

ROLE OF PROFITABILITY, BUSINESS RISK, AND INTELLECTUAL CAPITAL IN INCREASING FIRM VALUE

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ABSTRACT

Introduction/Main Objectives: This research illustrates the importance of firm value, both to investors and companies. Investors assess that an increase in the value of a company indicates a positive view of the company's performance, which leads to an investment decision. Besides that, an increase in the value of the company can indicate that the company is getting closer to achieving its goal, namely increasing the welfare of its stakeholders. **Background Issues:** In recent years, there has been a decline in the value of firms in the mining sector due to various factors that have affected it, which has resulted in a decrease in the value of the shares in several of the sub-sectors, especially the coal mining and petroleum sub-sectors. **Novelty:** This study examines the business risk and intellectual capital that are typical of firms in the mining industry with the generalized moments' methods. **Research Methods:** This research is a quantitative study that uses the generalized moments methods, where the robust least square test determines which model is more suitable for use in the research. The variables in this study consist of profitability, intellectual capital, and business risk, with variable controls being the gold price, exchange rate, and petroleum price. This study uses annual financial statements from mining companies that are listed on the Indonesia Stock Exchange. These statements include balance sheets and income statements. **Finding/Results:** These findings reveal that profitability, intellectual capital, and business risk affect the value of a company. Macroeconomic factors as the variable controls, namely gold prices, exchange rates, and petroleum prices, also affect the value of a company. Therefore, based on the research's results, management must pay attention to internal factors or company micro factors (profitability, intellectual capital, and business risks) and macroeconomic factors (gold prices, exchange rates, and petroleum prices) to increase company value. This is because investors use these factors when making decisions to invest in the mining sector. **Conclusion:** There are several important factors that, in principle, increase the value of a company. These factors come from internal and external factors (macroeconomics). This article successfully demonstrates the importance of profitability, intellectual capital, and business risk in supporting firm value. The results also showed that the gold price, exchange rate, and the price of oil have an effect on the price of mining stocks, which are used to measure changes in the economy.

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INTRODUCTION

Achieving and maintaining firm value is the main focus and goal of every company; this can help increase the wealth of shareholders as well as the public by maximizing the existing resources (Khan, 2020). Information related to the value of a company is very important, both for investors and for the company itself. Investors tend to rate an increase in firm value as a positive perception related to the company's performance, which ultimately leads to them making positive investment decisions. Besides that, the increase in firm value for a company can indicate it is getting closer to its main goal of improving the well-being of its stakeholders. Khan, (2020) states that every company operates in the market to create value at every stage of the company's lifecycle. Therefore, increasing their value is a very important thing for companies to do, especially profit-oriented companies.

One of the important factors that, in principle, affect the value of a company is profitability. According to Adiputra (2016), profitability can be defined as a company's ability to create profits within a given period from its assets, sales, and equity. Profitability ratios are important and beneficial to stakeholders. Profitability allows a company to pay its corporate obligations, while it helps potential creditors make financing decisions (Sucuachi & Cambarihan, 2016). Meanwhile, for investors, before making an investment, they will analyze information about the company's potential to generate profits, which will determine the level of compensation they may receive from the results of their investment (Kurniasari & Warastuti, 2015). Profitability can support firm value, where companies that can increase and maintain profits over time have more opportunities to expand their businesses. Expansion itself is a tool used by a company to expand its reach and size (Chumaidah & Priyadi, 2018).

A company that goes public, in practice, will always try to increase its value to attract investors to invest in it (Sucuachi & Cambarihan, 2016). However, in line with the increase in firm value, the company is also faced with an increase in its business risk. This is the risk that will be borne by the company during its operational activities. Thus, the company is required to consider policies that can minimize the risk in its business activities (Bandanuji & Khoiruddin, 2020; Pangestuti et al., 2021).

Research into the relationship between business risk and firm value is an interesting topic that is widely researched by academics and scientists. However, despite the large number of studies looking at the influence of these two variables, the results tend to vary. Based on research into the risks to firm value, it can be seen that business risk has a negative effect on firm value (Chen et al., 2020; Zungu et al., 2018; Barton & MacArthur, 2015; Grace et al., 2015; Hoyt & Liebenberg, 2015; Hoyt, 2011; Lam, 2014). While research by Maingot et al. (2012), states that there is no significant influence between business risk and firm value; this happens because the research data used in the research by Maingot et al. (2012) was limited to companies in Canada listed on the S&P Index in 2007 and 2008, and the research data only referred to the financial crisis years i.e. 2007-2008, so that the results of that study cannot be the basis for other periods. Meanwhile, research by Razali et al. (2011) into 528 public companies registered in Malaysia in 2017, shows that business risk has no effect on the value of a company. These results are not surprising given the fact that the level of awareness and understanding of enterprise risk management is still considered to be poor in Malaysian public companies. It seems that companies adopting ERM rely heavily on the presence of a chief risk officer. In addition, the research of Pagach &

Warr (2010) also shows that there is no influence between business risk and firm value. The results of that study are not perfect because the data are too volatile, or the tests were not strong enough to see changes in the data. Because of this, the results do not show how business risk affects the value of a company.

Generally, business risk is defined as the risk arising from a company's uncertainty about generating future profits (Hopkin, 2018). Related to firm value; business risks are related to the sustainability of a company; its ability to pay off obligations; the willingness of investors to invest in the company, and the company's ability to obtain funds to carry out its activities. Thus, the higher the business risk of the company, the lower the value of the company in the view of investors (Primantara & Dewi, 2016). Calculation of the business risk can be done with the BRISK (business risk) calculation. The BRISK calculation is carried out to see fluctuations in, and the risk to, the company's operating profit within a certain period of time. This calculation is used to see the amount of risk the company faces in its ability to generate profits in the future (Bandanuji & Khoiruddin, 2020).

Aside from business probability and risk, intangible asset factors are also starting to become a major focus in increasing the value of a company, especially in the era of digital information, as it is today (Ni & Cheng, 2019). Intangible assets become essential, which, in the context of research, are also referred to as intellectual capital. In general, intellectual capital (IC) is information that can be applied to form value for a company (Bayraktaroglu et al., 2019; Octavio & Soesetio, 2019; Singla, 2020).

Intellectual capital is a non-financial resource or non-financial asset that is a combination of intellectual property, human resources, research, and development. These elements illustrate how a company enables the

value creation process and quickly become an input for investment decisions (Bayraktaroglu et al., 2019). In addition, economic conditions that transition from a manufacturing base to a knowledge-based economy have significantly increased the role of intellectual capital in realizing a company's long-term goals. In this case, the goal is to increase firm value over time (Octavio & Soesetio, 2019; Singla, 2020).

In the mining industry, the demand for ore mineralogy development, raw materials' quality, and metal prices, as well as environmental policies that demand companies develop better metallurgical processes, force companies to develop such processes. This leaves mining sector companies facing various challenges in meeting market demands as well as satisfying the sustainability requirements imposed by policymakers; innovation is an important instrument to overcome these challenges (Octavio & Soesetio, 2019; Singla, 2020).

Economists do not consider the mining sector to be highly innovative or prioritize intellectual capital, as they assume that companies in the mining sector are more focused on large sectors and on the products they produce; while any innovation generally focuses on cost savings to obtain better profit margins. However, there is evidence to suggest that the mining sector is not only innovative but also continues to improve over time. The global mining-related research and development (R&D) expenditure of the last decade is likely to be around US\$140 billion. China (47%) is the largest contributor to this global figure, followed by the United States of America (22%), Australia (17%), Canada (8%), and Europe (5%).

In 2015, around US\$957 million was spent on mining R&D in Europe alone (Eurostat, 2018). Although it is still much lower than the so-called high-tech sectors, such as pharmaceuticals (US\$10,868 million) or chemical

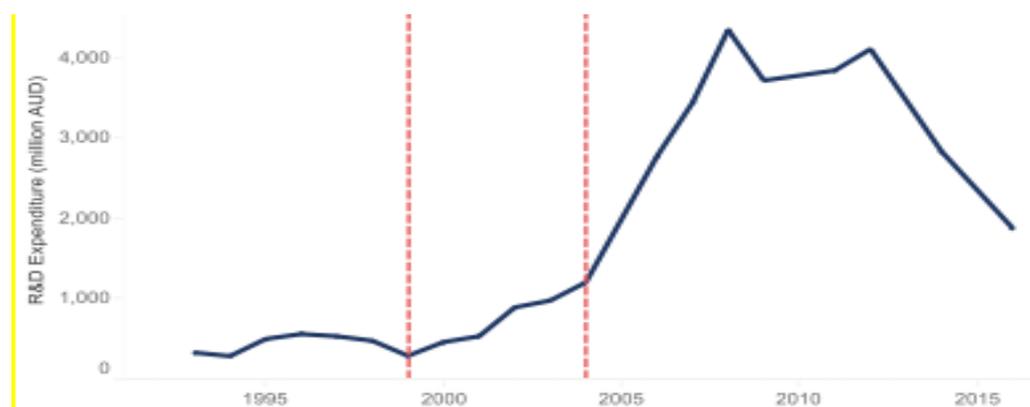
manufacturing (US\$7,416 million), it is still higher than agriculture (US\$654 million) and consumer electronics manufacturing (US\$347 million) (Daly et al., 2019). The main mining products in Europe are iron ore and copper. Because Europe is very rich in metals and minerals, the European continent is home to the world's major mining companies. In addition, the European continent also produces oil and natural gas, which are used as mining products. In addition, Russia, which is a country in Europe, is also the owner of the largest oil reserves, as well as being the largest exporter of natural gas in the world (Kompas.com, 2021). Based on this explanation, the European Union keeps making mining products more efficient (Ministry of Energy and Mineral Resources, 2021).

Community-based energy access initiatives in Asia have invested more than US\$9.5 billion in renewable energy, providing households with access to electricity, developing various training programs, and creating renewable energy research and development projects (Ren21, 2019). Especially for the China Nonferrous Metals Mining Group, an investment of RMB 1.418 billion was made to establish a research and development (R&D) center and an international laboratory. It is a project that is launched annually and supported by various agencies and research institutes in the country, which mine and makes different metals, and is the largest producer of tantalum in China (Toarik, 2018). In Asia, the mining industry faces problems such as regulatory overlap, regulatory capture, the lack of independence from governments, the lack of impartiality, transparency, stakeholder engagement, and access to regulators, and a lack of institutional capacity (O'callaghan & Vivoda, 2015).

