VIETNAM NATIONAL UNIVERSITY – HO CHI MINH CITY
INTERNATIONAL UNIVERSITY
SCHOOL OF INDUSTRIAL ENGINEERING AND MANAGEMENT

INDIVIDUAL PROJECT

PRODUCTION PLANNING AND MONITORING IN HOA PHAT

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ABSTRACT

Production Planning is one of the extremely important aspects in the field of Logistics and Supply Chain Management. In this article, I used the case of Hoa Phat Steel Group Corporation (Hoa Phat) is one of Vietnam's leading steel producers. The company has a strong presence in the domestic market and is also a major exporter of steel products.

To achieve these ambitious targets, I am implementing a comprehensive production planning process. This process includes the following steps:

- **Demand forecasting:** I forecasts demand for its steel products based on a variety of factors, including economic growth, construction activity, and global steel prices.
- **Production planning:** Based on the demand forecast, I develops a production plan that optimizes the use of its raw materials and production capacity.
- **Inventory management:** I maintains an optimal level of inventory to ensure that it can meet customer demand while minimizing carrying costs.
- **Supply chain management:** I develop the supply chain network by using algorithms
- **Production scheduling:** I schedules its production activities to ensure that it can meet customer deadlines and minimize downtime.

Production planning process is a key factor in the company's success. The process helps me to appoach realistic problems to produce high-quality steel products at a competitive price. This has made the company a leading player in the global steel market.

Keywords: Hoa Phat Steel Group Corporation, production planning, demand forecasting, production scheduling, supply chain management.

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CHAPTER 1 INTRODUCTION

1.1 Background

BASIC INFORMATION

• Trading name: Hoa Phat Group Joint Stock Company
• Business registration certificate number: 0900189284
• Charter capital: 58,147,857,000,000 VND
• Head office address: Pho Noi A Industrial Park, Giai Pham Commune, Yen My District, Hung Yen Province, Vietnam
• Hanoi Office: No. 66 Nguyen Du, Nguyen Du Ward, Hai Ba Trung District, Hanoi City
• Phone: 024. 6284 8666 | Fax: 024. 6283 3456
• Da Nang Branch: No. 171 Truong Chinh, An Khe Ward, Thanh Khe District, Da Nang City
• Phone: 023. 6372 1232 | Fax: 023. 6372 2833
• Ho Chi Minh City Branch: No. 22 Vo Van Kiet, Nguyen Thai Binh Ward, District 1, Ho Chi Minh City• Điện thoại: 028. 6298 5599 | Fax: 028. 6298 7799
• Website: www.hoaphat.com.vn

STOCK INFORMATION

• Stock code: HPG
• Listing platform: HOSE
• Listing start date: November 15, 2007
• Share par value: 10,000 VND/share
• Number of outstanding shares: 5,814,785,700 shares

BUSINESS AREAs

1. Production of construction steel, hot rolled steel coils;
2. Trading and importing and exporting iron and steel, materials and equipment for smelting and rolling steel;
3. Production of steel rolling, production of roofing sheets, galvanized sheets, cold-coated sheets, color-coated sheets;
4. Production of uncoated and galvanized steel pipes;
5. Production and trading of non-ferrous metals
types, non-ferrous metal scrap;
6. Refining iron and steel; Cast iron, iron, steel;
7. Production and wholesale of coke;
8. Metal ore mining; Buy and sell metals, metal ores, scrap iron and steel;
9. Manufacturing, trading, assembling, installing, repairing, and warrantying electrical, electronic, refrigeration, civil electrical, and air conditioning products.

10. Investment and synchronous construction of infrastructure and techniques of industrial parks and urban areas;
11. Real estate investment and business;
12. Producing and trading in animal feed, poultry, raising cattle, processing meat and meat products, chicken eggs, ...
13. Inland, coastal and ocean waterway transport;
14. Production and trade of containers

DISTRIBUTION SYSTEM:

	Location	Product	Market
Hoa Phat Dung Quat Steel Factory 1	Dung Quat Economic Zone, Quang Ngai	Hot rolled steel coil, billet	Central, Southern and export
Hoa Phat Dung Quat 2 Steel Factory	Dung Quat Economic Zone, Quang Ngai	Hot rolled steel coil, billet	Central, Southern and export
Hoa Phat Hai Duong Steel Factory	Nam Song Lu Industrial Park, Hai Duong	Construction steel, hot rolled steel coil, cold rolled steel coil, color coated corrugated iron, steel pipe	Northern and export
Hoa Phat Hung Yen Steel Factory	Pho Noi A Industrial Park, Hung Yen	Construction steel, hot rolled coil, cold rolled steel coil, color coated corrugated iron	Northern and export
Hoa Phat Long An Steel Factory	Duc Hoa Industrial Park, Long An	Construction steel, hot rolled coil, cold rolled steel coil, color coated corrugated iron	South and exports
Hoa Sen color coated steel factory	Nam Song Lu Industrial Park, Hai Duong	Color coated corrugated iron	Nationally

Table 1-1 : Distribution system of factories

	Capacity (million tonne / year)						Warehouse	
	Hot rolled steel coil	Cold rolled steel coil	Steel pipes	Billet	Construction steel	Color coated corrugated iron	Square(m2)	Capacity(tonne)
Hoa Phat Dung Quat Steel Factory 1	1.5			2.5			200000	500000
Hoa Phat Dung Quat Steel Factory 2	1.5			2.5			200000	500000
Hoa Phat Hai Duong Steel Factory	0.5	0.5	0.3		1	0.5	150000	300000
Hoa Phat Hung Yen Steel Factory	0.4	0.4			0.8	0.4	100000	200000
Hoa Phat Long An Steel Factory	0.3	0.3			0.6	0.3	80000	160000
Hoa Sen color coated steel factory			0.3			0.4		

Table 1-2 : Capacity of each factories

1.2 Problem Statement

1.3 Objectives of the study

With this project, I hope to be able to apply the specialized knowledge that I learned in school to practical problems, specifically Hoa Phat's. From the financial statements, I can estimate costs and revenues, from which I will plan aspects of production, so that I can equal the numbers from the financial statements (31/12/2023) with an acceptable margin of error.

In particular, I will apply the knowledge from the subjects to analyze:

- Forecasting sale in 2023, forecasting demand, quantity and cost for each part
- Monitoring inventory: analyzing Lot Sizing, Order – Quantity Merge strategy, calculating re order points and safety stocks, as well as managing multiple warehouse networks.
- Production planning: Create master production scheduling and production process (including required documents (production proposal, shop floor document, good receipts ...), record the BOM of each production process, PRT for each stages.
- Simulate production lines: Set up routes and work centers to calculate utilization as well as other aspects.
- Administer materials : Unit load design, storage system, material handing ergonomic and sortation.
- Procurement: create sales and cooperation contracts at each level (International: import and export contracts; Subcontract (Outsourcing contract) and Overtime).
- Create a set of documents for import and export of goods (including charter ships)
- Analysis of operating processes inside the company and factory
- Supply chain distribution analysis of Hoa Phat
- Retailing distribution analysis of Hoa Phat.
- Analyze and evaluate Hoa Phat's financial statements.

1.4 Scope and Limitations

Scope :

- The project focuses on applying specialized knowledge to practical problems of Hoa Phat, not in-depth research in each field.
- Data analysis will be performed based on existing data sources, excluding new data collection.
- Simulations will be performed using existing simulation tools, without developing new simulation models.
- Financial analysis will focus on Hoa Phat's key financial indicators, excluding a detailed analysis of each item

Limitations :

- Enterprises need to provide complete and accurate data so that the project can be implemented effectively.
- Project results may be affected by the quality of the data provided.
- I need support to explain specialist concepts and provide the necessary information for the project.

- Project results are for reference only, not final business decisions.

1.5 Project planning

The project will use the following research methods:

- Literature research: study documents, reports and information sources related to Hoa Phat's supply chain management, production and finance.
- Data analysis: analyze Hoa Phat's available data to identify demand, forecast sales, optimize warehouse operations and plan production.
- Simulation: use available simulation tools to analyze and improve the operational efficiency of the production line.
- Financial statement analysis: analysis of important financial indicators of Hoa Phat to evaluate the performance of the business.

Project Phases:

- Information Gathering:
- Discuss with Hoa Phat representatives to understand operational processes, data systems and business challenges.
- Gather relevant documents such as financial statements, production reports, operating procedures, etc.
- Situation Analysis:
- Analyze collected data to assess demand, forecast sales, inventory, production capacity, etc.
- Identify Hoa Phat issues and challenges in each field.
- Solution Design:
- Based on specialized knowledge, propose solutions to improve the following areas: forecasting, inventory management, production planning, line simulation, material management, procurement, import and export, supply chain analysis, distribution channel analysis and financial statement analysis.
- Solutions may include the application of forecasting models, inventory management strategies, production planning methods, simulation techniques, storage system design, procurement strategies, etc.
- Implementation and Testing:
- Implement solutions designed on Hoa Phat data.
- Check the effectiveness and feasibility of solutions.
- Adjust solutions if necessary.
- Reporting:

Timeline :

Master Plan

					Chuẩn bị		Nền tảng		Xây dựng			Tăng tốc			Về đích		
					Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Chủ thể	Task	Sub task	Ghi chú	26/02	04/03	11/03	18/03	25/03	01/04	08/04	15/04	22/04	29/04	06/05	13/05	20/05	27/05
Port NCKH					Prepare	Present											
Project cá nhân	Tổng hợp tiến độ	Check resources available															
		Xây dựng cách thức triển khai															
	Làm về giấy tờ Im / Ex																
	Forecast						x										
	Production Planning							x									
	Inventory								x								
	Procurement																
	Fulfilment																
	Retailing																
	Finance																
	Check																

CHAPTER 2 FINANCIAL STATEMENT

SUMMARY OF FINANCIAL INDICATORS

Chỉ tiêu (Đơn vị: Tỷ đồng)	2021	2022	2023
Kết quả hoạt động kinh doanh			
Doanh thu bán hàng & cung cấp dịch vụ	**150.865**	**142.771**	**120.355**
Doanh thu thuần	149.680	141.409	118.953
Lợi nhuận gộp	**41.108**	**16.763**	**12.938**
Chi phí tài chính ròng	(660)	(3.283)	(2.018)
Chi phí bán hàng	2.120	2.666	1.961
Chi phí quản lý doanh nghiệp	1.324	1.019	1.307
Lợi nhuận khác	48	129	142
Lợi nhuận trước thuế	**37.057**	**9.923**	**7.793**
Thuế TNDN	2.536	1.479	992
Lợi nhuận sau thuế	**34.521**	**8.444**	**6.800**
Lợi nhuận Cổ đông công ty mẹ	34.478	8.484	6.835
Chi phí khấu hao	6.083	6.772	6.773
BẢNG CÂN ĐỐI KẾ TOÁN			
Tổng Tài sản	**178.236**	**170.336**	**187.783**
Tài sản ngắn hạn	94.155	80.515	82.716
Tài sản dài hạn	84.082	89.821	105.066
Nợ phải trả	**87.456**	**74.223**	**84.946**
Vốn chủ sở hữu	**90.781**	**96.113**	**102.836**
Vốn điều lệ	44.729	58.148	58.148
BẢNG LƯU CHUYỂN TIỀN TỆ			
Tiền thuần từ hoạt động kinh doanh	26.721	12.278	8.643
Tiền thuần từ hoạt động đầu tư	(19.669)	(24.626)	(11.995)
Tiền thuần từ hoạt động tài chính	1.740	(1.778)	7.276
Lưu chuyển tiền thuần trong kỳ	8.792	(14.127)	3.924
Tiền và tương đương tiền đầu kỳ	13.696	22.471	8.325
Tiền và tương đương tiền cuối kỳ	22.471	8.325	12.267
CÁC CHỈ SỐ TÀI CHÍNH CƠ BẢN			
Tỷ suất Lợi nhuận gộp/Doanh thu thuần	27%	12%	11%
Tỷ suất Lợi nhuận sau thuế/Doanh thu thuần	23%	6%	5,7%
ROA	19,4%	5%	3,6%
ROE	38%	8,8%	6,6%
Lợi nhuận kế toán trước thuế, chi phí tài chính	40.788	16.950	12.984
Lợi nhuận kế toán trước thuế, chi phí tài chính và khấu hao	46.871	23.722	19.758

Table 2-1 : Summary of financial statements in 2023

In Hoa Phat's financial statements (consolidated financial statements 2023), it can be seen:

- The influence of people's real estate purchasing power
- The impact of Covid-19 on corporate health
- The increase in exchange rate due to high inflation rate
- The change in the percentage of interest from the bank.

Those are the factors that make the sales volume in 2021 and 2022 tend to decrease. However, Hoa Phat products still occupy a large market share in Vietnam (33%) and are still significantly profitable in recent times.

2.1 Revenue – Profit

Revenue and profit after tax of this segment account for 94% and 92% of the Group, respectively.

- Revenue from steel segment = 94% x VND 120,335 billion = VND 113,114.9 billion
- Profit after tax of steel segment = 92% x VND 6,800 billion = VND 6,256 billion

The share of 2023 sales revenues for the steel sector accounts for 94%

2.2 Production output and market share

In 2023, sales volume of HRC steel products, construction steel, high-quality steel and billets will reach 6.72 million tons, down 7%. In which, Hoa Phat supplied to the market 2.8 million tons of HRC, up 6% compared to 2022. Construction steel, high quality steel reached 3.78 million tons, down 11% over the same period last year. Hoa Phat steel market share consolidated its No. 1 position with 34.7%. In addition, Hoa Phat also supplied 685,000 tons of steel pipes, down 9% compared to 2022. Galvanized steel of all kinds reached the same level as the previous year when it reached 329,000 tons. The steel pipe market share will continue to be No. 1 reaching 28.3% at the end of 2023. Ton Hoa Phat is firmly in the Top 5 enterprises with the largest market share.

Hoa Phat steel pipe output reached 685,000 tons, accounting for a market share of 28.27% (according to statistics of the Vietnam Steel Association at the end of 2023), continuing to affirm its No. 1 position in Vietnam.

In 2023, An Thong Mineral Investment Joint Stock Company will have a consumption volume of 345,000 tons of ore of all kinds, helping Hoa Phat to be partially self-sufficient in domestic ore sources.

The products that contribute the most to the overall output are welded black steel pipes, galvanized corrugated steel pipes, hot-dip galvanized steel pipes. With sales volume in 2023 reaching 329,000 tons, of which, domestic sales reached 190,000 tons, up 24% compared to 2022. The strongest growing sales market area of Ton Hoa Phat is the Northern region, reaching over 141,000 tons, up 34% over the same period.

Export volume contributed 139,000 tons, equivalent to 42% of total sales volume of Ton Hoa Phat. Currently, the main export markets of Ton Hoa Phat are countries and territories in Europe, Asia, America, the main export products are galvanized and cold galvanized corrugated iron.

The company's best-selling item is galvanized corrugated iron, reaching over 158,000 tons, up 23% . Self-reliant in hot rolled coil (HRC) raw materials in DUng Quat Industrial Park.

- Hoa Phat has produced 6.7 million tons of crude steel,
- With a capacity of 8.5 million tons / year.
- HRC: output 3 million tons/year.

2.3 Other parameters

In current assets, inventory accounted for 42%, inventory turnover at December 31, 2023 was 3.07x, corresponding to a 6-day increase over the 2022 inventory turnover days. A decrease in inventories while an increase in inventory turnover represents a fast turnover of goods, indicating efficiencies in monitoring and reducing material stock levels to reduce the burden on working capital and financing costs.

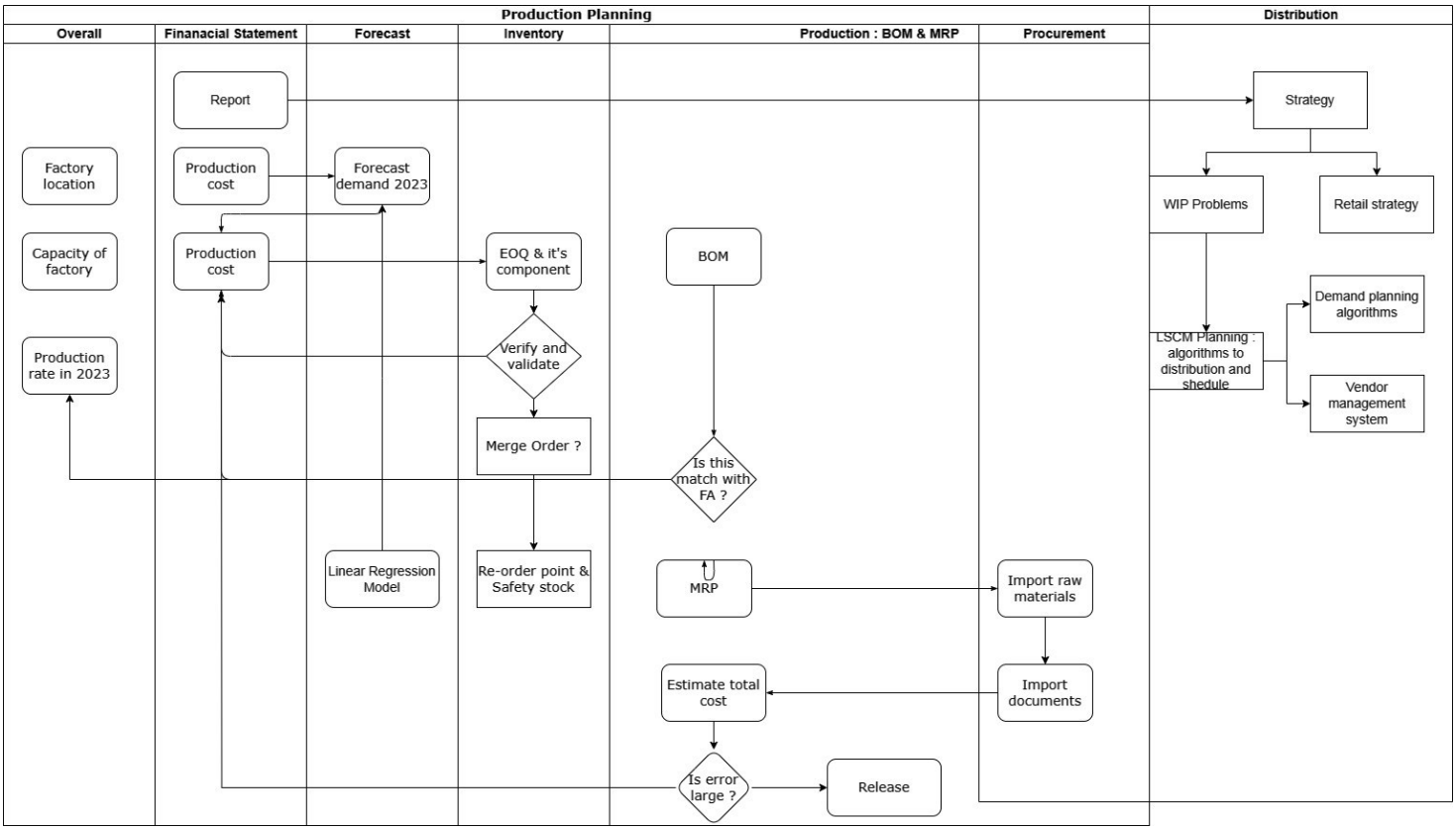
- Inventory (31/12/2023) : 34.504.487.406.261 VND (42%)
- Current assets (31/12/2023) : 82.716.439.173.043 VND
- Short-term debt (payable to employees): 403.391.467.732 VND

CHAPTER 3 METHODOLOGY

3.1 Approach Comparison and Selection

In this research paper, I will base my approach to the textbook content that I learned in school, in addition, in terms of data, I will search directly on the Internet as well as search engines, summarize information such as Gemini, Bing Chat. Although, the results will not be 100% accurate, however, those tools, help me a lot in discovering and approaching real values in the best way. Although I have researched many papers and research on Google Scholar, however, it seems difficult to find a suitable amount of data for the project I am working on.

