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Leonard Barolli *Editor*

Complex, Intelligent and Software Intensive Systems

Proceedings of the 16th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2022)

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Editor

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Welcome Message of CISIS-2022 International Conference Organizers

Welcome to the 16th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2022), which will be held from June 29 to July 1, 2022, in conjunction with the 16th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2022).

The aim of the conference is to deliver a platform of scientific interaction between the three interwoven challenging areas of research and development of future ICT-enabled applications: software-intensive systems, complex systems and intelligent systems.

Software-intensive systems are systems, which heavily interact with other systems, sensors, actuators, devices, other software systems and users. More and more domains are involved with software-intensive systems, e.g., automotive, telecommunication systems, embedded systems in general, industrial automation systems and business applications. Moreover, the outcome of web services delivers a new platform for enabling software-intensive systems. The conference is thus focused on tools, practically relevant and theoretical foundations for engineering software-intensive systems.

Complex systems research is focused on the overall understanding of systems rather than its components. Complex systems are very much characterized by the changing environments in which they act by their multiple internal and external interactions. They evolve and adapt through internal and external dynamic interactions.

The development of intelligent systems and agents, which is each time more characterized by the use of ontologies and their logical foundations, build a fruitful impulse for both software-intensive systems and complex systems. Recent research in the field of intelligent systems, robotics, neuroscience, artificial intelligence and cognitive sciences is very important factor for the future development and innovation of software-intensive and complex systems.

This conference is aiming at delivering a forum for in-depth scientific discussions among the three communities. The papers included in the proceedings cover all aspects of theory, design and application of complex systems, intelligent systems and software-intensive systems.

We are very proud and honored to have two distinguished keynote talks by Prof. Keita Matsuo, Fukuoka Institute of Technology, Japan, and Dr. Anne Kayem, Hasso Plattner Institute, University of Potsdam, Germany, who will present their recent work and will give new insights and ideas to the conference participants.

The organization of an international conference requires the support and help of many people. A lot of people have helped and worked hard to produce a successful technical program and conference proceedings. First, we would like to thank all authors for submitting their papers, the program committee members, and the reviewers who carried out the most difficult work by carefully evaluating the submitted papers. We are grateful to Honorary Chair Prof. Makoto Takizawa, Hosei University, Japan, for his guidance and support.

Finally, we would like to thank Web Administrator Co-chairs for their excellent and timely work.

We hope you will enjoy the conference proceedings.

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CISIS-2022 Keynote Talks

Design and Implementation Issues of Omnidirectional Robots and Their Applications for Different Environments

Keita Matsuo

Fukuoka Institute of Technology, Fukuoka, Japan

Abstract. Intelligent robotic systems are becoming essential for increasing Quality of Life (QoL) and keeping health for growing population of elderly people. In our research, in order to solve human health problems and support elderly people, we consider the design and implementation of omnidirectional robots. In this talk, I will introduce our results to show how omnidirectional wheelchair robots can support people with disabilities at home and at workplace. In our work, we also consider the use of the omnidirectional wheelchair robots for playing tennis and badminton. I also will present the application of omnidirectional robot as a mesh router in Wireless Mesh Networks (WMNs) in order to provide a good communication environment.

Is Privacy the Same as Security, or Are They Just Two Sides of the Aame Coin?

Anne Kayem

Hasso-Plattner-Institute, University of Potsdam, Potsdam, Germany

Abstract. Almost every digital device either generates or consumes data in some form. The result is that the volumes of data collected grow exponentially each day. Data analytics proponents have mooted that it is now possible in some cases to actually predict future human behaviors based on data collected through tracking and various other means. On the other parallel, the question of privacy has become ever more important as users increasingly seek ways of guarding their personal data from exposure. This as such raises the question of what the distinction between privacy and security (data protection) is, and what the boundary between the two should be. For instance, the 2014 incident of a hacker faking the German minister of defense's fingerprints was considered to be a security breach. However, a closer look at this issue highlights the fact that distinguishing between whether or not this was a privacy breach that enabled a security breach, or vice versa, does not have a straightforward answer. In this talk, I aim to explain why in my view privacy is different from security and, while though both privacy and security are mutually interdependent, why it is important to make the distinction. The talk will be supported by various examples to characterize privacy and distinguish it from security. At the same time, I will also explain why the two concepts are in fact two sides of the same coin.