The Australian Government has committed AUD50.5 million over three years to establish the new virtual National Critical Minerals Research and Development Centre. The center

will build on Australia's world-leading research capabilities by bringing together expertise from Commonwealth Scientific & Industrial Research Organization (CSIRO), Geoscience Australia, and the Australian Nuclear Science and Technology Organization (ANSTO) for the benefit of the critical minerals sector as a whole. The AUD50.5 million virtual National Critical Minerals Research & Development Centre will build Australian intellectual property in critical minerals processing, target technical bottlenecks in strategic supply chains, and drive breakthrough collaborative research. (Lewan, 2021). However, a national R&D series may be able to shed some light on how the trend might look. Figure 1 shows the spectacular increase in Australian mining R&D expenditure in the 2000s. In the first half of the last decade, the Australian mining sector more than doubled R&D investment. In the second half, we observe that the sector's investment in R&D increased at a much higher rate than had been observed previously. In contrast, we also observe that mining R&D expenditures have declined recently, coinciding to some extent with the recent global financial crisis and slowdown.

To reach those resources which remain, mines in Australia are increasingly being established in off-grid locations, and their lifecycle is decreasing. Hence, it is no longer financially viable to build permanent power infrastructure to service a mine. Additionally, as mines are getting deeper, the risk of collapse has greatly increased. As a result, with a rise in surface temperatures and an increasingly unpredictable climate, the temperature of a mine is more likely to fluctuate, and as a result, consistent temperature control is even more important than it has previously been. So, the future of the mining industry in Australia depends on the industry's ability to adapt and change in the face of uncertainty. (www.aggreko.com).

Figure 1. Business R&D Expenditure in Mining in Australia, 1993-2016

Source: Australian Bureau of Statistics, Research, and Experimental Development, Businesses

In America, the total R&D cost in the mining sector is US\$632 million, which is used to expand renewable energy sources such as solar or nuclear power plants (Muro et al., 2015). Mining products on the American continent are still not being managed optimally; this is because coal production in America has decreased. In addition, the competition for cheap natural gas as well as the reduced demand for fossil fuels due to the increase in renewable energy have added to the problem (Pitoko, 2021). However, most business R&D in the United States currently stems from a relative handful of industries, classified in both the manufacturing and non-manufacturing sectors (National Science Foundation, 2020).

The contribution of mining to the economies of African countries has grown in recent years, far outstripping other sectors, increasing their dependency on this industry as a mechanism for development and growth. Africa's mineral endowment has become a magnet for foreign direct investment in mineral exploration and mine development. In Africa, it has attracted US\$2.9 billion, or 17% of the worldwide mineral exploration, and was the dominant world producer of cobalt, platinum, diamonds, and chromium, and a significant producer of gold,

uranium, and copper. Total business R&D spending in Africa in 2018/2019 was ZAR14.448 billion, with the mining of minerals and mining-related activities contributing ZAR1.209 billion. Mineral mining accounts for more than half of R&D spending at 54.9%, while R&D activities related to mining (excluding mineral extraction) are at 45.1%. (<https://hsr.ac.za>). The African mining industry is facing many challenges. Chief among them is the low base for mining activities. A number of African countries depend on extractive resources for revenues and export earnings, but mining faces huge challenges relating to environmental degradation and social issues like the poor industrialization of the industry and a high degree of dependency. (www.africa.post)

Along with the fact that falling commodity prices are putting pressure on the mining sector, renewable energy is a solution to the problems faced and has become the main innovation developed by this sector, especially in Indonesia. The Ministry of Energy and Human Resources said, "Many investors are interested in investing in renewable energy and energy conservation. How to accelerate the transfer of technology to renewable energy includes working with several countries, such as Denmark, Norway, Austria,

and America (www.esdm.go.id, 2019).” Indonesia can be moved to become a non-consumer partner in technology by buying technology and building its industry here (Martini et al., 2018). The only way to improve the mining industry and give it a competitive edge is to change a company's direction so it becomes a knowledge-based company that uses innovation and intellectual capital to the fullest.

The mining sector is one of the pillars of a country's economic development, because of its role as a provider of the energy resources needed for the growth of the country's economy. Mining stock prices, which are a benchmark of economic changes, are influenced by many macroeconomic factors such as exchange rates, petroleum prices, and gold prices. The weakening of the rupiah certainly has an impact on the movement of stock prices in the mining sector. Likewise, the price of gold also affects the price of mining stocks. Gold investment can be done under any conditions, even when market conditions are not good, safe haven assets such as gold will still be in demand by investors. The price of gold in the world market has also increased from year to year. Even though there was a decline in 2018, it had no effect because the price after the decline in gold prices was still higher than the price at the beginning of the year (Shabbir et al., 2020). With the increase in gold prices year to year, it can certainly have a positive impact on the movement of the mining sector's stock prices, triggering an increase, as well as an increase in world petroleum prices. Because the greatest demand in this country is for petroleum, fluctuations in oil prices are closely related to fluctuations in stock prices. When the price of petroleum increases, it will result in an increase in the prices of production goods, which will cause companies to experience an increase in their production costs. If the stock price increases due to an increase in petroleum prices,

investors will tend to invest in companies in the mining sector. These trends can affect the value of companies. Based on these factors, this study looks at the exchange rate, the price of gold, and the price of petroleum as factors that control the value of mining company shares.

The effect of profitability, combined with business risks and intellectual capital, on mining companies, especially in developing countries such as Indonesia, is still very relevant and needs to be studied. This is because mining companies, especially in developing countries such as Indonesia, face more uncertainty, challenges, and risks that can affect company performance compared to companies in developed countries. Therefore, they need more improvement in the implementation of enterprise risk management. This research was conducted by adding intellectual capital variables that can affect a company's profitability. The basis of the intellectual capital variables are that there is still a considerable gap in the innovation and development of intellectual capital in the mining sector in developing countries compared to developed countries. The only way to develop the mining sector, to gain a competitive advantage, is to change the direction of knowledge-based companies through innovation and the maximum utilization of intellectual capital (Daly et al., 2019).

The purpose of this study is to find out and analyze the impact of profitability, business risk, and intellectual capital on the value of a company with macroeconomic variables, namely the gold price, exchange rate, and petroleum price, as its control variables. This study uses many economic variables that are dynamic, meaning that the value of a variable is influenced by the value of other variables and also the value of the variables concerned in the past. The method used is the regression of dynamic panel data with the Arellano-Bond generalized method of moments (GMM) approach. The research uses a method

called "dynamic panel data regression." This method has been used a lot in other countries, but it is still not very common in Indonesia.

This research is expected to develop and complete the literature. Taking into account profitability, business risk, and intellectual capital illustrates how companies enable their value creation process and quickly become inputs for investment decisions. In addition, economic conditions that have caused the transition from a manufacturing base to a knowledge-based economy have significantly increased the role of intellectual capital in realizing a company's long-term goal, which in this case is to add firm value over time. This research is very necessary because every company that wants to increase its firm value must overcome the business risks in managing the company. This research is very helpful for managers who want to increase the value of their companies and lessen the risks they face so that they do not mess up and cause the value of the company to go down.

LITERATURE REVIEW

1. Signaling Theory, Resource Based Theory, and Firm Value

Downes & Heinkel (1982), stated that a signal to convey information or instructions can be made by means of gesturing, action, or sound. In the financial world, investors look for signs of performance, to see whether it indicates an opportunity or a weakness. What management thinks is good and right is not necessarily interpreted the same way by investors. In its development, the signal theory was directed to explain the problem of information inequality in the labor market, and was applied to answering questions regarding the corporate dividend policy (Spence, 1973), capital structure decisions (Ross, 1977), voluntary disclosures (Ross, 1979), the retention of managerial ownership in

initial public offerings (Leland & Pyle, 1977; Downes & Heinkel, 1982), current value accounting (Forker, 1984), and the voluntary selection of auditors (Yosef & Livnat, 1984). During its development, the signal theory was applied to such things as dividend payments and capital structure. The selection of a signal will greatly affect the performance of a company. Researchers and scientists have identified the use of signals in various disciplines, but one of the most common and prominent is in institutions or companies. This theory is very relevant to the condition of companies struggling to survive by gaining legitimacy from outside parties. One way that companies do gain this legitimacy is through the quality of being "not informed" about the composition of the board of directors or top managers, so that with this the company hopes to get a positive reputation that is beneficial for the company's sustainability (Connelly et al., 2011).

In accordance with the concept of the signaling theory, companies will always try to send positive signals to investors regarding their overall performance. High profitability, as a measure of assessing a company's performance, shows the company has bright prospects for the future and this will be noted by investors as a positive signal during the consideration of their investment decisions in a company. The higher the level of investment, the more it will have an impact on increasing firm value (Sasmita et al., 2020).

Ulum, (2017) explained that in addition to the use of information asymmetry to create a positive image for a company; it also shows that a high-quality organization will signal its market excellence. On the other hand, companies with a poor capacity will tend to only disclose mandatory information. This is in line with Komara et al. (2020), who state that this theory emphasizes companies in terms of sending

positive signals to the market. Investors will begin to evaluate and make investment decisions that increase the firm value. However, from the perspective of investors and shareholders, this has its own consequences. If shareholders and investors do not try to find information regarding the signals sent by a company, then they have no chance of making a profit. Thus, every signal related to firm value needs to be investigated further (Komara et al., 2020.).

Firm value is determined by a company's management of its resources and how it can maximize them so that they become a sustainable competitive advantage. A firm's value can be in the form of its asset value, share price value, or present value derived from cash flows in the future. So, companies need to make policies to increase their firm value to show investors, shareholders, creditors, and other interested parties that the companies are doing well (Sugosha, 2020a).

