

**INTERNSHIP REPORT
AT PT VALE INDONESIA TBK.**



Rea Maranatha

14 14 07651

**INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM
FAKULTAS TEKNOLOGI INDUSTRI
UNIVERSITAS ATMA JAYA YOGYAKARTA**

2019

IDENTIFICATION PAGE

Industrial Practice Report that has been held at PT. Vale Indonesia Tbk from December 20th 2018 until January 28th 2019 written by:

Name : Rea Maranatha
NPM : 14 14 07651
Major of Study : Internasional Industrial Engineering
Faculty : Industrial Technology

has been checked and approved.

Sorowako, January 27th 2019

Field Advisor

Academic Advisor

M. Rifandy

Anugerah Kusumo Pamosoaji, ST.,M.T.

PREFACE

Praise and gratitude to the God Almighty because of the blessing of His mercy and His power the writer able to complete the internship and the final report of the Internship in PT. Vale Indonesia, Tbk.

The purpose of doing internship for the student is to introduce and learn about business activity in a company before graduating from Industrial Engineering Program, so hopefully the student can be ready for the real world. The author would like to thank:

1. God Almighty because of His blessing and mercy the author can finish all the activities related to the internship in PT. Vale Indonesia Tbk.
2. Anugerah Kusumo Pamosoaji, ST.,M.T. as the supervisor of the internship for all the feedback and guidance given to the author.
3. Mr. M. Rifandy as the Manager of Warehouse Support and also as the supervisor in doing the internship in PT. Vale Indonesia Tbk.
4. The employee of PT. Vale Indonesia Tbk especially the employee in Warehouse Support of PT. Vale Indonesia Tbk for the guidance in doing the internship.
5. The employee of PT. Mandiri Harapan Jaya for the guidance in doing the internship.
6. The employee of PT. Hati Murni for the guidance in doing the internship
7. All parties who involves in the internship activity in PT. Vale Indonesia Tbk and writing the internship report.

Of course this report is having many shortcomings that is why the writer is welcoming all of the suggestions and critics from the reader.

Finally, for the attention of all those who have been instrumental in writing the final report of this internship the writer said thank you. Hopefully this Report can be used as well as possible.

Sorowako, January 27th 2019

Rea Maranatha

TABLE OF CONTENT

	Page
TITLE PAGE	i
IDENTIFICATION PAGE	ii
PREFACE	iii
TABLE OF CONTENT	iv
LIST OF TABLE	vi
LIST OF FIGURE	vii
LIST OF APPENDICES	viii
 CHAPTER 1. INTRODUCTION	
1.1. Background	1
1.2. Purpose	2
1.3. Place and Time of Internship	2
 CHAPTER 2. COMPANY OVERVIEW	
2.1. Brief History of Company	3
2.2. Organizational Structure of Company.	5
2.3. Company's Management	8
2.3.1. Company's Vision and Mission Statement	10
2.3.2. Company's Values	10
2.3.3. Company's Achievement.....	10
2.3.4. Company's Employment	12
 CHAPTER 3. COMPANY'S SYSTEM OVERVIEW	
3.1. Business Process of Supply Chain Management (SCM) Department	14
3.2. Product Manufactured.....	17
3.3. Production Process.....	18
3.4. Production Facilities.....	20
 CHAPTER 4. STUDENT'S JOB REVIEW	
4.1. Scope of Responsibility.....	24
4.2. Responsibilities and Authority in Job	28
4.3. Methodology of Jobs Execution	28

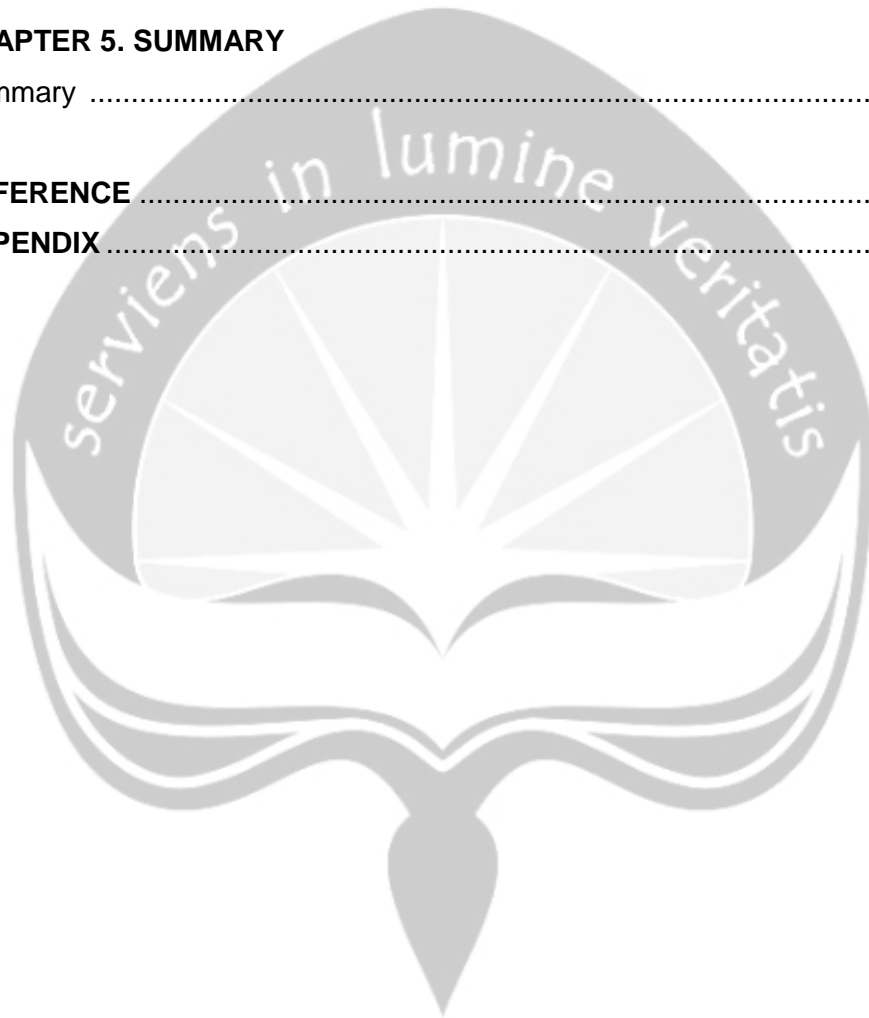
4.4. The Results of Student Jobs and Responsibilities.....	28
4.4.1. Design The Flowchart of each type of waste	28
4.4.2. Determine the differences between old flow and new flow	31
4.4.3. Detail Task.....	31
4.4.4. Detail System.....	33
4.4.5. Money, Quality, Time Factor	33

CHAPTER 5. SUMMARY

Summary	34
---------------	----

REFERENCE	35
------------------------	----

APPENDIX	36
-----------------------	----



LIST OF TABLE

	Page
Table 2.1. PT. Vale Indonesia Tbk Blocks in Indonesia	4
Table 2.2. The Meaning of PTVI Logo	9



LIST OF FIGURE

	Page
Figure 2.1. Organizational Structure	5
Figure 2.2. Company's Logo.....	9
Figure 2.3. PTVI Achievement	11
Figure 2.4. PTVI Achievement	11
Figure 2.5. PTVI Achievement	12
Figure 3.1. SCM Department Business Process	14
Figure 3.2. Nickel Bag and Nickel Matte	17
Figure 3.3. Nickel Matte and its Contents	17
Figure 3.4. Nickel Bag Contains Nickel Matte	18
Figure 3.5. Plant Site Layout.....	22
Figure 4.1. Goods Holding	25
Figure 4.2. Explosive Magazine	26
Figure 4.3. CMD	27
Figure 4.4. Flowchart MRO Obsolute Management	28
Figure 4.5. Flowchart Non MRO Management.....	29
Figure 4.6. Flowchart Daily Hazardous Waste Management.....	29
Figure 4.7. Flowchart Tender Hazardous Waste Management	29
Figure 4.8. Flowchart Daily Industrial Waste Management	30
Figure 4.9. Flowchart Tender Industrial Waste Management	30
Figure 4.10. Flowchart Retired Assets Management.....	30
Figure 4.11. Detail Task MRO Obsolute Management.....	31
Figure 4.12. Detail Task Non MRO (Surplus) Management	31
Figure 4.13. Detail Task Daily Hazardous Waste Management	32
Figure 4.14. Detail Task Tender Hazardous Waste Management	32
Figure 4.15. Detail Task Daily Industrial Waste Management	32
Figure 4.16. Detail Task Tender Industrial Waste Management.....	32
Figure 4.17. Detail Task Retired Assets Management	32
Figure 4.18. Detail System for Waste Management	33

LIST OF APPENDICES

	Page
Daily Log Book of Internship Activity	37



2019
IDENTIFICATION PAGE

Industrial Practice Report that has been held at PT. Vale Indonesia Tbk from December 20th 2018 until January 28th 2019 written by:

Name : Rea Maranatha
NPM : 14 14 07651
Major of Study : Internasional Industrial Engineering
Faculty : Industrial Technology

has been checked and approved.

