The Influence of Geology and Mining Factor in Mining Company Valuation

Ade Candra[1], DS Priyarsono[2], Nimmi Zulbainarni[1], Roy Sembel[3]

[1]*Business School, IPB UNIVERSITY, Indonesia. boedaxbangka.candra@gmail.com*
[2] *Faculty of Economy and Management, IPB UNIVERSITY, Indonesia.*
[3] *Business School, IPMI Business School, Indonesia.*

ABSTRACT:
M&A in coal industry are common corporate action conducted to expand the company businesses or to enlarge the company assets. We often find the candidates of transaction are using different valuation method to determine the Enterprise Value (EV). Therefore, deal may not be achieved. Some of the valuation methods do not show the roles of geologic factor and mining, yet these are the key factors for the M&A. This study aims to build mathematic model that accommodates different company's valuation methods, thus allowing much proper determination of EV. In addition, the model may help understanding direct role of geologic factors and mining in determination of the company's valuation. A statistic analysis is done first to validate the data that further used to build the model. The model will be formulated based on a linear regression utilizing EViews Software. Data are secondary that cover the last ten years of coal M&A transactions globally, limited to the well-published listed companies. Data covers the financial of company (EV, Revenue, GP, EBITDA, EBIT, FCF, Market Capitalization, P/E) and the commodity of transaction (Resources, Reserves, Grade, Recovery Factor, Commodity Price, etc.). These findings are expected from this study: geologic factor and mining can directly determine the EV; the valuation method mostly influenced the EV determination can be addressed. This study contributes simple and general geobusiness formulation to determine more accurate EV for both purchaser and seller. Hence, the negotiation of the M&A becomes easier since the deal opportunity for each party is higher.
KEYWORDS: *Merger and Acquisition; Enterprise Value; Geobusiness Modeling.*

I. INTRODUCTION

Merger dan Acquisition (M&A) are common corporate actions to accelerate company's growth that is faster than organic business growth, and can provide a channel for the company to strengthen its global market position and improve competitiveness (Sui and Dumitrescu- Peculea, 2016). Globally, big volumes and values of M&A activities are derived from major resource commodities, such as coal, industrial metal, silver, lead, zinc, copper, steel, aluminium, etc. The total M&A transaction's value of January to December 2018 for coal and metal sectors reached 60 Billion USD, which coal has the biggest portion of the transaction with 320 times of transaction volumes (Ernst and Young, 2019).

The coal commodity is commonly divided into two types: (i) coking coal, which is used to produce coke that is used in smelting process of iron ore; (ii) thermal coal, which is used for coal fired power plant. This thermal coal is divided into High Calorific Value (CV) thermal coal, Medium CV thermal coal, and Low CV thermal coal (Platt, 2019).

Some benefits of M&A activities for the company are to earn cashflow within a short period, to ease financial, to obtain experience workforce, to grab customer instantly, to get mature operational and administration systems, to reduce risk of business failure, to optimize time to enter new business, to minimize business rick, etc (Hariyani et al., 2011). M&A transactions can be done within a domestic scope or even overseas that involve minority share portion or acquisition, that takes over the management's control. The domestic acquisition conducted by the local purchaser generally gives a higher success possibility compared to the acquisition by the foreign investor because the local purchaser is much competible and confident upon all

factors in asset target of M&A as well as climate condition of investment in that certain country (Malone and Ou, 2008).

M&A is the corporate action that involves investment in a big scale, which has risk mainly in the uncertainty of commodity price in the market (Savolainen, 2016). Therefore, a due dilligence has to be done by the purchaser candidate before conducting the M&A transaction. From this due dilligence activity, the purchaser candidate will determine a proper valuation method to determine the enterprise value which will be proposed to the seller for further negotiation process. However, the valuation methods between purchaser and seller may differ that makes the enterprise value between them are significantly different.

M&A transaction can be done through these following processes: (i) purchasing through a pre- emptive right; (ii) open tender; (iii) offering to a specific purchaser, in example offering to local Government. M&A process generally consists of some steps as follows: planning and finding; due diligence; transaction structuring; valuation and pricing; negotiation process; signing of agreements; fulfillment of conditional precedents, transaction closing; and post M&A acquisition (Reed et al., 2007).