Advances in technology and information have brought significant changes to the evolving economic era, from companies previously being manufacturing-based to now being knowledge-based. The era of the knowledge-based economy recognizes that intellectual property is an important foundation for success in achieving firm value. The existence of knowledge is starting to be recognized by stakeholders, which encourages researchers to observe its development from time to time. One of the popular theories discussing this is the resource-based theory. According to Hitt et al., (2016), the resource-based view (RBV) theory is a theory that explains the ability of the internal resources of companies to create a competitive advantage and exploit them. A company's internal resources consist of its assets, capabilities, competencies, organizational processes, information, and knowledge that can be controlled by the company in order to implement the strategies

that have been formulated. The RBV is an approach to building a competitive advantage that began to be known between 1980 and 1990, through the publications of several experts, namely Wenerfelt in 1984, Prahalad and Hamel in 1990, and developed further by Barney in 2001 (Burvill et al., 2018).

According to Pedron & Caldeira (2009), the resource-based view is a theory that is widely discussed by different studies, and has been developed by researchers to find out how organizations gain a competitive advantage. It assumes that an organization is a set of assets, resources, and competencies that have both tangible and intangible properties which are difficult for the market to replicate. Thus, it can be said that organizational resources, as a source of capability, are a competitive advantage. Besides that, it has the power to survive in the midst of competition. These resources are valuable resources that are worth more than those of the competitors. These resources are rare, which means they are difficult to obtain on the market and are only owned by organizations. Besides that, these resources are imitable, which means that they are difficult to imitate and cannot be replaced.

2. Profitability and Firm Value

Profitability is one of the various important components that determine the sustainability of a company that is in business. Sucuachi & Cambarihan, (2016) and Sugosha, (2020) state that profitability is the ability owned by a company to generate a profit, where such profit is a measure of the company's performance. Good company performance is often characterized by an increase in profit, so profitability becomes important information for both investors and creditors. Information related to profitability makes an important contribution to investors and creditors. For investors, profita-

bility-related information can project a large value or gain on securities held as a return on investments, and for creditors profitability is often associated with a company's performance (Sugosha, 2020a). A higher profitability ratio is an indication of qualified performance. Conversely, if a company fails to generate a profit within a certain period, it will reflect problems with the company's performance, so that the threat of bankruptcy is inevitable. So, it can be seen as a reference to a company's ability to make a net income from its operating activities in the accounting period (Madtison et al., 2011; Sucuachi & Cambarihan, 2016; Sugosha, 2020).

Shareholders pay attention to their investments in companies, namely the yield on their investments. A high level of profitability displays the efficiency of a company, and regarding firm value, high profitability means an increase in firm value (Sucuachi & Cambarihan, 2016). High profitability, as one measure for assessing a company's performance, indicates the company's bright prospects and this is taken by investors as a positive signal in their consideration about investing in a company. The higher the level of investment, the more it will have an impact on the increase in firm value (Madtison et al., 2011; Sucuachi & Cambarihan, 2016).

One of the goals of investors is to improve their welfare. In other words, investors are expected to be more prosperous after making investments. This understanding is in line with the concept of firm value, which aims to maximize the welfare of shareholders. Investors own shares, with the intention of making a profit or gaining a return on their holdings. As a result, the greater the company's ability to generate profits, the higher the projected return on investment will be, and hence the higher the firm's value (Brigham & Houston, 2021a).

Profitability is the ability owned by a company to generate profits. When a company shows an increase in its profits, it is often due to the efficiency of management that results in better performance. High profitability, as one measure of a company's performance, indicates the company's bright prospects, and investors will interpret this as a favorable signal in their consideration about investing in a company. The higher the level of investment, the more it will have an impact on the increase in firm value.

Some articles that discuss the relationship between profitability and firm value tend to have different results. The study by Madtison et al., (2011); Sucuachi & Cambarihan, (2016), and Sugosha, (2020), shows a positive influence between profitability and firm value. However, in contrast to the results of previous studies, the results submitted by Asare et al., (2017); Mosavi et al., (2012), and Zandi et al., (2020) show that profitability negatively affects firm value. Ramirez, (n.d.) finds that there is no influence between profitability and firm value. Therefore, the first hypothesis of this study is:

H₁: Profitability has a positive effect on firm value.

3. Intellectual Capital and Firm Value

There are benchmarks that are often used to measure company value, namely the price to book value (PBV). The PBV is a ratio that compares a company's stock market price to its book value. The "gap," or difference between the market value and book value has attracted many researchers to examine the invisible value of financial statements (Bleoca, 2016). According to him (Bleoca), the difference between market price and book value is the value of intellectual capital (IC). In other words, if the market is efficient, investors will invest in companies with a greater IC value.

Taylor Frederick began the first discussion about IC during the 20th century. He mentioned that the knowledge, abilities, and expertise possessed by employees are things to consider in company management. However, the term "IC" has been widely used in the last decade, since the rapid development of technology has shifted the traditional economic base to a modern approach. This approach creates firm values where knowledge and expertise are now highly regarded (Radjenović & Krstić, 2017). In the end, the management of IC became crucial for the knowledge-based economy that exists today.

Intellectual capital itself has various terms, such as intangible assets, invisible assets, and immaterial values ((Joshi et al., 2013; Nguyen & Vo, 2020; Radjenović & Krstić, 2017; Wang, 2011). However, in a sense, these terms have the same meaning. Intellectual capital, according to the Society of Management Accountants Canada (SMAC), is the knowledge that the human resources in a company have and will generate profits in the future. For organizations, intellectual capital can also be interpreted as the corporate insights used in business processes to create added value (Petković & Đorđević, 2021; Sullivan, 2000).

Based on the discussion above, IC is only based on human knowledge or human capital. This is opposed by Sullivan, (2000), who states that "IC" is the phrase for a company's intangible assets, intellectual property, workers, and infrastructure. From this definition, it is clear that the elements of IC are not only the human capital but also other intellectual elements that support the creation of firm value. Aside from the probabilities and risks of a business, according to Cabrita & Bontis, (2008) and Wang, (2011), the intangible assets' factor is also starting to become a major focus for increasing the value of a firm, especially in today's era of digital information. Intangible

assets have become essential, which, in the context of research, are also referred to as intellectual capital. In general, intellectual capital (IC) is information that can be used to build company value (Petković & Đorđević, 2021).

Intellectual capital is observed as a non-financial resource or non-financial asset and is a combination of intellectual property, human resources, research, and development (Bleoca, 2016). These elements describe how a company activates the value creation process which quickly becomes an input into investment decisions. In addition, the economic conditions transitioning from a manufacturing-based to a knowledge-based economy have significantly increased the role of intellectual capital in realizing a company's long-term goal, which in this case is to add firm value over time (Pucci et al., 2015). Thus, intellectual capital variables have become important things to consider for research into firm value.

Indrabudiman & Handayani (2017) say that the main point of intellectual capital is to create value that can be understood in a complex way. This value comes from a combination of knowledge, talent, processes, and infrastructure that helps create a competitive advantage. Investing in intellectual capital can increase the knowledge, develop technology, and prepare companies for competition from new products. Competition in the 21st century, or a knowledge-based economy, encourages a more productive utilization of intangible assets in order to achieve success in the market. In the long term, IC offers a more efficient structure, a better work environment, and more effective business processes. The more effective a company's performance is, the greater the company's productivity and income will be, and the more able the company will be to create firm value for its stakeholders (Radjenović & Krstić, 2017).

Research related to intellectual capital and firm value has begun to be widely conducted. These factors have been researched by Cabrita & Bontis, (2008); Joshi et al., (2013); Nguyen & Vo, (2020); Petković & Đorđević, (2021); Pucci et al., (2015), and Wang, (2011), who all state the positive influence of intellectual capital on firm value. However, this is not in line with research by Bleoca, (2016) and Radjenović & Krstić, (2017) who mention that there is no influence between intellectual capital and firm value. Based on the explanation above, innovation from intellectual capital leads to profit maximization, economic growth, and improved welfare. Innovation in intellectual capital helps companies to explore competitive advantages that can increase their overall firm value. Therefore, the second hypothesis is:

H₂: Intellectual capital has a positive effect on firm value.

4. Business Risk and Firm Value

When making investment decisions, investors assess a company from various aspects, with the aim of measuring one thing: How the company can provide maximum returns for them in the future. One of the aspects considered is the projected risk that is likely to occur for the company. Every investor has a different preference and level of confidence in risk-taking. Every decision that a company takes must consider the business risks that will be faced, especially with regard to the interests of shareholders (Sahin et al., 2016). Business risk is defined as an uncertainty in the projected return from the capital invested in the company (Akccakanat, 2012). Companies with high business risks tend to make low investments because high business risks have an impact on the uncertainty of the company's profitability level in the future, which may create limited internal funds (Erkaningrum, 2013).

Business risk is the risk arising from fluctuations in a company's revenue and operating costs that cause uncertainty about its future profitability (Al-Khadash & Jireis, 2017). "Business risk" is the condition of the company related to the rise and fall in profits. Companies that experience fluctuations in their profits face uncertainty about their ability to pay their loans or debts, so companies that have high business risks tend to avoid debt in their financing (Jill & Houmes, 2014).

Business risks are related to the continuity of the organization, its ability to pay its obligations, and investors' interest in investing. They are also related to a company's ability to obtain funds for its activities (Jafari & Chadegani, 2011). In terms of company value, business risk has control over future profit fluctuations. Business risk is closely related to the company's life cycle, the company's ability to pay off debt, and investors' interest in investing; it also affects the company's ability to obtain funds for carrying out its operations (Alquier, 2006; Li, 2018; Sulin & Yuan, 2018).

According to Naude (2017), business risk describes the possibility of failure in an organization. Such a failure can hinder a company's ability to generate profits, and in certain situations it can affect the company's overall performance. Investor confidence can decrease if faced with the risks that may occur (Li, 2018; Sulin & Yuan, 2018; Zungu et al., 2018). A high business risk can also reduce the value of a company in the eyes of investors, especially when they realize the potential for bankruptcy. If that happens, the company's assets would be sold to settle its large debts rather than to return the value of the shares which the shareholders invested in (Akccakanat, 2012; Bandanuji & Khoiruddin, 2020).