3.2 Proposed Conception Design



CHAPTER 4 FORECASTING SALE

4.1 Forecasting sale and demand 2023

Task: Analyze sales reports in 2021 and 2022, to make recommendations on sales volume in 2023.

- Report analysis:
- Identify the market for each product
- Collect and analyze data on current revenue.
- Identify trends in the building materials industry (corrugated iron, iron, steel) that may affect revenue.
    - The increase or decrease in demand for construction materials (real estate purchasing power, population growth, urbanization)
    - The rise and fall in prices of raw materials (especially coal and iron ore)
    - Competition (new competitors, new technologies, new materials, new products, new services)
    - Sustainability
- Identify factors inside the business that may affect the forecast.
    - Business strategy (launching new products/services, expanding markets, adjusting prices, marketing and advertising, promotion)
    - Sales activities (personnel capacity, process efficiency, service quality)
    - Manufacturing activities (ability to meet demand, process efficiency, production costs, supply chain risks)
    - Financial activities (corporate financial situation, ability to invest in new projects, loan interest rates, exchange rates)
- Identify factors outside the business that may affect the forecast.
    - Economic conditions (economic growth, recession, interest rates, inflation)
    - Environment (climate change, natural disasters)
    - Government policy (changes in tax rates, regulations, trade policies)
    - Technology (online shopping, new technology)
    - Competition (new competitors, new market share)
    - Social trends (changes in customer preferences and behaviors, environmental and social concerns)
    - International events (pandemics, wars and conflicts)
- Analyze data on Downtown Radiology's previous procedures.
- Choose the right quantitative forecasting model for each procedure.
- Revenue forecasts are based on the selected model and certain assumptions.
- Key assumptions :
- Assumptions about the economic situation
    - Economic growth in 2023:
    - Economic slowdown in 2023
    - Economic stability in 2023
- Industry assumptions
    - The industry is growing upward
    - The industry is growing steadily (horizontally)
    - The industry is in decline
- Assumptions about competitors
    - Competitors don't change strategy
    - Competitors launch new products

    - Discount competitors
- Price assumptions
    - Stable raw material prices
    - Rising raw material prices
    - Falling raw material prices
- Assumptions about marketing strategy
    - The company continues its current marketing strategy
    - The company launches a new marketing strategy
    - The company reduced its marketing budget.
- In the current problem, I am calculating based on the assumption that all factors are stable and the same as 2023, so I will observe sales in 2021 and 2022. From there, find out what to expect for 2023.
- Using the Multiple Regression Model for assumptions, the Tree Diagram for rising and falling situations, which will be updated later, a more complex model needs to be calculated and needs careful preparation.

Analyze the available data

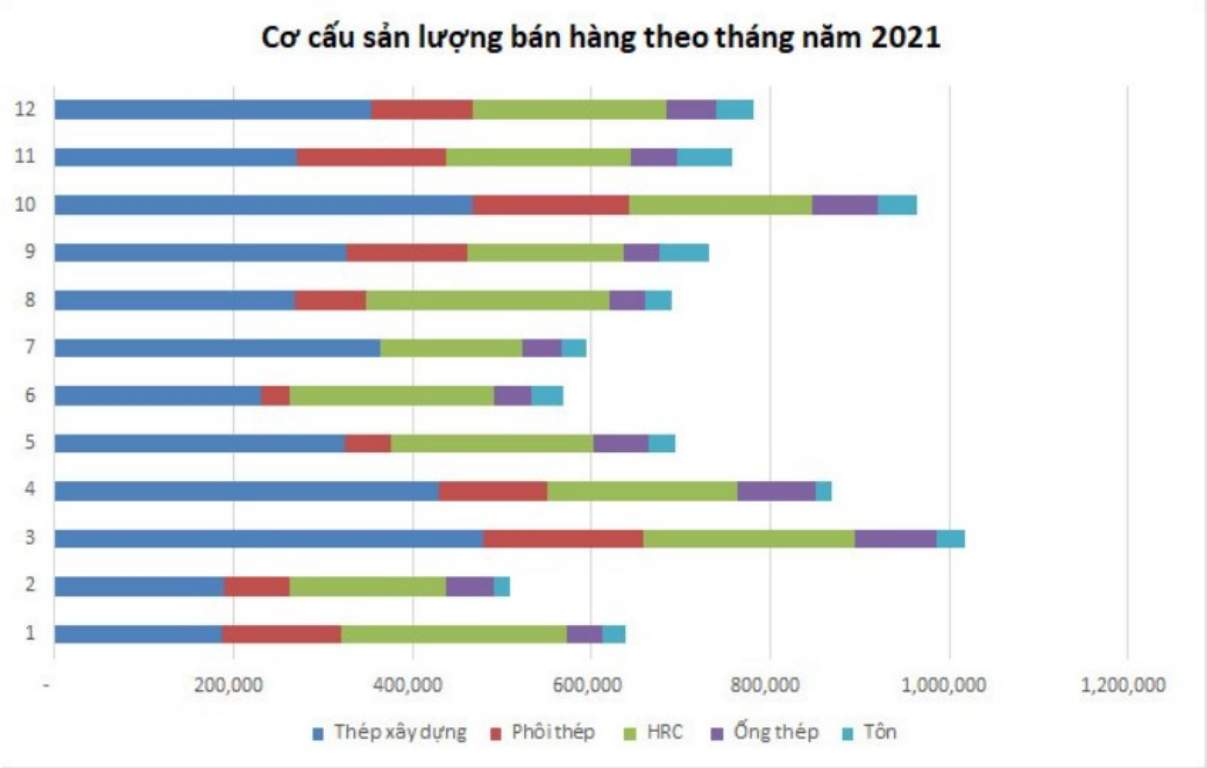


Figure 4.1 : Volume sale by products in 2021

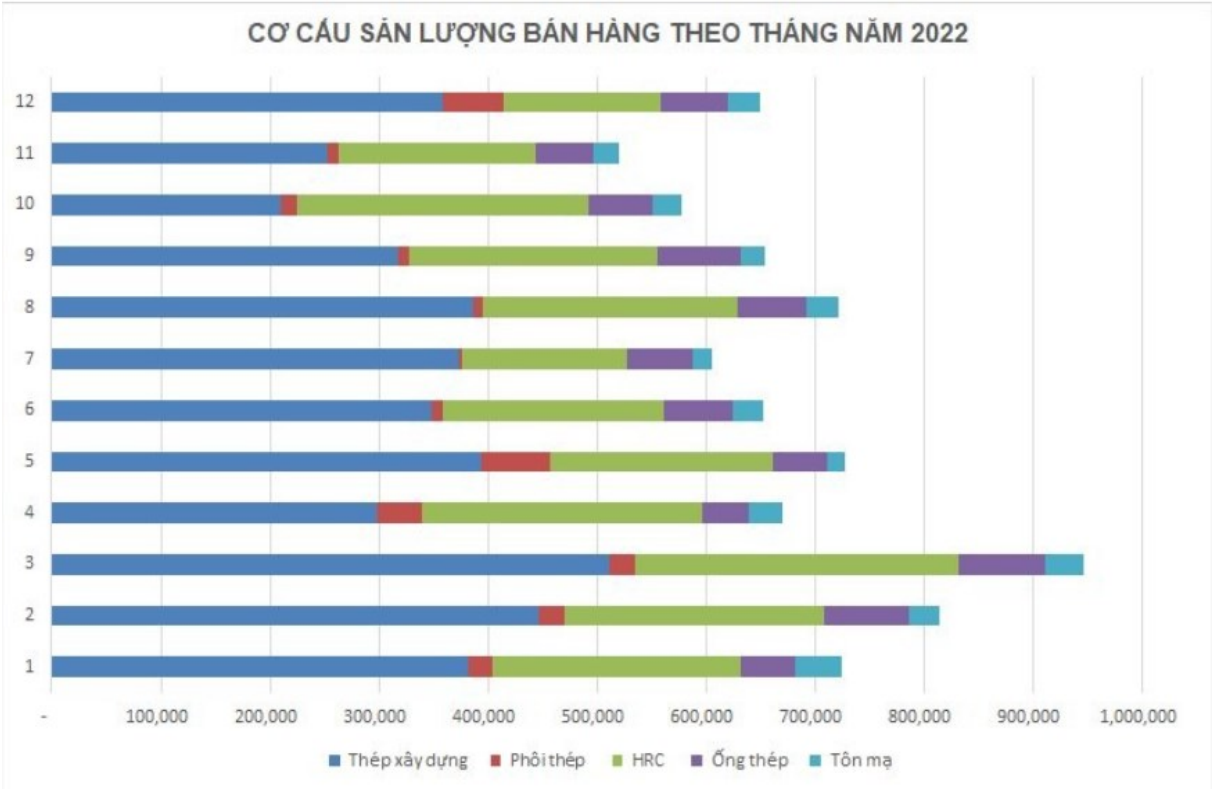


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Figure 4.2 : Volume sale by products in 2022

According to the report from the financial statements, sales volume of the following years:

Biểu giá bán ra Hòa Phát								
Group	**Products**	**Nhóm**	**Kg/Cây**	**Đơn giá (VNĐ/Kg)**	**Giá nguyên vật liệu (35%)**	**Giá bán ra (VAT + discount)**	**Giá bán ra (không discount) - 15%**	**Đơn vị**
Thép xây dựng	Phôi thép				VND 5,107,725.00	VND 12,690,000.00	VND 14,593,500.00	tấn
	Thép cuộn	Thép cuộn phi 6,8 (250kg)/ cuộn			VND 5,232.50	VND 13,000.00	VND 14,950.00	kg
	Thép cuộn cán nóng (HRC)	Thép HP Dung Quất			VND 8,516.90	VND 21,160.00	VND 24,334.00	kg
	Thép đặc biệt				VND 8,050.00	VND 20,000.00	VND 23,000.00	Kg
					VND -			
	Thép thanh				VND 5,691,350.00	VND 14,140,000.00	VND 16,261,000.00	tấn
Ống thép	**Ống thép đen**	Ống phi 21 - dày 1.0mm			VND 14,852.25	VND 36,900.00	VND 42,435.00	cây
		Ống phi 21 - dày 1.2mm			VND 18,112.50	VND 45,000.00	VND 51,750.00	cây
		Ống phi 27 - dày 1.2mm			VND 19,199.25	VND 47,700.00	VND 54,855.00	cây
		Ống phi 27 - dày 1.4mm			VND 22,459.50	VND 55,800.00	VND 64,170.00	cây
		Ống phi 27 - dày 1.8mm			VND 35,862.75	VND 89,100.00	VND 102,465.00	cây
		Ống phi 34 - dày 1.0mm			VND 24,633.00	VND 61,200.00	VND 70,380.00	cây
		Ống phi 34 - dày 1.2mm			VND 29,704.50	VND 73,800.00	VND 84,870.00	cây
		Ống phi 34 - dày 2.0mm			VND 36,949.50	VND 91,800.00	VND 105,570.00	cây
		Ống phi 34 - dày 1.8mm			VND 46,730.25	VND 116,100.00	VND 133,515.00	cây
		Ống phi 34 - dày 1.4mm			VND 61,220.25	VND 152,100.00	VND 174,915.00	cây
		Ống phi 42 - dày 1.2mm			VND 43,470.00	VND 108,000.00	VND 124,200.00	cây
		Ống phi 42 - dày 1.4mm			VND 47,092.50	VND 117,000.00	VND 134,550.00	cây
		Ống phi 42 - dày 1.8mm			VND 57,597.75	VND 143,100.00	VND 164,565.00	cây
		Ống phi 42 - dày 2.0mm			VND 70,638.75	VND 175,500.00	VND 201,825.00	cây
		Ống phi 42 - dày 2.3mm			VND 80,419.50	VND 199,800.00	VND 229,770.00	cây
		Ống phi 49 - dày 1.2mm			VND 43,470.00	VND 108,000.00	VND 124,200.00	cây
		Ống phi 49 - dày 1.4mm			VND 53,975.25	VND 134,100.00	VND 154,215.00	cây
		Ống phi 49 - dày 1.8mm			VND 69,552.00	VND 172,800.00	VND 198,720.00	cây
		Ống phi 49 - dày 2.0mm			VND 82,230.75	VND 204,300.00	VND 234,945.00	cây
		Ống phi 49 - dày 2.3mm			VND 93,460.50	VND 232,200.00	VND 267,030.00	cây
		Ống phi 60- dày 1.2mm			VND 51,439.50	VND 127,800.00	VND 146,970.00	cây
		Ống phi 60- dày 1.4mm			VND 67,016.25	VND 166,500.00	VND 191,475.00	cây
		Ống phi 60- dày 1.8mm			VND 80,781.75	VND 200,700.00	VND 230,805.00	cây
		Ống phi 60- dày 2.0mm			VND 101,067.75	VND 251,100.00	VND 288,765.00	cây
		Ống phi 76 - dày 1.2mm			VND 68,827.50	VND 171,000.00	VND 196,650.00	cây
		Ống phi 76- dày 1.4mm			VND 84,766.50	VND 210,600.00	VND 242,190.00	cây
		Ống phi 76- dày 1.8mm			VND 105,777.00	VND 262,800.00	VND 302,220.00	cây
		Ống phi 76- dày 2.0mm			VND 131,134.50	VND 325,800.00	VND 374,670.00	cây
		Ống phi 90- dày 1.4mm			VND 99,618.75	VND 247,500.00	VND 284,625.00	cây
		Ống phi 90- dày 1.8mm			VND 126,425.25	VND 314,100.00	VND 361,215.00	cây
		Ống phi 90- dày 2.0mm			VND 163,374.75	VND 405,900.00	VND 466,785.00	cây
		Ống phi 114- dày 1.4mm			VND 127,874.25	VND 317,700.00	VND 365,355.00	cây
		Ống phi 114- dày 1.8mm			VND 156,492.00	VND 388,800.00	VND 447,120.00	cây
		Ống phi 114- dày 2.0mm			VND 200,686.50	VND 498,600.00	VND 573,390.00	cây
		Ống phi 114- dày 3.0mm			VND 280,743.75	VND 697,500.00	VND 802,125.00	cây
	Ống thép mạ kẽm nhúng nóng	Phi 21 - 1.6mm	4,642	VND 19,000.00	VND 35,499.70	VND 88,198.00	VND 101,427.70	cây
		Phi 26.65 - 2.6mm	9.36	VND 19,000.00	VND 71,580.60	VND 177,840.00	VND 204,516.00	cây
		Phi 33.5 2.5mm	11.46	VND 19,000.00	VND 87,640.35	VND 217,740.00	VND 250,401.00	cây
		Phi 42.2 - 2.3mm	13.56	VND 19,000.00	VND 103,700.10	VND 257,640.00	VND 296,286.00	cây
		Phi 48.1 - 2.5mm	16.98	VND 19,000.00	VND 129,854.55	VND 322,620.00	VND 371,013.00	cây
	Ống thép cỡ lớn	Ống đen cỡ lớn D141.3 x 3.96	80.46	VND 14,591.00	VND 472,531.78	VND 1,173,992.00	VND 1,350,090.80	cây
		Ống đen cỡ lớn D168.3 x 6.35	130.62	VND 14,591.00	VND 767,115.09	VND 1,905,876.00	VND 2,191,757.40	cây
		Ống đen cỡ lớn D273 x 6.35	250.50	VND 14,591.00	VND 1,471,156.02	VND 3,655,046.00	VND 4,203,302.90	cây
Tôn	**Tôn cuộn mạ kẽm**	Loại tôn dày 2.0-5.0mm			VND 28,577.50	VND 71,000.00	VND 81,650.00	mét
	Tôn lợp mái HP				VND 56,350.00	VND 140,000.00	VND 161,000.00	tấm
Điện máy gia dụng								
Nông nghiệp								

4.1.1.1 Preprocessing data

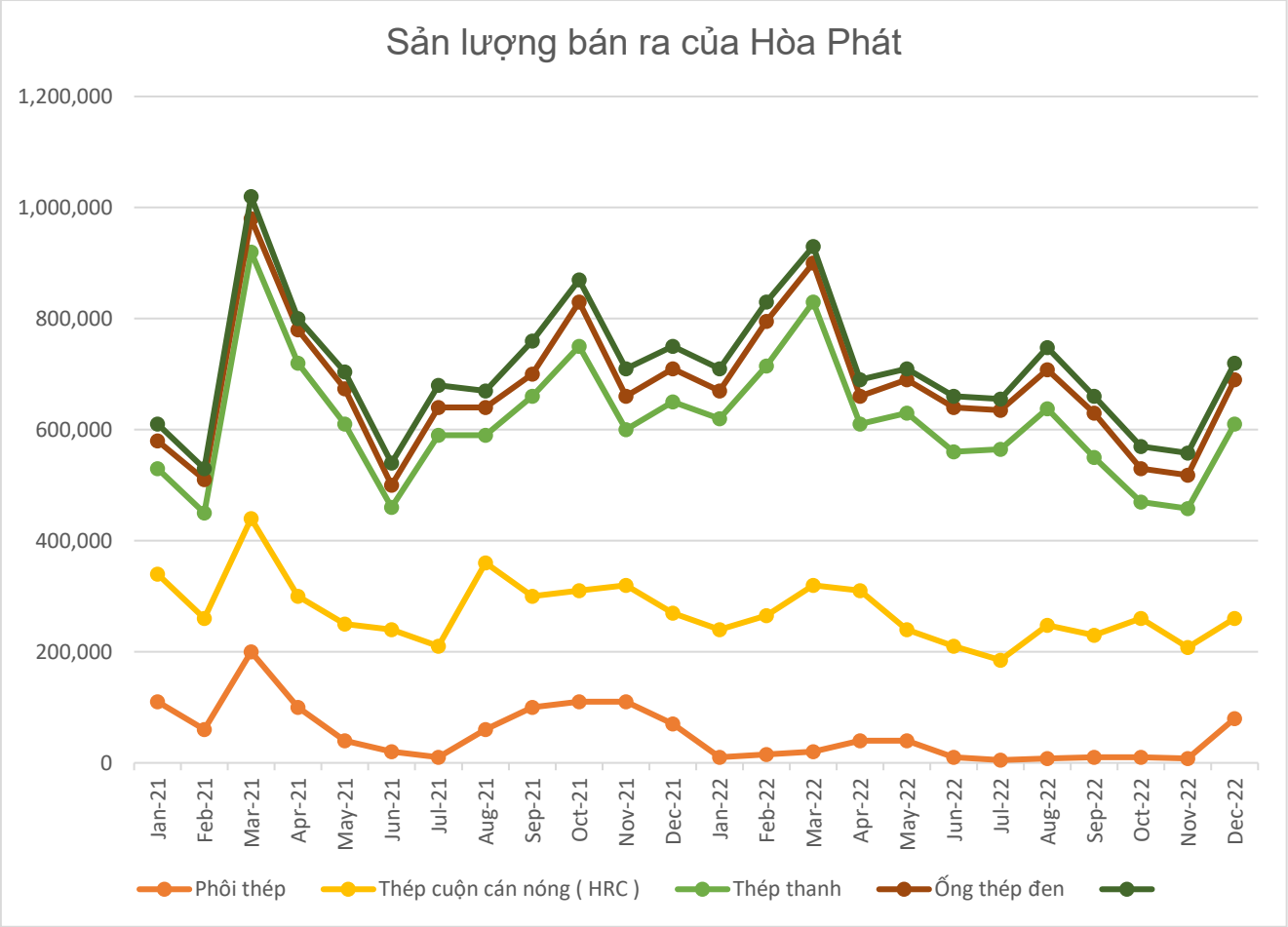


Figure 4.3 : Volume Sale in analysis line

4.1.1.2 Exploring data patterns with autocorrelation analysis

Autocorrelation is the correlation between a variable lagged one or more time periods and itself.

