International Journal of Engineering & Technology, 7 (4.34) (2018) 314-317

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research pa

The Mediating Roles of Block Chain Technology Practices on Green Supplier Development Process Towards Sustainability Performance: Indonesia Green Industry Level IV

Arry Hutomo[1]*, Mohd Haizam Mohd Saudi[1], Ridzuan Masri[2], Ilham Sentosa[3], Obsatar Sinaga[4]

[1]Faculty of Business and Management, Widyatama University, Indonesia
[2]Faculty of Business and Law, International University of Malaya Wales, Malaysia
[3]Faculty of Business and Management, Universiti Kuala Lumpur Business School, Malaysia
[4]Department of International Relations, Padjajaran University, Indonesia
**Corresponding author E-mail: arry.hutomo@widyatama.ac.id*

Abstract

Implementation of block chain technology has many benefits for some green industries, but there are also cautionary to implementation can be sustained continuously. This paper seeks to advance research development related to green supply chain and block chain technology especially regarding green supplier development process. The purpose of this research is the block chain practices can improve and affect sustainability performance on the green supplier development process. Researchers took 48's of green industry level IV in Indonesia use their approach and analyzed hypothesis in statistically. The results of this study stated have significant impact of block chain practices can be variable to improve sustainability performance on the green supplier development process. This framework can be the basis for the suggestion Green Industry Level IV in maintaining sustainability performance in Indonesia.

Keywords: *Green Supplier Development; Block Chain Technology; Sustainability Performance.*

1. Introduction

Green supplier development process (GSDP) is one of the most important part in explaining one of the items in the Green Supply Chain Management. Some of the problems and issues that arise associated with sustainability implementation on green process itself often becomes a topic of interest in the research of green practices. GSDP Industry Level IV Indonesia 55.41 % in 2017 especially in implementing green practices have limitations in the field of technology to make it easier to connect with the supplier who becomes the starting point of the fulfillment of the needs of the firm [1-2]. Advances technology only 34.22 % have led to green industry level IV and should review its back against the practice of sustainability [2-5]. The most important issue in utilizing the progress in implementation of the green technology in the supplier regarding the green knowledge transfer communication and investment resources transfer. According to the theory of ecological modernization, technology had a huge strong indication against environmental damage from economic growth when not handled mutually by the management [1, 3]. In some cases, there is still no clarity technology can benefit the dimensions of sustainability, since it still depends on the specific cases. Social dimension in the implementation of green technologies can contribute to all dimensions of sustain ability is still not clear [4].

Base on previous research, the advancement of technology is very broad and includes the value of activities in particular in the area of production information green practices and social technology [5]. Each of these technologies has implications towards green practices for the sustainability of the organization and particularly supply chains. Green supplier development practices (GSDP) had influence to manage sustainability in the implementation of green practices at the local level and globally. Green Initiatives by industry and current principals being the most important part in green supply chain management practices [2]. Some problems in widely GSDP in improving sustainability performance need to be dug deeper. This is due to that all technological developments, one of which is the block chain technology can have a huge impact for supply chain sustainability, also known as distributed ledger technology [2-3, 6].

Although green practitioners have put a whole section to the definition of the technology block chain in general characteristics, that they can do is how they define as a decentralized database or the record ledgers are divided between networks and supply chain participants [2]. Limitation research that block chain technology can affect the broad green supplier development process to improve sustainability performance. At this time that block chains, is the set of records and data secure, trackable, and administrative, and maintained on the peer-to-peer network problems [3, 7]. Appeared in implementing GSDP contributions has still not been examined more deeply, so the author make hypothesis of this research is doing is giving an insight into the potential of this application block chain technology to facilitate green practices in the supply chain [8-9].

To further and to clarify, we provide some insight into a variety of sustainability-oriented opportunities related to the technology of block chain that occur in the whole and in the green supplier development process (GSDP) 46.83% in Green Industry Level IV Indonesia. In previous research, has studied how technology block chain in particular, and the disruptive technology in general, requires a more nuanced investigation of sustainable supply chain in green practice and research [2, 9]. GSDP include practices such as

Copyright © 2018 Authors. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

providing green technology advice, information sharing on environmental topics, the setting of environmental improvement targets for suppliers are still in need of some variable and much influence another variable in improving sustainability performance [10]. Based on above problems, researchers hypothesized that block chain technology practices can be one of the dimensions have a significant impact towards increasing sustainability performance on green suppliers development practices.