Primantara & Dewi (2016) state that business risk is related to the continuity of the

organization, its ability to pay its obligations, and the interest of investors to invest, as well as being related to companies obtaining funds for their activities. In relation to firm value, business risk controls the fluctuations in future profits. According to Irawati & Komariyah (2019), business risk describes the potential for the failure of an organization. This failure can interfere with the company's ability to generate profits on investment, and in certain circumstances, it can affect the company's overall performance. Investor confidence will decrease if faced with the risks that may arise (Rahim & Ahmad, 2016).

According to Brigham and Houston (2021), a company that goes public in its implementation will always try to increase its value to attract investors to invest in it. However, in line with the increase in firm value, companies also face increased business risks ((Brigham & Houston, 2021). Proposed by Sahin et al., (2016) and Zungu et al., (2018), business risk is something that companies will definitely face in carrying out their business activities. So, companies need to think about policies that can make their business activities less risky.

Research into the relationship between business risk and firm value is an interesting topic for academics and scientists. However, despite the large number of studies looking at the influence of these two variables, the results tend to vary. In addition, only a few are still trying to examine the business risks of mining companies in developing countries. Concerning firm value, business risks are related to the sustainability of a company, its ability to pay off its obligations, the willingness of investors to invest in the company, and the company's ability to obtain funds to carry out its activities. Thus, according to the investors' point of view, the higher the

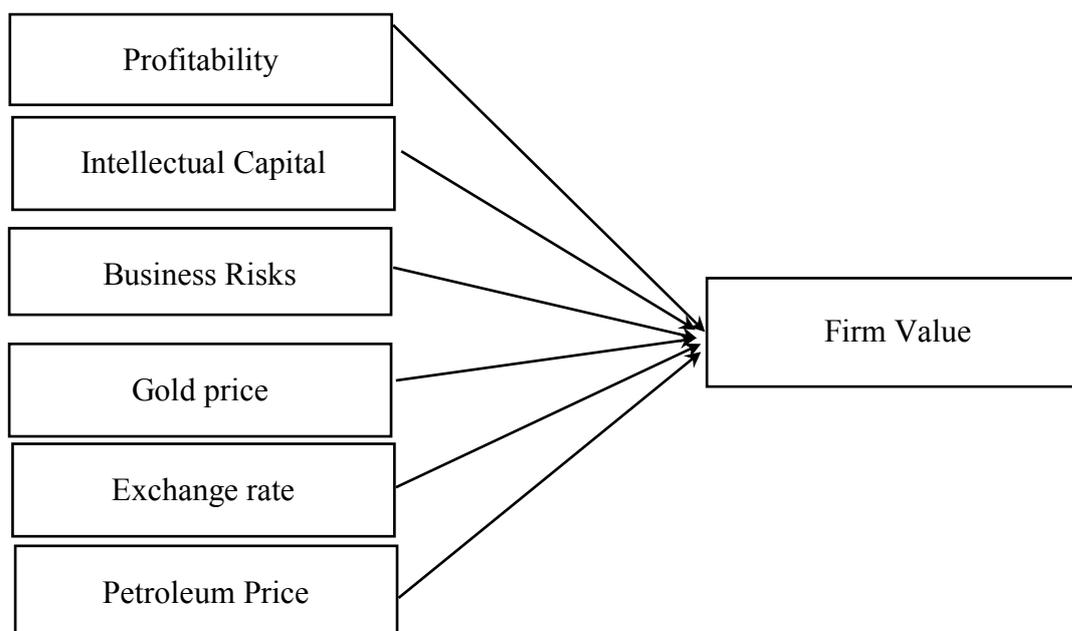
business risk of the company, the lower the value of the firm (Al-Khadash & Jreis, 2017; Jill & Houmes, 2014; Zungu et al., 2018).

Business risk calculation can be done using the BRISK calculation. BRISK is used to describe fluctuations and risks in a company's operating profits, in a given period. This calculation is used to look at the amount of risk a company has in its ability to generate future profits. There is supporting research that has been conducted to find the influence between business risk and firm value. There are studies that have researched both of these variables. Research conducted by Al-Khadash et al., (2017); Bandanuji & Khoiruddin, (2020); Jafari et al., (2011); Li, (2018); Naude, (2017); Sulin & Yuan, (2018), and Zungu et al., (2018) shows a negative influence between business risk and firm value. On the other hand, research by Dabari & Saidin, (2016) and Sahin et al. (2016) finds that generating business risks positively affects firm value.

Business risk has control over future profits if it is related to the value of a company. Firm value that is linked to a high business risk will also decrease, in the minds of investors, especially when they realize the potential for bankruptcy. In the end, the assets held by the company would be sold to settle large debts rather than to restore the value of the shares purchased by shareholders. Therefore, the third hypothesis is:

H₃: Business risk has negative effects on firm value.

Based on the theoretical foundations that have been presented, and the relationships between the variables, the framework of the research in this study is as follows:

Figure 2. Framework of Research

METHOD, DATA, AND ANALYSIS

1. Research Methods and Samples

This study used secondary data with quantitative methods. The data used were taken from the annual financial statements, consisting of balance sheets and income statements related to the research variables. Data were gathered from the Indonesia Stock Exchange's official website, www.idx.co.id, as well as mining sector corporate websites. The mining sector companies were chosen because they were in line with the fact that the fall in mining commodity prices had put pressure on the mining sector. In addition, the slowdown in economic growth, which led to a recession due to the pandemic, had also resulted in a sharp decline in commodity prices in general. The limited economic activity in more than 200 countries caused demand for the world's main commodities to decline. As a result, commodity prices fell sharply. The world oil price at the end of June 2020 fell to US\$37 per barrel. In fact, the WTI petroleum price experienced an anomalous transaction in which the price became negative, namely at the price of

–US\$37.6 per barrel in April 2020 (CEIC, 2020).

Mining commodity prices also experienced a significant decline, one of which was the price of coal. In early January 2020, the price of coal in the global market was around US\$70 per ton. On June 25, 2020, it fell sharply to US\$52.55 per ton. The sharp decline in coal commodity prices was also related to the economy, especially the industrial sector, due to reduced production capacity (tradingeconomics.com, 2020). Renewable energy is the solution and the main innovation developed in this sector, especially in Indonesia. To accelerate the process of technology transfer into renewable energy, the only way for companies in the mining sector to gain a competitive advantage was to change their direction from being a manufacturing company to a knowledge-based company through innovation and the maximum utilization of intellectual capital (Suian & Abeysekera, 2007; Wagiciengo & Belal, 2012).

The method of determining the sample in this study was saturated sampling, which meant

that all these members of the population were included as research samples. A sample of 47 mining companies listed on the Indonesia Stock Exchange was obtained for the period from 2017 to 2020. The data taken amounted to 134 of the total 188 data points (sample data from 47 companies for four years). This was because there were companies that did not have complete data, while data outliers were not included. The variables in this study consisted of dependent variables and independent variables. The dependent variable that was used was firm value (Y). The independent variables included profitability (X₁), intellectual capital (X₂), and business risk (X₃). Furthermore, the gold price (X₄), exchange rate (X₅), and petroleum price (X₆) were used as controlled variables.

2. Measurements

2.1. Dependent Variable (Y)

A dependent variable is a variable that is influenced by, or becomes, the result of the independent variable. There are many terms mentioning this variable, namely output, dependent, and consequent variables (Sugiyono, 2015). The dependent variable in this study was firm value. In this study, firm value was measured by the price to book value, which described the comparison of the price of shares per share with the book value (Sugosha, 2020b). The formula used was as follows:

$$\text{Price Book Value} = \frac{\text{Share Price}}{\text{Book Value}} \quad (1)$$

2.2. Independent Variable (X)

An independent variable is a variable that affects the dependent variable. This variable can also be referred to as the stimulus variable (Sugiyono, 2015). In this study, the return on equity (X₁), intellectual capital (X₂), and business risk (X₃) were the three independent variables.

2.2.1. Profitability (X₁)

Profitability is a company's ability to generate a profit, where profit is a measure of the company's performance. This study used the return on equity (ROE) to calculate profitability. ROE is a ratio that assesses how a company uses capital from investors and retained earnings to generate net profits (Sugosha, 2020b). The formula used was as follows:

$$\text{ROE} = \frac{\text{Net Income After Tax}}{\text{Total Equity}} \quad (2)$$

2.2.2. Business risk (X₂)

In this study, the business risk (X₂) was calculated using the BRISK unit, which was in line with research conducted by Bandanuji & Khoiruddin, (2020) using the formula:

$$\text{BRISK} = \text{Ln} (\sigma \text{EBIT}) \quad (3)$$

Ln : Natural Logarithm

σ : Standard Deviation

EBIT : Earnings before Interest and Taxes

3.2.2.3. Intellectual capital (X₃)

In this study, intellectual capital was measured using the VAICTM model by Pulic. This model had previously been applied to research by Hatane et al., (2017) with the following calculations:

$$\text{VAIC}^{\text{TM}} = \text{VACA} + \text{VAHU} + \text{STVA} \quad (4)$$

VAICTM = Value Added Intellectual Capital

VACA = Value Added Capital Employed

$$\text{VACA} = \frac{\text{VA}}{\text{CE}} \quad (5)$$

VAHU = Value Added Human Capital

$$\text{VAHU} = \frac{\text{VA}}{\text{HC}} \quad (6)$$

STVA = Structural Capital Value Added

$$\text{STVA} = \frac{\text{SC}}{\text{VA}} \quad (7)$$

VA = Value Added

$$VA = CI + EC \quad (8)$$

CI = Comprehensive Income

EC = Employee Cost

CE = Capital Employed

HC = Human Capital

SC = Structural Capital

2.3. Variables control

2.3.1. Gold Price (X₄)

The gold market price is formed from the accumulation of supply and demand on the London bullion market. The price of gold was taken from:

<https://id.investing.com/commodities/gold-historical-data> in USD/OZ. The data used were the average data of the annual gold price during the 2017 to 2020 period, in Indonesian rupiah.

2.3.2. Exchange Rate (X₅)

The rupiah exchange rate is the price of the Indonesian currency against other countries' currencies, or the currency of a country expressed in the currency of another country. The exchange rate used was the selling price of rupiah against the United States dollar, as issued by Bank Indonesia. The exchange rate data were taken from www.bi.go.id. The data used were the selling value at the end of the year in the period from 2017 to 2020.