There are two types of purchaser characteristics within M&A transaction, these are private equity company and retailer company, these two types have different characteristics of decision making (Smit and Lovallo, 2014). The purchaser from the private equity company tends to be more aggressive and to offer for a premium price than the retailer company. Perhaps, this is because the private equity company is a fund/ investment manager that the most risk is hold by the investor and the investment is for short- term only. However, the retailer investor is more conservative to determine the enterprise value and the investment is more for long- term than the private equity company.

There are two types of acquisition based on motif (background) of M&A: strategic and financial (Hariyani et al., 2011). The strategic M&A will be much longer term of investment than the financial one, and usually still relates or integrates with shareholder's business. The financial M&A will be much shorter term of investment than the strategic one, this condition is hoped to obtain a gain (or profit) from re- selling the asset. After the year of 2009, M&A commonly aims to grab new technology, to explore new business, and to respond for global competition (Lee and Lieberman, 2010). Three commonly known M&A transactions are vertical integration, horizontal integration dan conglomerate take over (Aluko and Amidu, 2005).

During this time, the valuation of the M&A process of mining (especially for coal commodity studied in this paper) generally refers to the valuation based on the financial method. A detailed discussion about a direct method to relate geologic parameter and mining toward valuation of the M&A transaction has not been found yet. Therefore, this paper will study about mathematic modeling that can accommodate the direct method to determine valuation of the M&A transaction. Further, this modeling will be stated as geobusiness modeling. Geobusiness word is combination from words of geo and business, mentioned as geo because of using geologic parameter and mining in the model, and business refers to the finance valuation method.

II. LITERATURE REVIEW
2.1. Literatures of Geology and Mining

In the coal mining industry, there are four steps of the project development: exploration, mineral resources, development, and production (CIMVAL, 2003). These steps are differentiated based on sufficiency of the data toward production level, availability of infrastructures, and level of permits. The sufficiency of exploration data will determine definitions of resources and reserves, the higher of confidence level of the data will lower the risk of the mineral or coal resources (JORC, 2012). If the amount of resources of metal and coal are small, there will be only a low risk to not discover that amount of resource, and the bigger the resources targetted will increase the risk to not discover its additional resources, hence the valuation of company will be higher when its amounts of resources and reserves are bigggger, that means lowering the risk level for purchaser and offering a higher enterprice value (Chandra and Guj, 2012).

Definition of resource is a concentration of mineral of importance for business concern insider on the Earth's crust in such geometrical shape, size, grade and tonnage that there are sound prospects for ultimate profitable extraction (JORC, 2012). While definition of reserve is the economically extractable part of a measured and/or indicated resources categories, where convertion of resources to reserves will consider some factors, such as mining factors, metalurgy, economic, marketing, legal, enviroment, social and government regulation (JORC, 2012). While doing M&A of coal company, purchaser buys the assets in term of coal resources and reserves, not in term of infrastructure assets, therefore being knowledgable or competible in detail about geologic and mining parameter is a must within M&A transaction of coal company. There are four geologic and mining factors influencing the evaluation of mining feasibility, these are (i) geological reserve, (ii) waste volume, (iii) ore tonnage, (iv) cut off grade or quality (Gama, 2013). In the mining industry, the ratio between ore tonnage over waste volume is stated as the stripping ratio, which is a trade of between production rate and the mine lifetime (JORC, 2012 and Savolainen, 2016).

In the mining process, to produce an open pit mine design, a well understanding of geologic and mining factors are needed, including cut of grade for mineral and quality of coal (Sabour and Dimitrakopoulos, 2011). Optimum pit produced can increase the amount of mineral or coal mined and can raise net present value (Dimitrakopoulos, 2011). Beside of that, determination of cut off grade mineral or coal quality produced within mine pit design will determine the amount of profit and net present value (Ahmadi, 2018). Mine design, mine planning, temporary closure, expansion, block sequence, contract, stockpiling are all mining factors that can influence company's appraisal in front of purchaser since these can affect free cash flow in financial model (Savolainen, 2016). Based on these previously mentioned information, we may summarize that geologic and mining factors which consist of resources, reserves, cut off grade or quality, stripping ratio, and design can influence profitability and company valuation or enterprise value (Gama, 2013).