Sorowako, January 27th 2019

Field Advisor



M. Rifandy

Academic Advisor



Anugerah Kusumo Pamosoaji, ST.,M.T.

SURAT KETERANGAN

Dengan ini menerangkan bahwa mahasiswa tersebut di bawah ini telah menyelesaikan **Kerja Praktek** di PT. Vale Indonesia Tbk, Sorowako.

Nama : **Rea Maranatha**
N.I.M. : 141407651
Universitas : ATMA JAYA Yogyakarta
Jurusan : Teknik Industri
Tempat Praktek : Departemen SCM SSO
Judul : ***Laporan Kerja Praktek Pada PT. Vale
Indonesia, Tbk***
Tanggal dimulai : 20 Desember 2018
Tanggal selesai : 28 Januari 2019

Demikian surat keterangan ini dibuat untuk dapat dipergunakan seperlunya.

Sorowako, 31 Januari 2019

 VALE
PT Vale Indonesia Tbk
Yusri Yunus
SNR MGR of Stakeholder Relations

CHAPTER 1 INTRODUCTION

1.1. Background

The industrial revolution has begun to affect the industrial system, which force the human resources to be able to compete with the machines. Human resources need to prepare themselves as soon as possible to be ready to enter the industrial world.

Industrial Engineering Program, Faculty of Industrial Technology, Atma Jaya University Yogyakarta (PSTI UAJY) requires all students to carry out internship in accordance with the Curriculum in PSTI UAJY. The UAJY PSTI sees internship as a vehicle or means for students to recognize the atmosphere in the industry as well as to grow, improve, and develop a professional work ethic as a candidate for Industrial Engineering graduate.

Internship can be said as a means of simulation of industrial engineering students profession. The paradigm that should be inculcated is that during the internship the students work in the company they choose. Work, in this case includes planning, design, repair, implementation and problem-solving activities. Therefore, in internship activities undertaken by students are:

1. Recognize the company's scope.
2. Following the work process in the company continuously.
3. Perform and perform tasks assigned by superiors, supervisors or field counselors.
4. Observe system behavior.
5. Compile reports in written form.
6. Carry out the internship exams.

Industrial Engineering is an engineering which deals with the plannings, designs, improvements and installations of integrated systems which consist of human, machinery, materials, information, energy, work methods and financial resources or briefly reviewing industrial systems. In particular, within the scope of Industrial Engineering it must be always realized that what is studied is the unity of the system elements consisting of Human, Machine, Material, Method, Money, Energy, Environment and Information. That is, in carrying out the activities under his responsibility, the Bachelor of Industrial Engineering should always view his activities within the framework of the system surrounding the activity.

Competencies held by students and Industrial Engineering graduates include:

1. System Design Work and Ergonomics.
2. Production Planning and Control.
3. Inventory / Inventory Management.
4. Quality Control System.
5. Material Handling System.
6. Logistics and Supply Chain Management.

7. Product Design and Development.
8. Occupational Safety and Health Techniques.
9. Design of Manufacturing Facility Layout.
10. Organizational Management.
11. Cost Analysis.
12. Industry Feasibility Analysis.
13. Process Design and CAD / CAM, and others.

1.2. Purpose

Things to be achieved through the implementation of this internship are :

- a. Learn about self-discipline.
- b. Learn to adjust to the company in accordance with the position
- c. Learn about the organization and it's function
- d. Improve the adaptability to the work environment
- e. Train the ability to interact with colleagues and superiors in the company.
- f. Observe business processes in the company directly
- g. Adjusting the theory received at college with the actual state of existence in the company
- h. Deepen the knowledge of the company's business processes and the production system.

1.3. Place and Time of internship

The Industrial Practice or internship (also known as Kerja Praktek or shortened as KP) activity that became the basis of this report's compilation was conducted in PT. Vale Indonesia (PTVI) Tbk which is located in Ternate Street No. 44, Sorowako, Nuha, Kab. Luwu Timur, Sulawesi Selatan (there are several other places owned by the company in Sorowako but the writer was stated the address of the external relation office of the company). The Industrial Practice activity was done from 20 December 2018 until 6 February 2019, with a total of 28 days of attendance of work.

CHAPTER 2

COMPANY OVERVIEW

2.1. History

It all begins in 1920s when the exploration in the eastern part of Sulawesi started, the exploration then develops not just the exploration activities but also the research and development continued in the period of independence and under the leadership of President Soekarno. In 1966 Beni Wahju, Hitler Singawinata, and INCO Ltd exploration team did the laterite ores expedition. The expedition of Inco Ltd Exploartion team ensured that 15% of the world's nickel can be found in Indonesia. PT. INCO was established in 1968. Then in 1968 PT. INCO and the Indonesian government signed a Contract of Work (CoW) between them, it means the Government gives PT. INCO a permission to do the exploratioin, mining, and processing the nickel ore in form of the licensed from the government. In 1970 the first sample of the ore from Sorowako that weigh about 50 tonnes are sent to Inco's research facilities in Port Colborne, Ontario, Canada. The ore shows that the Sorowako's ore can be successfully processed. In 1976 about 10,000 Indonesians and 1,000 expatriates are employed to build the nickel processing facility and the power generic plant because PT. INCO wanted to reduce the use of fossil fuels beside that the employee will also build the townl facilities, roads, airport, port and other required infrastructure to support the activity of PT. INCO in Sorowako. President Soeharto visits Sorowako and launch the mining and processing facilities of nickel in Sorowako. The first commercial production of PT. INCO was in 1978. In 1996 the CoW between PT. INCO and the Government is renewed and gave PT. INCO licensed to continue their activity in Sorowako until 2025. In 2011, the stockholders agreed to change the name of PT. INCO becomes PT. Vale. While in 2012 the name of PT. Vale is declared to all of the employees. In 2014, the CoW between PT. Vale and the goverment is renewed again and gave PT. Vale licensed to continue their activity until 2045. In 2015 PT. INCO records the highest ever production of 81,200 tonnes of nickel in matte per annum. And at the 2018, PT. Vale recorded 17,4 million working hours with zero lost time injury from period 5 April 2017 – 5 April 2018.

The company owns several blocks of area in Indonesia to support their production target, the area located in Sulawesi especially in Central Sulawesi, South

Sulawesi, South East Sulawesi. The block of PT. Vale Indonesia Tbk Indonesia will be stated below:

Table 2.1. PT. Vale Indonesia Tbk Blocks in Indonesia (source from *www.vale.com*)

Province	Block	CoW (Contract of Work) (ha)	Amendement (ha)
Central Sulawesi	Kolonedale	4,512.35	0
	Bahodopi	32,123.01	22,699
	Total	26,635.36	22,699
South Sulawesi	Sorowako-Towuti	108,377.25	70,398
	Matano	6,176.48	0
	Bulubalang	2,249.33	586
	Lingke	1,548.39	0
	Total	118,386.45	70,984
South East Sulawesi	Latao	3,148.11	0
	Matarape	1,679.87	0
	Pomalaa	20,286.19	20,286
	Lasusua	10,372.68	4,466
	Total	35,486.35	24,752
TOTAL		190,509.66	118,435

PT. Vale Investment Projects in the blocks (Indonesia Growth Project):

a. Bahodopi, Morowali, Central Sulawesi (2018-2020):

1. Construction of nickel processing plant to convert matte into NOS (Nickel Oxide Sinter).
2. Production capacity averaging 18,000 metric ton per year.
3. Investment value is US\$560 million (processing plant).

b. Sorowako, East Luwu, South Sulawesi (2015-2020)

1. Expansion of plant, which is the line production.
2. Production capacity will increase to 90,000 metric tons of nickel in the form of matte annually after the first phase and will arise to 120,000 tons after the second phased.

c. Pomalaa block, Kolaka, Southeast Sulawesi (2018-2022)

1. Production capacity averaging 40,000 metric tons a year.
2. Investment values at \$2.2 billion.
3. Build the processing plant using High Pressure Acid Leach (HPAL) technology in cooperation with Sumitomo Metal Mining, one of PT Vale Indonesia's shareholders.

2.2. Organizational Structure of Company

Organizational structure plays a pivotal role in the company, mainly for job division/classification and the appointment of suitable leaders to supervise each of their corresponding department(s). Without proper division of departments under the management of responsible heads, the company's activities will run in an unorganized manner, thus, reducing efficiency and effectiveness.