2. Theoretical Background

2.1. Green Supplier Development Process

Green suppliers development process (GSDP) have grouped into three categories: Investment Resources Transfer (GSDP1), Management Organizational Practices (GSDP2) and Green Knowledge Transfer Communication (GSDP3). The concept of share value on financial and capital resources make the portion of these types of supplier development. There are shared value that not all conditions are simple win-to-win solution and other motivations may need to play role. GSDP1 are define how investing in and building improvement of transaction process with reducing supplier environmental costs. Green Industry must be have capability to solving supplier environmental problems including financing suppliers for major capital. Green Industry transferring employees with environmental expertise to suppliers and having suppliers rewards and incentives for environmental performances with respect in green issues. GSDP2 must be develop into the participation of supplier in eco-design with formal process to identify supplier environmental into reduction targets. Some of criteria established about when to enter into green supplier development. Building top management commitment within buyer organization for green supply practices must have long-term contracts incorporating environmental factors. ISO 14000 certifications can support for supplier for formal process for green supplier development [2]. GSDP3 related to human resources and technology applied. Training supplier employees become indicators to provide green manufacturing related advice and awareness raising for suppliers and green technological advice to suppliers. Green Industry giving eco-design product development related advice to suppliers within train users in environmental capabilities and use environmental expectations to answer environmental issues. Some of information technology in block chain strategy that ongoing communication with supplier community via e-supplier environmental councils provided into information sharing on environmental topics [2, 11].

2.2. Block Chain Technology Practices

Block chain technology popular through cryptocurrency and after financial crisis [5-6, 11]. The unique characteristics of block chain technology inspired broader use of this technology in different markets and willingness to provide necessary technology assets support to suppliers even for non-financial business purposes with low risk of supplier bypassing. The risk of suppliers bypassing is a disinter mediation risk, where the focal company terminates the business with use cases have been some effective applications [12]. Block chain technology has a number of general characteristics. The integration of these characteristics differentiate block chain from other similar information technologies [13]. Block Chain Technology Practices can be mutual impact on sustainability performance if any joint and team problem solving on environmental issues. The participation of suppliers in eco-design or ISO 14000 certification can develop formal supplier environmental assessment programs. Block chain technology using green knowledge transfer can occur through ongoing communication between frequently supplier communities via the environmental councils. This research can be developed into green multitier supplier management. Issues facing Green Supply Management Practices should cover at any case of Green Supplier Development Process [14-15]. Block chain technology practices have grouped into Decentralized Database; Information Transparency; Data and Information Immutability; Smart Contracts. Technology loops mean that block chain forms of communication needed to determine the block chain issues that go beyond the number of sustainability performance measurement. Sharing information in block chain strategy must be benchmarking with help suppliers see how well they are doing related to environmental issues. Having block chain technology into green practices needed. It can raising and findings new programmatic offering may needed if performance is not meeting environmental expectations.

2.3. Sustainability Performance

Sustainability performance can be divided into 3 pieces namely in the fields of environment, social and economic finance. Some things need to be curious is that the process performance measurement is based measurement that has a relationship with green supply chain management [2]. There are some who became the main indicator i.e. Decrease in cost of materials purchasing; cost for energy consumption; fee for waste treatment; fee for waste discharge; Decrease in fine for environmental accidents [5]. Based on previous research, that the activities of these measurements is done connect related environmental indicators. For it is this research defines the dimensions of sustainability minimize waste or activities that are not useful [2]. Statement of sustainability performance prepared to describe the sustain condition of the company's past and used to predict future sustainability [5]. Based on the research and sustainability, as a dependent variable will describe to environmental performance. This study adopted a modified version of the definition of development and the capability of an organization to reduce the emissions, waste and the ability to reduce the consumption of hazardous and toxic materials and reduce the frequency of environmental accidents and environmental uncertainty [2, 5]. In other words, that the standards set by the world of HSE standards should be followed to maintain a balance in the utilization of existing natural resources so as not to generate waste; Operational performance. The study used a modified version and a definition for operational performance. The study adopted an expanded definition version for economic performance. Based on literature above, researchers give the hypothesis that Green Suppliers Development Process (GSDP) has positive impact to sustainability performance.