Contents

Conceptual Paper Tax Avoidance and Firm Value in Manufacturing Companies: A Case Study for Companies in Indonesia

Chrisna Suhendi, Luluk Muhimatul Ifada(✉), and Winarsih

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Abstract. This study aims to offer a conceptual framework for the effect of capital structure, dividend policy, profitability, and tax avoidance on the firm value of manufacturing companies in Indonesia. The signaling theory explains how a company should give signals to the financial statement users, including giving signals to the investor about how the company has future prospects. Several factors that affect firm value proposed in this conceptual paper are capital structure, dividend policy, profitability, and tax avoidance.

Keywords: PBV · DER · DPR · ROA · ETR

1 Introduction

The company's main objective is to maximize shareholder wealth [1, 2]. Shareholder wealth is reflected in the company's share price [2]. Companies to gain investors' trust are required hard work, especially in building a company's good value. Every company, especially companies that have gone public, has value. The firm value is a perception that comes from investors to the level of achievement of a company's success in carrying out various management of resources that it controls and has been reflected in the company's stock price in the market. Every company with a great desire to develop is always required to increase its value to maintain long-term survival amid the progress of IT globalization in the industrial era 4.0 towards industry 5.0. It is to retain its investors, namely investors who help build the company, especially capital. Firm value is the investor's perception of a company's success rate in managing its resources reflected in its stock price.

However, in general, the company is required to achieve maximum profit but is also expected to prosper shareholders and increase the firm value. The firm value is reflected in its share price. The higher the stock price, the higher the firm value because the high value indicates the prosperity of shareholders is also high [3]. Firm value can be measured using Price to Book Value (PBV), which compares the stock price and the book value per share. Based on these comparisons, the company's stock price can be above or below the book value [4]. The higher the value of this ratio, the higher the stock price is. Thus, it increases the firm value. Therefore, a company with a PBV ratio

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of more than 1 (one) indicates that it is performing well because investors are willing to buy more expensive shares than its book value.

One theory that explains a firm value is the Signaling theory, which states how a company should provide a signal to users of financial statements. A Signal is actions taken by company management that provide instructions to investors on how management assesses a company's prospects. Several factors can affect the firm's value: capital structure, dividend policy, profitability, and tax avoidance.

The capital structure is the proportion of funding with the company's debt. Thus, debt is an element of capital structure that becomes a key to improving the profitability and performance of the company. A capital structure is a combination of the company's long-term permanent funding indicated by debt, preferred stock, and common stock equity [5]. "Managers must choose the capital structure that they believe will have the highest firm value because this capital structure will be most beneficial to the company's shareholders." Determining a company's capital structure is a complex and challenging decision involving several antagonist factors (e.g., risk and profitability). Previous empirical studies of the relationship between capital structure and firm value have generated mixed results. In [6], the author found that the capital structure has a positive and significant effect on the firm value. Consider the literature on the relationship between capital structure and firm value.

Investors have the main goal to improve welfare by expecting returns in dividends and capital gains. Meanwhile, the company expects sustainable growth to maintain its survival while providing welfare to its shareholders so that dividend policies become essential to meet the interests of shareholders. On the other hand, dividend expectations by not hinder the company's growth which shows that dividend policy has a positive effect on the firm value [7]. Only Malaysia and the Philippines confirmed that the dividend policy positively impacted the firm value in this study.

The signaling theory's relationship with this study shows that high profitability will illustrate a good company's prospects. Profitability shows how the company's prospects in creating profits in the future. If the company can manage well, then the company can create profits. Thus, the investor's perception will be better, and the firm value will also be greater. According to [5], revenues positively affect the market value. It is evidence of the market perception that revenues are earned when they contain information about future profits and how the company is currently performing. Revenue is the focus of corporate executives and investors.

