Lecture Notes in Networks and Systems 278

Leonard Barolli
Kangbin Yim
Tomoya Enokido *Editors*

Complex, Intelligent and Software Intensive Systems

Proceedings of the 15th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2021)

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Welcome Message of CISIS-2021 International Conference Organizers

Welcome to the 15th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2021), which will be held from July 1 to July 3, 2021, at Soon Chun Hyang (SCH) University, Asan, Korea, in conjunction with the 15th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2021).

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, builds 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 a very important factor for the future development and innovation of software intensive and complex systems.

The CISIS-2021 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 Dr. Jayh (Hyunhee) Park, Myongji University, Korea, and Dr. Antonio Esposito, University of Campania "Luigi Vanvitelli", Italy, 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 CISIS-2021 technical program and conference proceedings. First, we would like to thank all the 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 Co-Chairs Kyoil Suh, Soon Chun Hyang (SCH) University, Korea, and Prof. Makoto Takizawa, Hosei University, Japan, for their guidance and advices.

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-2021 Keynote Talks

Asking AI Why: Explainable Artificial Intelligence

Jayh (Hyunhee) Park

Myongji University, Yongin, Korea

Abstract. In the early phases of AI adoption, it was okay to not understand what the model predicts in a certain way, as long as it gives the correct outputs. Explaining how they work was not the first priority. Now, the focus is turning to build human interpretable models. In the invited talk, I will explain why explainable AI is important. Then, I will explain an AI model. Through this invited talk, I will discuss models such as ensembles and neural networks called black-box models. I will deal with the following questions.

- Why should we trust your model?
- Why did the model take a certain decision?
- What drives model predictions?

Coevolution of Semantic and Blockchain Technologies

Antonio Esposito

University of Campania “Luigi Vanvitelli”, Aversa, Italy

Abstract. Semantic technologies have demonstrated to have the capability to ease interoperability and portability issues in several application fields such as cloud computing and the Internet of things (IoT). Indeed, the increase in resource representation and the inference capabilities enabled by semantic technologies represent important components of current distributed software systems, which can rely on better information interoperability and decision autonomy. However, semantics alone cannot solve trust and reliability issues that, in many situations, can still arise within software systems. Blockchain solutions have shown to be effective in this area, creating data sharing infrastructure where information validation can be done without the necessity of third-party services. A coevolution and integration of semantic and blockchain technologies would at the same time enhance data interoperability and ensure data trust and provenance, creating undeniable benefits for distributes software systems. This talk will focus on the current state of the art regarding the integration of semantic and blockchain technologies, looking at the state of their coevolution, at the available and still needed solutions.

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Environmental Performance Announcement and Shareholder Value: The Role of Environmental Disclosure

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Abstract. This study aims to analyze the effect of environmental performance announcements on shareholder value and how environmental disclosures mediate this relationship. The companies studied included 81 companies listed on the Indonesia Stock Exchange (IDX) in 2017–2019. Researchers determine the sample using purposive sampling, with the criteria 1) manufacturing companies that issue financial reports. 2) manufacturing companies that follow PROPER. 3) manufacturing companies that publish environmental disclosures in Sustainability Reporting. The results showed that the first hypothesis, namely the announcement of environmental performance has a positive effect on environmental disclosure, is accepted. Furthermore, the second hypothesis is that environmental performance announcements have no effect on shareholder value, and the third hypothesis is that environmental disclosure has a positive effect on shareholder value.

1 Introduction

Environmental issues have become an important topic in today's global economy. Corporate goals and responsibilities have begun to shift from focusing on profit to companies that care for the environment and society to maximize corporate value. Company value can be achieved by increasing the share price, thereby it will increase the prosperity of the owner [1]. One of the positive assessments from stakeholders is the announcement of a company that cares about the environmental performance around the company. The announcement is in the form of environmental performance announcements for companies participating in the Company Performance Assesment in Environmental Management (PROPER). PROPER will be notified to the public every year. This announcement can improve the company's reputation [2]. Announcement of environmental performance leads to a more thorough understanding of a company's environmental activities and their disclosures [3]. Companies announced by the Ministry of Environment to have PROPER especially for their good environmental performance will inform extensive environmental disclosures. The market reaction will be

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better for companies with good environmental performance announcements than companies with the poor environmental performance [4]. The results of research that have been conducted by [5–8] indicate that environmental performance announcements affect the extent of corporate environmental disclosure. However, research by [9] has had the opposite result. On the other hand, [10, 11] explains the existence of value creation for shareholders for social and environmental concerns with performance announcements and environmental disclosures. Shareholders will participate in increasing the value of the company's shares because the company maintains the environment well [12]. [13] explained that the implementation of environmental policies has a relationship with shareholder value but only under certain conditions. If the performance and environmental disclosures cannot maximize shareholder value, then the incentives issued include waste for the company. [14] showed that corporate social responsibility has an effect on firm value. The inconsistency of previous research makes the relationship between environmental performance announcements and shareholder value uncertain, whether environmental performance announcements are an aspect that can increase or even decrease company shareholder value.