2.2 Literature of Financial

There are two main definitions that we often hear within M&A transaction: enterprise value and equity value. The enterprise value reflects the market value for the entire of business or can be called as firm value, while the equity value is the enterprise value after deducted by all financial liabilities including debt and its interest (De Pamphilis, 2014).

We need to be familiar with M&A transaction and its targetted asset characteristics to better determine the enterprise value. Two or more companies will have different valuation toward one of M&A target since each company has its own assumption in its valuation model or method (Bartrop and White, 1995). Generally, one of requirement from purchaser is to determine the correct enterprise value to produce an internal rate of return (IRR), that is at least equal with the other investment instruments (De Pamphilis, 2014). The bottom line IRR of each company will differ because each company has its own expectation and this bottom line will depend on cost of fund charged by company in doing this M&A transaction.

During this time, the M&A players recognize the most common valuation method that is conventional discounted cash flow (Smit and Lovallo, 2014). This method can have a high accuration level when we have a high level of certainty on assumption built in valuation model. However, the accuration of assumption of this method will give a wide range of deviation when used for longterm valuation. This conventional discounted cash flow aims to predict free cash flow for the life of mine and then discounted factor applied, therefore when the target company is within a loss condition, this method may not be applied (Savolainen, 2016).

Meanwhile, M&A players recognize three types of company valuation assessment, which are income approach, market approach, and cost approach (CIMVAL, 2003). Those approaches will apply differently or simultaneously according to the stage of coal mining whether exploration, development or production (Savolainen, 2016). The income approach can be used in the stage of mineral resources properties, development, and production. The market approach can be applied in all those three different stages of coal mining, including the exploration stage. While, the cost approach can only be used in the stages of exploration and mineral resources (CIMVAL, 2003). The income approach in the production stage can use cash actual condition and/ or forecast from some assumptions built earlier. While assessment of the income approach in the stages of exploration, mineral resources, and development, will use model financial with parameters that all of them apply assumptions (Viet, 2015). If the income approach is used with assumptions, there will be a risk in the future that the parameter is not appropriate with the reality. The risks include capex assumption, cost, total production, and commodity price. The market approach is a pretty simple approach since this compares performance of the company target of M&A with other companies using multiple analyses, however this approach should be used on the companies which have similar technical and financial characteristics with the target company (Djaja, 2018).

The other classifications of the company valuation consists of economic valuation method, market valuation method, and asset based valuation method (Djaja, 2018). The economic valuation models include discounted cashflow model, economic value added model, adjusted present value model and real option model. The market valuation models consist of earning model (price to equity, enterprise value to EBIT, enterprise value to EBITDA), revenue model (price to sales, enterprise value to sales), and book model (price to book). While, the asset valuation models include liquifaction model, realizable asset model, and replacement model (Djaja, 2018). According to De Pamphilis (2014), the value of non-operating asset can be measured from these following information: (i) total cash available; (ii) total marketable securities; (iii) total investment value of target company in other company; (iv) total assets; (v) total patent; (vi) total pension values of employees. According to Djaja (2018), the multiple analysis especially differentiatiates into two kinds. First is the multiple produced equity values that consist of PE, price to sales, and price to book. Second is the multiple produced enterprise values that consist of EV/ EBIT, EV/ EBITDA, and EV/ sales.

Another reference according to the valuation method comes from Aluko and Amidu (2005), that mentioned about future total cash flows, valuation of specific assets, and historical total cash flow. Moreover, when we analyze the company valuation with those methods we need to consider the financial performance of

the company, when the profit is negative (or loss) a certain method will be difficult to be applied (Codau, 2013). As an example, when the profit margin is negative, the valuation method with multiple ratio will be hard to be applied, therefore looking at the book value of assets is much better to do (Deng et al., 2012).

Reed et al (2007) provides another discussion related to the valuation methods which include (i) replacement value method, (ii) investment or average rate of return method, (iii) payback period, (iv) IRR method, (v) market value method, (vi) comparable net worth to market value method, and (vii) discounted cash flow method. A well understanding of the correct valuation method will result on a range of enterprise value that is appropriate to the condition of assets of M&A target. Purchaser and seller can put the enterprise value which is overvalued or undervalued. The purchaser can bid with overprice value due to some factors, such as financial market exuberance, herding behaviour by investor, and decision making biases under uncertainty. The purchaser may also be undervalued because of these factors, like faulty benchmark for market value, moving too slowly, and executive narrow view of the deal (Smit and Lovallo, 2014).