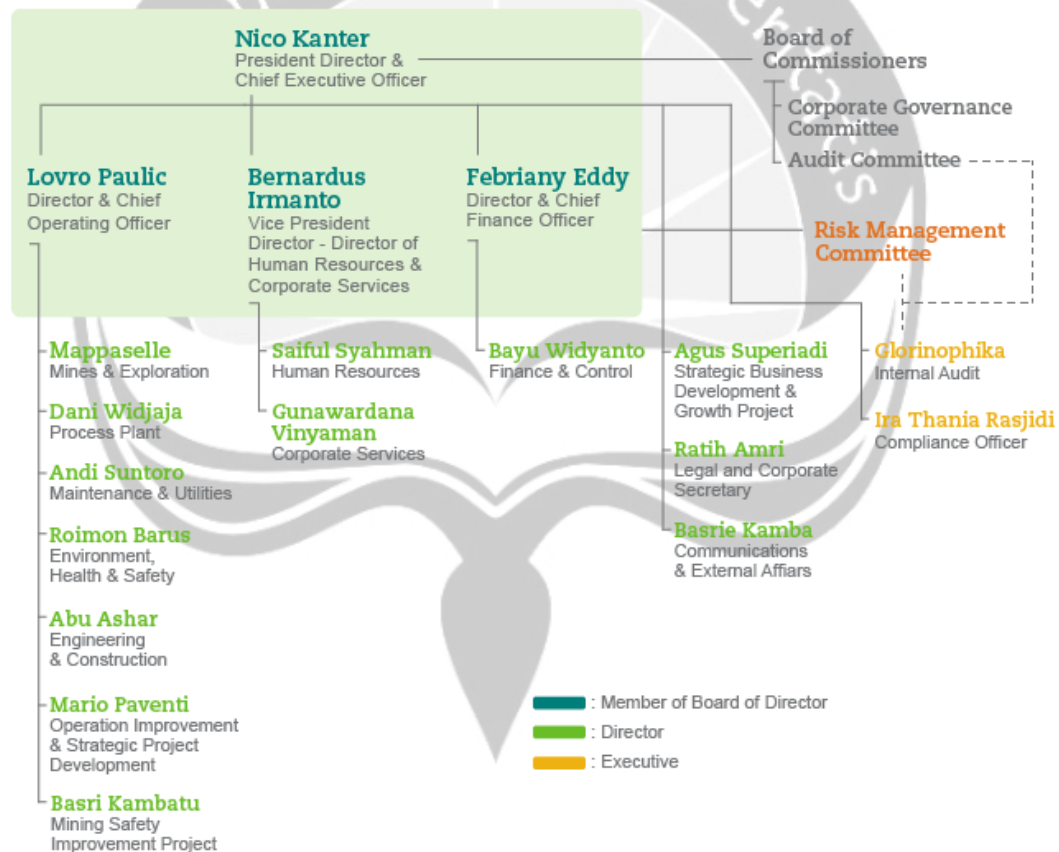


Figure 2.1. Organizational Structure

The job description of the position for general are as follows:

a. Chief Executive Officer (CEO)

The main task of a director is as the leader of the company. The director leads all the employees to run the business activity of the company, evaluate the how the organization run, deliver the report to the shareholders, etc.

b. Chief Operating Officer (COO)

COO is responsible for managing the company's daily operations in PT. Vale Indonesia Tbk (Mines and Exploration, Process Plant) and report the company's operations activity to the Director.

c. Chief Finance Officer (CFO)

Director finance responsible for directing the activity to anticipate all kind of financial risk that is faced by the company, coordinating all the activity of the company especially Supply Chain Management (SCM), Finance and Control, Treasury and Investor Relation, Project Financial Evaluation, Risk Management Unit, to earn the optimal business result.

d. Director Human Resources and Corporate Services

The responsibility is to pay attention to all aspects of human resources management of the organization. The other responsibility is to observe the activity of the company about employment, compensation, labor negotiations, and employee relations.

e. Manager External Relations and Corporation Affairs

The main task is to manage the activity of the company with the parties outside the company. This manager also responsible for all the communication lines of the company including communication with the public affairs, government, and internal stakeholders.

f. Manager Legal and Corporation Secretary

The responsibility of this position is to manage the activity in the company that is related to the law problems. The other responsibility is also to become the liaison between the board of directors, top management and the shareholders.

g. Manager Internal Audit

The responsibility are as follows for coordinating the internal audit of the company periodically, and doing the audit process thoroughly and continually financially and operationally. Beside that it also responsible for formulating and giving feedback if there is any problem that appear from the audit process result.

h. Manager Compliance

A Compliance Manager is responsible for ensuring that company's activity complies with legal standards, and provides direction and guidance on legal compliance.

i. Manager Supply Chain Management (SCM)

The SCM Manager coordinates and manages all the activity relates with the supply chain activity of the company for example procurement activity, inventory, vendor selection, and etc. Manager SCM supervises Manager SCM Excellence, Manager Procurement, Manager Material Management, Manager Logistic, Procurement and Warehousing Specialist, and SCM Admin Officer.

j. Manager SCM Excellence

This position are responsables for managing the demand planning, vendor management, compliance, and market intelligence.

k. Manager Procurement

The responsibility of this position is to manage the activity about the procurement of the goods that will be directly send to the user, or will become the goods to be stocked in warehouse.

l. Manager Material Management

It responsables for warehouse, fuel, bulk management, and CMD.

m. Manager Logistic

Manager Logistic fouces on the movement of the goods, which is have to manage the shipping and goods traffic management, export and import management, port operation, cargo and handling operation.

n. Procurement and Warehousing Specialist

The responsibility is about analyze the procurement and warehousing activity, and then giving feedback to the Procurement Manager, and Material Management Manager.

o. SCM Admin Officer

It responsables for managing all things that is related to the contractor that works for PTVI for example the badge number arrangement for contractor employee, beside that SCM Admin Officer also manage the administration activity which is conducted by the SCM Department.

p. Supervisor Inventory and Cataloging

The supervisor responsible for managing the inventory of the goods so it can be fullfil the demand of the user, and also optimize the inventory process and cost. The supervisor also needs to collect, keeping, and serving data of material to be used for departments / users in PTVI.

q. Supervisor Warehouse and Delivery

It responsibles for accepting the materials sent by the supplier or vendor, allocating the goods in the warehouse, serve the user orders, deliver the user order.

r. Supervisor Warehouse Support and Waste Management (Central Material Disposal)

The responsibility is to manage the activity in the satellite warehouse, beside that it also responsibles for managing the waste that generated by the activity in PTVI and also managing the activities of keeping project material, surplus material, explosion material, and CMD.

s. Supervisor Fuel and Bulk Management

This position is responsible for managing the fuel for example the solar (diesel fuel), bulk for example coal and silica. Fuel and bulk are needed for the production activity of PTVI.






2.3. Company's Management

PT. Vale Indonesia Tbk is the world's largerst producer of nickel, one of the multipurpose metals in existence. To keep their activity, they've set their vision and mission as stated in next sub-subchapter. Beside the vision and mission in this section will also explain about PT. Vale Indonesia Tbk logo, the logo of PT. Vale Indonesia has several meanings for every part of the logo. The meaning of every part of the logo also represent the value of PT. Vale Indonesia Tbk about environment, spirit of PTVI, efforts, and etc.



Figure 2.2. Company's Logo

Table 2.2. The Meaning of PTVI Logo

Logo	Meaning
	<p>Color:</p> <p>Green symbolize nature and valley</p> <p>Yellow symbolize the process of mineral wealth become the important part in the daily life</p>
	<p>V:</p> <p>V shape refers to “V” alphabet (like Vale, victory and value)</p>
	<p>Heart:</p> <p>Heart is the synthesis of the image</p> <p>Company: an unique global organization driven by the spirit of the employees</p>
	<p>Infinity:</p> <p>The curve at the top of the symbol is infinity, as an expression of continuous effort we pursue the perfect way to get things done.</p>
	<p>Invention:</p> <p>The golden edge in the symbols symbolize the spirit of discovery that encourages us to continue to search for minerals and turn them into essentials for the needs of people's lives.</p>

2.3.1. Company's Vision and Mission Statement

a. Vision:

- To be the number one global nature resources company in creating long term value, through excellence and passion for people and the planet.

b. Missions:

- To transform natural resources into prosperity and sustainable development.

2.3.2. Company's Values

a. Life matters most

Through this value PT. Vale Indonesia Tbk prioritizes the safety of life rather than profit alone.

b. Value our people

PT. Vale Indonesia Tbk tries to guide and give the opportunities for the development of an individu, rewarding peoples regardless with their background, supporting the diversity, acknowledging aspirations and individual needs.

c. Prize our planet

PT. Vale Indonesia Tbk is committed to the development of society, environment, and economy in taking the business decision.

d. Do what is right

All parties in PT. Vale Indonesia tbk supports the trust based on the open and clear communication, fair action, full of integrity, and fulling the law.

e. Improve together

All parties also strive for continuous collaboration, continuous improvement and innovation, enforcement of work discipline to enhance long-term values.

f. Make it happen

PT. Vale Indonesia also like any challenges, having an ability to adapt, proud of achievement and for what PT. Vale Indonesia has done in shaping the world.

2.3.3. Company's Achievement

One parameter to show how the activity of the company has done can be shown by their achievement, because achievements are given to appreciate what the company has done or what the company has reach. PT. Vale Indonesia has so many achievement, but this section will only show several achievements that PTVI has already.



Figure 2.3. PTVI was awarded as the 2nd Best of the Mineral Category in the awarding ceremony of RKAB (Rencana Kerja dan Anggaran Biaya) and LAKIP (Laporan Akuntabilitas Kinerja Instansi Pemerintah) Award 2014 held by the Directorate General of Mineral and Coal on June 5, 2015 at Hotel Trans Bali.