Equation 1 is the formula for computing the lag k autocorrelation coefficient (r_k) between observations, Y_t and Y_{t-k} that are k periods apart.

$$r_k = \frac{\sum_{t=k+1}^{n}(Y_t - \overline{Y})(Y_{t-k} - \overline{Y})}{\sum_{t=1}^{n}(Y_t - \overline{Y})^2} \qquad k = 0, 1, 2, \ldots \qquad \textbf{(1)}$$

where

r_k = the autocorrelation coefficient for a lag of k periods
$\overline{Y}$ = the mean of the values of the series
Y_t = the observation in time period t
Y_{t-k} = the observation k time periods earlier or at time period $t - k$

R1 = 0.157981

Year	Month	Seq	Sale	Y-1	Y - Yt-1
	Jan	1	610,000		0
	Feb	2	530,000	610,000	-80,000
	Mar	3	1,020,000	530,000	490,000
	Apr	4	800,000	1,020,000	-220,000
	May	5	704,000	800,000	-96,000
	Jun	6	540,000	704,000	-164,000
	Jul	7	680000	540,000	140,000
	Aug	8	670000	680,000	-10,000
	Sep	9	760000	670,000	90,000
	Oct	10	870000	760,000	110,000
	Nov	11	710000	870,000	-160,000
2021	Dec	12	750000	710,000	40,000
	Jan	13	710000	750,000	-40,000
	Feb	14	830000	710,000	120,000
	Mar	15	930000	830,000	100,000
	Apr	16	690000	930,000	-240,000
	May	17	710000	690,000	20,000
	Jun	18	660000	710,000	-50,000
	Jul	19	655000	660,000	-5,000
	Aug	20	748000	655,000	93,000
	Sep	21	660000	748,000	-88,000
	Oct	22	570000	660,000	-90,000
	Nov	23	558000	570,000	-12,000
2022	Dec	24	720000	558,000	162,000

The correlation between a variable lagged one or more time periods and itself is too weak.
With this value, I can declare that using regression model may not effectively.

Figure 4.4 : Autocorrelation Test

4.1.1.3 Are the data random?

Although correlation is known, however, I still want to test how random between variables there is

A hypothesis test is developed to determine whether a particular autocorrelation coefficient is significantly different from zero

Hi : pi = 0

H1: pi ≠ 0

Bằng cách kiểm tra với the standard error (estimated standard deviation) of the autocorrelation at time lag k

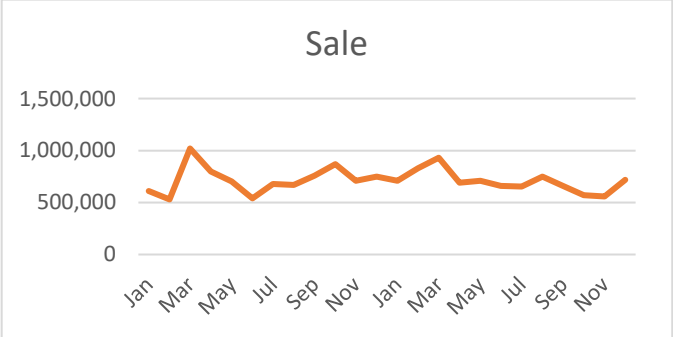
- Test statistics at time lag 1 : 0.7739
- T-critical value at 5% allowance : 1.711
- Confidence limits (95%) : 0 ± 1.711 x SE(k=1); 0 ± 1.711 x 0.7739
- Cannot reject the lag 1 autocorrelation is significantly different from 0.

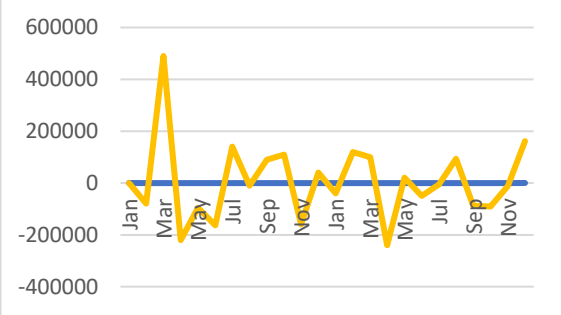
⇨ The data is quite similar, and the ability to use Naive is not satisfactory, because the data fluctuates too much.

⇨ there is a high probability that random data is quite high, it may have some errors.

4.1.1.4 Do the data have a trend ?

A stationary time series is one whose basic statistical properties, such as the mean and variance, remain constant over time. Consequently, a series that varies about a fixed level (no growth or decline) over time is said to be stationary. A series that contains a trend is said to be nonstationary. A method called differencing can often be used to remove the trend from a nonstationary series.





I differnce once, and noticed, the error seems to be quite stable.

⇨ I think there is a high probability that there is a trend factor in this right now.

Are the Data Seasonal?

If a series is seasonal, a pattern related to the calendar repeats itself over a particular interval of time (usually a year).

Are the Data Seasonal?				
Autocorrelation (r1)	0.15798064	<	critical value (SE)	0.400083
Autocorrelation (r2)	-0.19691242	<	critical valueSE(2)	0.409947
Autocorrelation (r3)	-0.3183585	<	Critical value SE(3)	0.424817
Autocorrelation (r4)	0.02697169	<	Critical value SE(4)	0.461428

Table 4-1 : Determine data is seasonal or not ?

I checked, "Is the data seasonal in quarters?"
However, it seems that with the current numbers, more data is needed to determine the seasonal factor in this case.

4.1.2 Choosing A Forecasting Technique

Some of the questions that must be considered before deciding on the most appropriate forecasting technique for a particular problem follow :
• Why is a forecast needed?
• Who will use the forecast?
• What are the characteristics of the available data?
• What time period is to be forecast?
• What are the minimum data requirements?
• How much accuracy is desired?
• What will the forecast cost

To select the appropriate forecasting technique properly, I must be able to accomplish the following:
• Define the nature of the forecasting problem.
• Explain the nature of the data under investigation.
• Describe the capabilities and limitations of potentially useful forecasting techniques.
• Develop some predetermined criteria on which the selection decision can be made.

Forecasting Techniques for Stationary Data : include naive methods, simple averaging methods, moving averages, and autoregressive moving average (ARMA) models (Box-Jenkins methods).

Forecasting Techniques for Trend Data : series is not constant (Increased productivity and new technology lead to changes in lifestyle ; Increasing population causes increases in demand for goods and services ; The purchasing power of the dollar affects economic variables due to inflation ; Market acceptance increases). The techniques can be considered include : moving averages, Holt's linear exponential smoothing, simple regression, growth curves, exponential models, and autoregressive integrated moving average (ARIMA) models (Box-Jenkins methods)

Forecasting Techniques for Seasonal Data : Must be estimated seasonally indexes from the history of the series. The techniques can be considered include : classical decomposition, Census X-12, Winter's exponential smoothing, multiple regression, and ARIMA models (Box-Jenkins methods).

4.1.3 Measuring Forecast Error

- A residual is the difference between an actual observed value and its forecast value
- The mean absolute deviation (MAD) measures forecast accuracy by averaging the magnitudes of the forecast errors (the absolute values of the errors).
- The mean squared error (MSE) : . This approach penalizes large forecasting errors
- The RMSE : The root mean squared error.
- The mean absolute percentage error (MAPE) : expressed as a percentage

- The mean percentage error (MPE) : necessary to determine whether a forecasting method is biased (consistently forecasting low or high).
  + If the forecasting approach is unbiased, the MPE will produce a number that is close to zero
  + If the result is a large negative percentage, the forecasting method is consistently overestimating
  + If the result is a large positive percentage, the forecasting method is consistently underestimating.

4.1.4 Data Modeling

After observing the characteristics of the data, I decided to use the following algorithms:

4.1.4.1 Moving Average

		MAD	MSE	RMSE	MAPE	MPE
MA(3)	Phôi thép	32444.44	1,895,111,111	43532.87391	156%	-1.195552249
	HRC	30277.78	1,539,814,815	39240.47419	14%	-0.03045167
	Thép thanh	67083.33	7,468,055,556	86417.91224	22%	-0.063208724
	Ống thép đen	9083.333	158,574,074	12592.61983	15%	-0.017260251
	Tôn	7222.222	82,870,370	9103.316449	22%	-0.043716931
MA(5)	Phôi thép	28566.67	1,695,463,333	41176.00434	159%	-1.363628698
	HRC	26250	1,331,166,667	36485.1568	12%	-0.022712201
	Thép thanh	54666.67	5,328,333,333	72995.43365	18%	-0.073147443
	Ống thép đen	8766.667	140,666,667	11860.29792	14%	-0.014061508
	Tôn	7583.333	101,750,000	10087.1205	23%	-0.03281746

Table 4-2 : Summary of moving average

4.1.4.2 Simple Exponential Smoothing Method

Alpha determines how "sensitive" the model is to new data.
I'm hypothesizing:

- Alpha = 0.1: the model will be extremely less sensitive to the previous month's sales
- Alpha = 0.35 : the model will be more or less sensitive to the previous month's sales

		MAD	MSE	RMSE	MAPE	MPE
Alpha = 0.1	Phôi thép	46504.54	2,738,255,078	52328.33915	294%	-2.810088226
	HRC	29226.81	1,200,313,934	34645.54711	13%	-0.040252156
	Thép thanh	89936.7	13,408,485,050	115795.0131	24%	0.113370612
	Ống thép đen	10780.62	169,258,115	13009.92372	17%	0.070173996
	Tôn	8586.008	111,045,046	10537.7913	28%	-0.054430845
Alpha = 0.35	Phôi thép	36699.09	2,151,165,734	46380.6612	163%	-1.379772697
	HRC	30565.54	1,366,508,748	36966.3191	14%	-0.034723907
	Thép thanh	79363.11	10,291,654,827	101447.7936	24%	-0.019222424
	Ống thép đen	9756.707	161,799,913	12720.05949	16%	0.007087006
	Tôn	8614.771	104,091,185	10202.50875	27%	-0.064234219

Table 4-3 : Summary of simple exponential smoothing

A tracking signal involves computing a measure of forecast errors over time and setting limits so that, when the cumulative error goes outside those limits, the forecaster is alerted. If the

magnitude of the error is greater than that threshold, then the magnitude of the alpha must be changed.

4.1.4.3 Exponential Smoothing Adjusted for Trend: Holt's Method

When a trend in the time series is anticipated, an estimate of the current slope, as well as the current level, is required. Holt's technique smoothes the level and slope directly by using different smoothing constants for each.

A (alpha):

- Decide how the latest observation affects the forecast.
- A high a-value means that the new observation has a stronger effect on the forecast, helping the model adapt quickly to changes.
- A low a-value means that the new observation has less impact, making the model more stable.

b (beta):

- Decide how the previous trend estimate influences the new trend estimate.
- A high b-value means that the previous trend estimate has a stronger influence, which helps the pattern maintain the trend for a longer time.
- A low b-value means that the previous trend estimate has less influence, giving the model more flexibility to change the trend.

Typically, the a value is selected between 0.1 and 0.3, while the b value is selected between 0 and 0.1.

		MAD	MSE	RMSE	MAPE	MPE	Tracking signal
Alpha = 0.3 ; Beta = 0.1	Phôi thép	27,386.90	1,114,180,930.68	33,379.35	104%	(0.41)	66,758.70
	HRC	240,887.10	692,281,571.11	26,311.24	10%	(0.02)	52,622.49
	Thép thanh	57,161.37	5,400,833,924.64	73,490.37	18%	(0.08)	146,980.73
	Ống thép đen	6,921.15	77,562,439.78	8,806.95	12%	(0.02)	17,613.91
	Tôn	6,875.73	58,196,525.54	7,628.66	22%	(0.06)	15,257.33
Alpha = 0.7 ; Beta = 0.3	Phôi thép	11,293.52	189,940,246.64	13,781.88	40%	0.13	27,563.76
	HRC	9,002.61	126,712,647.52	11,256.67	4%	(0.01)	22,513.34
	Thép thanh	23,983.65	983,726,432.74	31,364.41	8%	(0.03)	62,728.83
	Ống thép đen	3,269.02	16,614,824.95	4,076.13	5%	(0.02)	8,152.26
	Tôn	2,555.67	9,729,174.40	3,119.16	8%	(0.02)	6,238.32

Table 4-4 : Summary of Exponential Smoothing Adjusted for Trend: Holt's Method

4.1.4.4 Exponential Smoothing Adjusted for Trend and Seasonal Variation: Winters' Method

Winters' three-parameter linear and seasonal exponential smoothing method, an extension of Holt's method, might represent the data better and reduce forecast error. In Winters' method, one additional equation is used to estimate seasonality.

		MAD	MSE	RMSE	MAPE	MPE	Tracking signal
Alpha = 0.3 ; Beta = 0.1	Phôi thép	41,365.53	4,067,285,135.80	63,775.27	148%	1.31	127,550.54
	HRC	66,644.73	11,934,208,657.02	109,243.80	35%	0.04	218,487.61
	Thép thanh	177,235.83	58,475,457,052.13	241,816.99	67%	(0.06)	483,633.98
	Ống thép đen	15,612.70	622,248,851.35	24,944.92	30%	0.17	49,889.83
	Tôn	15,762.15	428,107,552.97	20,690.76	56%	(0.00)	41,381.52
Alpha = 0.7 ; Beta = 0.3	Phôi thép	50,491.73	5,566,788,379.84	74,610.91	131%	0.23	149,221.83
	HRC	121,491.33	27,149,442,981.07	164,770.88	64%	0.48	329,541.76
	Thép thanh	236,191.34	79,781,577,049.15	282,456.33	81%	0.41	564,912.66
	Ống thép đen	34,171.79	1,953,243,202.14	44,195.51	67%	0.48	88,391.02
	Tôn	22,113.03	853,769,707.76	29,219.34	74%	0.44	58,438.68

Table 4-5 : Summary of Exponential Smoothing Adjusted for Trend and Seasonal Variation: Winters' Method

4.1.4.5 Wrapping Up

Min	MAD	MSE	RMSE	MAPE	MPE
Phôi thép	11,294	189,940,247	13,782	40%	-2.81009
HRC	9,003	126,712,648	11,257	4%	-0.04025
Thép thanh	23,984	983,726,433	31,364	8%	-0.0766
Ống thép đ	3,269	16,614,825	4,076	5%	-0.01955
Tôn	2,556	9,729,174	3,119	8%	-0.06423

Decision	MAD	MSE	RMSE	MAPE	MPE
Phôi thép	Holt's 2	Holt's 2	Holt's 2	Holt's 2	Holt's 2
HRC	Holt's 2	Holt's 2	Holt's 2	Holt's 2	Holt's 2
Thép thanh	Holt's 2	Holt's 2	Holt's 2	Holt's 2	Holt's 2
Ống thép đ	Holt's 2	Holt's 2	Holt's 2	Holt's 2	Holt's 2
Tôn	Holt's 2	Holt's 2	Holt's 2	Holt's 2	Holt's 2

When comparing error indicators, I have found the method that best suits the current forecast model. This is : **Exponential Smoothing Adjusted for Trend: Holt's Method**

- Alpha = 0.7
- Beta = 0.3

Table 4-6 : Compare errors between 4 methods

With this result, it can be used to forecast sales volume in 2023 with the following values:

Unit : Tấn	Phôi thép	HRC	Thép thanh	Ống thép đen	Tôn
Jan	60,863	182,276	313,597	76,718	32,993
Feb	62,779	178,698	312,264	77,834	32,983
Mar	64,694	175,120	310,932	78,949	32,972
Apr	66,610	171,543	309,600	80,064	32,962
May	68,526	167,965	308,268	81,179	32,951
Jun	70,442	164,387	306,936	82,294	32,941
Jul	72,358	160,810	305,604	83,410	32,930
Aug	74,273	157,232	304,272	84,525	32,920
Sep	76,189	153,654	302,940	85,640	32,909
Oct	78,105	150,077	301,608	86,755	32,899
Nov	80,021	146,499	300,276	87,870	32,889
Dec	81,937	142,921	298,944	88,985	32,878

Table 4-7 : Final estimated demand for 2023

4.1.5 Is there another method?

4.1.5.1 DECOMPOSITION

One approach to the analysis of time series data involves an attempt to identify the component factors that influence each of the values in a series. This identification procedure is called decomposition.

The two simplest models relating the observed value (Y) of a time series to the trend (T), seasonal (S), and irregular (I) components are the additive components model.