2.3.3. Petroleum Price (X₆)

Petroleum price data were taken from the following web site:

<https://id.investing.com/commodities/crude-petroleum-historical-data>. The data used were the annual world petroleum price in the 2017 to 2020 period, in Indonesian rupiah.

3. Generalized Method of Moments (GMM)

The data analysis techniques in this study used Eviews 12 programs. In addition, the analytical method used was the generalized method of

moments (GMM). The GMM is a method used to obtain parameter estimates from statistical models. Furthermore, this study used a sample of mining company data registered with the IDX for the period 2017 to 2020. The GMM was used to overcome endogeneity problems that could arise, so the use of GMM estimates was considered capable of providing more powerful estimations than the fixed effect and OLS estimates (Pasaribu & Mindosa, 2021). In addition, the use of GMM estimates is more efficient when heteroskedasticity problems occur, because GMM does not require distribution assumptions about error terms (Maizuddin et al., 2021).

The model specifications built in this study consisted of a firm value (PBV) model. The built model was as follows:

$$PBV_{i,t} = \beta_0 + \delta PBV_{i,t-1} + \beta_1 ROE_{i,t} + \beta_2 BRISK_{i,t} + \beta_3 IC_{i,t} + \beta_4 GP_{i,t} + \beta_5 EX_{i,t} + \beta_6 OP_{i,t} + \varepsilon_{i,t}$$

PBV_{i,t} = PBV of the current year

β₀ = constant

δPBV_{i,t-1} = previous year's PBV

β₁ROE_{i,t} = coefficient of profitability (ROE)

β₂BRISK_{i,t} = coefficient of business risk (BRISK)

β₃IC_{i,t} = intellectual capital coefficient (IC)

β₄GP_{i,t} = gold price coefficient (GP)

β₅EX_{i,t} = exchange rate coefficient (EX)

β₆OP_{i,t} = petroleum price coefficient (OP)

ε_{i,t} = standard error

The stages of analysis carried out in this study were as follows:

1. Analyse the characteristics and general descriptions of the firm value of mining companies in Indonesia, as well as the factors that might affect them.
2. Evaluate the model based on the OLS estimate.
3. Estimate using GMM Arellano-Bond.

6. The gold price variable X_4 had a highest value of 1,811.210 and a lowest value of 1,345.770. This meant that the value of the data sample ranged between 1,345.770 and 1,811.210. The resulting standard deviation (186.9820) also had a lower value than the average value (1,487.84), which reflected a good distribution among the data presented.
7. The exchange rate variable (the X_5 variable), had data which ranged from 13,548.00 to 14,481.00, which meant it had a maximum value of 14,481.00 and a minimum value of 13,548.00. The standard deviation was smaller than the average, with values of 335.2018 and 14,047.40. This indicated that the data were well distributed.
8. The petroleum price variable, which was X_6 in this study, had a data range of 38.60000 to 64.54000, which showed the maximum value was 64.54000 and the minimum value was 38.60000. It also had a good distribution because the standard deviation of the sample data was less than that of the average, which was 53.7936.

2. Model Generalized Method of Moment (GMM)

This study used the *dynamic panel model* for firm value modeling.

2.1. OLS Estimation

The results of the estimation using the OLS method are displayed in Table 2.

Based on Table 2, it can be seen that the previous PBV had a lag coefficient value of 5.812744. The value of the PBV lag coefficient was worth more than one. If the value of the lag coefficient was greater than one, then the estimate to find the lag coefficient would be biased and inconsistent.

2.2 Arellano-Bond GMM Estimates

The estimation used in this study was the GMM Arellano-Bond two-step estimator. The results of testing the significance of the parameter simultaneously were indicated by the p-value of 0.000. Therefore, the decision was taken to reject H_0 , which indicated that there was at least one significant coefficient in the model. Partially testing the significance of the parameters can be seen in Table 3.

Table 2. OLS Results

Variable	Coefficient	Std. Error	t	P-Value
C	5.812744	4.779174	1.216265	0.2344
PBV-1	0.652987	0.052942	12.333938	0.0000
ROE	0.031649	0.006917	4.575815	0.0001
IC	6.90E-06	2.67E-06	3.584342	0.0155
BRISK	-0.0022386	0.036988	-0.064497	0.0394
GOLDPRICE	0.000304	0.001981	1.84497	0.0379
EXCHAGERATE	-0.0173118	0.000735	-1.793353	0.0483
PETROLEUMPRICE	0.1017318	0.044281	2.391096	0.0198

Table 3. Partial Test Results

Variable	Coefficient	Std. Error	Z	P Value.
C	0.888876	2.460391	0.361274	0.7179
PBV-1	0.638558	0.033850	18.86448	0.0000
ROE	0.023476	0.004863	4.827304	0.0000
IC	9.39E-06	2.01E-06	3.720354	0.0018
BRISK	-0.011169	0.031436	-0.035528	0.0422
GOLDPRICE	0.002784	0.001068	2.606036	0.0092
EXCHAGERATE	-0.000458	0.001310	-2.475914	0.0140
PETROLEUMPRICE	0.057873	0.022158	2.611851	0.0090

Based on Table 3, it can be seen that the p-value of all variables was below 0.05. As a result, ROE, IC, BRISK, gold price, exchange rate, and petroleum price all had a significant impact on the PBV.

After conducting parameter significance testing, the next step involved measuring the criteria of the best model. The dynamic panel method with the Arellano-Bond GMM approach can be said to be a good method if it meets the criteria of the consistency and validity of the instrument. The test results of the best model criteria can be seen in Table 4.

Table 4. Model Criteria Results

Arellano-Bond Test Statistical Value	P-Value
1.2163 (m1)	0.2732
-0.15623 (m2)	0.7733
Sargan Test Statistical Value	P-Value
4.481293	0.4788

Based on Table 4, it can be seen that the dynamic panel method with the Arellano-Bond GMM approach met the criteria of the best statistical model. This was because the results were consistent and the instrument variables that we used were valid. The Arellano-Bond (AB) results for m2 showed a p-value of 0.7733. If the value had been 5%, then the decision to reject H0 would not be taken. Thus, the estimate was said to be consistent, and there was no

autocorrelation in the first difference error of the second order. Sargan's estimation results showed a p-value of 0.4788. If the value was 5%, then the decision to reject H0 would not be taken. Thus, there was no correlation between the residual and overidentifying restrictions. In other words, the instrument variables were used more frequently than the number of parameters suspected. Therefore, it could be said that there was no problem with the validity of the instrument.

2.3. Relationship between variables X and Y

The influence between independent variables and dependent variables can be explained as follows:

1) Based on Table 2

It can be seen that the previous PBV had a lag coefficient value of 0.652987. The value of the PBV lag coefficient was less than one. If the value of the lag coefficient was less than one, then the estimate to find the lag coefficient would be unbiased and consistent

2) Influence between Profitability (ROE) and Firm Value (PBV)

Based on the results of the t-test analysis from Table 3, it can be stated that ROE had a significance value. This was because the value, which was 0.0000, was less than 0.05, and the value of t calculated (4.827304) was higher than

the t table's value (1.657037). Therefore, H_0 was rejected and H_1 was accepted. In other words, profitability had a significant effect on firm value.

Based on the results obtained that profitability has a significant effect on the value of the company, which in this case were the same results as the signaling theory which states that a firm's performance will always give a positive signal to investors. High profitability or increased profits indicate a bright outlook for a company in the future and are interpreted by investors as a positive signal to invest. The better a company's ability to generate profits, the higher is the expected return for investors, which will increase the value of the firm. And conversely, the low profitability of an enterprise is a bad signal for investors to invest.

Profitability is one way to exactly assess the extent of the rate of return that can be obtained from investment activity. If the company's condition is categorized as profitable or promises profits in the future, many investors will invest their funds in the company's shares. Of course, this will push the stock price higher. Based on the test results of 47 companies in the mining sector from 2017 to 2020, it can be seen that profitability (ROE) had a positive effect on firm value (PBV), which was indicated by a regression coefficient that was positive (0.023476). This meant, for every increase in profitability (ROE) by one unit, assuming the other independent variables were considered to be constant, the firm value (PBV) increased by 0.023476. This showed that high profitability was considered to be a positive signal for investors who hoped that, with the increase in the company's net profits, the company's management would also increase the dividends that would be distributed to shareholders (investors). The company's high profitability should increase the value of the company

because, from the perspective of investors, companies that have been able to generate high profits have indicated that they managed the capital owned by the company, including the share capital invested by investors, well. This can further increase investor confidence that the capital they invested is in a profitable investment. Then, the investor's decision to invest in related companies would be the right decision. High profitability is positively responded to by the market, by appreciating the stock price. However, the market will react negatively when a company's profitability has decreased, which results in a decrease in the stock price. Furthermore, it will also affect the value of the company (Brigham & Houston, 2021b). The results of this study are in line with the results of research by Sucuahi & Cambarihan, (2016) in the Philippines, which showed that profitability had a positive impact on the value of the company. This indicated that the higher the profitability of a company, the greater the revenue that could be distributed to shareholders. Furthermore, the expected value of the company would be higher. Return on equity indicates the company's efficiency in managing capital and is also a positive measure of profitability. The results of this study are also in line with the results of previous research by Sugosha, (2020b). The results showed that profitability had a positive and significant influence on the value of the firm. An increase in profit will increase the dividends distributed. Thus, investors will give the company more value. Profitability has a very important role in maintaining the long-term continuity of the company since it indicates the prospects of the company. A company with high profitability will give an indication of its good prospects that could lead investors to increase their demand for shares. Furthermore, an increase in the demand for such shares may increase the value of the company (Maditison et

al., 2011; Sucuachi & Cambarihan, 2016; Sugosha, 2020).

3) Influence between Intellectual Capital (VAICTM) and Firm Value (PBV)

Based on the results of the t-test analysis from Table 3, it can be stated that VAICTM had a significance value. This was due to the result (0.0018) being less than 0.05. The value of the t count was greater than that of the t table, at 3.720354 and 1.657037 respectively. Furthermore, H_0 was rejected and H_2 was accepted. In other words, intellectual capital had a significant effect on firm value.