Figure 2.4. Bloomberg Businessweek Indonesia magazine, which is part of Bloomberg Businessweek International Magazine headquartered in New York, USA, selected PTVI as “Best Issuer 2015” for the mining sector.



Figure 2.5. PTVI won the Sustainable Business Awards (SBA), provided by the Global Initiatives with PricewaterhouseCoopers (PwC) and IBCSD (Indonesia Business Council for Sustainable Development), under Sustainability category in the Business Responsibility and Ethics Category. The award was given on December 4, 2017 at Grand Hyatt's Grand Ballroom, Jakarta.

2.3.4. Company's Employment

To achieve the goals, PT. Vale Indonesia Tbk must have many competent people, that is why PTVI has 3,066 staff employees, 35 non-staff employees based on 2016 Sustainability Report of PTVI and also PTVI has about 3000 employees from the contractor. The working hours of the employees of Supply chain management department are as follows:

- Monday – Thursday: 07.00 – 15.30 (lunch break time 11.45-12.15)
- Friday: 07.00 – 16.00 (lunch break time 11.45-13.00)

To support the activities of the company, PT. Vale Indonesia Tbk must treat their company by giving them some facilities. The facility for the employee are:

a. Salaries and Subsidy

Every employee is given salary according to their position. All employees will be paid on the last day of every month while staff employees will receive a salary on the 25th every month. The employer deducts the income tax from the gross salary of the employee in accordance with the applicable tax regulations. Employees are also entitled to receive turnover premiums, temporary employment, living expenses, leave, funeral allowances and housing. The holiday subsidy will be given to the employee 1.3 times the base salary. PTVI

also has a savings plan program where the company do the saving for pension fund preparation for the employee.

b. Leave

Employees are entitled to annual leave for each 12 months of continuous service. First year leave rights can be taken after the employee completes nine months of service.

c. Health Insurance and Transportation

PT. Vale Indonesia Tbk provides hospital facilities to employees and their families located in the middle of Sorowako village. Every employee is also included in the Jamsostek program. PTVI also has a collaboration with many hospitals in several big cities in Indonesia to provide health treatment for their worker and family. To ensure the safety of employees while leaving for work and also to reduce the use of car and motorcycle, PTVI provides bus transportation to pick up its employees at some point of location and provide personal equipment to keep employees safe while working.

d. Housing

PT. Vale Indonesia Tbk also provide house for their employee, PTVI has three blocks of housing they are called Old Camp, Pontada, and Salonsa. These house are given to some certain positions.

CHAPTER 3

COMPANY'S SYSTEM OVERVIEW

3.1. Business Process of Supply Chain Management (SCM) Department

Business process is a flow of how the activity done by the department which is connecting the user and the company, in this chapter especially with the SCM Department. This business process will be divided into 2 parts, first part is Supply Chain Management business process generally, and the second part is the flow process of goods receipts process.

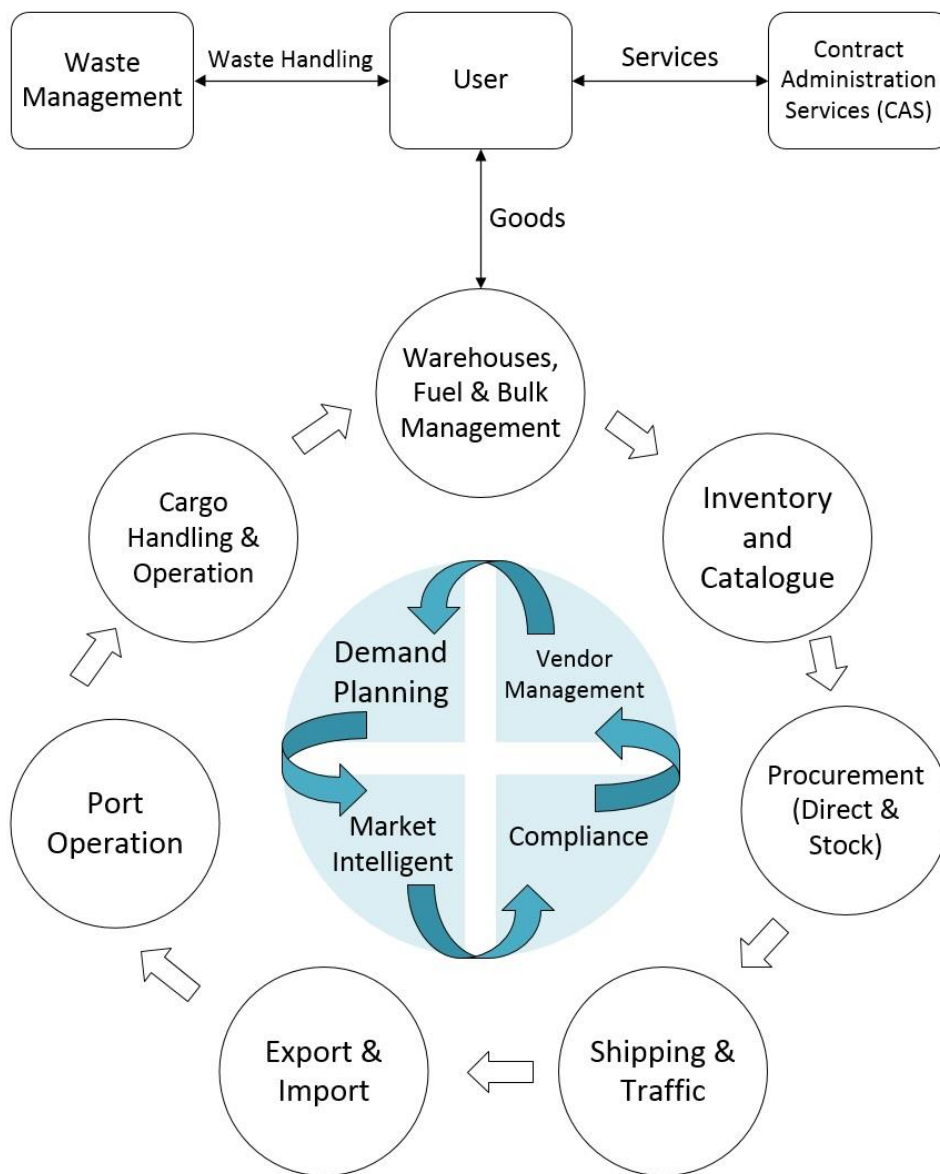


Figure 3.1. SCM Department Business Process

a. Material Management:

1. Warehouse, fuel and bulk management:

This section of Supply Chain Management department focus on maintain the activity in the main warehouse and the satellite warehouse, beside that this section also maintains about the fuel for keeping the activity of the company the example of fuel is Solar and H₂SO₄, bulk is also the fuel for the company activity but in form of coal.

2. Inventory and Catalogue:

Inventory and Catalogue section focus on managing the inventory inside the warehouse, and also optimize the inventory process and cost.

3. Waste Management

All of these section stated above are work together under the Supply Chain Management Department. In generally the flow of process will be like this the user will related to three activites with the SCM which are waste, services, and goods. For the waste activity it will be related to the Waste Management section, and for the services it will be related to the Contract Administration Services (CAS). For the goods, the user will be related to several section. The sections are Warehouse, Fuel and Bulk Management, Inventory and Catalogue, Procurement, Shipping and Traffic, Export and Import, Port Operation, Cargo Handling and Operation all of these sections are supported by Demand Planning Section, Vendor Management, Compliance, and Market intelligent.

b. Procurement:

1. Procurement (Direct & Stock):

Procurement section will do the purchasing activity for the direct good means the product will directly send to the user without keeping it on the warehouse first, and also for the stock goods mean the product will be stocked in the warehouse wether it is in the main warehouse or in the satellite warehouse.

2. Contract Administration Services (CAS)

This section responsible for managing all the activity related to the third parties or in other words contractor that is working with PT. Vale Indonesia Tbk. the activity consists of choosing the contractor, manage the contract of contractor, maintain the contract of the contractor, etc.

c. Logistics:

1. Shipping & Traffic:

Shipping and traffic section will manage the flow of goods from the supplier to PT. Vale Indonesia Tbk, this section also simplify the activity related to the alternative strategy to minimize cost and improving services of the flow of the goods.

2. Export and Import:

This section focuses on the activity related to the goods coming from other countries. Export and Import section like the name will manage all the activity about the export and import of the goods.

3. Port Operation:

Port Operation in PT. Vale Indonesia Tbk are located in Balintang Port in Malili, this port is owned by PTVI to support the activity like receive the goods from the Tanjung Perak Port in Surabaya and to send the products of PTVI to Japan.

4. Cargo handling and operation

The goods that is sent to PT. Vale Indonesia many of it are put in the cargo which is need special treatments, this section task is to manage the activity related to the cargo.

d. Supply Chain Management (SCM) Excellence:

1. Demand Planning:

This section task is to do the planning about demand of certain goods, to minimize the out of stock goods to optimize the activity of the company.

2. Vendor Management:

The task of Vendor Management section is to choose which vendor or supplier are appropriate with the need of the company, which supplier can fulfil the demand of the company, and other activities related to the supplier.