- Yt = Tt + St + It (the same variability throughout the length of the series)
- Yt = Tt * St * It (when the variability of the time series increases with the level)

Trend equation :

- Trend(T) = b0 + b1t (the trend appears to be roughly linear)
- Trend(T) = b0 + b1t + b2t^2 (the trend appears to be roughly quadratic)
- Trend (T) = b0*b_1^t ((the trend appears to be roughly exponential)

In order to accurately forecast the equation, many methods are needed to calculate it. However, this is a pretty good calculation.

Seasonality equation :

- Having to remove the trend, to calculate the seasonal index is a must.

Cyclical and Irregular Variations equation :

- Reverse the the cyclical component.

This method is a bit difficult to use, and in order to accurately forecast the trend equation, many factors are really needed.
In addition, from decomposition, it can be further developed using Census II decomposition and The X-12-ARIMA program

4.1.5.2 SIMPLE LINEAR REGRESSION (Updating)

As mentioned above, when analyzing autocorrelation, with too small a value, I feel that using the regression model is not advisable, but in this project, I will still try to use them and see what the results will be.

Muti- Regression Model Procedure
Report analysis:
Determine the market for each procedure.
Collect and analyze data on current revenue
Identify trends in the healthcare industry that may affect revenue

Key assumptions:

4.1.5.3 THE BOX-JENKINS (ARIMA) METHODOLOGY (Upcomming by MiniTab)

The Box-Jenkins methodology of forecasting is different from most methods because it does not assume any particular pattern in the historical data of the series to be forecast. It uses an iterative approach of identifying a possible model from a general class of models. The chosen model is then checked against the historical data to see whether it accurately describes the series

CHAPTER 5 INVENTORY MANAGEMENT AND PRODUCTION PLANNING

5.1 Order Quantities When Demand Is Approximately Level

5.1.1 EOQ and it's component

EOQ should only be used in the following cases:

- The demand rate is constant and deterministic
- The order quantity need not be an integral number of units, and there are no minimum or maximum restrictions on its size.
- The unit variable cost does not depend on the replenishment quantity; in particular, there are no discounts in either the unit purchase cost or the unit transportation cost.
- The cost factors do not change appreciably with time; in particular, inflation is at a low level.
- The item is treated entirely independently of other items; that is, benefits from joint review or replenishment do not exist or are simply ignored.
- The replenishment lead time is of zero duration
- No shortages are allowed.
- The entire order quantity is delivered at the same time
- The planning horizon is very long

Although EOQ is not an exact number to order, however, determining EOQ will be an important foundation for future calculations.

A.Variable costs

Variable costs are those that vary with the level of production. As output increases, so do variable costs, and vice versa.

For enterprises producing steel, cast iron and corrugated iron such as Hoa Phat, the main variable costs include:

Ingredients:

Chi phí biến đổi / 1 tấn thép			
Nguyên vật liệu			
	Quặng sắt	$	600
	Than cốc	$	250
	Phế liệu thép	$	200
	Vôi đá	$	50
	Khí đốt	$	20
	Điện năng	$	10
Nhân công		$	100
Chi phí bao bì		$	50
Chi phí vận chuyển		$	30
Tổng		$	1,310

Table 5-1 : Estimate variable cost / tonne steel

- Iron ore: Accounts for the highest proportion in variable costs, ranging from 50-70% of product costs. The price of iron ore depends on many factors such as the international market, ore quality, the percentage of iron in the ore,... The current iron ore price (May 2024) fluctuates around 80-100 USD/ton
- Coke: Provides energy for the steelmaking process. The price of coke depends on the price of raw coal, transportation and processing costs. The current price of coke (May 2024) fluctuates around 200-300 USD / ton.
- Steel scrap: Recycled raw materials help reduce production costs. The price of steel scrap

demand. The current price of steel scrap (May 2024) fluctuates around 400-500 USD / ton.

- Lime stone: Used to remove impurities in the steelmaking process. The price of limestone is relatively stable, fluctuating around 50-100 USD/ton.

- Combustion gas: Provides heat to the furnace. Gas prices depend on oil and natural gas prices. The current gas price (May 2024) hovers around $5-10/GJ.

B. Fixed costs

Fixed costs are those costs that do not change with the level of production over a certain period of time. Whether output increases or decreases, fixed costs remain relatively stable.

For enterprises producing steel, cast iron and corrugated iron such as Hoa Phat, the main fixed costs include:

Chi phí cố định / 1 tấn thép			
Khấu hao tài sản cố định		$	100
Chi phí thuê nhà xưởng, kho bãi		$	50
Chi phí quản lý		$	150
Chi phí lãi vay		$	50
Chi phí bảo hiểm		$	8
Tổng		$	358

Table 5-2 : Estimate fixed cost / 1 tonne steel

C. Carrying charge

Carrying charge rate ($/$/year)	
Chi phí kho bãi	1%
Chi phí lãi vay	6%
Chi phí bảo hiểm	0.50%
Chi phí hao hụt	1%
Chi phí sửa chữa	2%
Tổng	11%

Table 5-3 : Estimate carrying charge rate by year

5.1.2 Estimate the transportation cost

However, I had trouble using the EOQ formula, as EOQ considers transportation cost to be fixed cost/order. Therefore, I have a few calculations to estimate as follows:

- Sea freight (in case of purchasing from overseas) (CIF)
  - Charter cost: 500 million VND/trip
  - Cost of loading and unloading goods at the port: 20 million VND/trip
  - Cost of cargo insurance: 1% of the value of goods
  - Cost of customs supervision: 5 million VND/trip
  - Transportation agency commission cost: 2% of the value of goods

- Air freight
    - Freight cost: 20,000 VND/kg
    - Cost of loading and unloading goods: 1,000 VND/kg
    - Cost of cargo insurance: 2% of the value of goods
    - Cost of customs clearance: 10 million VND/trip
    - Transportation agency commission cost: 3% of the value of goods
- Trucking (domestic purchase)
    - Fuel cost: 10 million VND/trip (assuming transportation distance is 500 km and fuel consumption is 10 liters/100 km, gasoline price is 20,000 VND/liter)
    - Vehicle wear and tear cost: 2 million VND/trip
    - Driver's salary cost: 5 million VND/trip
    - Vehicle maintenance cost: 1 million VND/trip
    - Cost of car insurance: 2 million VND/trip
    - Transport agency commission cost: 1% of the value of the goods
- Rail transport (domestic purchase)
    - Freight cost: 5,000 VND/ton/km (assuming a transport distance of 500 km and a cargo weight of 10 tons)
    - Cost of loading and unloading goods: 500,000 VND/trip
    - Cost of cargo insurance: 0.5% of the value of goods
    - Transport agency commission cost: 1% of the value of the goods.

Conclude:
To be able to choose the most reasonable transportation cost calculation, I will consider the factors :

- Type of goods: the size, weight, dangerous nature of the goods can affect the transportation cost.
- Media type
- Leadtime
- Cost.

In the Hoa Phat 2023 financial report, the exact purchase value of imported materials is not mentioned, but in the 2022 financial report, the proportion of imported raw material costs accounts for **32.5%** of the total cost of raw materials, while the proportion of domestic raw material costs accounts for **67.5%** of the total cost of raw materials.
The total cost of raw materials is **VND 80,514,711 million.**

According to the 2023 financial report, Hoa Phat's market sales volume reached 329,000 tons of steel and corrugated iron products of all kinds, including domestic and foreign markets.

In the interim, I have not added inventory, based on these values, I can estimate the minimum value of input materials as follows:

- Iron ore: 329,000 tons x (1.6 + 1.8) tons/ton of steel / 2 = 530,400 - 590,400 tons
- Coke: 329,000 tons x (0.6 + 0.7) tons/ton of steel / 2 = 197,400 - 230,300 tons
- Limestone: 329,000 tons x (0.1 + 0.15) tons/ton of steel / 2 = 32,900 - 49,350 tons
- Steel scrap: 329,000 tons x (0.3 + 0.5) tons/ton of steel / 2 = 98,700 - 164,500 tons

Khối lượng nguyên vật liệu đầu vào	
Mức tiêu hao nguyên vật liệu	
Quặng sắt	1,6 - 1,8 tấn/tấn thép
Than cốc	0,6 - 0,7 tấn/tấn thép
Vôi đá	0,1 - 0,15 tấn/tấn thép
Phế liệu thép	0,3 - 0,5 tấn/tấn thép
Phụ gia	0,05 - 0,1 tấn/tấn thép

Table 5-4 : Proportion of raw materials for one tonne steel

- Additives: 329,000 tons x (0.05 + 0.1) tons/ton of steel / 2 = 16,450 - 32,900 tons

In addition, estimating the lot size of sea freight from abroad, I hypothesize as follows:

ASSUMPTION 1:
Hoa Phat chartered vessel with a capacity of 25000 TEU.
TEU = 6.096 m x 2.438 m x 2.591 m = 38.56 m^3
Pallet volume = 1.219 m x 1.016 m x 1.219 m = 1.506 m^3
Number of pallets = TEU volume / Pallet volume = 38.56 m^3 / 1.506 m^3 ≈ 25.6 TEU/pallet.
Estimated mass of material per cubic meter :
- Iron ore density: 3 - 5 tons/m^3
- Coke density: 0.8 - 1.2 tons/m^3
- Rock density: 1.8 - 2.2 tons/m^3

Medium density :
- Iron ore: 4 tons/m^3
- Coke: 1 ton/m^3
- Limestone: 2 tons/m^3

Mass of material per pallet :
- Iron ore: 4 tons/m^3 x 1,506 m^3 = 6,024 tons/pallet
- Coke: 1 ton/m^3 x 1.506 m^3 = 1.506 tons/pallet
- Stone lime: 2 tons/m^3 x 1,506 m^3 = 3,012 tons/pallet

Total volume estimation for 25000 TEU
Total pallets: 25,000 TEU x 25.6 TEU/pallet ≈ 640,000 pallets
Total volume :
- Iron ore: 640,000 pallets x 6,024 tons/pallet = 3,855,360 tons
- Coke: 640,000 pallets x 1,506 tons/pallet = 963,840 tons
- Limestone: 640,000 pallets x 3,012 tons/pallet = 1,927,680 tons

Conclusion :
The use of container cargo to transport iron ore, coke and limestone cannot optimize the storage space due to the bulky size of the item. Moreover, the use of enclosed spaces, also poses a high risk of fire and explosion as well as damage to containers. However, if it is a high-value item, then container closure is quite possible. In that case, you can use Open Top Container, Flat Rack Container, Bulk Container.

ASSUMPTION 2 :
- **Output of corrugated iron steel, pig iron:** 329,000 tons
- **Purchase rate of raw materials from abroad:** 32.5%
- **Number of shipments:** 8 trips/year
- **Type of transportation:** Sea, using bulk, don't use container.
  - **Unit:** tons
  - **Ships** : Capesize ships
  - **Distance** : 6500 nautical miles

Loại nguyên vật liệu		Khối lượng mỗi chuyến (tấn)
Quặng sắt (nhập khẩu)		60,000
Than cốc (nhập khẩu)		20,000
Vôi đá (nhập khẩu)		10,000
Phế liệu thép		
Phụ gia (nhập khẩu)		3,000
Tổng		93,000
Chi phí vận chuyển(25$/tấn)		$ 2,325,000
Chi phí xếp dỡ hàng (Cảng Melbourne : 3$/tấn)		$ 279,000
Chi phí xếp dỡ hàng (Cảng Cát Lái : 3$/tấn)		$ 279,000
Tổng chi phí		$ 2,883,000

Table 5-5 : Estimate transportation cost by bulk type, not using containers

Therefore, the average shipping value, goods from Australia to Vietnam via sea will be equal to: 2,883,000 USD / Trips

Assess:

With total cost of purchasing materials = **80,514,711 million VND 3,426,157,915 Dollar≈**

With 32.5% of foreign material purchase value: **3,426,157,915 x 32.5%** = **$1,113,501,322**

Ratio between freight cost and total purchase value = $\frac{2,883,000}{1,113,501,322} \boldsymbol{x\ 100\% = 0.00205}$ %

With that result, the freight cost value is acceptable.

5.2 EOQ and Lot Sizing

A, EOQ

With a fixed cost (transportation cost) of 2,295,868 (USD/Trips) for purchases from overseas.

Unit : Tấn	Phôi thép	HRC	Thép thanh	Ống thép đen	Tôn	
Jan	60,863	182,276	313,597	76,718	32,993	
Feb	62,779	178,698	312,264	77,834	32,983	
Mar	64,694	175,120	310,932	78,949	32,972	
Apr	66,610	171,543	309,600	80,064	32,962	
May	68,526	167,965	308,268	81,179	32,951	
Jun	70,442	164,387	306,936	82,294	32,941	
Jul	72,358	160,810	305,604	83,410	32,930	
Aug	74,273	157,232	304,272	84,525	32,920	
Sep	76,189	153,654	302,940	85,640	32,909	
Oct	78,105	150,077	301,608	86,755	32,899	
Nov	80,021	146,499	300,276	87,870	32,889	
Dec	81,937	142,921	298,944	88,985	32,878	
Total	856,797	1,951,182	3,675,240	994,223	395,228	7,872,670
Demand nước ngoài (32.5%)	278,459.02	634,134.04	1,194,453.13	323,122.47	128,449.02	2,558,617.68
Demand trong nước (67.5%)	578,337.96	1,317,047.63	2,480,787.27	671,100.52	266,778.73	5,314,052.11

Table 5-6 : Overall demand for 2023

We have the EOQ table, with the following parameters:

Unit : Tấn	Phôi thép	HRC	Thép thanh	Ống thép đen	Tôn
EOQ	96,414	145,495	199,684	103,858	65,482
Inventory turnover	3.40	4.18	4.89	3.53	2.80
Frequency	2.89	4.36	5.98	3.11	1.96
Total relevent cost	7,803,476.98	9,586,125.24	11,230,267.72	8,099,153.35	6,431,029.92
Total Ordering cost	13,261,706.02	20,012,865.99	27,466,499.19	14,285,726.56	9,007,082.68
Total Holding cost	13,261,706.02	20,012,865.99	27,466,499.19	14,285,726.56	9,007,082.68
Total cost ($)	26,523,412.05	40,025,731.97	54,932,998.38	28,571,453.13	18,014,165.36

Table 5-7 : EOQ value for each products

However, during the purchase process, there will be discounts on the price of finished products, or on shipping costs, here is an example:

Mức mua	% Giảm giá	Giá mua sau giảm ($/unit)	Tiết kiệm chi phí
EOQ hiện tại (96.414)	0%	$ 1,310.00	$ -
2x EOQ (192.828)5	5%	$ 1,244.50	$ 65.54
3 x EOQ (289.242)	10%	$ 1,179.50	$ 131.04

Table 5-8 : Discount affects to variable costs

Alternatively, the effects of inflation rate and exchange rate are considered:

Tình huống	Tỷ lệ lạm phát	Tỷ giá hối đoá	Giá mua sau	Chêch lệch
Hiện tại	0%	0%	$1,310	
Tăng	2%	2%	$1.372,22	+3,82%
Tăng	5%	5%	$1.443,11	+10,15%
Tăng	10%	10%	$1.595,69	+21,80%
Tăng & Giảm	2%	-2%	$1.282,98	-2,10%
Tăng & Giảm	5%	-5%	$1.246,89	-4,87%
Tăng & Giảm	10%	-10%	$1.191,58	-9,00%
Giảm & Tăng	-2%	2%	$1.297,02	-0,99%
Giảm & Tăng	-5%	5%	$1.273,93	-2,74%
Giảm & Tăng	-10%	10%	$1.232,44	-6,02%

Table 5-9 : How inflation and exchange rate change to unit costs

Another case is, the company can rely on the criterion "Price set as fixed fractional markup on unit variable cost." By setting the desired profit margin, which in turn will affect the order quantity.

In Taylor's book (2018), the following formula is used, however, I think it will be difficult to implement in practice.

$$Q_{\text{opt}} = \sqrt{\frac{2AD}{v(r+fi)}} = \text{EOQ}\frac{1}{\sqrt{1+fi/r}} \qquad (4.18)$$

Figure 5.1 : Equation of EOQ with price set fixed fractional markup

5.3 Lot Sizing and Merge Order

When the demand rate varies with time, we can no longer assume that the best strategy is always to use the same replenishment quantity; in fact, this will seldom be the case. The methods below, though, can be of great help in deciding how to order, and how many?

- Use of the basic EOQ : L4L và fixed EOQ
- Use of the exact best solution to a particular mathematical model of the situation : Wagner–Whitin algorithm
- Use of an approximate or heuristic method :

Limitations: These methods, which seem to be limited, are only applicable to individual products, with the multi-products problem, which will probably need more research in the near future.

Fixed EOQ

When the demand rate is approximately constant. One possible approach to the case of a time-varying rate is to simply ignore the time variability, thus continuing to use the EOQ.

Phôi thép													
t	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Dt	60,862.8	62,778.6	64,694.4	66,610.2	68,526.0	70,441.8	72,357.7	74,273.5	76,189.3	78,105.1	80,020.9	81,936.7	856,797.0
Qt	96,413.7	96,413.7		96,413.7	96,413.7	96,413.7		96,413.7	96,413.7	96,413.7	96,413.7		867,723.4
It	35,550.9	69,186.0	4,491.6	34,295.1	62,182.8	88,154.6	15,797.0	37,937.2	58,161.7	76,470.3	92,863.1	10,926.4	586,016.8
Setup cost	2,295,868.0	2,295,868.0	-	2,295,868.0	2,295,868.0	2,295,868.0	-	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	-	20,662,812.0
Holding cost	5,122,886.8	9,969,705.5	647,240.2	4,941,922.6	8,960,536.9	12,703,083.1	2,276,345.3	5,466,755.2	8,381,097.0	11,019,370.6	13,381,576.2	1,574,497.7	84,445,017.1
Total cost	7,418,754.8	12,265,573.5	647,240.2	7,237,790.6	11,256,404.9	14,998,951.1	2,276,345.3	7,762,623.2	10,676,965.0	13,315,238.6	15,677,444.2	1,574,497.7	105,107,829.1

Table 5-10 : Merge Order : Using fixed EOQ order

The Wagner-Whitin Method

The Wagner–Whitin algorithm is guaranteed to provide a set of replenishment quantities that minimize the sum of replenishment plus carrying costs out to a specified horizon.