Legitimacy theory implies that a function of the high intensity of stakeholder expectations of the company's environmental performance has an impact on the legitimacy that ensures the sustainability of company's business [15]. The company's environmental disclosure becomes a tool to obtain and maintain the company's legitimacy status to stakeholders [16]. Signal theory suggests that companies with superior environmental performance have an incentive to disclose superior company performance and choose to mark company achievements by publishing sustainable ESG reports in addition to mandatory financial reports [17]. Signaling theory refers to the ability to communicate with all stakeholders, where companies consistently make environmental disclosures and announcements of sustainability performance signifying them as good corporate citizens. To maintain the financial and non-financial performance that affects increasing stakeholder value [17], this is a reflection of how the company should behave.

[11] explains environmental disclosure information as a form of transparency in the business sector regarding the company's environmental activities and shows the company's concern and responsibility in front of shareholders so that the preservation of the surrounding environment will build a good legitimacy for companies related to increasing stakeholder value. Environmental disclosure is an important aspect for company management and investors [10]. In line with the above research, [7] and [18] state that disclosure of the company's environment provides additional information for external parties about the company's environmental performance and the development of company greenhouse gas emission information. In doing so, it allows analyst and investors to better assess and increase the visibility of their shareholder value. This study tries to find that environmental disclosure can mediate the effect of environmental performance announcements on stakeholder values. Variations in environmental disclosure transparency can explain the increase in stakeholder expectations and are relevant to the formation of an image of shareholder value [19]. It is intended that the company makes environmental performance announcements to improve the company's reputation.

2 Theoretical and Hypothesis Development

This study proposes the disclosure of environmental performance to mediate the effect of environmental performance on company shareholder value. The announcement of the company's environmental performance by the Ministry of Environment can show that the company is proactive in giving the impression of good management of the environment. This opportunity can be used by companies to publish parts of company activities that meet the wishes of stakeholders in terms of environmental programs, which will further increase the value of the company's shareholders [20].

2.1 Environmental Performance Announcement and Environmental Disclosures

Companies with high environmental performance announcements will be credible and broader in delivering environmental disclosures. In this case, the company will still get legitimacy and a longer going concern because the community will be more accepting of the company's existence [21, 22]. This shows the positive effect of environmental performance announcement on the level of environmental disclosure. [5, 6, 21] have similar research results that company's environmental performance announcement has a positive effect on environmental disclosure.

H1: Environmental performance announcements have a positive effect on the company's environmental disclosures

2.2 Environmental Performance Announcement and Shareholder Value

The presence of companies that participate in PROPER aims to improve environmental performance and environmental disclosure. In this case, the better the company improves its performance announcements, the better the reputation of all stakeholders will be increased [23]. This statement is supported by [24] which states that companies that receive good environmental performance announcements from third parties will get response from investor through an increase in the company's stock price and long-term company earnings. Through the announcement of environmental performance, it contains information that is relevant to achieving good communication for many stakeholders that the company has a concern for environmental programs. [21] explained that environmental disclosure can increase customer and employee satisfaction which then has an impact on shareholder value creation. This reflects that good corporate value will reflect the creation of good shareholder value as well [25]. [26] and [27] showed that environmental performance announcements increase the shareholder value of the company.

H2: Environmental performance announcements have a positive effect on shareholder value

2.3 Environmental Disclosure and Shareholder Value

In company's environmental reporting, companies can be consistent and proactive to meet stakeholder expectations [11]. It can make a good impression by publishing parts

of the company's environmental operations such as energy and emissions, waste data, environmental initiatives, and environmental policies, environmental capital expenditures that will have a direct impact on the company's future cash flows and the risks associated with the company's holding value [28]. Disclosure of information about the company's concern for the environment is carried out because indirectly this will become a consideration for investors and creditors on the company's credibility [15]. In empirical research, [29, 30] states that stocks perform better in terms of stock returns which have a positive relationship with the disclosure of the company's environment. Companies make environmental disclosures as an environmental responsibility to create shareholder value, this is in line with the results of research by [3, 10, 11]. Environmental disclosures create relevant value through their direct impact on the cost of capital or value.

H3: Environmental disclosure has a positive effect on shareholder value

3 Methodology

3.1 Sample

Population and Sample. The population in this study were all manufacturing companies in Indonesia. This research sample used purposive sampling. Based on the availability of annual reports that are listed on the IDX or the company website, the samples used were 81 companies from 2017 to 2019 (Table 1).

Table 1. Variable measurement

Variable	Measurement	
Environmental performance announcements	The average score of PROPER achieved by each company	[2]
Shareholder value	$PBV = \frac{Stock\ price}{Share\ Book\ value}$	
Environmental disclosures	$IEs\ index = \frac{\sum (itemdisclose\ \mathrm{X}\ IER'sindexxscore)}{\text{Total items}}$	[18]

The average of shareholder value (SV) is 2,96. The average value of the company's environmental performance announcement is 3. While the company's environmental disclosure score is 1.71 (Table 2).