Referring to these results, the fluctuations in intellectual capital that occurred in mining sector companies affected or caused fluctuations in the value of the mining companies. If the value of the intellectual capital described by VAIC decreased, the company value, as described by its price book value (PBV) ratio, also tended to decrease. This finding was in accordance with the concept of the resource-based value (RBV), which states that competitive resources, such as intellectual capital, can help companies increase their company value. These competitive resources, derived from ongoing research, help companies discover the renewable innovations that investors and shareholders look for (Radjenović & Krstić, 2017).

The superior resources owned by a company are resources that create an identity for the company, because these resources are unique and difficult for other companies to replicate. All the resources owned by a company can create value that will improve the company's performance for the better (Ulum, 2017). The improved performance of a mining company will surely attract many investors to invest in it, so that the company can increase its value. Therefore, the fact that intellectual capital is an asset for the company and that the increase in its

value will also increase the value of the company is undeniable (Petković & Đorđević, 2021).

A good company value indicates the company has the ability to use its tangible and intangible assets effectively and efficiently. Utilizing the potential of the company can create added value, which in turn encourages an increase in its firm value. To create value, a company needs good quality human resources. Maximizing the human resource's management can create added value for the company. Structural capital (SC) is the entire non-human storehouse of knowledge in an organization; it includes organizational charts, databases, process manuals, routines, strategic planning, and all that can make the company's value higher than its material value (Ulum, 2017). Companies that are able to meet their needs for their routine processes and structures that support the employees' efforts to produce an optimal business performance and intellectual performance will create added value for themselves. Intellectual capital is believed to be one of the main causes of increasing company value. This statement is in accordance with the statement which states that investors will give more value to the company by investing more in it (Sullivan, 2000). These results are also in accordance with the research by Cabrita & Bontis, (2008); Joshi et al., (2013); Nguyen & Vo, (2020); Petković & Đorđević, (2021); Pucci et al., (2015), and Wang, (2011) that found there is a significant influence of intellectual capital on the value of a company.

4) Influence between Business Risk (BRISK) and Firm Value (PBV)

Based on the results of the t-test analysis from Table 3, it can be stated that BRISK had significance because it had a value (0.0394) which was less than 0.05, and a value for the t count $>$ that for the t table, which was $-0.035528 > -1.657037$ respectively. Furthermore, H_0 was

rejected and H_3 was accepted. In other words, the business risk had a significant effect on firm value.

These probability tests illustrated that the business risks had a significant negative effect on firm value. So, if the business risk increased, then the firm value owned by mining sector companies listed on the IDX would decrease, and vice versa. These findings indicated that increased business risks could have a real influence on firm value. This research was in accordance with the signal theory, which states that information that indicated a decline in a company's performance could undo an investor's intention to invest because it would be considered as a negative signal. The confidence of shareholders would weaken if faced with risks. Hence, the value of companies that have a high business risk will decrease in the eyes of investors.

The results illustrate that an increase in the business risk will decrease firm value. According to Dabari & Saidin (2016) and Sahin et al., (2016), high returns resulting from the price to book value (PBV) can cover the possibility of increased business risks. This is because investors tend to expect optimal returns, and high returns are linked to high risk. According to Dabari & Saidin, (2016) and Sahin et al. (2016), investors will always choose the stocks they want based on their ability to control risk, which, logically, if the expected rate of return is high, then there is a large business risk as well. Following the risk and return theory, which states that when investing in financial assets, investors will face large risk factors, but their returns may also be high. Because of this, investors need to think carefully before buying financial assets, especially stocks, which can change at any time for reasons that are both internal to the company and external from the economy that could not be predicted beforehand (Dabari & Saidin, 2016; Sahin et al., 2016).

5) Influence between Gold Price and Firm Value (PBV)

Based on the results of the t-test analysis from Table 3, it can be stated that the gold price had significance because its value (0.0092) was less than 0.05. Furthermore, it had a t count value $>$ that of the t table, which were $2.606036 > 1.657037$ respectively. In other words, the gold price had a significant effect on firm value. This showed that any increase or decrease in the price of gold affected the rise or fall of the stock's price.

The results of research that has been carried out showed that the market price of gold had a positive and significant effect on the value of mining companies. The stock values of mining companies would be boosted by an increase in the market price of gold. This was because investors considered that the increase in the market price of gold would eventually increase the share price of companies in the mining sector. When the mining sector showed an increase in corporate profits, due to the increase in the market price of gold, investors would be interested in investing. When the demand for shares increases, the value of the company will also automatically increase. Gold is one of the indicators that can affect the level of integration, which can be seen through the level of volatility. Gold is considered to be one of the few commodities that are free from the influence of inflation, compared to other commodities. In other words, it has a zero inflation effect because gold is a good instrument for its hedging value, which has a positive correlation with inflation (Bampinas & Panagiotidis, 2015). In addition, gold is considered capable of maintaining its purchasing power compared to other assets during periods of high inflation (Kumar & Sahadudheen, 2015). The reason gold is a variable that can affect the integration of the capital market is that gold is a solution if

investors around the world experience panic. They will, in the event of a national or international economic crisis, buy into gold investments instead of stocks in the capital market. This is because an economic crisis affects the economic activities of countries, so it can cause a decline in their economic growth and stock markets.

According to Priadipa (2021), the gold price has a significant positive effects on the value of a company because the price of petroleum can also affect the share price of a company, which in the end also affects the value of the company. This research supports the research conducted by Dwiati & Ambarwati(2016) and Hamzah et al. (2021), who mentioned that the price of gold has an influence on the price of shares. Hence, the investors' decisions about where to invest are influenced by the price of gold.

6) Influence between Exchange Rate and Firm Value (PBV)

Based on the results of the t-test analysis from Table 3, it can be stated that the exchange rate had a significance value. This was because it had a value of 0.0140, which is less than 0.05. Furthermore, it had a t count value > than that of the t table value, which were $-2.475914 > -1.657037$ respectively. In other words, the exchange rate had a significant effect on firm value.

The exchange rate (US dollar) showed a negative and significant influence on the value of mining companies. The exchange rate of the US dollar against the rupiah was a factor that had quite an influence on the stock price. If the USD/IDR exchange rate is high, then investors will be more interested in investing in US dollars than stocks. If the USD/IDR exchange rate falls, then investors will prefer to invest in stocks, which will ultimately affect the stock price. Rupiah exchange rate stability is very important

in the Indonesian economy. The weakening of the rupiah exchange rate can affect the rate of return on investment by a company. The exchange rate indicates the price or value of the currency of one country expressed in the value of the currency of another country (Sukirno, 2006). The exchange rate can also be used as a benchmark for companies that carry out export and import activities. According to Madura, (2020), the exchange rate may also change substantially in accordance with changing economic conditions. The weakening of the rupiah exchange rate against foreign currencies has caused an increase in production costs and decreases in profitability in the past. So in the end, companies values also decreased (Pangestuti, 2020).

An increase in the rupiah exchange rate indicates that Indonesia's macroeconomic or economic situation is improving. On the other hand, if the rupiah exchange rate depreciates, it can be interpreted that the Indonesian economy is experiencing turmoil. Domestic economic troubles will make investors less interested in investing, because the risk of investing will go up because of the unstable economy. The weakening of the rupiah against the dollar will also have an impact on companies. Those companies that have debts and operational activities that require production resources to be paid for in dollars will experience an increase in their production expenses due to the exchange rate. This will cause the companies' profits to decline. The decline will result in the investors having a lack of confidence about investing in those companies. Thus, investors will reconsider their capital outlays and shift them to the foreign exchange markets because they will hopefully provide higher returns. This study supports the previous research by Dwipartha, (2013), Azizah & Priyadi, (2016), and Risman et al., (2017), which found that the exchange rate has a negative impact on firm value.

7) Influence between Petroleum Price and Firm Value (PBV)

Based on the results of the t-test analysis from Table 3, it can be stated that the petroleum price had a significance value. This was because it had a value of 0.0090, which was less than 0.05. Furthermore, it had a t count value > than that of the t table value, which were $2.611851 > 1.657037$ respectively. This meant that the price of petroleum had a significant effect on the value of firms.

Petroleum is one of the important commodities for the economies of several countries, especially Indonesia. Indonesia sets the price of crude petroleum as one of the macroeconomic assumptions in the development of its state budget (Steven, 2020). This is because crude petroleum is a fuel that is widely used in daily and industrial activities. Petroleum is one of the commodities that can affect other commodities, because the prices of commodities other than petroleum are influenced by changes in petroleum prices (Putra and Robiyanto, 2109). Petroleum is the biggest need in the country; therefore, petroleum price volatility has a close correlation with changes in stock prices. This is because when the price of petroleum increases, it will result in an increase in the prices of production goods, which will cause companies to experience an increase in their production costs.

Fluctuating world petroleum prices can affect the capital markets. Petroleum exporting countries and mining sector companies can benefit from rising world petroleum prices because they can attract investors. Volatile world petroleum prices can affect a country's capital markets. The increase in world petroleum prices could provide benefits for mining sector companies on the IDX, because the companies' net profits would increase. This can attract investors to buy shares in mining companies so

that the value of these companies further increases. This research supports the research conducted by Hutapea et al., (2014), Risman et al. (2017), and Priadipa, (2021), who mention that petroleum prices have a significant positive effect on firm value because petroleum prices can affect the share price of companies, which in the end is also affected by the value of the firm.

3. Robustness Test

A robustness test needed to be done to see how long the model would last or if it was correct. Robustness tests are carried out by replacing the profitability variable, such as the return on equity (ROE), with the return on assets (ROA), using the same sample. ROA reflects a company's business profit and efficiency in the utilization of its total assets, which is calculated by the division of net profit by total assets ($ROA = \text{net profit} / \text{total assets}$). The increase and decrease in ROE is influenced by the value of ROA and the company's debt. If a company takes on more debt, shareholders will get higher returns as long as the company's return on assets (ROA) is higher than the cost of debt, or the cost of preferred shares (Brigham & Houston, 2021b).

Based on the results of the overall study, there is no significant difference in the results between the use of ROA and ROE variables. Both results showed significant results. Based on the results of the t-test analysis, it can be stated that ROA had a significance value. This was because the value, which was 0.00231, is less than 0.05. Furthermore, it had a t count value of $3.765345 >$ than that of the t table value, which was 1.657037. In other words, ROA had a significant effect on firm value. Based on the results of the robustness test, it showed that the found model was valid because it passed the simulation or conditions that could cause errors or variations of errors.