3. Compliance:

This section is responsible for ensuring that Supply Chain Management department activities already complies with legal standards, and provides direction and guidance on legal compliance.

4. Market Intelligent:

Market Intelligent section focus on analyzing the activity of market in order to optimize the procurement activity of Supply Chain Management department.

3.2. Products Manufactured

PT. Vale Indonesia Tbk product is nickel in matte, which is an intermediate product that is used to manufacture refined nickel that have 78% nickel, 1% cobalt, and 20% sulfur and other metals. This product late on will be send to the customer in Japan, which are Vale Japan Limited and Sumitomo Metal Mining Co., Ltd. Vale Japan Limited and Sumitomo Metal Mining Co., Ltd. are mining and smelting companies in Japan that become the only customer of PT. Vale Indonesia Tbk according to CoW that valid until 2025.



Figure 3.2. Nickel Bag and Nickel matte.



Figure 3.3. Nickel matte and its contents



Figure 3.4. Nickel Bag contains Nickel matte (3 tonnes per bag)

3.3. Production Process

Production process of nickel matte divided into 2 departments, Mines & Exploration Department and Process Plant Department. Mines & Exploration Department does the process of searching the rocks and soils samples which contains nickel and then checking whether the rocks and soils before can be processed further. Process Plant Department continues the process by processing the rocks and soils until it becomes nickel matte. Here is the production process explanation:

a. Mines & Exploration Department

1. Land Clearing

In this process the location that will be used for mining area will be cleared, the surface of the ground must be clean from every kind of things and plants.

2. Stripping

Overburden and the subsoil with low laterite number excavated up to 6-15 metres from the ground. The excavated-soils are brought to the landfill and in a certain time will be reused to hoarding reforestation the post-mining land.

3. Ore Mining

In this step the subsoil with the high level of nickel will be excavated as deep as about 7 metres. Periodically, the soil's sample is taken from the mining location to do the grade control that will measure the level nickel in the soil.

4. Screening Station

The soils from the ore mining step will be taken to the screening station and then the ore mining results will be sorted according to their size.

5. Stockpile

This is the temporary shelter and also to reduce the level of water of the mining results from the steps before to be processed further in plant or factory.

b. Process Plant Department

1. *Afron Feeder*

The ores from the stockpile are brought to the *afron feeder* to do the filtering and setting the load before send to the conveyor belt to the dryer.

2. Dryer

The dryer evaporates a portion of the water content from the wet ores without involving a chemical reaction. Dryer Kiln Product (DKP) still contains water about 19-21%. At the tip of the drying furnace *trommel screen* for product screening. Products under 25 mm will be sent directly to the Dry Ore Storage Warehouse (DOS). Ore dryer products from West Blocks above 25 mm will be filtered again in secondary *trammel sreen* (Mc Lanaahan) before being transferred to a rock drainage site. Ore dryer products from East Block that under 25 mm will be crushed with *Symon Crusher* dan will directly send to DOS without filtering it again.

3. Dryer Ore Storage (DOS)

DOS collect the ore produced by drying furnace. The dry ore of the Western Blocks and the Eastern Block are separated. These dry ores are not fully dry and still need to be dried again in a reducing kiln.

4. Reduction Kiln

This process takes place in five reducing kilns. This process goal is to eliminates free water and crystalline water and reduces nickel oxide to nickel metal. The end result of this process is called calcine that has the temperature about 700 C.

5. Furnace

PT. Vale Indonesia Tbk has 4 electric furnaces that will be functioned to melt the calcine into nickel matte and slag, separate the slage, and remove the matte. The matte temperature is about 1300 C and the slag is about 1500 C. The slag will be taken by the *haulmaster* and will be thrown away in the predetermined place.

6. Converter

PT. Vale Indonesia Tbk has 3 units of converter. The converter will eliminate almost all the levels of steel that contains in the electric furnace matte through the oxidation process. The process will result the matte content is increased to 78%. After being sprayed with the high pressure water to form a grains, after that the matte will be ready to be filtered and packed.

7. Packaging

Nickle matte is packaged in a nickel bag that contains 3 tons of nickel matte per bag. The product is then transported to Port Balintang using *trailer*, the *trailer* is able to carry about 12 nickel bag per *trailer*. In Port Balintang the product will be sent to Vale Japan Limited and Sumitomo Metal Mining Co., Ltd in Japan.

3.4. Production Facilities

The main plant of PT. Vale Indonesia Tbk in South Sulawesi is located in Sorowako and Towuti called Plant Site. The area of PTVI in Sorowako and Towuti in total is 70,398 ha. In order to support the production activity in the Plant Site, PT. Vale Indonesia has several facilities as follow:

a. Dryer Machine

Currently PT. Vale Indonesia Tbk has 3 units of dryer machine. Every unit has a different level of production capacity. Dryer main function is to reduce the water level of the wet ore. The products from the dryer will be sent to DOS (Dry Ore storage). There are 2 DOS in Plant Site to receive the product from Dryer.

b. Kiln Machine

In Plant Site of PT. Vale Indonesia Tbk in Sorowako it has 5 units of operated kiln machines. Every kiln just like the dryer has a different level of production capacity. This kiln machines are processed the product from DOS and then eliminates free water and crystalline water and reduces nickel oxide to nickel metal.

c. Furnace Machine

PT. Vale Indonesia Tbk has 4 electric furnaces in order to support the production facility of the company. The furnace machine task is to melt the calcine into nickel matte and slag, separate the slag, and remove the matte.

The products from this machine are slag and furnace matte that later on will be sent to converter machine.

d. Converter Machine

There are 3 converter machines in Plant Site to process the product from furnace. This machine will eliminate almost all the level of steel in the product from furnace machine. The process will result the matte that fulfil the requirement of the company which is 78% of nickel percentage.

Below will be shown the layout of the Plant Site in Sorowako:



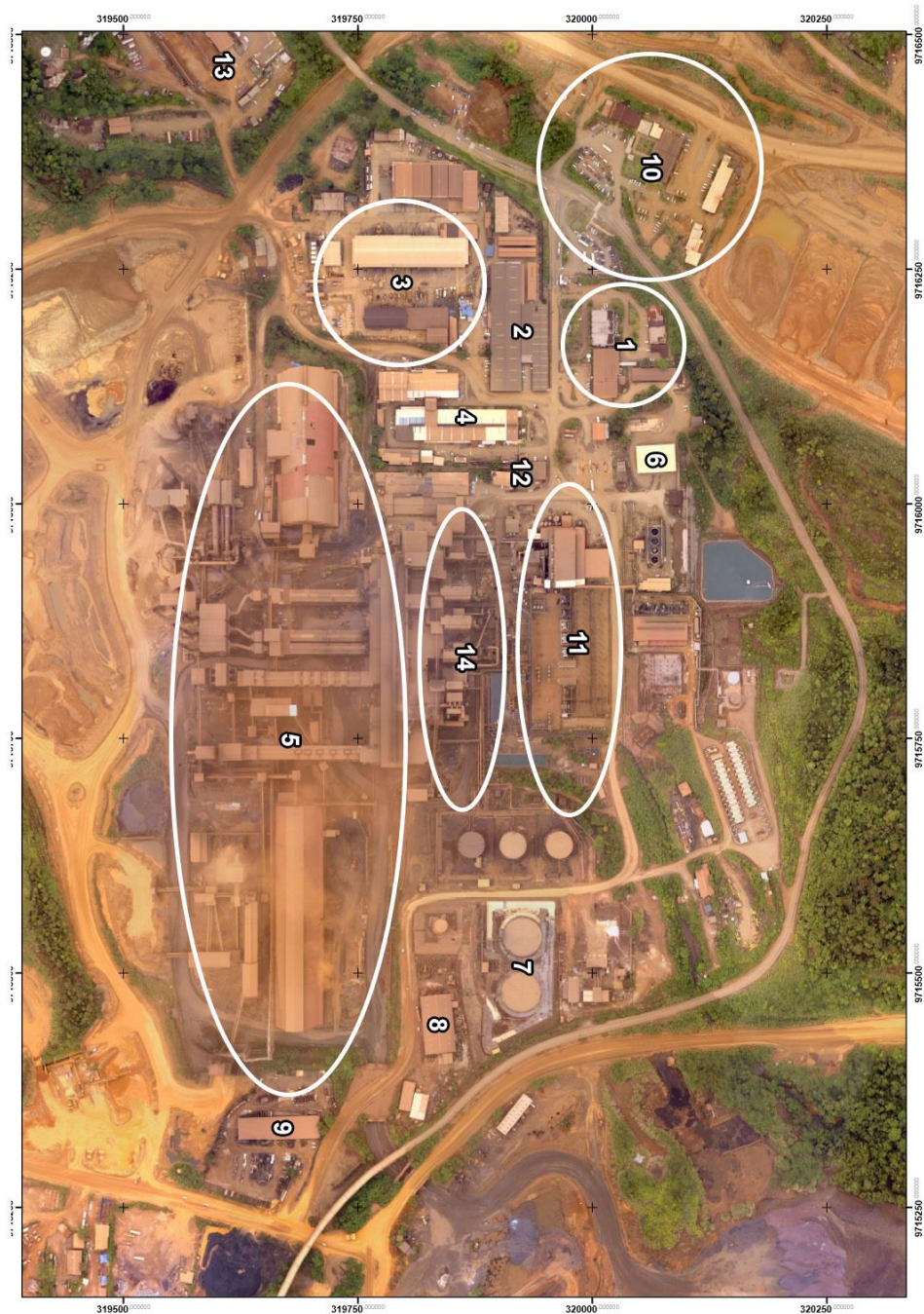


Figure 3.5. Plant Site Layout

The explanation of the layout will be stated below:

- a. Number 1: It is the main office of Plant Site, Siloku Cateen, and Information Technology Department.
- b. Number 2: It is the Supply Chain Management Department, and also the place of the main warehouse of Plant Site where the writer is assigned during the internship.