SUMMARY TABLE	**Phôi thép**											
Last Period with Ordering	Planning Horizon (t)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2,295,868	80,166,260,001	245,386,901,921									
2		4,591,736	82,614,912,696									
3			6,887,604	85,063,565,391	260,069,634,619							
4				9,183,472	87,512,218,086	267,411,000,968	544,598,245,773	923,966,666,153				
5					11,479,340	89,960,870,781	274,752,367,317	559,278,682,603				
6						13,775,208	92,409,523,476	282,093,733,666	573,959,119,433			
7							16,071,076	94,858,176,171	289,435,100,015			
8								18,366,944	97,306,828,866	296,776,466,364		
9									20,662,812	99,755,481,561	304,117,832,713	
10										22,958,680	102,204,134,256	
11											25,254,548	104,652,786,951
12												27,550,416
	2,295,868	4,591,736	6,887,604	9,183,472	11,479,340	13,775,208	16,071,076	18,366,944	20,662,812	22,958,680	25,254,548	27,550,416
	1	2	3	4	5	6	7	8	9	10	11	12

Table 5-11 : Merge Order : Using the Wagner-Whitin Method

The Heuristics Approach

A, The Silver-Meal

The Silver–Meal heuristic selects the replenishment quantity in order to replicate a property that the basic EOQ possesses when the demand rate is constant with time, namely, the total relevant costs per unit time for the duration of the replenishment quantity are minimized.

Phôi thép													
t	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Dt	60,862.8	62,778.6	64,694.4	66,610.2	68,526.0	70,441.8	72,357.7	74,273.5	76,189.3	78,105.1	80,020.9	81,936.7	856,797.0
Qt	60,862.8	62,778.6	64,694.4	66,610.2	68,526.0	70,441.8	72,357.7	74,273.5	76,189.3	78,105.1	80,020.9	81,936.7	856,797.0
It	-	-	-	-	-	-	-	-	-	-	-	-	-
Setup cost	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	27,550,416.0
Holding cost	-	-	-	-	-	-	-	-	-	-	-	-	-
Total cost	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	27,550,416.0

Table 5-12 : Merge Order – Using the Silver-Meal Method

B. The Least Unit Cost

The Least Unit Cost (LUC) heuristic is similar to the Silver–Meal heuristic except that it accumulates requirements until the cost per unit (rather than the cost per period) increases

Phôi thép													
t	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Dt	60,862.8	62,778.6	64,694.4	66,610.2	68,526.0	70,441.8	72,357.7	74,273.5	76,189.3	78,105.1	80,020.9	81,936.7	856,797.0
Qt	60,862.8	62,778.6	64,694.4	66,610.2	68,526.0	70,441.8	72,357.7	74,273.5	76,189.3	78,105.1	80,020.9	81,936.7	856,797.0
It	-	-	-	-	-	-	-	-	-	-	-	-	-
Setup cost	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	27,550,416.0
Holding cost	-	-	-	-	-	-	-	-	-	-	-	-	-
Total cost	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	2,295,868.0	27,550,416.0

Table 5-13 : Merge Order : Using the Least Unit Cost

Other Methods :

- Part – Period Balancing : select the number of periods covered by the replenishment such that the total carrying costs are made as close as possible to the setup cost.
- Heuristics : Networking

Model Evaluation :

- Obviously, by current parameters, optimal merge orders are impossible. The question is, how to adjust the parameters, in order to get the most optimal value, remains a difficult problem
- Although it is impossible to find the right merge order value, however, using the above algorithms is still very useful, when considering problems related to Lot Sizing.

Note:

The above problems, only apply in cases where the variability of demand is moderate, and not applicable to multi-product.

5.4 Re-Order Point and Safety stock

To further improve my model, I considered other components such as On-hand stock, net stock, inventory position, safetystock, shortage cost, back-ordering cost and lost sale.

Use ABC Classification: to classify the goods.

ABC Classification						
Name	Sale	% sale	Accumulative	Value	% value	Class
Tôn	395,228	5.02%	5.02%	22,271,083,850	0.09%	C
Phôi thép	856,797	10.88%	15.90%	4,376,283,353,022	17.24%	B
Thép thanh	3,675,240	46.68%	62.59%	20,917,079,434,845	82.40%	A
HRC	1,951,182	24.78%	87.37%	16,618,019,192	0.07%	B
Ống thép	994,223	12.63%	100.00%	51,142,333,372	0.20%	C
Total	7,872,670			25,383,394,224,281		

Table 5-14 : ABC Classification of products

Assumption

- Decision Rule for Continuous – Review, Order-Point, Order-Quantity(s,Q) Control System.
- Based on observing Hoa Phat's operating model, I decided to choose the (s,Q) inventory system, to find out the associated costs.

Suppose:

- Back-ordering cost (B2): The cost incurred, if the business resets products that are out of stock.
    - Cost of purchasing materials: if acquired, may be higher than at the time of initial purchase
    - Shipping costs: usually higher, due to hasty deliveries
    - Order processing costs: often increase, due to the need to process orders in a short time.
    - Storage costs
    - Compensation costs: if the delivery is late, or the product is missing, it is possible to compensate for discounts, handle claims
    - Cost of loss of revenue
    - The cost of losing brand credibility.

Back - Ordering cost / unit (tấn)		
Chi phí mua	$	1,310
Chi phí vận chuyển(1 tấn)	$	100
Chi phí xử lý đơn hàng	$	50
Chi phí lưu kho	$	10
Chi phí bồi thường	$	200
Chi phí mất doanh thu	$	500
Chi phí mất uy tín thương hiệu	Khó ước tính	
Tổng	$	2,170

Table 5-15 : Estimate back order cost per tonne

- With demand volatility increasing by 5% (minus on-hand inventory), then we can estimate the following missing units:
    - B2 = average demand x 5% x back-order cost/unit.

Back - Ordering cost / unit (tấn)	
Ước lượng S.L thiếu (10%)	$ 7,746,872.69

- Leadtime: Time of delivery in normal distribution N (mean = 30 days, var = 10^2)

Ước lượng leadtime từ Úc - Việt Nam		
Thời gian sản xuất		
	Quặng sắt	1-2 tuần
	Than cốc	2-3 tuần
Thời gian vận chuyển		
	Tàu biển	20-30 ngày
	Máy bay	2-3 ngày
Xử lý hải quan		3-5 ngày
Tổng	Tàu biển	30-40 ngày
	Máy bay	5-8 ngày
Leadtime ước tính nằm trong khoảng Normal Distribution N(30,10) ngày		

Table 5-16 : Estimate the leadtime of each order

After calculating, I calculated the table of re-order points and safety stock as follows:

Unit (Tonne)	Phôi thép	HRC	Thép thanh	Ống thép đen	Tôn
Annual Demand	856,796.98	1,951,181.67	3,675,240.40	994,222.99	395,227.75
EOQ	165,233.00	249,348.00	342,216.00	177,992.00	112,223.00
Time per order (month)	2.31	1.53	1.12	2.15	3.41
G(r*) Prob{X ≤ x}, c.d.f of demand during leadtir	0.999981399	0.999981399	0.999981399	0.999981399	0.9999814
θ (E(X) mean demand during leadtime)	77,120.54	175,626.42	330,809.44	89,490.30	35,574.56
Var (std dev of demand during leaditme.)	41,797.40	94,758.37	176,890.30	48,003.27	19,015.44
G(r*)	0.999981399	0.999981399	0.999981399	0.999981399	0.9999814
z - statistics - Normal Distribution	0.84	0.84	0.84	0.84	0.84
Re - order point	112,286.37	255,350.45	479,634.38	129,877.38	51,573.02
Safety stock (monthly)	35,165.83	79,724.03	148,824.93	40,387.08	15,998.46

Table 5-17 : Re-order point and safety stock

5.5 Other Factors :

A, Cotinuous versus Periodic Review

	Continuous Review	Periodic Review
Characteristics	the stock status is always known, each transaction (shipment, receipt, demand, etc.) triggers an immediate updating of the status. Suitable for fast-moving items where there are many transactions per unit of time	the stock status is determined only every R time units Uncertainty as to the value of the stock level. Suitable for medium and slow-moving items.
Advantages	Decision can be made at practically any moment in time. Provide the same level of customer service, it requires less SS	More appealing (all items in a coordinated group can be given the same review interval.) Allows a reasonable prediction of the level of the workload on the staff involved
Disadvantages	More expensive (reviewing costs and reviewing errors)	Higher carrying costs.

Inventory Policy	Order – Point, Order-Quantity (s,Q) System	Order – Point, Order-Up-to-Level (s,S) System	Periodic-Review, Order-Up-to-Level (R,S) System
	A fixed quantity Q is ordered whenever the inven tory position drops to the reorder point s or lower.	Continuous review, a replenishment is made whenever the inventory position drops to the order point s or lower (S = s + Q) Min-max range Q.	A replenishment cycle system. Frequently seen when items are ordered from the same supplier, or require resource sharing
Advantages	Quite simple, error less likely occur, production requirements for the supplier are predictable	frequently encountered in practice.	Control the inventory position. More saving in LCL movements. Flexible to change S, because demand pattern is changing with time.
Disadvantages	Unmodified form, and if the transaction that triggers the replenishment in an (s,Q) system is large enough, then, a replenishment of size Q won't even raise the inventory position above the reorder point	Suppliers could make errors more frequently,	Higher the carrying cost than continuous-review systems.

CHAPTER 6 PRODUCTION PLANNING & MRP

6.1 Production process line

Basically, the production process as well as the standard of production have been standardized. Therefore, here are a few common steelmaking processes.

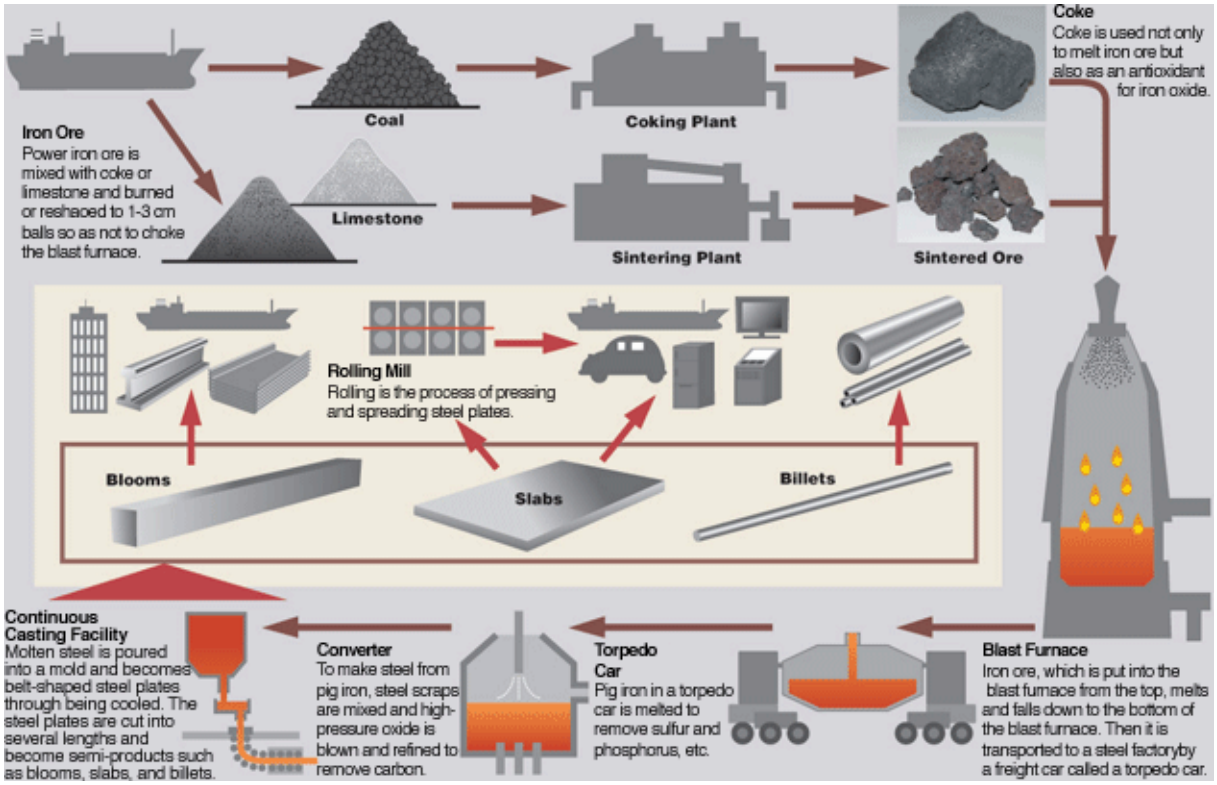


Figure 6.1 : Steel (Billets) production line

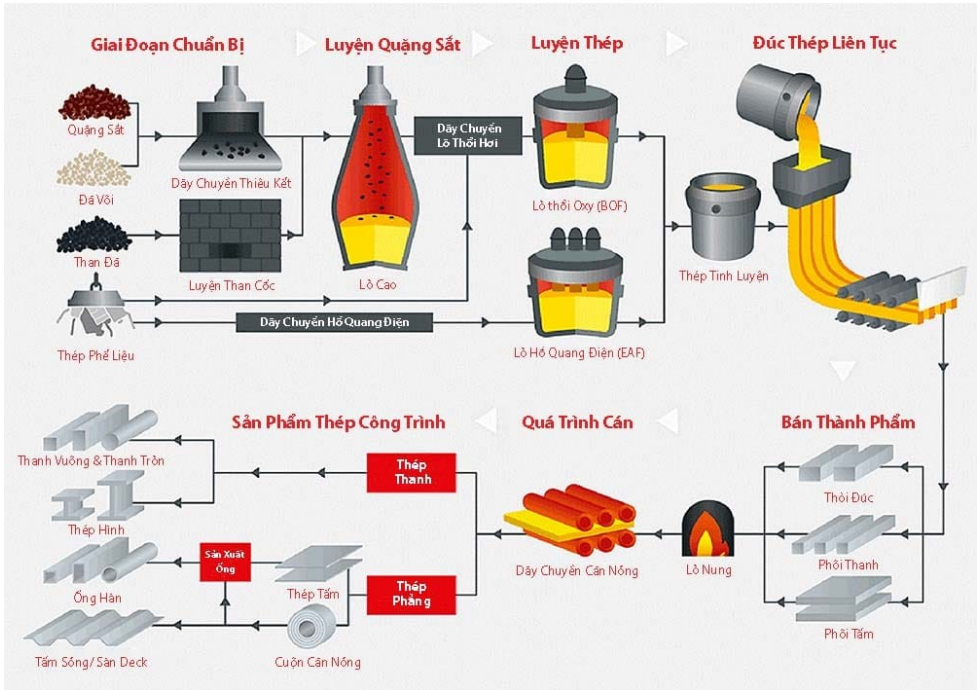


Figure 6.2 :Production process of construction steel and steel pipes

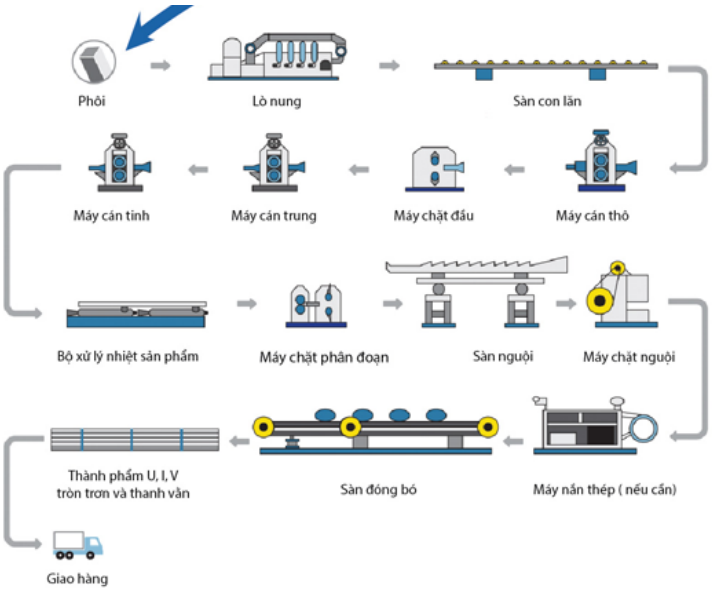


Figure 6.3 : Hot rolled coil production process (HRC)

Work center						
Mã WC	Tên WC	Mô tả	Vị trí	Sức chứa	Năng suất	Chi phí(VND/tấn)
HRC01	Lò nung	nung nóng quặng sắt, than cốc và đá vôi để tạo thành gang nóng.		100-800 tấn/giờ		
HRC02	Máy cán thô	cán gang nóng thành phôi thép		100-1000 tấn / giờ		100,000
HRC03	Máy chặt đầu	cắt bỏ phần đầu và đuôi của phôi thép.		50-200 tấn/giờ		20,000
HRC04	Máy cán trung	cán phôi thép thành các sản phẩm thép khác nhau, chẳng hạn như thép xây dựng, thép HRC, tôn màu và ống thép.		50-500 tấn/giờ		50,000
HRC05	Máy cán tĩnh	cán các sản phẩm thép có độ dày lớn, chẳng hạn như thép tấm và thép hình		20-200 tấn/giờ		10,000
HRC06	Bộ xử lý nhiệt	nung nóng và làm nguội thép				150,000
HRC07	Máy chặt phân đoạn	cắt các sản phẩm thép thành các đoạn có độ dài mong muốn.		50-200 tấn/giờ		30,000
HRC08	Sàn nguội	làm nguội các sản phẩm thép sau khi cắt phân đoạn.				10,000
HRC09	Máy chặt nguội	cắt tỉa và hoàn thiện các chi tiết của sản phẩm.		50-200 tấn/giờ		20,000
HRC10	Máy nắn thép	nắn thẳng các sản phẩm thép bị cong vênh.		50-200 tấn/giờ		10,000
HRC11	Sàn đóng bó	đóng gói các sản phẩm thép thành bó trước khi giao hàng.				5,000
HRC12	Đóng hàng					10,000
					Tổng	415,000

Table 6-1 : Work center for HRC production line

Route : sản xuất thép HRC	Mã route	Mô tả	Bản đồ	Nguyên liệu đầu vào	Sản phẩm đầu ra	Cycle time	Năng suất	Chi phí
HRC		Thép HRC		Phôi thép 95%	HRC mã 1			
				Hợp kim 5%				

Table 6-2 : Route production

BOMB										
	Billet	Alloy	Iron ore	Coke	Limestone	Additives	Lubricants	Anti-rust agent	Deoxidizer	Colorants
Billet			60-70%	25-30%	5-10%	1-2%	1%	1%	0.50%	0.50%
Construction steel	95-98%	2-5% (mangan, silic, crom)								
HRC Steel	90-95%	5-10% (mangan, silic, crom)								
Color sheet	80-90%					1-5% (galvanized, painted)				
Steel pipes	95-98%	2-5% (food, silic, crom)								