Taxes have an essential role in corporate funding decisions that impact the firm value [2, 4, 8]. Tax avoidance can be seen as a management strategy for implementing effective tax planning and generating more profits or cash flow in the future [2]. Another view stated that tax avoidance is a risky activity and could lead to companies bearing a more significant burden in the future through sanctions, penalties, and other payments, as well as reputational costs [2]. According to [2], tax planning scores positively affect the relationship between pre-tax income and market-to-book ratios. [2] also found a positive influence of tax avoidance on firm value. Ineffective tax law enforcement in Indonesia is one-factor causing tax avoidance to benefit companies [2].

Based on the phenomenon that has been presented and refers to the results of several previous studies that show inconsistent results (GAP research). This research is focused on and aimed to provide empirical evidence from the Indonesia Stock Exchange (IDX) to overcome the influence of capital structure, dividend policy, profitability, and tax avoidance on the firm value of manufacturing companies listed on the Indonesia Stock Exchange (IDX). The study adds more to the growing literature on capital structure, dividend policy, profitability, and tax avoidance. It investigates the influence of capital structures, dividend policies, profitability, and tax avoidance on firm value to justify conflicting results in previous research. Based on the background of the study described above, the author sets the problem formula as follows:

1. Does the capital structure affect the firm value?
2. Does the dividend policy affect the firm value?
3. Does profitability affect the firm value?
4. Does tax avoidance affect the firm value?

2 Literature Review

2.1 Signaling Theory

Signal Theory [9] stated that company executives who had better information about their company would be encouraged to pass it on to potential investors. The company could increase the firm value by reporting and sending signals through its annual report. Financial statements should provide information for all interested parties (investors and creditors) who can help those parties make a policy or decision on investment, credit, and other decisions. Thus, signaling theory explained that financial statements would be used to signal the company state to outside parties. One solution used by managers with excellent information about their companies was to give investors signals of actions or policies that companies cannot replicate, such as investing in sustainable, productive assets. According to [10], in the last few days, management has had more information on company prospects than external parties. According to [11], The lack of external information about the company causes them to give low prices for the company. What a company can do to increase its value is to reduce information asymmetry. Signal theory in this study is used to describe the relationship of the influence of each independent variable to dependent variables, namely the relationship of capital structure, dividend policy, profitability, and tax avoidance with firm value.

2.2 Firm Value

The firm value is the price that the prospective buyer is willing to pay if the company is sold. The firm value is essential because the company's high value will be followed by high shareholder prosperity [12]. The higher the stock price, the higher the firm value. The high firm value is the desire of the company owner because high value shows the prosperity of shareholders is also high. The wealth of shareholders and companies are represented by the stock market price, reflecting investment decisions, financing, and asset management.

The company's primary goal is to maximize shareholder value [10]. Shareholder value is reflected in the company's stock price that makes up the firm value. A company's stock price is the simplest and best measure of shareholder prosperity. The higher the stock price, the greater the level of shareholder prosperity, and the greater [2] it describes that the stock market price reflects the information. Investors will respond to new information available to buy or sell their shares. The stock price will move quickly when the company's financial statements are published. The movement will increase if the company's performance exceeds investor expectations, and conversely, the stock price will fall if the company's performance is smaller than market expectations [2].

2.3 Capital Structure

The capital structure is the proportion of funding with the company's debt. Companies with a large level of business developers would need a large source of funding, so additional funding from external parties is needed to increase funding needs in the business development process. Companies with a good level of business development will provide great profits to investors in the long run. It would have an impact on increasing the firm value. According to [13], what is meant by capital structure is the balance of the amount of short-term debt that is fixed, long-term debt, preferred stock, and common stock. [10] Stated that the capital structure is the ratio or balance of a company's long-term funding aimed at comparing long-term debt to a source of capital. According to [9], the best capital structure is a capital structure that can maximize the firm value or stock price. Therefore, companies with a good capital structure will increase the firm's value.