In addition, the presence of purchaser as the existing shareholder either the minority or the controlling one, will determine the company valuation offered. When the purchaser is the controlling shareholder, the offered price (value) will not obtain that much premium compared to the purchaser who has not had shares in the target company (Wickramanayake and Wood, 2009).

III. DATA AND METHODOLOGY

3.1 Data

This study will focus on the coal commodity since coal, currently, is the source of energy that is mostly utilized for power plant. Moreover, the coal commodity contributes to the transaction of M&A a lot more than the other sources of commodities, as mentioned previously in the introduction.

Data of M&A coal commodity are obtained from S&P Capital Intelegence (2019). Data are collected from the last 10 years. These data of the M&A transactions involve

minority share transaction, majority share portion, or 100% acquisition from the purchaser party. Most of either the purchasers or sellers are the companies listed in the stock exchange in some countries.

The distributions of data will be classified based on the transaction value are as follows:
a. The total amount of transactions below USD 250 mio
b. The total amount of transactions in between USD 250 mio to USD 500 mio
c. The total amount of transaction in between USD 500 mio to USD 1 bio; and
d. The total amount of transactions above USD 1 bio.

The next step of this study will conduct statistic analyses of those data, to be further classified based on two stages of operations whether they are belong to the exploration stage or the production stage. This classification is important because in the exploration stage, the target company has not produced cash flow yet, and therefore some valuation methods cannot be applied appropriately.

3.2 Methodology

There will be some conclusions expected from this study, these are (i) modeling of influence geologic and mining factor toward the enterprise value, (ii) modeling of some valuation methods and their effects toward the enterprise value, (iii) comprehensive modeling that involves geologic factor, mining factor, and some valuation methods in determination of the correct enterprise value. Modeling will observe whether the factor influences the enterprise value or not. Finally, a linear regression of factors selected before can be obtained by utilizing the EViews software.

IV. RESULT EXPECTATION

A mathematic model in the form of linear regression is expected from this study. This model defines a relationship between geologic and mining factors, and finance to obtain a much better enterprise value, this model in this study is called as a Geobusiness Modeling.

Geologic and mining variables that will use within this modeling are as follows: (i) resources (R1); (ii) reserve (R2); (iii) stripping ratio (SR); and (iv) coal quality especially value of CV, ash (A), sulfur (S). While, variables of finance that will be used consist of:

A. *Market Valuation Method includes (i) price to equity (PE), (ii) EV/EBIT (E1), (iii) EV/EBITDA (E2), (iii) EV/sales (E3), (iv) price to book (PB), (v) market capitalization (MC);*
B. *Income Valuation Method includes (i) enterprise value, (ii) discounted free cash flow (DFCF); and*
C. *Asset Valuation Method measured from (i) net asset value (NAV) and (ii) price to NAV (PNAV).*

Geobusiness modeling resulted will be classified based on two groups, they are exploration stage and production stage, because of technical and financial characteristics of each group are different. Furthermore, that

geobusiness modelling can be combined with the values of (i) EV to resources (ER1), (ii) EV to Reserve (ER2), and (iii) EV to production (ER3).

This geobusiness modeling will help purchaser, seller, independent consultant, and auditor to determine fair value of M&A transaction. This can increase rate success of negotiation of company valuation since the range of value/ price between parties of M&A get smaller. Further, the government auditor may take benefit because the language and method used with the parties of M&A are simillar therefore this can be well understood. The government auditor usually puts much concern with the company valution or enterprise value since these will influence to the amount of taxes which much be paid by the seller to the governemEnt upon the M&A transaction.

V. NEXT STEP

Further steps that will be done in this study are as follows: (i) to conduct statistic analysis of all data collected; (ii) to understand the relationship between variables of geologic, mining, and finance toward the enterprise value also to determine which variable/s appropriate to be included in the geobusiness modeling; (iii) to formulate the geobusiness modeling applied for the M&A transaction of the coal mining business.