Table 6-3 : Bill of Materials

Nhóm thép	Loại thép	Mác thép	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	B			
Thép cuộn cán nóng HRC	Thép cacbon - SAE J403	SAE1006	≤0.08	≤0.1	≤0.45	≤0.03	≤0.03	≤0.2	≤0.15	≤0.2	≤0.06	-			
		SAE1006B	≤0.08	≤0.1	≤0.45	≤0.03	≤0.03	≤0.2	≤0.15	≤0.2	≤0.06	≥0.0008			
		SAE1008	≤0.1	≤0.15	≤0.5	≤0.03	≤0.03	≤0.2	≤0.15	≤0.2	≤0.06	-			
		SAE1008B	≤0.1	≤0.15	≤0.5	≤0.03	≤0.03	≤0.2	≤0.15	≤0.2	≤0.06	0.0008			
		SAE1010	0.08 ÷ 0.13	≤0.2	0.3 ÷ 0.6	≤0.03	≤0.03	≤0.2	≤0.15	≤0.2	≤0.06				
			C	**Mn**	**P**	**S**	**Cu**	**Ni**	**Cr**	**Mo**	**V**	**Ch**	**Ti**	**Giới hạn đàn hồi (Mpa)**	**Độ giãn dài (%)(cữ đo**
	Thép lá cán nóng và cuộn cán nóng	Type A	0.1	0.6	0.03	0.035	0.2	0.2	0.15	0.06	0.008	0.008	0.025	205 ÷340	Nhỏ nhất 25
		Type B	0.02 ÷ 0.15	0.6	0.03	0.035	0.2	0.2	0.15	0.06	0.008	0.008	0.025		
		Type C	0.08	0.6	0.01	0.035	0.2	0.2	0.15	0.06	0.008	0.008	0.025		
		Type D	0.1	0.7	0.03	0.035	0.2	0.2	0.15	0.06	0.008	0.008	0.025		
			C	**Mn**	**P**	**S**	**Giới hạn chảy MPa**	**Giới hạn bền MPa**	**Chiều dày**	**Mẫu thử**	**Độ giãn dài %**	**Góc uốn**	**Bán kính gối uốn**	**Mẫu thử**	
	Thép cán cho kết cấu thông thường	SS330			≤0.05	≤0.05	≥205	330 ÷ 430	T≤5	Mẫu 5	26 min	180	0.5T	Mẫu 1A	
		SS400							5<T≤16	Mẫu 1A	21 min				
		SS490			≤0.05	≤0.05	≥245	400 ÷ 510	T≤5	Mẫu 5	21 min	180	1.5T	Mẫu 1A	
		SS540							5<T≤16	Mẫu 1A	17 min				
					≤0.05	≤0.05	≥385	490 ÷ 610	T≤5	Mẫu 5	19 min	180	2T	Mẫu 1A	
									5<T≤16	Mẫu 1A	15 min				
			≤0.3	≤1.6	≤0.04	≤0.04	≥400	≥540	T≤5	Mẫu 5	16 min	180	2T	Mẫu 1A	
									5<T≤16	Mẫu 1A	13 min				
			C	Si	Mn	P	S	CEV	Giới hạn chảy	Giới hạn bền	Mẫu thử	Độ giãn dài %			
	Thép cán cho kết cấu hàn	SM400A	≤0.23		≥2.5%C	≤0.035	≤0.035	-	≥245	400-510	T≤ 5: Mẫu 5	23 min			
		SM400B	≤0.2	≤0.35	0.60 – 1.5	≤0.035	≤ 0.035	-			5<T≤16: Mẫu 1	18 min			
		SM400C	≤0.18	≤0.35	0.60 – 1.5	≤0.035	≤ 0.035	-							
		SM490A	≤0.2	≤0.55	≤1.65	≤0.035	≤0.035	≤0.38	≥345	490 - 610	T≤ 5: Mẫu 5	22 min			
		SM490B	≤0.18	≤0.55	≤1.65	≤0.035	≤0.035	≤0.38			5<T≤16: Mẫu 1	17 min			
		SM490C	≤0.2	≤0.55	≤1.65	≤0.035	≤0.035	≤0.38							
		SM490YA	≤0.2	≤0.55	≤1.65	≤0.035	≤0.035	≤0.38	≥365	490 - 610	T≤ 5: Mẫu 5	19 min			
		SM490YB	≤0.2	≤0.55	≤1.65	≤0.035	≤0.035	≤0.38			5<T≤16: Mẫu 1	15min			
		SM520B	≤0.2	≤0.55	≤1.65	≤0.035	≤0.035	≤0.4	≥365	520 - 640	T≤ 5: Mẫu 5	19 min			
		SM520C	≤0.2	≤0.55	≤1.65	≤0.035	≤0.035	≤0.4			5<T≤16: Mẫu 1	15 min			
			C	Mn	P	S	1.2≤T<1,6	1.6≤T<2	2≤T<12.5	2.5≤T<3.2	3.2≤T<4	4≤T	T≤3.2	T>3,2	
	Thép cuộn cán nóng chất lượng thương mại và gia công	SPHC	≤1.2	≤0.6	≤0.045	≤0.035	≥270	≥27	≥29	≥29	≥29	≥29	≥31	Mẫu 5	180
		SPHD	≤0.1	≤0.45≤	0.035	≤0.035	≥270	≥30	≥32	≥33	≥35	≥35	≥39		
		SPHE	≤0.08	≤0.4≤	0.03	≤0.03	≥270	≥32	≥34	≥35	≥37	≥37	≥41		
		SPHF	≤0,08	≤0.35	≤0.025	≤0.025	≥270	≥37	≥38	≥39	≥39	≥40	≥42		
	Thép cacbon kết cấu	Q195	≤0.12	≤0.3	≤0.5	≤0.035	≤0.04	≤0.3	≤0.3	≤80	≥195	315-430	≥33	T≤: Mẫu P5	180
		Q215A		≤0.15	≤0.35	≤1.2	≤0.045	≤0.05	≤0.3	≤0.3	≤80	≥215	3335-450	3≤T<16: Mẫu P14	
		Q215B		≤0.15	≤0.35	≤1.2	≤0.045	≤0.045	≤0.3	≤0.3	≤80				
		Q235A		≤0.22	≤0.35	≤1.4	≤0.045	≤0.05	≤0.3	≤0.3	≤80	≥235	370-500		
		Q235B		≤0.20	≤0.35	≤1.4	≤0.045	≤0.045	≤0.3	≤0.3	≤80				
		Q275A		≤0.24	≤0.34	≤1.5	≤0.045	≤0.05	≤0.3	≤0.3	≤80	≥275	410-540		
		Q275B		≤0.21	≤0.34	≤1.5	≤0.045	≤0.045	≤0.3	≤0.3	≤80				

Table 6-4 : HRC steel production item code

6.2 MRP

Unit : Tấn	Phôi thép	HRC	Thép thanh	Ống thép đen	Tôn
Jan	60,863	182,276	313,597	76,718	32,993
Feb	62,779	178,698	312,264	77,834	32,983
Mar	64,694	175,120	310,932	78,949	32,972
Apr	66,610	171,543	309,600	80,064	32,962
May	68,526	167,965	308,268	81,179	32,951
Jun	70,442	164,387	306,936	82,294	32,941
Jul	72,358	160,810	305,604	83,410	32,930
Aug	74,273	157,232	304,272	84,525	32,920
Sep	76,189	153,654	302,940	85,640	32,909
Oct	78,105	150,077	301,608	86,755	32,899
Nov	80,021	146,499	300,276	87,870	32,889
Dec	81,937	142,921	298,944	88,985	32,878

Table 6-5 : Demand in 2023

Requirement for phôi thép :

		Period											
Item : Phôi thép		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lot size : Packing standardization	LT: 1 month												
Gross Requirement		612,816	611,072	609,328	607,584	605,840	604,096	602,352	600,608	598,865	597,121	595,377	593,633
Scheduled Receipt													
Projected on hand													
Net Requirement													
Planned Order Receipt													
Planned Order Release													

Table 6-6 : Example about MRP checklist

Dựa vào tỉ lệ của BOM, ta có thể dễ dàng ước tính được số lượng nguyên vật liệu đầu vào, ta tính được tỉ lệ sau :

Unit : Tấn		Period											
Item : Phôi thép		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lot size : Packing standardization	LT: 1 month												
Gross Requirement	Phôi thép	612,816	611,072	609,328	607,584	605,840	604,096	602,352	600,608	598,865	597,121	595,377	593,633
	Quặng sắt	398,330.19	397,196.67	396,063.14	394,929.62	393,796.09	392,662.57	391,529.05	390,395.52	389,262.00	388,128.47	386,994.95	385,861.42
	Than cốc	153,203.92	152,767.95	152,331.98	151,896.01	151,460.04	151,024.07	150,588.09	150,152.12	149,716.15	149,280.18	148,844.21	148,408.24
	Vôi đá	55,153.41	54,996.46	54,839.51	54,682.56	54,525.61	54,368.66	54,211.71	54,054.76	53,897.81	53,740.87	53,583.92	53,426.97
	Phụ gia	6,128.16	6,110.72	6,093.28	6,075.84	6,058.40	6,040.96	6,023.52	6,006.08	5,988.65	5,971.21	5,953.77	5,936.33

Table 6-7 : Total raw materials needed by BOM

In January :

- Billet = demand billet + demand steel HRC * 95% + demand steel bar *90% + demand black steel pipe * 90% + demand of corrugated iron * 95%

⇨ Billet = 60.863 + 182.276*95% + 313.597*90% + 32.993*95% = 612.816 (tons)

- Iron ore = total billet demand*65%

⇨ Iron ore = 612,816 * 65% = 398,330 (tons)

- Coke = total billet demand*25%

⇨ Coke = 612,816 * 25% = 153,203.92 (tons)

- Limestone = total billet demand*9%

⇨ Limestone = 612,816 * 65% = 55,153.41 (tons)

- Additives = total demand billet*1%

⇨ Additives = 612,816 * 1% = 6,128.16 (tons)

CHAPTER 7 IMPORT PROCEDURE

7.1 Import process:

Process		**Requirement**	**Notes**
Train booking		Signing foreign trade contracts	Check POL & POD, shipment name, weight, ETD, Packing time, container information
		Provide information to fwd VN to get Booking information	
		Contact a package coordination partner	
Check & complete booking			
Track the packaging process and exporter information		Take photos of containers to ensure no damage	
		Frozen goods, temperature panel photography	
Check relevant documents and documents			
Notification of arrival	B/L	Import/exporter information, container number, ship name, seal, trip number, description of goods + surcharge	
	D/O	Referral, Original Bill, Power of Attorney	
Procedures for importing goods	Determination of the type of imported goods		
	Check the set of import and export documents	Foreign Trade Contract (Sale Contract)	
		Commercial Invoice	
		Shipment waybill (B/L)	
		Packing list	
		Certificate of Origin (C/O)	
	Declaration and transmission of customs declarations	After obtaining an Arrival Notice from the shipping line, enterprises declare information on ECUSS5 and transmit the electronic declaration	It is recommended to declare before the train reaches its destination, declare the correct HS Code, avoid administrative penalties for tax fraud
	Get a delivery order	Identity card / Citizen ID copy	Enterprises go to the carrier to get the Delivery Order
		Duplicate bill of lading	

		Original bill of lading with carpentry	
	Preparation of customs documents		
	Paying taxes	Includes Import Duty + VAT	Depending on the goods, they will pay additional environmental tax + excise tax.

Table 7-1 : Import process

Requrement :

As calculated above, I will rely on the EOQ volume as the basis for the calculation. Using bulk cargo for transport, MEARSK's Capasize ship.

Purchased goods are transported from the port of Melbourne, Australia to the port of Cai Lat, Vietnam.

Loại nguyên vật liệu		Khối lượng mỗi chuyến (tấn)
Quặng sắt (nhập khẩu)		60,000
Than cốc (nhập khẩu)		20,000
Vôi đá (nhập khẩu)		13,000
Phế liệu thép		
Phụ gia (nhập khẩu)		-
Tổng		93,000
Chi phí vận chuyển(25$/tấn)		$ 2,325,000
Chi phí xếp dỡ hàng (Cảng Melbourne : 3$/tấn)		$ 279,000
Chi phí xếp dỡ hàng (Cảng Cát Lái : 3$/tấn)		$ 279,000
Tổng chi phí		$ 2,883,000

Table 7-2 : Estimate transportation cost

Key important notes :

Document	Key Features	Normal Value	Adjust Value
Sale Contract	Package	Depends on the container, packaging, contains the product. Example: 500 kgs	Not to mention. Because the goods are bulk, and there will be no need for packages.
Commercial Invoice	Cont/Seal No.	Declare Cont and Seal numbers, e.g. MSCU1234567	Not to mention, because I'm assump bulk cargo, and not packed into containers.
Packing List	CTN/PCS	Must declare CTN.No, CTN. Quantity, PCS No. Total PCS.	It will also be vacant, due to no requirement for containers.
	CAT(Carton Application Type)	- 10' Standard Dry - 20' Standard Dry - 40' Standard Dry - 40' High Cube Dry - 45' High Cube Dry - 20'/40' Reefer	There will also be empty, as there is no requirement for cargo containers.
	Weight	Gross Weight = Net Weight + Carton weight	Skip Carton Weight
CO			No adjustments

Phytosanitary Certificate			No need : due to the peculiarities of the item not required.
Shipping Instruction	Container / Seal No. Size/Type No/Kind of Package CBM Condition (Reefer / Temperature / Humidity)	Normal can be recorded as: 15x Cont 40ft WHLU4254220 40” DV Pallet declaration CBM declaration Must declare according to the characteristics of goods.	Do not write in, because the cargo does not use containers. Iron ore, coke, lime and rock, it is necessary to avoid direct exposure to the sun, rain, high humidity, because it will cause oxidation, explosion, mold. Keep open levels stable, and have safety shielding.
Bill of Landing	Customer Order	Request which cont, quantity, conveyed or not, and further notes	
	Carrier	Declare handing unit, package	It can't be completed, the handling unit, be it space, or the cargo tank code.

Table 7-3 : Key important notes about documents

7.2 Sale contract

SALES CONTRACT

NO: HPBHP 03/IM
DATE: June 04, 2024

The Seller:
BHP GROUP LTD
Add :171 COLLINS STRESS, MELBOURNE, VICTORIA 3000, AUSTRALIA
Tel : (61 3) 1300 55 47 57

Hereinafter called “the Seller”:

The Buyer:
HOA PHAT GROUP JOINT STOCK COMPANY
Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM
Tel: (028) 629 75 599

Hereinafter called “the Buyer”

It is mutually agreed that the Seller sells and the Buyer buys commodities on terms and conditions hereunder stipulated:

Article 1: Commodity, Quantity, Price, Quality, Packing and Marking.
Commodity:

No	Description of Goods	HS Code	Unit	Qty(tonne)	Price/ unit (USD)	Total (USD)
1	Iron Ore (65% Fe)	26012000	Tonne	60,000	130	7,800,000
2	Limestone	25210000	Tonne	20,000	100	2,000,000
3	Metallurgical Coke	27040090	Tonne	13,000	180	2,340,000
19	Package		Tonne			-
TOTAL FOB MELBOURNE			Tonne	93,000		12,140,000
FREIGHT						2,325,000
	TOTAL PAYMENT					14,465,000
	Say word: Fourteen million and four sixty-five thousand US dollar					

- Total amount of the contract: USD 14,465,000/CFR CAI LAT PORT-Incoterm 2010.
  (In word: Fourteen million and four sixty-five thousand US dollar**.** only).
- Quality: New 100% according to export standard quality.
- Origin: Australia
- Packing: Export packing standard suitable to sea transportation.
- Marking: Manufacturer's own marking

Article 2: Shipment
- Latest date of shipment: Allowed
- Port of loading: Allowed
- Port of destination: Cat Lai, Viet Nam
- Partial shipments: Allowed.
- Transshipment: Allowed.
- After the cargo loaded, within 2 working days, the Seller will inform the Buyer by email of commodity, contract number, quantity, B/L No. Should the Seller fail such advice, any loss and damage to the goods is to be on the Seller's account.

Article 3: *Payment*
Payment for 100% contract amount by L/C for the Buyer' Bank after shipment through:
Issue Bank : THE JOINT STOCK COMMERCIAL BANK FOR FOREIGN TRADE OF VIETNAM Quang Ngai Branch
SWIFT BIC : BFTVVNVX027
Add Bank : No. 345 Hung Vuong Avenue, Quang Ngai, Vietnam
Intermediary Bank : THE COMMONWEALTH BANK OF AUSTRALIA United Kingdom Branch
SWIFT BIC: CTBAAU2S XXX
Beneficiary's Branch in Australia: THE COMMONWEALTH BANK OF AUSTRALIA Melbourne Branch
Acc Number: 1107025029914015339
SWIFT BIC: CTBAAU2S 3FX
Add Bank:No 325 Collins St, Melbourne Specialist Centre

The shipping documents to be presented:

- Commercial Invoice with 03 Original .
- Packing list (if have)

Article 4: Warranty
Warranty: none

Article 5 : Insurance
The two parties agreed to purchase insurance from Bao Viet Company (110%), Vietnam to apply to the shipment from the time the goods are loaded onto the ship at the Port of Melbourne, Australia.

Article 6: Claim.
The Seller has liability for proceeding the inspection of goods before shipment and bear all expenses occurred.
All claims by the Buyer shall be made within 15 days for shortage and 45 days for quality after goods landed at port of arrival and shall be confirmed in writing together with Survey report issued by the Vietnam superintendence and inspection joint stock Company (VINACONTROL).
The Buyer has the right to refuse the goods if the quality of the goods is not suitable to the stipulation in Article 1 of this contract.
The Buyer's claim should be settled by the Seller within 30 days from the date of receiving supporting documents.

