to field location, such as delivery from supplier location to warehouse location or inbound logistics. This is because the inbound logistics are closely related to procurement strategies which

out of HCML logistics scope. Furthermore, the cost from warehouse or shore base to field location took 75% of annual logistics budget from the marine fuel cost.

The logistics operation scheme to support multi production fields is required by HCML to operate the production fields smoothly and meet company targets. The location selection of logistical operation will be major part of the logistics operation scheme that can leads into further decision details such as number of vessel, type of vessels, number of worker, etc. Selecting the logistics operation location is systemic problem which involve concerns from stakeholders. The approach of this research which involving related experts as respondents in decision making process could provide optimum results. By this condition, this research will make contribution to HCML to solve the open issues.

This research also can be considered as novelty in offshore upstream oil and gas logistics operation. Most of logistics operation in upstream oil and gas only use 1 location to support all the production fields in 1 block or working area. This research provides sensitivity in location selection by providing multi criteria and sub criteria to be considered during decision making process. The experts involved in this research also will make the location selection considered from multi point of view. This research use long-term company plan to select the location as part of logistics strategy development.

I.5 Research Questions and Research Objectives

According to business issue explanation, there are several research question to be answered by this final project as following:

1. What is the alternatives of the logistics operation location to support HCML multi production field operation?
2. What is the decision making criteria?
3. What is the selected logistics operation location?

The objective of this research are:

1. To determine the options of logistics location in order to support HCML multi field production operation
2. To develop the critical criteria for logistics operation location selection
3. To design the optimum logistics operation location based on decision making analysis process

I.6 Research Scope and Limitation & Brief Writing Structure

I.6.1 Research Scope and Limitation

The scopes and limitation of this research are as follows:

1. This research will focus on selecting location for material supply and personnel transfer as part of logistics operation needs to support the production activities. Marine fleet will not explained and become subject of the research.
2. The scope of transportation in this research only from the port location to field location. The materials assumed already stored in the warehouse or storage location and ready to be mobilized to the field location, therefore the distance from supplier location to warehouse location is not considered in this research. The location of warehouse or storage location assumed in 1 integrated location with the port location, or next to the port location, or very near with the port location, as existing condition in Sampang shore base and Banyuwangi Shorebase. This conditions will also implied to related to cost, time, and other related aspect that occur to deliver the materials/service to storage location or port location.
3. The existing operation production taken in October 2022 when HCML only has 1 production field and will not explain temporary logistics operation scenario (location) taken by company.
4. The decision makers or respondents are represent by related personnel in internal HCML as the parties who closely involve on the issue, to provide more accurate judgement on questionnaire.

5. The alternative location in this research will be mapped by available public port surround the Madura Strait with considering HCML operation condition.
6. Some data will not be shared in this research and some data which use HCML internal data will not explained in details due to company confidentiality issue

I.6.2 Brief Writing Structure

This final project explained in 5 chapters with research scope and limitation as following:

1. Chapter I - Introduction

This chapter explain the background of the importance of logistics operation, especially in upstream sector in oil and gas industry. After that, the explanation continue with HCML company profile, the business issue regarding the requirements of logistics operation location to support multi field production operation, and the stakeholders involved in logistics operation. At the next part in this chapter, the research questions and objectives are described.

2. Chapter II – Literature Review

This chapter will explain the theoretical foundation of this research and the conceptual framework. The theoretical foundation will provide related theory and/or previous study/research to support this final project. Conceptual framework will explain the concept/model to solve the business issue.

3. Chapter III – Research Methodology

In this chapter, the steps to answer research questions will be explained. This chapter consist of research design, data collection method, and data analysis method. Research design will explain the research method and technique chosen for this final project. Data collection method will explain

the way to collect data for this final project in order to answer the research question. Data analysis method will explain how to process and analyse the collected data to get the solution.

4. Chapter IV – Results and Discussion

In this chapter, the data collected and analysed using the chosen technique. The technical method to answer the research question will be explained steps by steps. This chapter consist of analysis, business solution, also implementation plan and justification. This final project will use Analytical Hierarchy Process (AHP) as the method for analysis to get the solution. The AHP method is used in analysis part in this chapter. In business solution part, the optimum solution from AHP analysis will be explained. For the implementation plan and justification part, the requirements for implementation of optimum solution will be further described including its justification for the implementation.

5. Chapter V – Conclusion and Recommendation

This chapter will describe the conclusion of the research to answer the research question. Then followed by recommendation to the stakeholders as impact of implementation plan.