

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)

 Springer

# Lecture Notes in Networks and Systems

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Leonard Barolli · Kangbin Yim ·  
Tomoya Enokido  
Editors

# Complex, Intelligent and Software Intensive Systems

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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 distributed 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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# Interaction Model of Knowledge Management, Green Innovation and Corporate Sustainable Development in Indonesia

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**Abstract.** The case in this research is the global challenges that require a competitive advantage for Micro, Small and Medium Enterprises (MSMEs). The purpose of this research is to formulate efficient strategies to improve Corporate Sustainable Development for MSME practitioners. This research population comprised all MSMEs in Central Java Indonesia with 100 MSME units as the research illustration. This research method used a non-random sampling method with a purposive sampling method. The research results indicated that the five hypotheses in this research have a positive and significant relationship.

**Keywords:** Knowledge creation · Knowledge acquisition · Green innovation · Corporate sustainable development

## 1 Introduction

In the millennial era, consumers can access various objects they need easily and quickly. It is a challenge for MSME actors to increase their competitive advantage amidst intense market competition. Therefore, MSME actors must be able to formulate efficient strategies in increasing corporate sustainable development.

One of the strategies is to increase knowledge management for MSMEs. Knowledge management is a source of strategic energy for MSMEs because they think knowledge management can exceed their competitors [1]. Some types of knowledge that MSMEs must improve are knowledge creation and knowledge acquisition. MSME actors need knowledge creation to produce innovative and unique products in the market share. Knowledge acquisition also means trying to make MSME actors ready to experience all forms of transformation socially, technologically, or in area [11].

Corporate sustainable development emphasizes more on the area aspect [4]. Implementing the green innovation concept is to share facilities with MSME actors by increasing area-friendly products. The full implementation of green innovation is to minimize the negative effects of MSME operational activities in the area. Based on the explanations above, it can be concluded that the problem formulations in this research are; How to improve Green Innovation through Knowledge Creation and Knowledge Acquisition?; How to enhance Corporate Sustainable Development through Green innovation? And how is the Corporate Sustainable Development optimization model for MSMEs in Indonesia?

## 2 Literature Review

Knowledge management is a conversion of implicit knowledge replaced as explicit knowledge to be transferred, learned, and understood by others. Knowledge management can be an aspect driving corporate sustainable development. The development of knowledge management can also be a stable foundation for MSME actors in conducting business. It aims to make its products survive and have a competitive advantage in market share. Efficient knowledge management allows organizations to be more innovative and creative. As a result, some MSME actors take knowledge management as a strategic energy source that will enable them to defeat their competitors [1].

Knowledge creation results from the interaction between knowledge and identification through activities, practice, and people [7]. Knowledge creation in operational activities is meaningful for MSMEs. This knowledge creation allows MSME actors to practice new knowledge and generate new inspiration or solutions for employees [1]. In MSMEs, the purpose of knowledge is to achieve efficiency related to energy sources' effective use and tend to explore area-friendly. Knowledge creation contained in MSMEs does not only suppress and facilitate the process of making area-friendly products. Therefore, this study's hypothesis is H1: Knowledge creation has a positive and significant impact on Green innovation.

Knowledge acquisition refers to an organization's activities to obtain, extract, and control knowledge from various sources [1]. Most MSMEs' employees want to get knowledge from internal sources. Thus, the MSME actors show that they can gain and absorb knowledge positively, which will impact their financial performance. To achieve corporate sustainable development, MSME actors must use their knowledge acquisition in MSMEs' operational activities. Therefore, the second hypothesis in this research is H2: Knowledge acquisition has a positive and significant effect on Green innovation.

Green innovation is a facility used by the industry to eliminate or minimize the negative effects of their operational activities in nearby areas [8, 15]. The purpose of green innovation is to bring revisions in the manufacturing process through raw materials into finished products. It aims to minimize natural consequences, sources of consumption, capitalization of current energy sources, and reduce waste. Therefore, the research hypothesis is H3: Green innovation positively and significantly impacts corporate sustainable development.

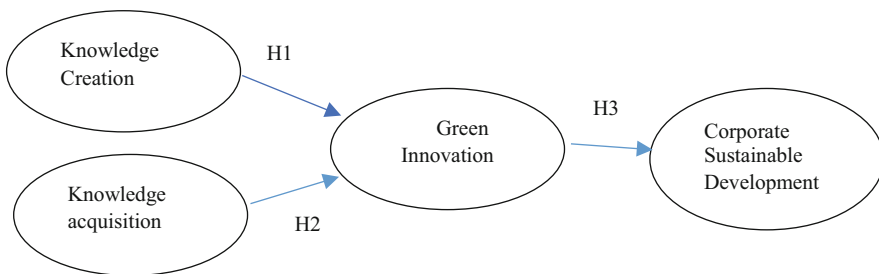
The theory of corporate sustainable development is linked to the "Brundtland Commission" report entitled "Our Common Future" presented at the UN Union Assembly in 1987. The report highlighted the interconnected issues of economic development and area stability. Corporate sustainable development is a development that aims to fulfill all the needs of people without risking natural conditions and nearby areas [1, 3]. The area approach implemented by corporate sustainable development focuses on preserving nature, natural areas, justifying clean water and air, and minimizing natural energy source utilization. Moreover, the economic approach also requires practicing creative skills to produce area-friendly products that do not use risky and quality materials to be accepted by market share and optimize profits by increasing

sales and reducing operational costs. Conversely, a social approach to corporate sustainable development also focuses on strengthening the relationship between organizations, humans and people. It also promotes human welfare by controlling all that is needed. Besides, the existence of corporate sustainable development aims to share social justice for human rights and labor.