7.3 Commercial Invoice

<table>
<tr><td colspan="2">SELLER
BHP GROUP LTD
Addr : No. 171 COLLINS STRESS, MELBOURNE, VICTORIA 3000, AUSTRALIA
Tel : (61 3) 1300 55 47 57</td><td colspan="3">INVOICE NUMBER
BHPV 24-06-005/EX
CUSTOMER REFERENCE NUMBER
HPVN01</td><td>DATE
15th June, 2024
DATE
15th June, 2024</td></tr>
<tr><td colspan="2" rowspan="2">SOLD TO
HOA PHAT GROUP JOINT STOCK COMPANY
Add: No. 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM
Tel: (028) 629 75 599</td><td colspan="4">TERMS OF SALE
CFR</td></tr>
<tr><td colspan="4">TERMS OF PAYMENT
IRREVOCABLE LETTER OF CREDIT AT SIGHT</td></tr>
<tr><td colspan="2" rowspan="2">FROM
MELBOURNE PORT, AUSTRALIA

TO
CAI LAT PORT, VIETNAM</td><td colspan="2">CURRENCY OF SETTLEMENT
USA</td><td colspan="2">CONT/SEAL NO.</td></tr>
<tr><td colspan="2">MODE OF SHIPMENT
CFR</td><td>BILL OF LANDING/AWB
BHPHP490320255</td><td>VESEL
CMA CGM /0029W</td></tr>
<tr><td>QTY</td><td>PRODUCT DESCRIPTION</td><td>HS CODE</td><td>UNIT OF MEASURE</td><td>UNIT COST</td><td>TOTAL ($)</td></tr>
<tr><td>60,000</td><td>Iron Ore (Pellet)</td><td>26012000</td><td>Tonne</td><td>130</td><td>7,800,000</td></tr>
<tr><td>20,000</td><td>Limestone</td><td>25210000</td><td>Tonne</td><td>100</td><td>2,000,000</td></tr>
<tr><td>13,000</td><td>Metallurgical Coke</td><td>27040090</td><td>Tonne</td><td>180</td><td>2,340,000</td></tr>
<tr><td colspan="2">PACKAGE MARKS</td><td colspan="3">TOTAL COMMERCIAL VALUE</td><td>12,140,000</td></tr>
</table>

	MISCCHARGES (PACKING,INSURANCE(2,5%FOB)	**30,350**
	TOTAL INVOICE VALUE	**12,170,350**
CERTIFICATIONS	I CERTIFY THAT THE STATED EXPORT PROCESS ANDA DECRIPTION OF GOODS ARE TRUE AND CORRECT SIGN TITLE: NGUYEN VAN PHONG	

7.4 Packing List

<table>
<tr><td rowspan="2">EXPORTER/SHIPPER NAME :
BHP GROUP LTD
Addr : No. 171 COLLINS STRESS, MALBOURNE, VICTORIA 3000, AUSTRALIA
Tel : (61 3) 1300 55 47 57</td><td colspan="4">INVOICE NO : BHPV 24-06-005/EX
EXP NO :
PACKING LIST : 21968043-1
L/C NO : HPVCB15032024</td><td>DATE : 2024/08/05
DATE
DATE</td></tr>
<tr><td colspan="5">CAT :
H.T.S CODE NO : 26012000, 25210000, 27040090</td></tr>
<tr><td rowspan="4">APPLICANT :
HOA PHAT GROUP JOINT STOCK COMPANY
Add: No. 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM
Tel: (028) 629 75 599</td><td colspan="4">B/L NO : BHPHP490320255</td><td>DATE : 2024/06/05</td></tr>
<tr><td colspan="5">CARRIER : MAERSK AUSTRALIA - CAPASIZE /0029W</td></tr>
<tr><td colspan="5">E.R.C.NO : QS-FE62-1000T-20240512-VN-MEL-CATAI</td></tr>
<tr><td colspan="5">TERMS OF PATYMENT :
IRREVOCABLE LETTER OF CREDIT AT SIGHT</td></tr>
<tr><td rowspan="2">NOTIFY :
VIETNAM PROJECTS TRANSPORT CO.., LTD
Add : 2ND FLOOR, VINACOMEX BUILDING, 47 DIEN BIEN PHU, DAKAO DISTRICT 1, HO CHI MINH CITY, VIETNAM
Tel : +84 28 6279 8383 / 8484 / 8585 / 9393 / 9494 / 9595
Fax : +84 28 6279 9999</td><td colspan="5">L/C ISSUE BANK :
THE JOINT STOCK COMMERCIAL BANK FOR FOREIGN TRADE OF VIETNAM Quang Ngai Branch
SWIFT BIC : BFTVVNVX027
Add Bank : No. 345 Hung Vuong Avenue, Quang Ngai, Vietnam</td></tr>
<tr><td colspan="5">ADVISING BANK :
THE COMMONWEALTH BANK OF AUSTRALIA Melbourne Branch
Acc Number: 1107025029914015339
SWIFT BIC: CTBAAU2S 3FX
Add Bank:No 325 Collins St, Melbourne Specialist Centre</td></tr>
<tr><td>PORT OF LOADING :
MELBOURNE PORT</td><td colspan="5">FINAL DESTINATION : CAT LAI PORT, VIETNAM</td></tr>
<tr><td>PORT OF DISCHARGE : CAT LAI PORT</td><td colspan="5">SHIPPED PER : VESSAL</td></tr>
<tr><td>SHIPPING MARK</td><td>DESCRIPTION OF GOODS</td><td>CTN NO</td><td>CTN QTY</td><td>PCS CTN</td><td>TOTAL PCS</td></tr>
<tr><td>SHIP TO

SIDE MARK :</td><td>Iron Ore (Pellet – 65% Fe)
Limestone
Metallurgical Coke</td><td></td><td></td><td></td><td></td></tr>
</table>

TOTAL GRAND TOTAL CARTON : GRAND TOTAL PCS : GRAND TOTAL NET WEIGHT : 93,000 Tonne GRAND TOTAL GROSS WEIGHT : 93,000 Tonne GRAND MEASUREMENT : CARTON MEASUREMENT : COUNTRY OF ORIGIN : AUTRALIA	FOR,……..LTD. SIGNATURE :

7.5 Certificate of Origin : Form AANZ

<table>
<tr><td colspan="3">1.Goods Consigned from (Exporter's name, address and country)
BHP GROUP LTD
Add :171 COLLINS STRESS, MALBOURNE, VICTORIA 3000, AUSTRALIA
Tel : (61 3) 1300 55 47 57</td><td colspan="3">Certificate No : COBHP2465 Form AANZ</td></tr>
<tr><td colspan="3">2.Goods Consigned to (Importer's/ Consignee's name, address, country)
HOA PHAT GROUP JOINT STOCK COMPANY
Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM
Tel: (028) 629 75 599</td><td colspan="3">AGREEMENT ESTABLISHING THE ASEAN – AUSTRALIA–NEW ZEALAND FREE TRADE AREA (AANZFTA)
CERTIFICATE OF ORIGIN
(Combined Declaration and Certificate)
Issued in …5th July, 2024……
(Country)
(see Overleaf Notes)</td></tr>
<tr><td colspan="3">3. Means of transport and route (if known)
Shipment Date: 10th August,2024
Vessel's name/Aircraft etc.: MEARSK CAPASIZE /0029W
Port of Discharge: Cat Lai Port, Vietnam</td><td colspan="3">4. For Official Use
- Preferential Treatment Given Under AANZFTA
- Preferential Treatment Not Given (Please state reason/s)
……
Signature of Authorised Signatory of the Importing Country</td></tr>
<tr><td>5.Item number</td><td>6.Marks and numbers on packages</td><td>7. Number and kind of packages; description of goods including HS Code (6 digits) and brand name (if applicable). Name of company issuing third party invoice (if applicable)</td><td>8. Origin Conferring Criterion (see Overleaf Notes)</td><td>9. Quantity (Gross weight or other measurement), and value (FOB) where RVC is applied (see Overleaf Notes)</td><td>10. Invoice number(s) and date of invoice(s)</td></tr>
<tr><td>1

2

3</td><td></td><td>Iron Ore (26012000)

Limestone (25210000)

Metallurgical Coke (27040090)</td><td>PE

PE

PE</td><td>60,000 tonne / FOB 7,800,000 USD
20,000 tonne / FOB 2,000,000 USD
13,000 tonne / FOB 2,340,000 USD</td><td>BHPV 24-06-005/EX</td></tr>
<tr><td colspan="3">11. Declaration by the exporter</td><td colspan="3">12. Certification</td></tr>
</table>

The undersigned hereby declares that the above details and statements are correct; that all the goods were produced in ……Australia…… (country) and that they comply with the rules of origin, as provided in Chapter 3 of the Agreement Establishing the ASEAN-Australia-New Zealand Free Trade Area for the goods exported to ……Vietnam…… (importing country) …… Place and date, name, signature and company of authorised signatory Melbourne Port, 5th July,2024 BHP Group LTD. Signature	On the basis of control carried out, it is hereby certified that the information herein is correct and that the goods described comply with the origin requirements specified in the Agreement Establishing the ASEAN-Australia-New Zealand Free Trade Area. ……..... Place and date, signature and stamp of Authorised Issuing Authority/ Body
13. ✔ Back-to-back Certificate of Origin ☐Subject of third-party invoice ☐ Issued retroactively ☐ *De Minimis* ☐ Accumulation	

7.6 Shipping Instruction

SHIPPING INSTRUCTION			MAERSK LINE AUSTRALIA	Date : 5th August,2024 Attn : Receiving department	
Shipper / Exporter (Complte name and address)			Booking No. BHPMAERSK080524		
BHP GROUP LTD Add :171 COLLINS STRESS, MELBOURNE, VICTORIA 3000, AUSTRALIA Tel : (61 3) 1300 55 47 57			Bill of landing type : NEGOTIABLE Ocean B/L : BHPHP490320255	NEGOTIABLE ☐	SEAWAY X
Consignee (complete name and address) HOA PHAT GROUP JOINT STOCK COMPANY Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM			Information Contact Tel: (028) 629 75 599		
Notify Party (Complete name and address) D&T LOGISTICS TRADING COMPANY LIMITED Office : Floor 1, No.34 Hoang Viet Street,Ward 04, Tan Binh Dist, HCM City, Vietnam Tel : +84 28.3825 4246 / 4648/ 4868 Fax : +84-28.3978.0868			2nd Notify Party (Complete name and address) HOA PHAT GROUP JOINT STOCK COMPANY Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM Tel: (028) 629 75 599		
Feeder Name CSCL LE HAVRE	Voy No CSCL LE HAVRE	Port of Loading Melbourne	Service Contract Number		
Mother Vessel MAERSK CAPASIZE	Voy No 0029W	Port of Discharge Cat Lai	HS Code 26012000 25210000 27040090		
		Melbourne Port: Place of Delivery			
PARTICULAR FURNISHED BY SHIPPER - CARRIER NOT RESPONSIBLE					

Container / Seal No	Size / Type	Shipping Marks	Description of goods	No/Kind of Package	Gross weight	Measurement Cbm
			Iron Ore (Pellet) Limestone Metallurgical Coke		93,000 tonne	
			Total		93,000 tonne	

Freight Component	Prepaid	Collect	Invoice party	Draft Bill of Lading Deliver To	Reefer : Keep in 30°C
Feight cost	$ 2,325,000		VIETNAM PROJECTS TRANSPORT CO.., LTD Add : 2nd Floor, Vinacomex Building, 47 Dien Bien Phu, Dakao District 1, Ho Chi Minh City, Vietnam Tel : +84 28 6279 8383 / 8484 / 8585 / 9393 / 9494 / 9595 Fax : +84 28 6279 9999	HOA PHAT GROUP JOINT STOCK COMPANY Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM Fax : Phone : (028) 629 75 599	Temperature Setting Giữ nhiệt độ ở mức ổn định, tránh nhiệt độ cao, tránh ttiếp xúc trực tiếp ánh nắng mặt trời và nước mưa, đảm bảo thông thoáng gió tốt. Riêng đối với than cốc, vôi đá, giữ độ ẩm mở mức 10%,
					Humidity : 10%
Invoice seperation request		Issuing date : 5th, August,2024			Other Requirement Avoid water

7.7 Bill Of Landing

Ship from : Melbourne Port, Australia BHP GROUP LTD Add :171 Collins Stress, Melbourne, Victoria 3000, Australia Tel : (61 3) 1300 55 47 57 SID#: …….FOB Malbourne Port…….	Date of issue : 2024/08/10 Bill of Landing No : BHPHP490320255 Packing List No. : 21968043-1 Bar code space :
Ship to : Cat Lai Port, Vietnam . HOA PHAT GROUP JOINT STOCK COMPANY Add: 643 Dien Bien Phu, 25 Ward, Binh Thanh Dist, Ho Chi Minh City, Viet Nam Tel: (028) 629 75 599 CID # : …….FOB : Cat Lai Port…….	Carrier Name : Maersk Line Vessel / Voyage : MAERSK CAPASIZE/0029W Total No.of Container / Package Received By the Carrier : 0 Trailer No : Seal Number(s) : SCAC : MATS Pro No : Maersk fill in Barcode Space
Third Party Freight Charges – Bill to : VIETNAM PROJECTS TRANSPORT CO.., LTD Add : 2nd Floor, Vinacomex Building, 47 Dien Bien Phu, Dakao District 1, Ho Chi Minh City, Vietnam Tel : +84 28 6279 8383 / 8484 / 8585 / 9393 / 9494 / 9595 Fax : +84 28 6279 9999	Frieght Charge Terms (prepaid unless marked otherwise) Prepaid…… Collect…… 3rd Party..... Master BOL : w/attached underflying BOLs
Special Instructions :	

Customer Order Information

Customer Order No.	# Pkgs	Weight	Pallet / Slip (Y/N)	Additional Shipper Info
Iron Ore (Pellet)		60,000 tonne		
Limestone		20,000 tonne		
Metallurgical Coke		13,000 tonne		
Total				

Carrier Information

Handing Unit		Package		LTL Only		Commodity Description
QTY	TYPE	QTY	TYPE	NMFC No	Class	

						Iron Ore (Pellet)
						Limestone
						Metallurgical Coke
15		225				Totals :

Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property as follows: "The agreed or declared value of the property is specifically stated by the shipper to be not exceeding	COD Amt : $.2,325000..... Fee Terms :…….Collect……..Prepaid (Customer Check Acceptable)
NOTE: Liability Limitation for loss or damage in this shipment may be applicable. See 49 U.S.C. - 14706(c)(1)(A) and (B).	
RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications and rules that have been established by the carrier and are available to the shipper, on request, and to all applicable state and federal regulations. This is to certify that the above named materials are properly classified, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT.	The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. Shipper Signature

Shiper Signature Date	Trailer Loaded - By Shipper - By Driver Freight Counted - By Shipper - By Driver/pallets said to contain - By Driver/Pieces	Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and/or carrier has the DOT emergency response guidebook or equivalent documentation in the vehicle. Property described above is received in good order, except as noted. Carrier Signature

7.8 Customs Declaration

HẢI QUAN VIỆT NAM TỜ KHAI HÀNG HÓA NHẬP KHẨU

Cục Hải quan:

HQ/2015/NK

Chi cục Hải quan đăng ký tờ khai: **Chi cục Hải quan cửa khẩu nhập:**	**Số tham chiếu:** **Ngày, giờ gửi:**	**Số tờ khai:** **Ngày, giờ đăng ký:** **Số lượng phụ lục tờ khai:**	**Công chức đăng ký tờ khai**
1. Người xuất khẩu: BHP GROUP LTD Add :171 COLLINS STRESS, MELBOURNE, VICTORIA 3000, AUSTRALIA Tel : (61 3) 1300 55 47 57 Fax : 61 3 9609 3015	5. Loại hình: A12		
2. Người nhập khẩu: HOA PHAT GROUP JOINT STOCK COMPANY Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM Tel: (028) 629 75 599 Fax : 023.637 22 833 MST 0900189284	6. Hóa đơn thương mại: Số : BHPV 24-06-005/EX Ngày : 05/06/2024	7. Giấy phép số: Ngày Ngày hết hạn	8. Hợp đồng: HPBHP 03/IM Ngày 01/06/2024 Ngày hết hạn
3. Người uỷ thác/người được ủy quyền: Nguyễn Văn Phong Add : Khu phố 6, Linh Trung, Thủ Đức, Thành phố Hồ Chí Minh, Việt Nam Tel : 0899818947 Fax : 023. 623 55 222	9. Vận đơn (số/ngày): Số : BHPHP490320255 Ngày : 10/08/2024	10. Cảng xếp hàng: Cảng Melbourne, Australia	11 Cảng dỡ hàng: Cảng Cát Lái, Việt Nam

CCCD : 036203010436			
MST 8771941268	12. Phương tiện vận tải:		13. Nước xuất khẩu: Australia
4.Đại lý Hải quan: Tên : Công Ty Vận Tải Năm Sao Địa chỉ : Số 2 Lê Phụng Hiểu, Phường Cát Lái, Quận 2, Thành phố Hồ Chí Minh. SDT : 028 3742 3649. Mã chi cục: 02CI Fax Số, ngày hợp đồng đại lý hải quan : 11/09/2024	Tên, số hiệu: CSCL LE HAVRE /0029W Ngày đến 01/09/2024		
	14. Điều kiện giao hàng: CFR CAI LAT PORT-Incoterm 2010	15. Phương thức thanh toán: Irrevocable Letter Of Credit At Sight	
MST	16. Đồng tiền thanh toán: USD	17. Tỷ giá tính thuế: 23,500 VND / USD	

Số TT	18. Mô tả hàng hóa	19.Mã số hàng hóa	20. Xuất xứ	21. Chế độ ưu đãi	22. Lượng hàng	23. Đơn vị tính	24. Đơn giá nguyên tệ	25. Trị giá nguyên tệ
1	Iron Ore (Pellet) – Quặng sắt dùng nung luyện gang thép	26012000	Autralia		60,000	Tấn	130 USD	7,800,000 USD
2	Limestone – đá vôi chuyên dụng nung vật liệu xây dựng	25210000	Australia		20,000	Tấn	100 USD	2,000,000 USD
3	Metallurgical Coke – than cốc metal	27040090	Australia		13,000	Tấn	180 USD	2,340,000 USD

Loại thuế	Trị giá tính thuế/ Số lượng chịu thuế	Thuế suất (%)/ Mức thuế	Tiền thuế
26. Thuế nhập khẩu	12,140,000 USD	5%	607,000 USD / 14,264,500,000 VND
27. Thuế TTĐB		0%	0
28. Thuế BVMT	CIF (14,470,350 USD)	10% (Quặng sắt, than cốc) 5% (vôi đá)	3,614,712 USD / 84,945,732,000 VND
29. Thuế GTGT	CIF (14,470,350 USD)	8 %	1,157,628 USD / 27,204,258,000 VND

30. Tổng số tiền thuế (ô 26+27+ 28+29): 126,414,490,000 VND

Bằng chữ: Một trăm hai mươi sáu tỷ bốn trăm mười bốn triệu bốn trăm chín mươi nghìn đồng

31. Lượng hàng, số hiệu container

Số TT	a. Số hiệu container	b. Số lượng kiện trong container	c. Trọng lượng hàng trong container
1		93,000 tấn (Iron Ore , Limestone, Meltallurgical Coke)	93,000 tấn (hàng rời)
2			**Cộng: 93,000 tấn**