- There have positive impact between Green Suppliers Development Process (GSDP) and Sustainability Performance (SP) on Indonesia Green Industry Level IV.
- There have positive impact between Green Suppliers Development Process (GSDP) and Sustainability Performance (SP) mediating by Block Chain Technology Practices (BCTP) on Indonesia Green Industry Level IV.

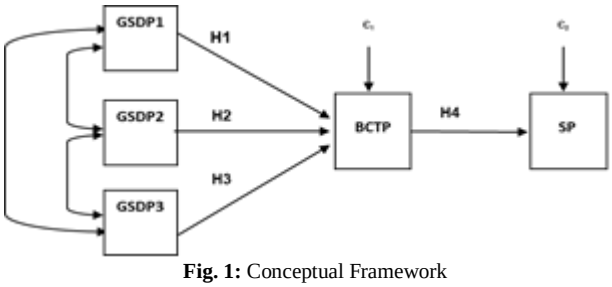

Fig. 1: Conceptual Framework

3. Methodology

As shown in Fig. 1, we investigate the impact of mediating effect of block chain technology practices (BCTP) towards sustainability performance (SP) with AMOS 25.0 Software. There were confirmed 48 usable respondents for data analysis and model validation. All variables and items in GSDP, BCTP and SP have been implement to structural model as an interaction effect as shown in Fig. 1. The main respondents in this research study are fishery

industries in Indonesia Green Industry Level IV that have register to SCG Industry (SCG) ®.

Systematic random sampling is used because all data and the name are identified clearly. The sampling frame divided with unit manager who work in supplier tier2. Then, from the first interval, using this technique [2], one element selected. In this research, a systematic random sample relies on some sort of ordering to choose sample all selected manager from each region green industries level IV.

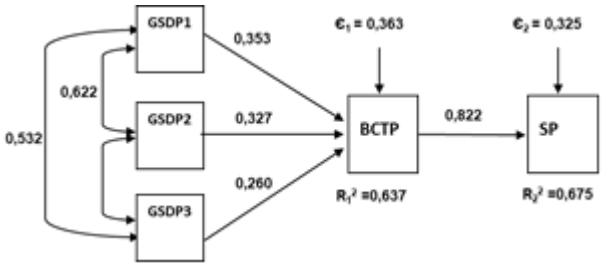

Fig. 2: Structural Measurement Framework

The present study used a five-point Likert scales for measuring all variables in this study.

4. Results and Discussion

Analysis of this variable is the recap of each variable is involved in the research. The recapitulation is obtained from the respective variables are tabulated. On the recap of the variable here will be taken to the highest value items, the value of the item is lowest, and average value of the item is contained in the variable.

Researchers conducting the analysis of verificative with calculating coefficients of regression, correlation coefficients with successive intervals method use their advance. The value of the correlation of GSDP1 and GSDP2 is 0.622, GDSP 1 and GSDP3 is 0.532 GSDP2 and GSDP3 are 0.561. The regression coefficient values between GSDP1 and BCTP was 0.352; GSDP2 and BCTP was 0.327. GSDP3 and BCTP was 0.260. Then the regression coefficient values BCTP to SP is 0.822**.**

Table 1: Verification Analysis

VARIABEL	DIRECT IMPACT	UNDIRECT IMPACT			TOTAL
		GSDP1	GSDP2	GSDP3	
GSDP1	0.124		0.072	0.049	0.245
GSDP2	0.107	0.072		0.048	0.226
GSDP3	0.068	0.049	0.048		0.164
TOTAL	0.299	0.121	0.119	0.097	0.635

VARIABEL	DIRECT IMPACT	UNDIRECT IMPACT	TOTAL
	SP	SP	
BCTP	0.676		0.676

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
GSDP > BCTP	.798	**.637**	.612	4.39063

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
BCTP > SP	.822	**.675**	.668	3.80110