### 3 Research Methods

The type of research is both explanatory research and descriptive research. This research aims to describe and analyze the research results according to the reality of the object under study to describe the increase of Corporate Sustainable Development of MSMEs in Indonesia. The population is a combination of all research objects; they are humans, events or various indications that are intertwined and needed by researchers to support success in research. In connection with this research, the selected population comprised Micro, Small and Medium Enterprises (MSMEs) in Central Java.

Sample is part of the number and characteristics of a population. The sampling method used in this research is the non-random sampling method with purposive sampling. The researchers selected a group of subjects adjusted to specific criteria and based on the research objectives. There were also illustrative criteria from this research. The criteria were 100 MSMEs in Indonesia, especially in Central Java, consisted of one manager, namely the owner/leader of each MSME. In this research, information was obtained through 2 sources, primary data and secondary data. The primary data extracted in this research were related to research variables, specifically related to the increase of corporate sustainable development in MSMEs. The secondary data in this research were scientific journals, scientific books, the internet and other data associated with this research. The researchers collected data by using a questionnaire. The Inner Model in this research is shown in Fig. 1 as follows:



**Fig. 1.** Research inner model

An operational definition is a practical operational definition of a variable. The operational definitions for each variable are as follows (Tables 1 and 2):

**Table 1.** Operational definition of variables and indicators

No	Variable	Indicator	Source
1	<b>Knowledge Creation (X1)</b> <i>A knowledge that MSME actors must possess is related to the creativity of MSME actors in creating new products and ideas</i>	X1.1 = service attitude X1.2 = innovation capabilities X1.3 = employee development X1.4 = employee motivation level	[1, 4]
2	<b>Knowledge Acquisition (X2)</b> <i>A knowledge that MSME actors must possess is related to MSME actors' attitudes in facing various changes that occur in the business sector</i>	X2.1 = dynamic business environment X2.2 = flexibility X2.3 = responsiveness	[1, 6]
3	<b>Green Innovation (Y1)</b> <i>MSME actors use a concept to eliminate and minimize the MSME operational activities' negative impact on the community and the surrounding environment</i>	Y1.1 = green technology innovation Y1.2 = green management innovation	[1, 15]
4	<b>Corporate Sustainable Development (Y2)</b> <i>A concept in which MSME actors must continue to preserve nature in developing and expanding their businesses to meet the current generation's needs without having to sacrifice/destroy all resources related to MSMEs' operational activities</i>	Y2.1 = environmental sustainability Y2.2 = social sustainability Y2.3 = economic sustainability	[1, 3]

## 4 Research Results and Discussion

This research used the Structural Equational Modeling (SEM) analysis procedure operated through the Partial Least Squares (PLS) program. The researchers processed the information by using WarpPLS 5.0. All indicators used to measure all variables in this research have a reflective character. To test the measurement model, it must fulfill the convergent validity test, discriminant validity, and composite reliability test. Based on the field information analysis results, the information used in this research is valid and reliable so that other tests can test the information. The results of the research analysis can be seen in the table as follows:



**Table 2.** Results of research data analysis

Dependent variable	Independent variable	Path coefficient	P-value	Information
<b>Regression model I</b>				
Green Innovation (Y1)	Knowledge Creation (X1)	0.295	0.036	H1: X1&#xF0E0; Y1 Accepted
	Knowledge Acquisition (X2)	0.478	0.006	H2: X2 &#xF0E0; Y1 Accepted
<i>R-Squared = 0.547</i>		<i>Adj. R-Squared = 0.568</i>		<i>Regression I: X1, X2 → Y1</i>
<b>Regression model II</b>				
Corporate Sustainable Development (Y2)	Green Innovation (Y1)	0.577	0.018	H3: Y1&#xF0E0; Y2 Accepted
<i>R-Squared = 0.426</i>		<i>Adj. R-Squared = 0.355</i>		<i>Regression II: Y1 → Y2</i>

Source: Processed primary data, 2020

Based on the results of the regression analysis, the three research hypotheses show positive and significant results. Hypothesis 1 tested the relationship between Knowledge Creation and Green Innovation shows positive and significant results. The greater the Knowledge Creation values of MSME actors, the greater the Green Innovation that MSMEs will possess. Hypothesis 2 in this research implies a positive and significant relationship between Knowledge Acquisition and Green Innovation. This hypothesis explains that if there is an increase in Knowledge Acquisition in MSMEs, there will be more Green Innovation of MSMEs. Meanwhile, hypothesis 3 of this research explains a positive and significant relationship between Green Innovation and Corporate Sustainable Development. The statement confirms that the greater the Green Innovation possessed by MSME actors, the value of Corporate Sustainable Development for MSME actors will also increase. The effort that MSME actors in Indonesia can make is to increase the Corporate Sustainable Development that each MSME has. It is expected that the MSME actors, especially in Indonesia, will be ready and able to compete in the digital era in all market segments.

## 5 Conclusion

Based on the research results, it can be concluded that the three hypotheses of this research are acceptable. In other words, the three results of the research hypothesis analysis show a positive and significant effect on the relationship between each variable. The MSME actors can increase Green Innovation through some variables such as Knowledge Creation and Knowledge Acquisition. On the other hand, to increase the Corporate Sustainable Development of MSME actors, it can improve the Green Innovation implementation by MSME actors.

This research's limitation is that the distribution of illustrated areas is still limited to the Central Java area. The research aspect is related to MSMEs only in five business fields. The empirical research model is still simple. Future researchers can expand the distribution area of illustrations in the Central Java region and outside the zone. Additionally, future research can also add other aspects of MSME-related research to different business fields. The empirical research model is also broadened or narrowed towards the antecedents of future research. It aims to expand the illustration and data in detail further.

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