- c. Number 3: It is the Mobile Equipment Maintenance Department. This is the department that responsible for maintain the mining vehicle that is used in PT. Vale Indonesia Tbk.
- d. Number 4: It is the Mechanic Shop, in this section it responsible for maintaining all the machines that will be used in the production activity of Plant Site.
- e. Number 5: It is where the Process Plant Office consist of Dryer Machine, Kiln Machine, Furnace Machine, and Converter machine are located.
- f. Number 6: It is the Fire and Emergency Services (FES) Office, this section responsible for doing the services if there is happen any emergency condition in the Plant Site area.
- g. Number 7: Tanks for keeping the fuel that will be used by the company.
- h. Number 8: It is the satellite warehouse called 105 Warehouse, this warehouse keeps the items for project in the company. (Explosive Magazine will be keeps at betsy storage)
- i. Number 9: It also the satellite warehouse called Flex Warehouse, this warehouse is keeping the items for project in the company.
- j. Number 10: It is called Harapan office, this office is the office for the mining activity of the company.
- k. Number 11: It is the electiricity plant that support the electricity for the whole Plant Site.
- l. Number 12: This is the utilities Office.
- m. Number 13: This is the satellite warehouse it is called Open Store, this warehouse is keeping the items like nickel bag, metal plate, and other big items.
- n. Number 14: It is the Process Plant Office.

CHAPTER 4

STUDENT'S JOB REVIEW

This chapter will explain about job and responsibilities given to the student by the supervisor or manager to be finished during internship period in PT. Vale Indonesia Tbk.

4.1. Scope of Responsibility

During this internship period, the writer was assigned by the company in the Warehouse Support section which is the part of the Supply Chain Management Department. The writer was supervised by the Head of Warehouse Support himself, Mr. Muhammad Arifandy.

In Warehouse Support section, it actually focused on managing material and waste in terms of ergonomics and safety. The main goal is to optimize the flow system when managing material while reducing the money spent, time wasted, and material used that will lead to the increase of incoming profit earned of the PTVI. There are some main activities in the Warehouse Support system. Which are :

a. Goods Holding (Binning)

Goods Holding system is a system designed by the PT. Vale to manage the project material in PTVI. There are 2 types of projects in PTVI which are Capital Project (Main/Big project that influence business process in PTVI directly) and Non-Capital Project (Project which will support the maintenance process in PTVI).

Later, some of materials in Goods Holding will be used for other departments, other projects, or taken by Inventory. The rest item will be stored as excess material.



Figure 4.1. Goods Holding

b. Explosive Magazine (Receiving, Binning, Picking)

Magazine system is a system that have duty to plan the inventory of explosive material based on the needs of user while consider about the capability of the storage to keep the explode material and always checking the permit of storage. Magazine system also have duty to communicate with the ESDM department, Police of Indonesian Republic, and the Supplier of Explode Material before do procurement of Explode Material. Later, all of the explode material will be maintained and prepared by the Magazine and will be used by the user to do PTVI projects.



Figure 4.2. Explosive Magazine

c. Central Material Disposal (Receiving, Binning, Picking)

CMD system is a new system designed by the PT. Vale to maximize the quality of processing material or waste, in order to increase the sales profit. There are some waste category which handled by the CMD, which are :

1. Hazardous Waste

PT. Vale Indonesia Tbk does not handle the hazardous waste generated by tem. These waste are collected by all the areas in the company which generate the waste and then put in the tanks in the temporary storage that is located in the warehouse for maximal 90 days. After that PTVI send the collected waste to the KLHK & Perhubdar Certified Vendor which will handle the hazardous from PTVI.

2. Surplus

PT. Vale Indonesia Tbk have many projects which needed to buy material from supplier. Many of these projects is already done and some of these projects also stopped because of certain reason. All of the excess materials transferred from the goods holding will be transferred to CMD as Non-MRO and will be surplus.

3. Industrial Waste

PT. Vale Indonesia Tbk consist of some departments which also have their own type of waste. WHS Support have system to segregate these waste into 4 bins which is Red(Metal), Blue(Recycle), Green(Compose), and Grey bin. Users have to follow this segregation and all of this waste is called Industrial Waste.

4. MRO Obsolute

PT. Vale Indonesia Tbk have inventory in their Supply Chain Management system. When user want to buy / use material from inventory for their projects, before the material from inventory sent to user, all of the material will be sent into WHS Support and later will be sent to user. All of the materials left or not used for particular time will be called as MRO Obsolute.

5. Retired Assets

All of departments in PTVI have their own specific equipment for specific purpose. Every equipments have it's own expired time or may be damaged when used. All of these expired or damaged equipment have to be replaced to the new one and the old equipment have to be dismissed from PTVI. These equipment is called as retired assets.



Figure 4.3. CMD

4.2. Responsibilities and Authority in Job (Role Profile)

During this internship activity in PT. Vale Indonesia Tbk, the writer was given general responsibilities from the Warehouse Support Manager such as :

1. Analyze the flow of operation
2. Create flow chart of operation
3. Create Detail Task
4. Create Detail System
5. Analyze the differences between the old flow operation and the new operation flow
6. Analyze the Money, Quality, Time factor from the new operation flow.

4.3. Methodology of Jobs Execution

1. Interview the Manager, Supervisor, and Storeman to collect information about each process of Waste Management
2. Directly join the storeman to the work site to watch and learn about flow of each Waste Management.
3. Review the literature of all the data and flow given by the Manager

4.4. Result of Student Jobs and Responsibilities

4.4.1. Design the flowchart of each type of waste

❖ MRO Obsolute

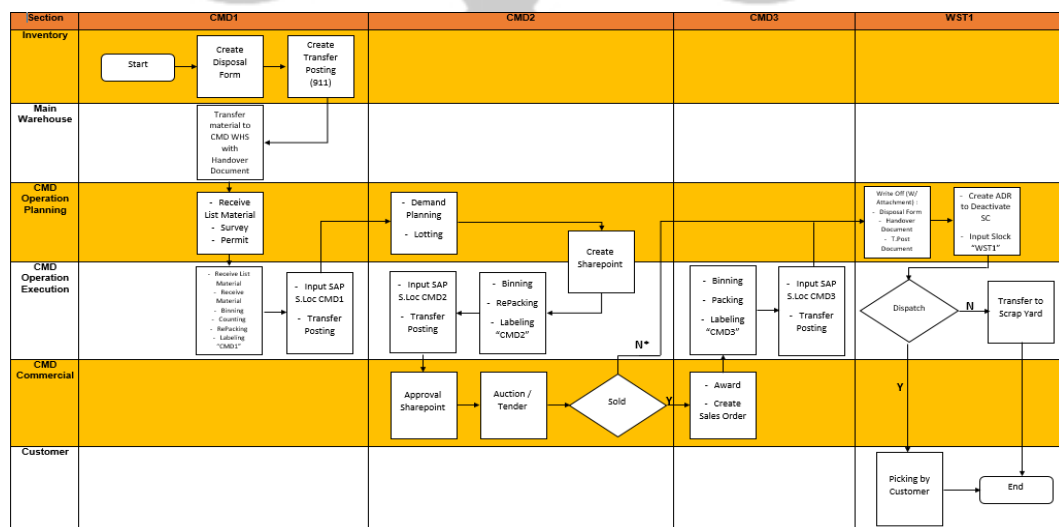


Figure 4.4. Flowchart for MRO Obsolute Management

❖ Non MRO (Surplus)