The calculation results using SPSS or R Square suggests that the determination of 0.637 (GSDP-BCTP). Thus, it can be said that the influence of total GSDP either directly or indirectly through BCTP of 0.637 or 63.7%. BCTP to SP amounted to 67.5%. Test validity and Reliability obtained the value of Cronbach Alpha GSDP (0.908); GSDP2 (0.875); GSDP3 (0.764); BCTP (0.790) greater than (> 0.708) means that all data valid and meet reliability. Shown in Fig. 3, using the one-sample Kolmogorov-Smirnov test Asymp. SIG (2-Tailed) = 0.907 greater than > 0.05, which mean all data normal distribution. The variables GSDP1 and GSDP2 relate or correlate with the value of the correlation 0.622. This correlation indicates that there are strong links between GSDP1 and GSDP2. GSDP1 and GSDP3 are lower but still strong enough of 0.532. Shown in the Table. 1 the remaining influences or residue (the influence of other free variables not examined against the sustainability performance of 1-SP is 0.6358 = 0.3642 or 36.42%. Positive influential BCTP with sustainability performance (SP). Direct influence BCTP towards Sustainability Performance (SP) of 67.57%. From this analysis the researcher bias to see that there is increasing, i.e. the influence of GSDP against BCTP of 63.58% and influence BCTP against SP 67.57%. One feature of the mediating variable is needed. In this case, with the mediating variable block chain technology practice occurring increase of 63.58% to 67.57% (there is an increase of 3.99%).

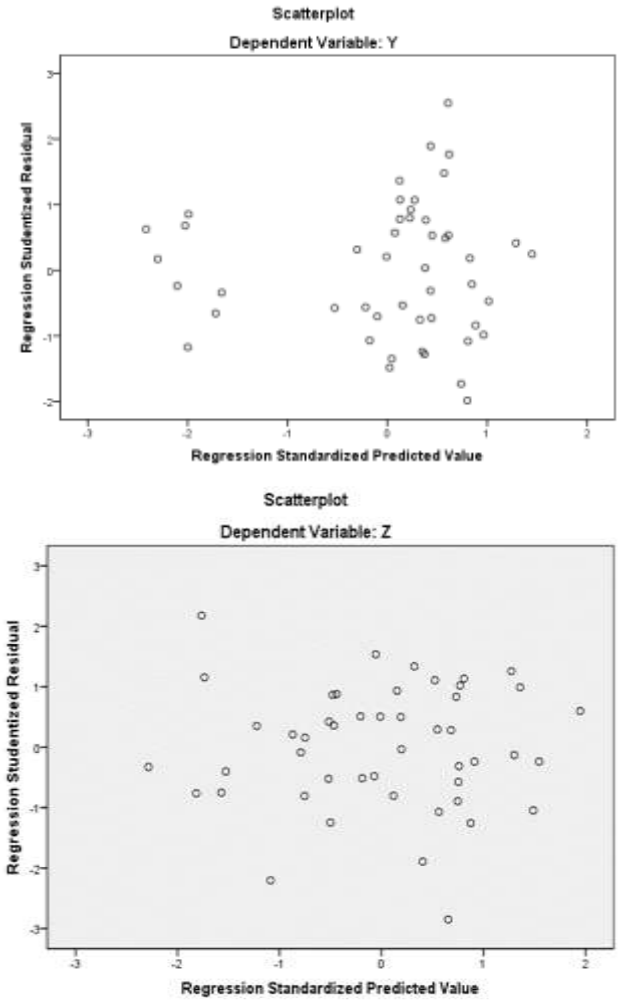

Fig. 3: Scatter Plot Normal

5. Conclusion

Based on the results of the descriptive analysis with verify and use their AMOS 25.0 25.0 SPSS that Supplier rewards and incentives for environmental; reducing supplier costs environmental; transferring employees with environmental expertise to suppliers are most significant impact on sustainability performance (SP), this relates to Investment Resources Transfer (GSDP1). Organizational Management Practices should lead to programs such as building top management commitment within supplier organization for green supply chain practices. Established criteria about when to enter into the green supplier development must be identification of high performing critical suppliers for environmental improvement opportunities. Long-term contracts incorporating environmental factors are indeed not too large correlate with BCTP and SP still strong enough to support the green supplier development process. GSDP3 (Green Knowledge Transfer and Communication) must

have technologies directly to Decentralized Indicators Database; Information Transparency; Data and Information Immutability; Smart Contracts. The green knowledge transfer practices by way of training suppliers and employees on environmental issues must be providing green technological advice to suppliers with giving eco-design product development related advice to suppliers. All information sharing on environmental issues providing feedback about supplier environmental performance.