REFERENCES

[1]. G. O Ahmadi, M.R. Cutoff Grade Optimization Based on Maximizing Net Present Value Using A Computer Model. Journal of Sustainable Mining, 17, 2018, 68- 75.
[2]. Aluko, B.T., & Amidu, A.R., Corporate Business Valuation for Mergers and Acquisitions. International Journal of Strategic Property Management, 9(3), 2005, 173- 189.
[3]. Bioye Tajudeen Aluko & Abdul-Rasheed Amidu, Corporate business valuation for mergers and acquisitions, International Journal of Strategic Property Management, 9:3, 2005, 173-189.
[4]. Bartrop, S. B., & White, A., Spadework - How Miners Value Resources, JASSA, 1995, 1:7- 13.
[5]. Chandra, A., & Guj, P., Option Valuation and Accounting for Contingent Consideration in Mineral Sector Acquisitions. International Journal of Business Studies, 20(1), 2012, 43- 68.
[6]. CIMVAL code version 2003
[7]. Codau, C., Influencing Factors of Valuation Multiples of Companies. Annales Universitatis Apulensis Series Oeconomica, 15(2),2003, 391- 401.
[8]. Deng, M., Easton, P.D., & Yeo, J., Another Look at Equity and Enterprise Valuation Based on Multiples. SSRN Electronic Journal, DOI: 10.2139/ssrn.1462794, 2012
[9]. DePamphilis, D., *Mergers, Acquisitions, and Other Restructuring Activities 7th Edition, 2012*
[10]. Dimitrakopoulos, R., Stochastic Optimization for Strategic Mine Planning: A Decade of Developments. Journal of Mining Science, 47(2), 2011, 138- 150.
[11]. Djaja, I., *All About Corporate Valuation: Memetakan, Menciptakan, Mengukur, dan Merealisasikan Nilai Perusahaan*. Jakarta: Gramedia, 2018
[12]. Ernst and Young report, 2019
[13]. Gama, C.D., Easy Profit Maximization Method for Open-pit Mining. Journal of Rock Mechanics and Geotechnical Engineering, 5, 2013, 350- 353.
[14]. Hariyani, I., Serfianto, R., & Yustisia, C., *Merger, Konsolidasi, Akuisisi, & Pemisahan Perusahaan – Cara Cerdas Mengembangkan dan Memajukan Perusahaan*. Jakarta: Visimedia, 2011
[15]. JORC code, 2012
[16]. Lee, G.K., & Lieberman, M.B. Acquisition Vs. Internal Development as Modes of Market Entry. Strategic Management Journal, 31, 2010, 140- 158.
[17]. Malone, C.B., & Ou, Z., Acquisition Actions in Australia: A Test of Acquisitions Theory. International Journal of Managerial Finance, 4(3), 2008, 220- 231.
[18]. Platt report, 2019
[19]. Reed, S.F., Lajoux, A.R., & Nesvold, H.P., *The art of M&A: A merger acquisition buyout guide (4th ed.).* New York: McGraw-Hill, 2007
[20]. Sabour, S.A.A., & Dimitrakopoulos, R. Incorporating Geological and Market Uncertainties and Operational Flexibility Into Open Pit Mine Design. Journal of Mining Science, 47(2), 2007, 191- 201.
[21]. Savolainen, J., Real Options in Metal Mining Project Valuation: Review of Literature. Resource Policy, 50, 2016, 49- 65.
[22]. Smit, H., & Lovallo, D., Creating More Accurate Acquisition Valuations. MITSloan Management Review, 56(1),2014, 62-71.
[23]. Sui, Y., & Dumitrescu- Peculea, A., Financial Risk Identification and Control of Cross- Border Merger and Acquisition Enterprises. Audit Financiar, vol. XIV, no. 12(144),2016, 1368- 1377.
[24]. Viet, N.T., *Business Valuation and Pricing In Merger and Acquisition Context Case Study: Intel- Altera.* A Bachelor's Thesis, Degree Program in International Business, Faculty of Business Studies, Lahti Universities of Applied Science, Finland, 2015
[25]. Wickramanayake, J., & Wood, A., Determinants of Acquisition Premiums: Empirical Evidence from Mining industry in Australia and Canada, 2009