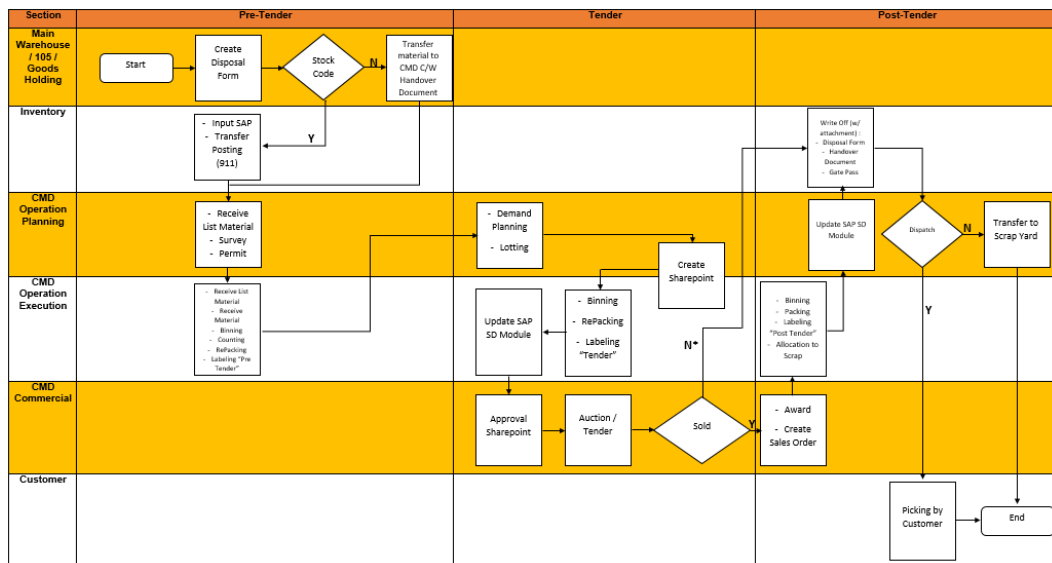


Figure 4.5. Flowchart for Non MRO (Surplus) Management

❖ Hazardous Waste

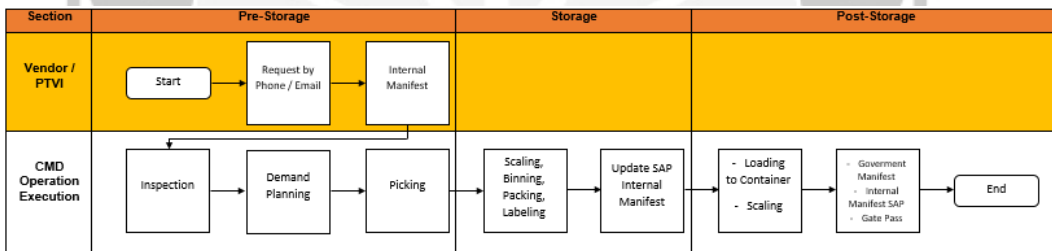


Figure 4.6. Flowchart for Daily Hazardous Waste Management

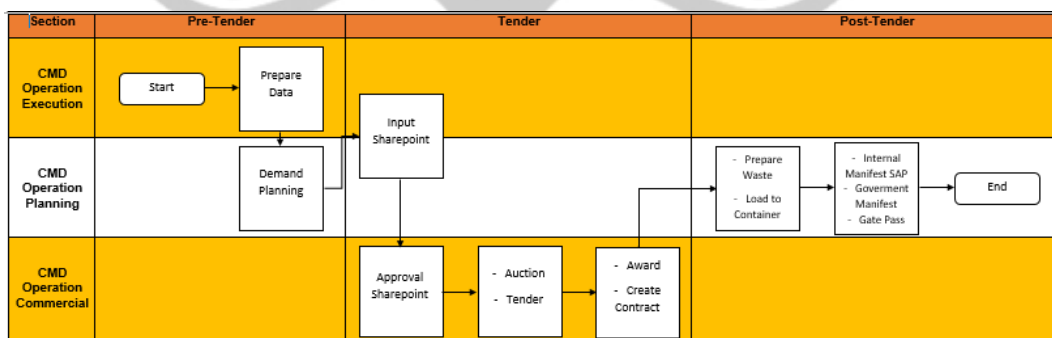


Figure 4.7. Flowchart for Tender Hazardous Waste Management

❖ Industrial Waste (Non Hazardous)

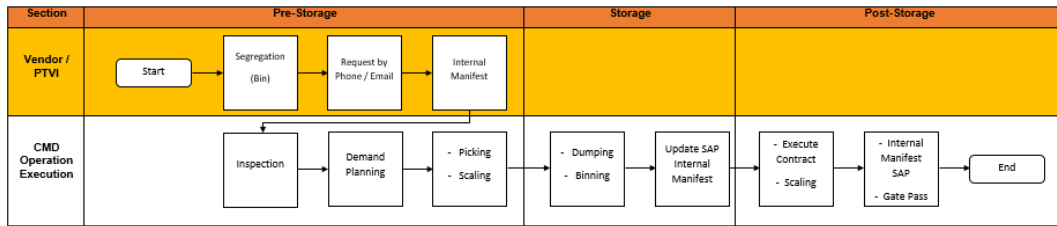


Figure 4.8. Flowchart for Daily Industrial Waste (Non Hazardous) Management

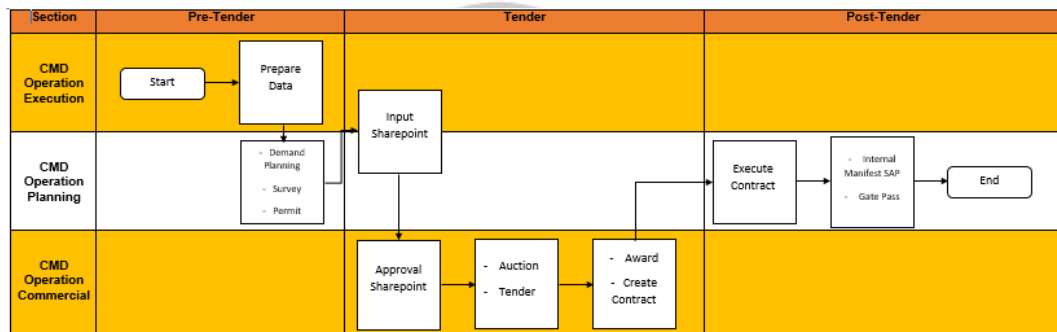


Figure 4.9. Flowchart for Tender Industrial Waste (Non Hazardous) Management

❖ Retired Assets

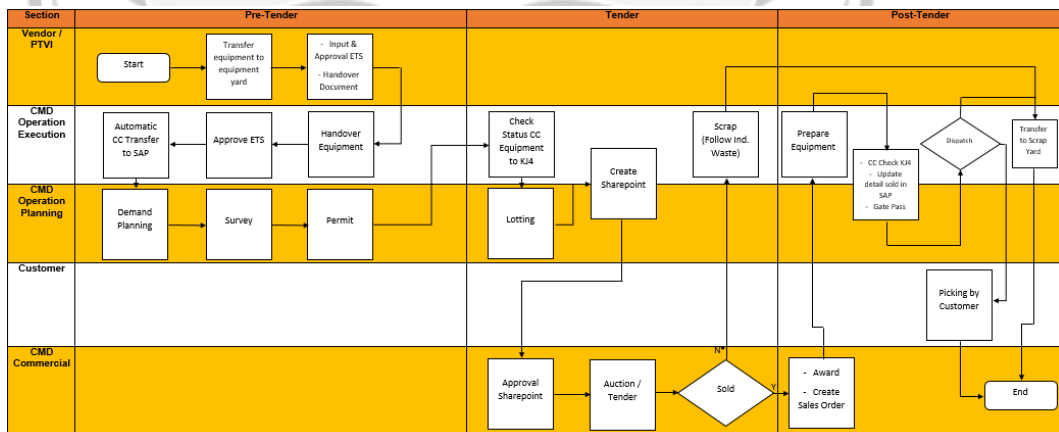


Figure 4.10. Flowchart for Retired Assets Management

4.4.2. Determine the differences between Old Flow and New Flow

Based on the new flow chart design, there are several main differences between the old bussiness process and the new bussiness process. These main differences are :

1. All scrap will be weighted first before transferred to the Scrap Yard
2. All data will be inputed to the SAP System
3. All material & equipment will be auctioned first before became scrap
4. Add new variations of sales based on the type of waste material
5. Market Intelligent to collect information about market needs

4.4.3. Detail Task

❖ MRO Obsolute

SECTION	CMD1	CMD2	CMD3	WST1
Inventory	<ul style="list-style-type: none"> ➢ Create Disposal Form ➢ Create Transfer Posting (911) 			
Main Warehouse	Transfer Material to CMD WHSE C/W Handover document			
CMD Operation Planning	<ul style="list-style-type: none"> ➢ Receive List Material ➢ Permit (Jika ada) ➢ Survey (Jika ada) 	<ul style="list-style-type: none"> ➢ Demand Planning ➢ Lotting ➢ Create Sharepoint 		<ul style="list-style-type: none"> Write Off (w/ attachment) : ➢ Disposal form ➢ Handover document ➢ Create ADR to Deactivate SC ➢ Input SAP Sloc WST1 ➢ Transfer Posting Document ➢ Gate Pass
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Receive List Material ➢ Receive Material ➢ Binning Barang ➢ Counting Barang ➢ Re-Packing Barang ➢ Labeling CMD 1 ➢ Input SAP Sloc CMD 1 ➢ Transfer Posting 	<ul style="list-style-type: none"> ➢ Create Sharepoint ➢ Binning ➢ Re-packing ➢ Labeling CMD 2 ➢ Input SAP Sloc CMD 2 ➢ Transfer Posting 	<ul style="list-style-type: none"> ➢ Binning ➢ Packing ➢ Labeling CMD 3 ➢ Input SAP Sloc CMD 3 ➢ Transfer Posting 	<ul style="list-style-type: none"> ➢ Transfer to dispatch ➢ Transfer to Scrap Yard
CMD Commercial		<ul style="list-style-type: none"> ➢ Approve/reject share point ➢ Tender ➢ Auction 	<ul style="list-style-type: none"> ➢ Award ➢ Create Sales Order 	
Customer				➢ Picking By Customer