2.4 Tax Avoidance

Tax avoidance can be interpreted as using tax law loopholes made by companies to gain profit by significantly reducing the payment of corporate taxes [2]. Taxes reduce net income and net cash flow after taxes are available to investors; thus, they motivate companies to undertake tax avoidance practices [2]. In [2], the author defined tax avoidance as "anything that reduces a company's taxes relative to its pre-tax accounting income". In [8], the author described tax planning strategies as a continuum. If tax compliance is at one end, then tax non-compliance is closer to the other end of the continuum. In [14], the author stated that tax avoidance activities carried out by companies can be described through tax avoidance, tax planning, and aggressive tax reporting. Tax avoidance is seen as a strategy that benefits companies and shareholders due to providing the resources needed to develop a company through investments or increasing the cash available to shareholders through a dividend distribution. In contrast, tax avoidance can be viewed negatively by investors and markets as it can incur additional costs for companies [8, 15].

2.5 Dividend Policy

A dividend is an allocation of some of the company's profits to shareholders. The amount of this dividend can affect the stock price. If the dividend paid is high, then the stock price tends to be high so that the firm value is also high. Conversely, if the dividend paid is small, then the company's stock price is also low. The ability to pay dividends is closely related to the company's ability to earn profits. If the company earns a large profit, then the ability to pay dividends is also enormous. In [16], the authors stated that dividend policy is a decision on whether profits earned by the company will be distributed to shareholders or withheld to fund future investments. In [10], the author explains that dividends are the company's earnings that are distributed to shareholders. Dividends are the distribution of profits given by the issuing company from profits generated by the company. The dividend Pay-out Ratio (DPR) is a ratio that shows the percentage of each earned profit that is distributed to shareholders in cash.

2.6 Profitability

The profitability ratio is used to see how a company can create profits. This ratio will indicate the overall operational effectiveness of the company [17]. The company's ability to generate profits in its operations focuses on assessing its performance. The company's profitability is one way to assess the return obtained from investment activities accurately. According to [13], profitability is the ability to gain profits over a given time using assets or capital, both overall capital and capital itself.

3 Hypothesis Development

3.1 Capital Structure and Firm Value

The capital structure represents the proportion of the company's financing long-term debt and current equity [6]. The empirical literature on the capital structure has witnessed an ongoing debate on whether higher leverage increased or decreased the firm value. Leverage has resulted from fixed cost assets or funds to enlarge return to company owners, and increased leverage results in improved returns and risks. The amount of leverage in a company's capital structure can significantly affect its value by affecting returns and risks [6]. The more debt a company has, the more likely it will not meet its contractual obligations. Provide costs that do not increase consumer needs [6]. Companies that manage to earn a steadily increasing profit show that the company has a good performance that obtains a positive response from investors and encourages an increase in the company's stock price. On the positive side, debt provides a significant tax advantage because interest is a tax-deductible [6]. Based on the above problems, this study provides empirical evidence of a positive relationship between external financing and firm value. In [6], the authors documented that there is a positive influence of capital structure on the company's value. In [18], the author found that the capital structure was negatively and statistically related to the firm value. In [19], the author stated that there is a negative relationship between leverage and the firm value. "Managers must choose the capital structure that they believe will have the highest firm value because this capital structure will be most beneficial to the company's shareholders." Determining a company's capital structure is a complex and challenging decision involving several antagonist factors (e.g., risk and profitability). Previous empirical studies of the relationship between capital structure and firm value have generated mixed results. In [6],

the author found that the capital structure had a positive and significant effect on the firm value. By considering the literature on the relationship between capital structure and firm value, the following hypotheses can be formulated as follows:
H1. Capital structure has a significant effect on the firm value of manufacturing companies in Indonesia listed in Indonesia (IDX).