3.2 Data Analysis

For data analysis, this study used SPSS in the form of simple linear regression analysis.

4 Results

4.1 Descriptive Statistic

Table 2. Descriptive statistic

	N	Minimum	Maximum	Mean	St. deviation
SV	81	.207	9.465	2.96460	2.454547
EP	81	2.00	4.000	3.00000	.474342
ED	81	.003	5.110	1.71698	1.256533

4.2 The Results of Hypothesis Testing

The Kolmogorov-Smirnov test results show the Asymp. Sig. value that is more than 0.05, namely 0.200 for model 1 and 0.063 for model 2. This shows that model 1 and model 2 in this study have a regression model with a normal distribution. The heteroscedasticity test shows a number above 0.05 so that model 1 and model 2 have no heteroscedasticity. Furthermore, the results of the Durbin-Watson value for model 1 lie between du < d <4-du = 1,664 <1,764 <2,336, while model 2 is 1,689 <1,771 <2,310. It means, the two models do not have autocorrelation. The F-test value in model 1 is 106,942 and model 2 is 2334,633 (Tables 3 and 4).

Table 3. Hypothesis testing model 1

Model	Heteroscedasticity	Unstandardized	T	Sig.
		B		
(Constant)		−4,310	−7,306	,000
KL	,106	,066	,620	,537

Normality Test Statistic 0,080. Asymp. Sig. (2-tailed) 0,200. Durbin- Watson 1,764. F test 106,942. R Square 0,575. Adjusted R Square 0,570

Table 4. Hypothesis testing model 2

Model	Heteroscedasticity	Unstandardized	T	Sig.
		B		
(Constant)		−3,200	−,822	,414
KL	,071	−,027	−,373	,710
PL	,027	,045	1,658	,101

Normality Test Statistic 0,096. Asymp. Sig. (2-tailed) 0,063. Durbin- Watson 1,771. F test 2334,633. R Square 0,984. Adjusted R Square 0,983

Meanwhile, the value of R-Square for model 1 is 57.5% and model 2 is 98.4%. This means that in model 1, environmental performance announcement affects environmental disclosure by 57.5% and the remaining 42.5% is influenced by other variables. Whereas in model 2, environmental performance announcements and environmental disclosures affect shareholder value by 98.4%, and the remaining 1.6% is influenced by other variables.

Table 5. T-test model 1

Model	T	Sig.
KL	10,341	,000

Table 6. T-test model 2

Model	T	Sig.
KL	−,412	,682
PL	44,851	,000

Based on Table 5, the effect of environmental performance announcements on environmental disclosures shows the t-value of 10.341 with a significance of 0.000, less than 0.05. This means that the first hypothesis which stated that the environmental performance announcements have a positive effect on environmental disclosure, is accepted.

Meanwhile, based on Table 6, environmental performance announcement on shareholder value shows a negative t-value of 0.412 with a significance value of 0.682, greater than 0.05. This means that the second hypothesis which states that environmental performance announcements do not affect shareholder value, is accepted. Furthermore, the effect of environmental disclosure on shareholder value shows a t-value of 44.851 and a significance value of 0.000, less than 0.05. This shows that the third hypothesis that environmental disclosure on shareholder value, is accepted.

5 Discussion and Conclusion

This study examines how the environmental performance announcement strategy affects the level of corporate stakeholder value through environmental disclosure. An analysis by [31] shows that the extent of environmental disclosure is the creation of a shareholder image carried out by disseminating credible information about the company's environmental performance which can increase or decrease the image of shareholders in the company (industry). This shows that companies with good environmental performance announcements will convey more information in their disclosures to get legitimacy so that the company's sustainability will last much longer [21, 22]. This explanation is in line with the results of the study by [5, 6].

The results of the second hypothesis analysis, environmental performance announcements do not affect shareholder value. For investors, companies with high environmental performance announcements do not guarantee that a company can provide benefits for investors. Because this activity requires a large allocation of resources and investors have to increase the investment cost which can conflict to maximize shareholder value [17]. [32] and [17] prove that companies that announce environmental performance need higher incentives that will affect the response of investors in providing investments that will affect the income and image of stakeholders. Furthermore, environmental disclosure will increase production costs and thereby reduce profitability [9]. The results of this analysis contradict to the study of [26, 27].

The results of the analysis of the third hypothesis, namely the disclosure of the company's environment affect the increase in shareholder value. This result is in line with research from [18], that environmental disclosure provides an assessment of relevant information related to information desired by investors that will increase shareholder value by facilitating information on predictions of future financial performance or even reducing the cost of capital [29]. [3] also showed that environmental disclosures can be used as a management tool to create organizational pressure and incentives to encourage action to reduce greenhouse gas emissions. Thus, environmental disclosure significantly affects company's value. This is consistent with the legitimacy theory, which suggests companies disclose more environmental information that can increase the company's credibility and shareholder value.

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