Figure 4.11. Detail Task for MRO Obsolute Management

❖ Non MRO (Surplus)

SECTION	Pre tender	Tender	Post tender
Main Warehouse/105/GH	<ul style="list-style-type: none"> ➢ Create Disposal Form ➢ Check Material (Stock Code/ Non Stock Code) ➢ Transfer material to CMD C/W Handover document 		
Inventory	<ul style="list-style-type: none"> ➢ Input SAP ➢ Create Transfer Posting (911) 		
CMD Operation Planning	<ul style="list-style-type: none"> ➢ Receive List ➢ Permit (Jika ada) ➢ Survey (Jika ada) 	<ul style="list-style-type: none"> ➢ Demand Planning ➢ Lotting ➢ Create Sharepoint 	<ul style="list-style-type: none"> Write Off: ➢ Disposal Form ➢ Handover Document ➢ Update SAP SD Module ➢ Gate Pass
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Receive Barang & List ➢ Binning Barang ➢ Counting Barang ➢ Re-Packing Barang ➢ Labeling "Pre-Tender" 	<ul style="list-style-type: none"> ➢ Binning ➢ Re-packing ➢ Labeling "Tender" ➢ Update SAP SD Module 	<ul style="list-style-type: none"> ➢ Binning ➢ Packing ➢ Labeling "Post Tender" ➢ Allocation to scrap yard
CMD Commercial		<ul style="list-style-type: none"> ➢ Approve/reject share point ➢ Tender ➢ Auction 	<ul style="list-style-type: none"> ➢ Award ➢ Create Sales order ➢ Picking by Customer

Figure 4.12. Detail Task for Non MRO (Surplus) Management

❖ Hazardous Waste

SECTION	Pre-Storage	Storage	Post Storage
Vendor/PTVI	<ul style="list-style-type: none"> ➢ Phone ➢ Email ➢ Internal Manifest 		
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Inspection ➢ Demand Planning ➢ Picking 	<ul style="list-style-type: none"> ➢ Scaling ➢ Binning ➢ Packing ➢ Labelling ➢ Update SAP Internal Manifest 	<ul style="list-style-type: none"> ➢ Loading Container ➢ Internal Manifest SAP ➢ Government Manifest ➢ Gate Pass

Figure 4.13. Detail Task for Daily Hazardous Waste Management

SECTION	Pre-Tender	Tender	Post Tender
CMD Operation Planning	<ul style="list-style-type: none"> ➢ Prepare data 	<ul style="list-style-type: none"> ➢ Input SharePoint 	
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Demand Planning 	<ul style="list-style-type: none"> ➢ Input SharePoint 	<ul style="list-style-type: none"> ➢ Prepare Waste ➢ Loading to Container ➢ Internal Manifest SAP ➢ Government Manifest ➢ Gate pass
CMD Operation Commercial		<ul style="list-style-type: none"> ➢ Approval ➢ Auction ➢ Tender ➢ Award ➢ Contract 	

Figure 4.14. Detail Task for Tender Hazardous Waste Management

❖ Industrial Waste (Non Hazardous)

SECTION	Pre-Storage	Storage	Post Storage
Vendor/PTVI	<ul style="list-style-type: none"> ➢ Segregation ➢ Phone ➢ Email ➢ Internal Manifest 		
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Inspection ➢ Demand Planning ➢ Picking ➢ Scaling 	<ul style="list-style-type: none"> ➢ Dumping ➢ Binning ➢ Update SAP Internal Manifest 	<ul style="list-style-type: none"> ➢ Execute Contract ➢ Scaling ➢ Internal Manifest SAP ➢ Gate Pass

Figure 4.15. Detail Task for Daily Industrial Waste (Non Hazardous) Management

SECTION	Pre-Tender	Tender	Post Tender
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Prepare Data 	<ul style="list-style-type: none"> ➢ Input Sharepoint 	
CMD Operation Planning	<ul style="list-style-type: none"> ➢ Demand Planning ➢ Survey ➢ Permit 	<ul style="list-style-type: none"> ➢ Input Sharepoint 	<ul style="list-style-type: none"> ➢ Execute Contract ➢ Internal Manifest SAP ➢ Gate pass
CMD Operation Commercial		<ul style="list-style-type: none"> ➢ Approval ➢ Auction ➢ Tender ➢ Award ➢ Create Contract 	

Figure 4.16. Detail Task for Tender Industrial Waste (Non Hazardous) Management

❖ Retired Assets

SECTION	Pre tender	Tender	Post tender
PTVI	<ul style="list-style-type: none"> ➢ Input & Approval ETS ➢ Transfer Equipment to Yard 		
CMD Operation Execution	<ul style="list-style-type: none"> ➢ Handover Equipment ➢ Approve ETS ➢ Automatic transfer to SAP 	<ul style="list-style-type: none"> ➢ Check Status CC Equipment in KJ4 ➢ Scrap follow Industrial Waste System 	<ul style="list-style-type: none"> ➢ Prepare Equipment ➢ Transfer to Scrap yard ➢ CC Check KJ4 ➢ Gate Pass
CMD Operation Planning Customer	<ul style="list-style-type: none"> ➢ Demand Planning ➢ Survey ➢ Permit 	<ul style="list-style-type: none"> ➢ Lotting ➢ Create Sharepoint 	<ul style="list-style-type: none"> ➢ CC Check KJ4 ➢ Gate Pass
CMD Commercial		<ul style="list-style-type: none"> ➢ Approval ➢ Auction ➢ Tender 	<ul style="list-style-type: none"> ➢ Picking by Customer ➢ Award ➢ Create Sales Order

Figure 4.18. Detail Task for Retired Assets Management

4.4.4. Detail System

Section	In	Process	Out
MRO Absolute	<ul style="list-style-type: none"> ➤ Disposal Form ➤ Transfer Posting (911) 	<ul style="list-style-type: none"> ➤ Sloc-CMD1-CMD2-CMD3 ➤ Input Sharepoint ➤ Approval Sharepoint 	<ul style="list-style-type: none"> ➤ Write Off ➤ ADR for Deactivate ➤ Input Sloc WST1 SAP ➤ Gate Pass
Non- MRO (Surplus)	<ul style="list-style-type: none"> ➤ Disposal Form ➤ Transfer Posting (911) 	<ul style="list-style-type: none"> ➤ SD Module ➤ Input Sharepoint ➤ Approval Sharepoint 	<ul style="list-style-type: none"> ➤ Write Off ➤ SD Module ➤ Gate Pass
Retired Assets	<ul style="list-style-type: none"> ➤ ETS 	<ul style="list-style-type: none"> ➤ Cost Center KJ4 ➤ Input Sharepoint ➤ Approval Sharepoint 	<ul style="list-style-type: none"> ➤ Cost Center KJ4 ➤ Update detail sold di SAP ➤ Gate Pass
Industrial Waste (Non-Hazardous)	<ul style="list-style-type: none"> ➤ Internal Manifest In SAP 	<ul style="list-style-type: none"> ➤ S.Loc yard ➤ Input Sharepoint ➤ Approval Sharepoint 	<ul style="list-style-type: none"> ➤ Internal Manifest Out SAP ➤ Gate Pass
Hazardous Waste	<ul style="list-style-type: none"> ➤ Internal Manifest In SAP 	<ul style="list-style-type: none"> ➤ S.Loc Gudang LB3 ➤ Input Sharepoint ➤ Approval Sharepoint 	<ul style="list-style-type: none"> ➤ Internal Manifest Pemerintah ➤ Internal Manifest Out SAP ➤ Gate Pass

Figure 4.18. Detail System for Waste Management

4.4.5. Money, Quality, and Time Factor

Based on the differences between Old Flow and New flow above, we can conclude that there are additional processes. These additional processes is meant to be process to increase the value of material/waste. Some of the benefits are :

1. Money :
 - Increase the price values of each materials and equipments
2. Quality :
 - The data is more accountable
 - Quality of goods is valued based on type of items
3. Time :
 - Quicker handover execution from vendor
 - Quicker selling process
 - Higher time value

CHAPTER 5 SUMMARY

The writer has finish all of the role profile given by the manager, such as :

1. Understand each detail about the flow of waste management
2. Created new flow chart for MRO Obsolute, Non MRO (Surplus), Hazardous Waste, Industrial Waste, and Retired Assets
3. Created and understood about the Detail Task in waste management
4. Created and understood about the Detail System in waste management
5. Able to distinguish between the old and the new operation flow
6. Draw conclusion of benefits in terms of Money, Quality, and Time from the new operation flow



REFERENCE

Vale. *Vale – Indonesia*, 2017, www.vale.com/Indonesia/EN/Pages/default.aspx.

Vale. (2012). *Storeman Pocket Book*. Vale Indonesia.



Attachment