Block Chain Technology Practices can be mutual impact on sustainability performance if any joint and team problem solving on environmental issues. The participation of suppliers in eco-design or ISO 14000 certification can develop formal supplier environmental assessment programs. Block chain technology using green knowledge transfer can occur through ongoing communication between frequently supplier communities via the environmental councils. This research can be developed into green multitier supplier management. Issues facing Green Supply Management Practices should cover at any case of Green Supplier Development Process. Including this research, researchers conclude that green supplier development process have significant impact on sustainability performance and mediator of block chain technology practices increasing impact on sustainability performance in Indonesia Green Industry Level IV. The complexities arise from the Green Supply Chain management due to the limitations of this study, should the pattern of knowledge need acquisition studied inter organization. This research contributes to knowledge due to degrading mediators block chain technology to improve sustainability performance in the green supplier development process. As for the development of this research can be used by the Indonesian Government to applied technology suitable for green are level IV in Indonesia.

Acknowledgement

An appreciation is given to the SCG Consultant for their secondary data support and wish to acknowledge of Widyatama Foundation in financial support.

References

[1] Bergendahl, J.A., Sarkis, J., Timko, M.T. Transdisciplinarity and the food energy and water nexus: Ecological modernization and supply chain sustainability perspectives. Resour. Conserv. Recycl., 2018, 133, 309–319.
[2] Sarkis, J., Zhu, Q. Environmental sustainability and production: Taking the road less travelled. Int. J. Prod. Res., 2018, 56, 743–759.
[3] Swan, M. Blockchain: Blueprint for a New Economy. O'Reilly Media Inc., 2015.
[4] Hervani, A.A., Helms, M.M., Sarkis, J. Performance measurement for green supply chain management. Benchmarking, 2005, 12, 330–353.
[5] Nakamoto, S. Bitcoin: A Peer to Peer Electronic Cash System. 2008, https://www.academia.edu/download/32413652/BitCoin_P2P_electronic_cash_system.pdf.
[6] Bitcoin Project 2009-2018. https://bitcoin.org/.
[7] Burger, C., Kuhlmann, A., Richard, P., Weinmann, J. Blockchain in the Energy Transition: A Survey among Decision-Makers in the German Energy Industry. DENA German Energy Agency, 2016.
[8] Spielman, A. Blockchain: Digitally Rebuilding the Real Estate Industry. Massachusetts Institute of Technology, 2016.
[9] Veuger, J. Attention to Disruption and Blockchain Creates A Viable Real Estate Economy. J. US-China Public Adm., 2017, 14, 263–285.
[10] Ølnes, S., Ubacht, J., Janssen, M. Blockchain in government: Benefits and implications of distributed ledger technology for information sharing. Gov. Inf. Q., 2017, 34, 355–364.
[11] Mettler, M. Blockchain technology in healthcare: The revolution starts here. Proceedings of the IEEE 18th International Conference on e-Health Networking, Applications and Services, 2016, pp. 1-3.
[12] Mengelkamp, E., Notheisen, B., Beer, C., Dauer, D., Weinhardt, C. A blockchain-based smart grid: Towards sustainable local energy markets. Comput. Sci. Res. Dev., 2018, 33, 207–214.
[13] Zheng, Z., Xie, S., Dai, H., Chen, X., Wang, H. An overview of blockchain technology: Architecture, consensus, and future trends. Proceedings of the IEEE International Congress on Big Data, 2017, pp. 557-564.
[14] Sulkowski, A.J. Blockchain, Law, and Business Supply Chains: The Need for Governance and Legal. 2018, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3205452.
[15] Olabutiyi, M.E. A User's Guide to Path Analysis. University Press of America, 2006.