32. Chứng từ đi kèm Hóa đơn thương mại : BHPV 24-06-005/EX Giấy báo kết quả kiểm tra chuyên ngành : CLI110824 Bản chụp hợp đồng ủy thác Giấy chứng nhận nguồn gốc xuất xứ : COBHP2465	33. Tôi xin cam đoan, chịu trách nhiệm trước pháp luật về nội dung khai trên tờ khai Ngày 05 tháng 09 năm 2024 *(Người khai ký, ghi rõ họ tên, đóng dấu)* *Phong* *Nguyễn Văn Phong* *Mộc*

34. Kết quả phân luồng và hướng dẫn làm thủ tục hải quan	36. Xác nhận của hải quan giám sát	37. Xác nhận giải phóng hàng/ đưa hàng về bảo quản/chuyển cửa khẩu	38. Xác nhận thông quan
Luồng vàng 35. Ghi chép khác:			

7.9 Arrival Notice

Logo	VIETNAM PROJECTS TRANSPORT CO.., LTD Add : 2nd Floor, Vinacomex Building, 47 Dien Bien Phu, Dakao District 1, Ho Chi Minh City, Vietnam Tel : +84 28 6279 8383 / 8484 / 8585 / 9393 / 9494 / 9595 Fax : +84 28 6279 9999 www.vnprojects.vn Tax code : 0313768294 Bank account : 0371000446325 (VND) – Vietcombank (Tan Dinh Branch)

TP. Hồ Chí Minh, Ngày 10 tháng 09 năm 2024

GIẤY BÁO HÀNG ĐẾN
ARRIVAL NOTICE
(Thông báo lần 1)

Kính gửi (To) : HOA PHAT GROUP JOINT STOCK COMPANY
Địa chỉ : 643 Dien Bien Phu, 25 Ward, Binh Thanh Dist, Ho Chi Minh City, Viet Nam
Chúng tôi, CÔNG TY TNHH VẬN TẢI VIỆT NAM PROJECTS xin trân trọng thông báo lô hàng của quý công ty :
Chi tiết như sau :
Số HBL (B/L) : BHPHP490320255
Người gửi (Shipper) : CÔNG TY TNHH VẬN TẢI VIỆT NAM PROJECTS
Tên tàu (Vessel name): CSCL LE HAVRE Số chuyến(Voyage) : /0029W
Cảng xếp hàng (P.O.L) : Melbourne Port, Australia Ngày tàu đến (ETA) : 10/09/2024
Cảng dỡ hàng (P.O.D) : Cat Lai Port, Vietnam
Nơi giao hàng : Cảng Cát Lái – kho 02CIS01

Số container / Seal (Cont No / Seal No)	Số lượng (Quantity)	Số kiện (Package)	Tên hàng (Description of goods)	Trọng lượng (G.W / KGS)	Thể tích (CBM)
	93,000 tonne		Iron Ore (Pellet) Limestone Metallurgical Coke	93,000 tonne	
Total : 93,000 tonne				93,000 tonne	

Vui lòng nhận lệnh D/O sau khi nhận được thông báo của chúng tôi trong vòng 5 ngày kể từ ngày tàu đến. Quá thời hạn trên Quý Công ty sẽ trả phí lưu trữ Container và phí lưu bãi.
(You are kindly requested to take the Delivery of above mentioned cargo within 5 days from the date of vessel's arrival. Otherwise, all container demurrage & storage charges will be at your company)
Khi nhận D/O vui lòng mang theo
Endorsed Origin HBL……..FREE DEM : 7 DAYS
Notice of Arrival
Recommendation Letter
Identification Card
LOCAL CHARGES AT HO CHI MINH PORT
Tỷ giá USD và VND tại ngân hàng Vietcombank ngày 10 tháng 09 năm 2024 : 23,050 VND, Căn cứ theo Local Charge 01/08/2022 (SOB).

Tên phí (Name fee)	Đơn vị (Unit)	Số lượng (Quantity)	Mức phí (Rate)	Tổng phí	VAT (8%)	Tổng cước (+ VAT)
Phí chứng từ (DO)	BL	1	VND 864,000	VND 864,000	VND 69,120	VND 933,120
Phí cảng (Port Dues)	1$/tấn	93000 tấn	93,000 $	93,000$/2,185,500,000 VND	174,484,000 VND	2,359,984,000 VND
Phí dẫn đường (Pilotage)	Fixed		7500$	7500$/176,250,000 VND	14,100,000 VND	176,264,100 VND
Phí kéo (Towage)			3500$	3500$/82,250,000 VND	6,580,000 VND	88,830,000 VND
Phí bốc xếp hàng		93000 tấn	1.5$ / tấn	139500$/ 3,278,250,000 VND	262,260,000 VND	3,540,510,000 VND
Tổng số tiền thanh toán						6,165,588,100 VND

Biểu phí lưu trữ Container và lưu bãi (Áp dụng khi hết thời gian ưu đãi)

Demurrage + Detention Combined	Cont.Type	Free Time	Tier 1 Period	Tier 1 Rate/ day	Tier 2 Period	Tier 2 Rate/day	Thereafter Rate/day
	40'DV	7 calendar days	8th to 12th days	VND 882,000	13th to 18th day	VND 1,562,000	VND 2,897,000
Storage	40'DV	6 calendar days					VND 76.526 / USD 3.32

Xin Quý công ty lưu ý :
Địa chỉ liên hệ nhận chứng từ : Công ty TNHH Việt Nam Projects (Địa chỉ : Lầu 2, Tòa nhà Vinaconex, Số 47 Điện Biên Phủ, phường Dakao, Quận 1, Thành phố Hồ Chí Minh.
Công ty chúng tôi nhận làm mọi thủ tục Hải Quan, giao nhận và vận chuyển với giá tốt, đặc biệt hàng quá khổ quá tải như container, Flat Rack, thuê tài rời
Xin vui lòng xác nhận sau khi nhận được thông báo hàng đến (Email : operation@vnprojects.vn / Email : ops@vnprojects.vn)

7.10 Cargo Insurance Policy

Bảo Việt Insurance Trụ sở chính : 104 Trần Hưng Đạo, Phường Cửa Nam, Quận Hoàn Kiếm, Hà Nội, Việt Nam Telephone : (+84 24) 3826 2614/ Fax : (+84 24) 3825 7188 / Email : bvvn@baoviet.com.vn	Đơn vị bảo hiểm số : 28775

BẢN CHÍNH

Tên và địa chỉ của người được bảo hiểm : HOA PHAT GROUP JOINT STOCK COMPANY
Add: 643 DIEN BIEN PHU, 25 WARD, BINH THANH DIST, HO CHI MINH CITY, VIET NAM
Tel: (028) 629 75 599

ĐƠN BẢO HIỂM NÀY chứng nhận rằng trên cơ sở Người được bảo hiểm thanh toán phí bảo hiểm theo thoả thuận cho Bảo Hiểm Bảo Việt vì lợi ích của mình hoặc được thừa hưởng hoặc những người khác. Bảo Hiểm Bảo Việt nhận bảo hiểm cho các hàng hóa được kê khai dưới đây theo quy tắc chung bảo hiểm hàng hóa vận chuyển đường biển của Bảo Hiểm Bảo Việt và / hặc theo điều kiện và/hoặc điều khoản được chỉ rõ trong đơn vị hoặc phụ lục văn bản đính kèm đã được Người được bảo hiểm đọc kỹ và hiểu rõ.

Tên tàu / phương tiện vận chuyển : MAERSK CAPASIZE	Chuyến hành trình/ Đăng ký số : 0029W	B/L & AWB hoặc số : BHPHP490320255
Nơi khởi hành :Cảng Melbourne, Australia	Đến cuối cùng : Cảng Cát Lái, Việt Nam	HĐVC số : BHPMAERSK080524
Cảng xếp hàng : Cảng Melbourne, Australia	Cảng dỡ hàng : Cảng Cát Lái, Việt Nam	Số Hợp Hóa đơn số : (L/C số) : HPVCB15032024
Ngày khởi hành : 10/08/2024	Chuyển tải : Cho phép	Dự kiến ngày đến : 10/09/2024
Tổng số tiền bảo hiểm (110%)	12,140,000 USD / 285,290,000,000VND	13,354,000 USD / 313,819,000,000 VND
Tỷ lệ phí bảo hiểm	2.5%	303,500 USD/ 7,132,250,000 VND
VAT	8%	24,280 USD/ 570,580,000 VND
Tổng số tiền thanh toán		327,780 USD/ 7,702,830,000 VND
Tỷ giá (USD / VND)	23.500	

Đối tượng được bảo hiểm / Tên hàng hóa
Tên : Iron Ore, Limestone, Metallurgical Coke
Total : 93,000 tấn

Những thoả thuận bảo hiểm đặc biệt khác :
Loại trừ, mất mát thiếu hụt trong trường hợp kiện hàng còn nguyên niêm phong kẹp chì, không có dấu hiệu cạy phá hoặc hư hỏng trong quá trình vận chuyển thông thường
- Điều khoản thay thế
- Điều khoản loại trừ tổn thất cơ điện điện tử trừ khi do các rủi ro được bảo hiểm gây ra
- Các điều khoản loại trừ đặc biệt khác được in ở mặt sau đơn vị bảo hiểm
- Bảo Việt sẽ không chịu trách nhiệm đối với bất kì tổn thất nào xảy ra cho lô hàng trước 04:14 PM ngày 10/08/2024
- Phí bảo hiểm phải được thanh toán trong vòng 05 ngày làm việc kể từ ngày phát hành đơn bảo hiểm và trước ngày phương tiện vận chuyển tới nơi cuối cùng có tên trên đơn bảo hiểm.

QUAN TRỌNG
Những thủ tục cần thiết trong trường hợp mất mát, tổn thất mà Người được bảo hiểm có thể phải chịu trách nhiệm cũng như trách nhiệm của người chuyên chở, người nhận ủy thác hàng hóa hay các bên thứ ba có liên quan
Trong mọi trường hợp Người được bảo hiểm và đại lý của họ phải có nghĩa vụ tiến hành mọi biện pháp được coi là hợp lý nhằm hạn chế và giảm thiểu đối với hàng hóa và đảm bảo rằng mọi quyền khiếu nại đối với Người chuyên chở, người nhận ủy thác hàng hóa hay các bên có liên quan phải được bảo lưu. Đặc biệt Người được bảo hiểm hay đại lý của họ cần làm các yêu cầu sau đây :
1. Khiếu nại ngay lập tức đối với Người chuyên chở, chính quyền cảng hay người nhận ủy thác hàng hóa khác đối với bất cứ loại hàng nào bị mất
2. Trừ khi có thư kháng nghị, trong mọi trường hợp không được cấp giấy biên nhận hoàn chỉnh cho những hoàng hóa có hiện tượng nghi vấn
3. Khi giao container phải đảm bảo rằng các container phải còn nguyên vẹn và phải có các nhân viên có chức năng kiểm tra ngay. Nếu nhận container bị tổn thất, niêm phong bị gãy vỡ, mất mát hoặc khác với sự miêu tả trong chứng từ vận tải thì phải lập giấy giao chứng từ đúng như tình trạng như vậy và giữ lại tất cả các niêm phong không bình thường và gãy vỡ đó để điều tra sau này
4. Yêu cầu người đại diện chuyên chở hay người nhận ủy thác hàng hóa tham gia chứng kiến việc giám định ngay khi phát hiện hàng hóa có hiện tượng mất mát hoặc hư hỏng và qua giám định nếu thực tế có tổn thất thì phải lập hồ sơ khiếu nại họ
5. Gửi giấy ba cho đại diện người chuyên chở hay người nhận ủy thác hàng hóa trong vòng 03 ngày sau khi nhận hàng nếu có tổn thất khó phát hiện vào thời gian nhận hàng
6. Để đòi bồi thường, người khiếu nại phải có quyền lợi trong đối tượng bảo hiểm vào thời gian xảy ra tổn thất đó và thực sự chịu tổn thất thực tế.
Ghi chú : Người nhận hàng hoặc địa lý của họ phải tuân theo đúng các qui định của chính quyền cảng tại cảng dỡ hàng.

Chứng từ khiếu nại
1 Bản gốc Hợp đồng bảo hiểm hoặc Giấy chứng nhận bảo hiểm
2 Bản gốc hoặc bản sao của Hóa đơn gửi hàng kèm tờ kê chi tiết hàng hóa hoặc phiếu khi trọng lượng
3 Bản gốc Vận tải đơn và/hoặc Hợp đồng thuê tàu và/hoặc hợp đồng vận chuyển khác
4 Bản gốc Biên bản giám định và chứng từ,bằng chứng khác thể hiện rõ mức độ mất mát hoặc tổn thất
5 Giấy biên nhận hoặc Giấy chứng nhận tàu giao hàng và phiếu ghi trọng lượng tại nơi nhận cuối cùng
6 Bản sao báo cáo hải sự và/hoặc trích sao nhật ký hàng hải
7 Công văn trao đổi với Người vận chuyển và/hoặc những bên khác có liên quan về trách nhiệm của họ đối với mất mát hoặc tổn thất
8 Thư đòi bồi thường
9 Những chứng từ khác
Nếu Người được bảo hiểm thiếu một trong những chứng từ trên thì tùy theo từng trường hợp mà Người bảo hiểm có thể chế tài một phần hoặc toàn bộ tài sản bồi thường.

Trong trường hợp mất mát hay tổn thất đề nghị thông báo tới đại lý giám định : TỔNG CÔNG TY BẢO HIỂM BẢO VIỆT

Địa chỉ : 104 Trần Hưng Đạo, Phường Cửa Nam, Quận Hoàn Kiếm – Hà Nội Điện thoại : 04.393342226 E-mail : nguyenvanphong@baoviet.com.vn	
Thanh toán bồi thường tại : Hà Nội Bởi : BẢO HIỂM BẢO VIỆT	Phát hành : ngày 01 tháng 07 năm 2024
Lưu ý : Trong mọi trường hợp mất mát hay tổn thất có thể gây ra khiếu nại theo đơn vị bảo hiểm này, thông báo ngay lập tức phải được gửi tới đại lý giám định có tên ở trên hoặc Đại lý Lloyd's gần nhất tại cảng hoặc nơi mà tổn thất hay mất mát được phát hiện nhằm mục đích để họ có thể kiểm tra hàng hóa và phát hành một biên bản giám định. Nếu Người bảo hiểm không đến giám định. Trừ khi có thoả thuận khác, Người bảo hiểm có quyền từ chối giải quyết một vụ khiếu nại không được chứng minh trong biên bản giám định do địa lý được Người bảo hiểm chỉ định trên đơn phát hành. (Phí giám định thông thường được trả bởi người khiếu nại và được tính vào số tiền khiếu nại của người bảo hiểm Người được bảo hiểm cũng được yêu cầu tham khảo điều khoản " QUAN TRỌNG." Và hành động theo đó	Tổng Công ty Bảo hiểm Bảo Việt Mộc

CONCLUSIONS

7.11 Result Discussion and Implications

Through the project, I learned a lot about production planning, there are many small aspects that need to be paid attention to. Although I studied in school, however, applying formulas and knowledge to solving a practical problem, gave me a much more comprehensive and comprehensive view. Of course, there are still quite big errors in the process, but this is only the first version, and I will edit more in the future. To be able to apply more to production planning, it is necessary to have practical experiences, receive more comments from predecessors, as well as teachers, compare with the subject content. In the future, I will continue to improve the model, adding a few more tools for maximum operation, such as using Power BI, Power Automate, or using Simulation software to model processes in the factory.

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Production line HRC ; Thép HRC là gì? Quy trình sản xuất thép cuộn cán nóng HRC (hoaphat.com.vn)

Local Charge by MSC : Local Charge in HCM Port

APPENDIX

Link to excel forecast : Forecast (1).xlsx
Link to exxcel inventory reorder point and safety stock : Inventory reorder point .xlsx
Link to excel BOM, MRP : Production Planning (1).xlsx

Mean absolute deviation

$$MAD = \frac{1}{n}\sum_{t=1}^{n}|Y_t - \hat{Y}_t| \quad (7)$$

Mean squared error

$$MSE = \frac{1}{n}\sum_{t=1}^{n}(Y_t - \hat{Y}_t)^2 \quad (8)$$

Root mean squared error

$$RMSE = \sqrt{\frac{1}{n}\sum_{t=1}^{n}(Y_t - \hat{Y}_t)^2} \quad (9)$$

Mean absolute percentage error

$$MAPE = \frac{1}{n}\sum_{t=1}^{n}\frac{|Y_t - \hat{Y}_t|}{|Y_t|} \quad (10)$$

Mean percentage error

$$MPE = \frac{1}{n}\sum_{t=1}^{n}\frac{(Y_t - \hat{Y}_t)}{Y_t} \quad (11)$$

Moving average for *k* time periods

$$\hat{Y}_{t+1} = \frac{Y_t + Y_{t-1} + \cdots + Y_{t-k+1}}{k} \quad (8)$$

Double moving average

$$M'_t = \frac{M_t + M_{t-1} + M_{t-2} + \cdots + M_{t-k+1}}{k} \quad (9)$$

$$a_t = 2M_t - M'_t \quad (10)$$

$$b_t = \frac{2}{k-1}(M_t - M'_t) \quad (11)$$

$$\hat{Y}_{t+p} = a_t + b_t p \quad (12)$$

Simple exponential smoothing

$$\hat{Y}_{t+1} = \alpha Y_t + (1 - \alpha)\hat{Y}_t \tag{13}$$

Equivalent alternative expression:

$$\hat{Y}_{t+1} = \alpha Y_t + \alpha(1 - \alpha)Y_{t-1} + \alpha(1 - \alpha)^2 Y_{t-2} + \alpha(1 - \alpha)^3 Y_{t-3} + \cdots \tag{14}$$

Holt's linear smoothing

The exponentially smoothed series, or current level estimate:

$$L_t = \alpha Y_t + (1 - \alpha)(L_{t-1} + T_{t-1}) \tag{15}$$

The trend estimate:

$$T_t = \beta(L_t - L_{t-1}) + (1 - \beta)T_{t-1} \tag{16}$$

The forecast for p periods into the future:

$$\hat{Y}_{t+p} = L_t + pT_t \tag{17}$$

Winters' multiplicative smoothing

The exponentially smoothed series, or level estimate:

$$L_t = \alpha\frac{Y_t}{S_{t-s}} + (1 - \alpha)(L_{t-1} + T_{t-1}) \tag{18}$$

The trend estimate:

$$T_t = \beta(L_t - L_{t-1}) + (1 - \beta)T_{t-1} \tag{19}$$

The seasonality estimate:

$$S_t = \gamma\frac{Y_t}{L_t} + (1 - \gamma)S_{t-s} \tag{20}$$

The forecast for p periods into the future:

$$\hat{Y}_{t+p} = (L_t + pT_t)S_{t-s+p} \tag{21}$$