3.2 Dividend Policy and Firm Value

The Effect of Dividend Policy on Firm Value Dividend policy is related to the company's policy regarding how much dividends will be distributed to shareholders and the resulting profits. The number of dividends distributed will affect the stock price of a company. Companies that pay dividends regularly and tend to increase will provide positive sentiment for investors. This situation aligns with the Signaling theory which states that the company will guide investors on how management views its prospects. This signal is information about what management has done to realize the owner's wishes. The explanation above aligns with [7], which shows that dividend policy positively affects firm value.
H2: Dividend policy has a significant effect on the firm value of manufacturing companies in Indonesia listed on the (IDX).

3.3 Profitability and Firm Value

The relationship between the Signaling theory and this research shows that high profitability will describe good company prospects. The better the company's prospects, the more interested investors will invest their funds. Higher demand from investors towards shares will affect the stock price, and the firm value will also increase. When the company can manage debt, the debt will increase the firm value. If managers believe the company's prospects are good, managers can use more debt as a more credible signal. Profitability is the company's ability to earn profits in sales, assets, and equity. It is the ratio of management effectiveness based on the return generated from sales and investment [6]. High profitability affects the company's financial flexibility, so the company can pay dividends and obtain a positive rating in the capital market [20]. Profitability allows investors to see how efficiently a company spends its funds for its operational activities to obtain higher profits. High profits reflect the company's excellent prospects, which attract investors to increase demand for the company's shares. Higher demand for company shares increases the firm value [21]. In [22], the authors stated that profitability has a positive effect on a firm value. [12] reported that profitability is positively related to firm value. In [15], the author documented that there is a positive effect of profitability on firm value. According to [23] income has a positive effect on market value. It is evidence of the market perception that income is earned when it contains information about future earnings and its current performance. Revenue becomes the focus of attention of corporate executives and investors. In [24], the authors documented that highly profitable firms are faster. By considering the literature on the relationship between profitability and firm value, the following hypothesis can be formulated as follows:
H3. Profitability significantly affects the firm value of manufacturing companies in Indonesia listed on the IDX.

3.4 Tax Avoidance and Firm Value

The appropriate tax planning strategy can significantly contribute to the firm value. Tax planning strategies that companies often use are sustainability strategies in achieving consistent tax payments from time to time and a strategy to minimize the company's tax burden as low as possible [2]. According to [14], the tax planning score positively affects the relationship between income before tax and the market-to-book ratio. In [8], the authors also found a positive effect of tax avoidance on firm value. Ineffective tax law enforcement in Indonesia is one of the factors causing tax avoidance that benefits companies [8]. In [25], the authors stated that aggressive tax planning detected by tax authorities could impose high costs on companies such as consulting fees, legal fees, and other corporate resource expenditures. Tax avoidance activities can have a detrimental impact on companies and investors, such as a decrease in the company's stock price and other indirect costs [26]. Thus, the fourth hypothesis in this study is formulated as follows:
H4: Tax Avoidance significantly affects the firm value of manufacturing companies in Indonesia listed on the IDX.

Empirical research model
See Fig. 1.