CONCLUSION AND SUGGESTION

Based on the results of the hypotheses through testing using the methods of the generalized method of moments and the discussions that have been outlined, it can be seen that profitability has a significant effect on the value of a company. Increasing or high profitability indicates a company's bright prospects for the future and this is viewed by investors as a positive signal in their considerations about investing. The greater a company's ability to generate profits is, the higher the expected return is from investors, which will increase the value of the company. The increase or decrease in intellectual capital of mining sector companies affects or causes an increase or decrease in mining firm values. Business risk has a significant effect on the value of a company, so that if business risk increases, the value of the company owned by the mining sector companies listed on the IDX decreases, and vice versa. These findings suggest that an increased business risk can have a noticeable influence on a company's value. Macroeconomic variables as variable controls, such as the price of gold, show that they have a significant effect on the value of the company. The results of studies that have been carried out showed that the market price of gold had a positive and significant influence on the value of mining companies. The next control variable, the exchange rate (US dollar), shows a negative and significant influence on the value of mining companies. Rupiah depreciation can affect the return on investment of a company. Fluctuating world petroleum prices can affect the capital markets. Petroleum exporting countries and mining sector companies can benefit from rising world petroleum prices because this will attract investors. So, the results of this study add to the results of previous studies that showed profitability, intellectual capital, business risks, and macroeconomic factors like gold prices,

exchange rates, and oil prices affect the value of mining companies in Indonesia.

This research has some limitations that affect the results. First, this study only looked at a sample from one sector, the mining sector listed on the Indonesia Stock Exchange (IDX). This means that the model made cannot be used to predict firm value in other sectors of the IDX. Secondly, some companies did not publish consecutive financial statements during the research period. Third, the study only used annual financial statement data with observation periods of four years, i.e., 2017 to 2020; using a longer period may produce different results. It is suggested that future researchers add other research variables in conjunction with firm value (PBV), in addition to the independent variables that have been tested above, and also add a range of research periods that may be able to give better results than the ones obtained here.

REFERENCE

- Akcakanat, (2012), Enterprise Risk Management and Process of Enterprise Risk Management. *Demirel University the Journal of Visionary*, 17(4), 125–140.
- Al-Khadash, & Jreis. (2017). COSO Enterprise Risk Management Implementation in Jordanian Commercial Banks and Its Impact on Financial Performance. *International Journal of Research Gate*, 23(5), 333–345.
- Alquier. (2006). Risk Management in Small and Medium Sized Enterprises. *Production Planning and Control*, 17(3), 273–282.
- Asare, N., Alhassan, A. L., Asamoah, . (2017). Intellectual capital and profitability in an emerging insurance market. *Journal of Economic*, <https://doi.org/10.1108/JEAS-06-2016-0016>
- Azizah, S., & Priyadi, M. P. (2016). Pengaruh Faktor Internal dan Eksternal Perusahaan terhadap Nilai Perusahaan Pada Perusahaan Manufaktur. *Jurnal Ilmu Dan Riset Akuntansi (JIRA)*, 5(10).
- Bampinas, G., & Panagiotidis, T. (2015). On the relationship between petroleum and gold

- before and after financial crisis: linear, nonlinear and time-varying causality testing. *Studies in Nonlinear Dynamics and Econometrics*, 19(5), 657–668.
- Bandanuji, A., & Khoiruddin, M. (2020). The Effect of Business Risk and Firm Size on Firm Value with Debt Policy as Variable Intervening. *Management Analysis Journal*, 9(2), 200-210.
- Baur, D. G. (2012). Asymmetric Volatility in The Gold Market. *Journal of Alternative Investments*, 14(4), 26–38.
- Brigham, E. F., & Houston, J. F. (2021a). *Fundamental of Financial Management*. Cengage Learning.
- Cabrita, M. R., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology*, 11(3), 146–158. <https://doi.org/10.1504/IJTM.2008.019416>
- Chen, Y. L., Chuang, Y. W., Huang, H. G., & Shih, J. Y. (2020). The value of implementing enterprise risk management: Evidence from Taiwan's financial industry. *The North American Journal*, <https://www.sciencedirect.com/science/article/pii/S1062940818303000>
- Chumaidah, & Priyadi, M. P. (2018). Pengaruh Profitabilitas dan Size Terhadap Nilai Perusahaan dengan CSR sebagai Variabel Pemoderasi. *Jurnal Ilmu Dan Riset Akuntansi*, 7(3), 1-20. <https://doi.org/ISSN : 2302-8912>
- Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, 37(1), 39-67. <https://doi.org/10.1177/0149206310388419>
- Dabari, & Saidin. (2016). A Moderating Role of Board Characteristics on Enterprise Risk Management Implementation: Evidence from the Nigerian Banking Sector. *IOSR Journal of Business and Management*.
- Daly, A., Valacchi, G., & Raffo, J. (2019). Measuring Innovation in the Mining Industry with Patents. *World Intellectual Property Organization (WIPO) Economic Research Working Paper No. 56*, 5.
- Darminto. (2010). Pengaruh Faktor Eksternal dan Berbagai Keputusan Keuangan terhadap Nilai Perusahaan. *Jurnal Aplikasi Manajemen*, 8(1), 138–150.
- Dwiati, A. R., & Ambarwati, Y. B. (2016). Pengaruh Harga Emas Terhadap Indeks Harga Saham Gabungan Indonesia dengan Nilai Kurs Sebagai Variabel Moderating. *National Conference & Call For Paper*, 1–9.
- Dwipartha, N. M. W. (2013). Pengaruh Faktor Ekonomi Makro dan Kinerja Keuangan Terhadap Nilai Perusahaan. *E-Jurnal Ekonomi Dan Bisnis Universitas Udayana*, 226–248.
- Erkaningrum, I. F. (2013). Interactions Among Insider Ownership, Dividend Policy, Debt Policy, Investment Decision, And Business Risk. *Journal of Indonesian Economy and Business: JIEB.*, 28(1), 132.
- Gede Adiputra, I. (2016). The effect of internal and external factors on the value of a firm through its investment opportunities on the stock exchange of the Southeast Asian Countries. *International Business Management*. <https://doi.org/10.3923/ibm.2016.370.376>
- Hamzah, Valeriani, D., & Yusufany, A. (2021). Pengaruh Variabel Makro Ekonomi Terhadap Indeks Harga Saham LQ-45 Di Bursa Efek Indonesia. *Sorot (Jurnal Ilmu-Ilmu Sosial)*, 16(2), 85–98. <https://doi.org/10.31258/sorot.16.2.85-98>
- Hatane, S. E., Djajadi, A. T., & Tarigan, J. (2017). The Impact of Corporate Governance on Intellectual Capital and Firm Value: Evidence from Indonesia and Malaysia Consumer Goods. *Journal of Management Applied Science*, 3(9), 78-83.
- Hopkin. (2018). Fundamentals of Risk Management: Understanding, Evaluating, and Implementing Effective Risk Management. *Kogan Page Publishers*.
- Hunah, G. R., Pangestuti, D. C., & Sugianto, S. (2021). Analisis Risk Management Disclosure pada Bank Umum Konvensional yang Terdaftar Di Bursa Efek Indonesia. *Konferensi Riset Nasional Ekonomi Manajemen dan Akuntansi*, 2(1), 1042-1056.
- Hutapea, G., Margareth, E., & Taringan, L. (2014). Analisis Pengaruh Kurs US \$ / IDR, Harga Minyak , Harga Emas Terhadap Return Saham. *Jurnal Ilmiah*, 18(2), 23–33.

- Irawati, A. E., & Komariyah, E. F. (2019). The Role of Capital Structure on The Effect of Dividend Policy and Business Risk on Firm Value (Evidence from Indonesian Manufacturing Company). *The Indonesian Journal of Accounting Research*, 22(02), 207-228. <https://doi.org/10.33312/ijar.463>
- Jafari, & Chadegani. (2011). Effective Risk Management and Companys Performance: Investment in Innovations and Intellectual Capital Using Behavioral and Practical Approach. *Journal of Economics*, 10(9), 677-688.
- Jill, & Houmes. (2014). COSO's Updated Internal Control and Enterprise Risk Management Frameworks. *The CPA Journal*.
- Khan, A. (2020). How do petroleum prices and investments impact the dynamics of firm value? *System Dynamics Review*, 36(1), 74-100. <https://doi.org/10.1002/sdr.1649>
- Kilian, L. (2009). Not All Petroleum Price Shocks Are A Like: Disentangling Demand and Supply Shocks in The Crude Petroleum Market. *American Economic Review*, 99(3), 1053-1069.
- Komara, A., Ghozali, I., & Januarti, I. (2020). Examining the Firm Value Based on Signaling Theory. *International Conference on Accounting, Management, and Entrepreneurship 2019*, 123, hlm. 1-4. <https://doi.org/10.2991/aebmr.k.200305.001>
- Kumar, A., & Sahadudheen, I. (2015). Understanding The Nexus Between Petroleum and Gold. *Resources Policy*, 46, 85-91.
- Kurniasari, W., & Warastuti, Y. (2015). The Relationship Between CSR and Profitability to Firm Value in SRI-KEHATI Index. *International Journal of Economic Behavior*, 5(1), 31-41.
- Maditinos, D., Chatzoudes, D., Tsairidis, (2011). The impact of intellectual capital on firms' market value and financial performance. *of Intellectual Capital*. <https://doi.org/10.1108/14691931111097944>
- Madura, J. (2020). *International financial management*. Cengage Learning.
- Maingot, M., Quon, T. K., & Zéghal, D. (2012). The effect of the financial crises on enterprise risk management disclosures. In *International Journal of Risk Assessment*.
- Martini, Sulaiman, Maria, Sari, & Pangaribuan. (2018). Return on Investment in Mining Companies: Intellectual Capital Aspect. *Jurnal Terapan Manajemen Dan Bisnis*.
- Muizzuddin, M., Tandelilin, E., Hanafi, M. M., & Setiyono, B. Does Institutional Quality Matter in the Relationship Between Competition and Bank Stability? Evidence from Asia. *Journal of Indonesian Economy and Business*, 36(3), 283-301.
- Muro, M. Rothwell, J. Andes, S. Fikri, K. & Kulkarni, S. (2015). *America's Advantage Industries*. The Brookings Institutions.
- National Science Foundation. (2020). *Science and Engineering Indicators*. City of Alexandria.
- Ni, Y., & Cheng, Y. (2019). Do intellectual capitals matter to firm value enhancement? Evidences from Taiwan. *Journal of Intellectual Capital*. <https://doi.org/10.1108/JIC-10-2019-0235>
- O'Callaghan, T & Vivoda, V. (2015). *Problems of Regulatory Governance in the Mining Sector in Asia*. ResearchGate.
- Pagach, D. P., & Warr, R. S. (2010). The Effects of Enterprise Risk Management on Firm Performance. In *SSRN Electronic Journal*. Elsevier BV. <https://doi.org/10.2139/ssrn.1155218>
- Pangestuti, D. C. (2018). *Manajemen Risiko*. Jakarta, Kresna Bina Insan Prima.
- Pangestuti, D. C. (2020). *Manajemen Keuangan Internasional*. Deepublish.
- Pasaribu, P., & Mindosa, B. (2021). The Bank Specific Determinants Of Loan Growth And Stability: Evidence From Indonesia. *Journal of Indonesian Economy & Business*, 36(2).
- Petković, M., & Đorđević, M. (2021). Intellectual Capital Investments and Company's Profitability. *Economic Analysis*. <https://www.library.iien.bg.ac.rs/index.php/ea/article/view/1331>
- Primantara, A., & Dewi, M. (2016). Pengaruh Likuiditas, Profitabilitas, Risiko Bisnis, Ukuran Perusahaan, Dan Pajak Terhadap Struktur Modal. *E-Jurnal Manajemen Universitas Udayana*, 5(5), 2696-2726.
- Pucci, T., Simoni, C., & Zanni, L. (2015).