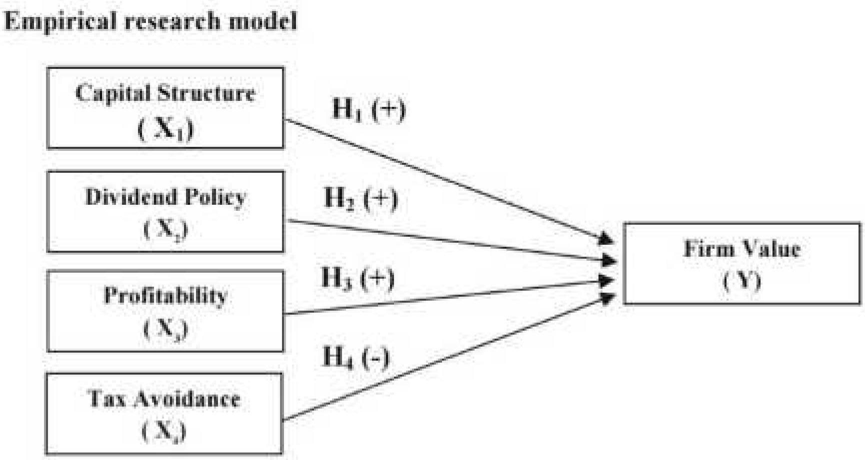

Fig. 1. Empirical research model

4 Methods and Procedures

4.1 Population and Sample

Population

In [27], the author explained population as a generalization area consisting of; objects/subjects with specific qualities and characteristics. The research population used manufacturing companies in Indonesia, a developing country where manufacturing companies are growing well. The sampling technique used a purposive sampling method with specific criteria and a quantitative research method.

According to [27], quantitative methods are research methods based on the philosophy of positivism that is used to examine specific populations or samples to test predetermined hypotheses. This study was associative causality, namely research that seeks a causal relationship or effect of the independent variable (X) on the dependent variable (Y) based on the hypothesis that has been formulated.

4.2 Measurement Method

Variable Operational Definition

No	Variable	Operational	Indicator	Sources
1	**Firm value** (Y)	Firm value is the company's performance as reflected by the stock price	*PBV Ratio:* $\frac{\text{(Market Price per Share)}}{\text{(Book Value per Share)}}$	[41]
2	**Capital structure (X_1)**	Capital structure is a form of funding to meet investment needs and company operational activities	*Debt Equity Ratio:* $\frac{\textit{Total Amount of debt}}{\textit{Total assets}} \times 100\%$	[41]
3	**Dividend policy (X_2)**	Dividend policy is the proportion of profit-sharing obtained by the company, which is distributed to the company's shareholders	*Dividend Pay-out Ratio:* $\frac{\textit{Dividen per Share}}{\textit{Earning per Share}}$	[41]

(*continued*)

(*continued*)

No	Variable	Operational	Indicator	Sources
4	**Profitability (X_3)**	Profitability is a performance indicator carried out by management in managing company assets which can be seen from the profits generated by the company	*ROE (Return on Equity):* $\frac{Earning\ after\ tax}{Total\ Equity} \times 100\%$	[41]
5	**Tax avoidance (X_4)**	Tax avoidance is an effort to avoid tax carried out legally and safely for tax payers because it does not conflict with tax provisions	Effective Tax Rate: $\frac{Total\ tax\ expenses}{Pretax\ income}$	[41]

4.3 Research Period

This research was conducted from June 2022 to May 2023 by going through the research stages. Including observation, submitting research proposals, making and testing research instruments, data documentation, and research data analysis.

4.4 Method of Collecting Data

The type of data used in this research was secondary data. Secondary data obtained and collected indirectly related to data published by a company, such as journals, previous research, or financial reports. The data collection method used in this study was the documentation method. The documentation method is a technique of collecting data and information in books, archives, documents, writings, numbers, and images in the form of reports and information that can support the research [27]. The documentation method was carried out by downloading or downloading financial reports and annual reports of manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2016-to 2020 on the www.IDX.co.id and company websites.

4.5 Engineering Data Analysis Techniques

This study examined whether the capital structure, dividend policy, profitability, and tax avoidance affect firm value. In this study, the data analysis technique used Multiple Linear Regression Analysis using SPSS (Statistical Product and Service Solution) software to process the data. Other tests used in this research were the descriptive analysis test, classical assumption test, and hypothesis testing. In [27], the author revealed that multiple linear regression analysis could be formulated as follows:

$$\mathbf{Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e}$$

Information:

Y = Firm value, a = Constants, $b_1 - b_4$ = Regression coefficient, X_1 = Capital structure, X_2 = Dividend Policy, X_3 = Profitability, X_4 = *Tax Avoidance*, *e* = *Error.*

5 Conclusion

Based on this conceptual framework, the capital structure, dividend policy, profitability, and tax avoidance affect the firm values, thus the management should be more careful in making decisions regarding these key factors. It is expected that the factors which influence how creditors, investors, and governments act, can be used as guidelines in carrying out the company's operational activities.

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