- Measuring the relationship between marketing assets, intellectual capital and firm performance. *Journal of Management & Governance*.
<https://doi.org/10.1007/s10997-013-9278-1>
- Putra, A., & Robiyanto, R. (2109). The Effect of Commodity Price Changes and USD/IDR Exchange Rate on Indonesian Mining Companies' Stock Return. *Jurnal Keuangan Dan Perbankan*, 23(1), 103–115.
- Radjenović, T., & Krstić, B. (2017). Intellectual Capital As the Source of Competitive Advantage: the Resource-Based View. *Economics and Organization*, 14(2), 127-137. <https://doi.org/10.22190/fueo1702127r>
- Rahim, S. A., & Ahmad, N. (2016). Confidence Effect Among Sukuk Investors Following Sukuk. *South East Asia Journal of Contemporary Business, Economics and Law*, 10(1), 31-36.
- Razali, A. R., Yazid, A. S., & Tahir, I. M. (2011). The Determinants of Enterprise Risk Management (ERM) Practices in Malaysia Public Listed Companies. *Journal of Social and Development Science*, 1(5), 202–207.
- REN21. (2019). *Asia and the Pacific Renewable Energy Status Report*. Paris: REN21 Secretariat.
- Riga, M. H., Indriana, V., & Rahmanto, F. (2016). The Effects of Crude Petroleum Price Changes on The Indonesian Stock Market: A Sector Investigation. *Indonesian Capital Market Review*, 8(1), 12–22.
- Risman, A., Salim, U., Sumiati, S., & Indrawati, N. K. (2017). Commodity prices, exchange rates and investment on firm's value mediated by business risk: A case from Indonesian stock exchange. *European Research Studies Journal*, 20(3), 511–524. <https://doi.org/10.35808/ersj/725>
- Ross, S. A. (1977). The Determination of Financial Structure: The Incentive Signaling Approach. *The Bell Journal of Economics*, 8(1), 23–40.
- Rotinsulu, R. Y., & Untu, V. N. (2021). Uji Kausalitas Beberapa Indeks Saham Global, Harga Emas dan Minyak Mentah Dunia Terhadap Kinerja Indeks Harga Saham Gabungan (IHSG) Periode 2016-2020. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 9(3), 1611–1619.
- Sahin, Aktan, & Ozturk. (2016). Relationship Between Financial Risk and Business Risk with Firm Values in the Logistics Industry: An Analysis on Brics-T Countries. *Journal of Management, Economics, and Business*.
- Samudra, Y. P., & Widyawati, N. (2018). Pengaruh Inflasi, Suku Bunga, dan Kurs Terhadap Nilai Perusahaan. *Jurnal Ilmu Dan Riset Manajemen*, 7(8), 1–18.
- Sartika, Siddik, & Choiriyah. (2019). Pengaruh Inflasi, Suku Bunga, Nilai Tukar, dan Produk Domestik Bruto Terhadap Nilai Perusahaan. *Jurnal Ilmu Manajemen*, 9(2), 75–89.
- Shabbir, A., Kousar, S., & Batool, S. A. (2020). Impact of Gold and Petroleum Prices on The Stock Market in Pakistan. *Journal of Economics, Finance and Administrative Science*, 25(50), 279–294.
- Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, 87(3), 355–374. <https://doi.org/10.1055/s-2004-820924>
- Steven, Y. (2020). *Pengaruh Harga Komoditas Minyak Mentah, Nilai Tukar, Investasi, dan Risiko Bisnis Terhadap Nilai Perusahaan Pada Industri Manufaktur Subsektor Logam Dasar dan Sejenisnya yang Terdaftar Di Bursa Efek Indonesia Tahun 2014 – 2018*. Universitas Atma Jaya Yogyakarta.
- Sucuachi, & Cambarihan. (2016). Influence of Profitability to the Firm Value of Diversified Companies in the Philippines. *Accounting and Finance Research*, 5(2), 149–153.
- Sucuahi, W., & Cambarihan, J. M. (2016). Influence of Profitability to the Firm Value of Diversified Companies in the Philippines. *Accounting and Finance Research*, 5(2), hlm. 149-153.
<https://doi.org/10.5430/afr.v5n2p149>
- Sugiyono. (2015). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Bandung : Alfabeta.
- Sugosha, M. J. (2020b). The role of profitability in mediating company ownership structure and size of firm value in the pharmaceutical industry on the Indonesia stock exchange. *International Research Journal of Management, IT and Social Sciences*, 7(1), 104-115.
<https://doi.org/10.21744/irjm.v7n1.827>

- Sugosha. (2020a). The Role of Profitability in Mediating Company Ownership Structure and Size of Firm Value in the Pharmaceutical Industry on the Indonesia Stock Exchange. *Research Journal of Management, IT, and Social Sciences*, 7(1), 104–115.
- Sukirno, S. (2006). *Makroekonomi Teori Pengantar*. PT Rajagrafindo Persada.
- Suryantini, N. P. S., & Arsawan, I. W. E. (2014). Pengaruh Faktor Eksternal Terhadap Nilai Perusahaan (PBV) dan Harga Saham Terhadap Perusahaan Manufaktur di Bursa Efek Indonesia. *Jurnal Manajemen, Strategi Bisnis Dan Kewirausahaan*, 8(2), 91–101.
- Treisya, S. M., & Robiyanto, R. (2021). Volatilitas Harga Emas dan Minyak pada Integrasi Pasar Modal Indonesia dengan Pasar Modal Asia. *AFRE Accounting and Financial Review*, 4(2), 194–205.
- Ulum, I. (2017). Intellectual Capital : Model Pengukuran, Framework Pengungkapan & Kinerja Organisasi. In *Akuntansi*. Malang: UMM Press.
- Wagiciengo, & Belal. (2012). Intellectual Capital Disclosures by South African Companies: A Longitudinal Investigation. *Advances in Accounting*, 28(1), 111–119.
- Internet Source**
- Berita Satu, Cnmc Investasikan Dana Riset & Pengembangan Sebesar Rmb 1,418 Miliar. retrieved from <https://www.beritasatu.com/bisnis/587606/cnmc-gelontorkan-dana-riset-rp-284-triliun-di-indonesia-afrika#>
- Data Browser. Eurostat. Retrieved from https://ec.europa.eu/eurostat/databrowser/view/RD_E_BERDINDR2/default/table?lang=en&category=scitech.rd.rd_b
- Economic Research Working Paper No. 56 Mining patent data: Measuring innovation in the mining industry with patents. Retrieved from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_econstat_wp_56.pdf
- Five Common Challenges Facing The Mining Industry In Australia. Retrieved from <https://www.aggreko.com/en-au/news/2018/auspac-news/07-july/five-common-challenges-facing-the-mining-industry>
- Grand Strategy Mineral Dan Batubara Arah Pengembangan Hulu Hilir Mineral Utama Dan Batubara Menuju Indonesia Maju. Retrieved from <https://www.esdm.go.id/assets/media/content/content-buku-grand-strategy-komoditas-minerba.pdf>
- Mining Industry Prospects In Africa. Retrieved from <https://blogs.afdb.org/fr/afdb-championing-inclusive-growth-across-africa/post/mining-industry-prospects-in-africa-10177>
- 5 Negara Penghasil Batu Bara Terbesar Di Dunia. Retrieved from <https://www.idntimes.com/business/economy/ridwan-aji-pitoko-1/5-negara-penghasil-batu-bara-terbesar-di-dunia/>
- Potensi Sumber Daya Alam Benua Eropa. Retrieved from <https://www.kompas.com/skola/read/2021/04/19/163844269/potensi-sumber-daya-alam-benua-eropa?page=all>
- Research and Development: U.S. Trends and International Comparisons. Retrieved from <https://nces.nsf.gov/pubs/nsb20203/u-s-business-r-d>
- Research and development boosts Australia's Critical Minerals industry. Retrieved from <https://www.pwc.com.au/mining/energy-utilities-mining-matters/rd-critical-minerals-industry.html>
- Transfer Pricing in Mining with a Focus on Africa. Retrieved from <https://documents1.worldbank.org/curated/en/213881485941701316/pdf/112344-REVISED-Transfer-pricing-in-mining-with-a-focus-on-Africa-a-briefing-note-Web.pdf>