ANALYSIS OF FACTORS AFFECTING INTENTION TO PRACTICE GREEN SUPPLY CHAIN MANAGEMENT IN INDONESIA'S OIL AND GAS INDUSTRY

Zul Fajri Erdison, Fergyanto Efendy Gunawan and Firdaus Alamsjah*

Industrial Engineering Department, BINUS Graduate Program – Master of Industrial Engineering
Bina Nusantara University
Jl. K. H. Syahdan No. 9, Kemanggisan, Palmerah, Jakarta 11480, Indonesia
zul.fajri@binus.ac.id; fgunawan@binus.edu
*Corresponding author: alamsjah@binus.edu

ABSTRACT. *In recent years, environmental management in a business or company has the focus known as Green Supply Chain Management (GSCM) which links environmental management with supply chain management. The application of GSCM in the oil and gas industry will reduce or eliminate the negative impact of business activities. The study objective is to determine the factors that influence Indonesia's oil and gas industry workers in implementing GSCM. In this paper, quantitative research is done by collecting sampled data of 219 Indonesia's oil and gas workers, investigating the behavior intention based on the theory of planned behavior, and analyzing the data by using Smart-PLS. The results show that facilitating conditions such as equipment compatibilities, competencies, and control belief strength are the key factors of GSCM application in Indonesia's oil and gas industry. Other driving factors of adopting GSCM are the usefulness of adopting GSCM, knowledge, government regulations, company policy, and the descriptive belief or imitation of another typical organization applying GSCM in their business processes.*
Keywords: Green supply chain management, Behavior intention, Oil-gas industry, Structural equation modelling, Theory of planned behaviour

1. **Introduction.** Company or business activities can pose a major threat to the environment with indicators of Carbon Dioxide (CO_2) which is a greenhouse gas, packaging material waste, toxic materials, traffic jams, and other types of pollution caused by other industries [1]. The contributions of several industrial sectors were reported by the Food and Agriculture Organization of the United Nations in the Greenhouse Gas Emissions from Agriculture, Forestry, and Other Land Use (AFOLU) in 2017 shown in Table 1.

FAO reports that the three largest sectors contributing to greenhouse gas production are energy, AFOLU, and the industrial sector. Based on data that is published by Our World in Data, the energy and industrial sector are intersected where one of the largest energy consumptions is the industrial sector at 24.2% (Figure 1).

Preliminary global greenhouse gas emission 2018 excluding land use change and forestry from Climate Watch reports that Indonesia is the top 10 largest greenhouse gas emitter in the world. The data shows that Indonesia is the eighth rank contributor to producing greenhouse gas of 865.3 Metric ton Carbon Dioxide equivalent ($MtCO_2e$) or 2.03% of greenhouse production worldwide, while China is the largest greenhouse gas producer in the world, contributing 26.1%. The 2020 Indonesia environmental statistic report known as "Laporan Statistik Lingkungan Hidup Indonesia" reports that the energy sector is the largest contributor of greenhouse gases in Indonesia, which is 7 831 906 Tons of CO_2e or 39.54%. Food and Land Coalition (FoLU) or known as "koalisi pangan dan tata guna lahan" ranks second in producing greenhouse gas at 39.32%.

TABLE 1. The global greenhouse gas emission distribution [2]

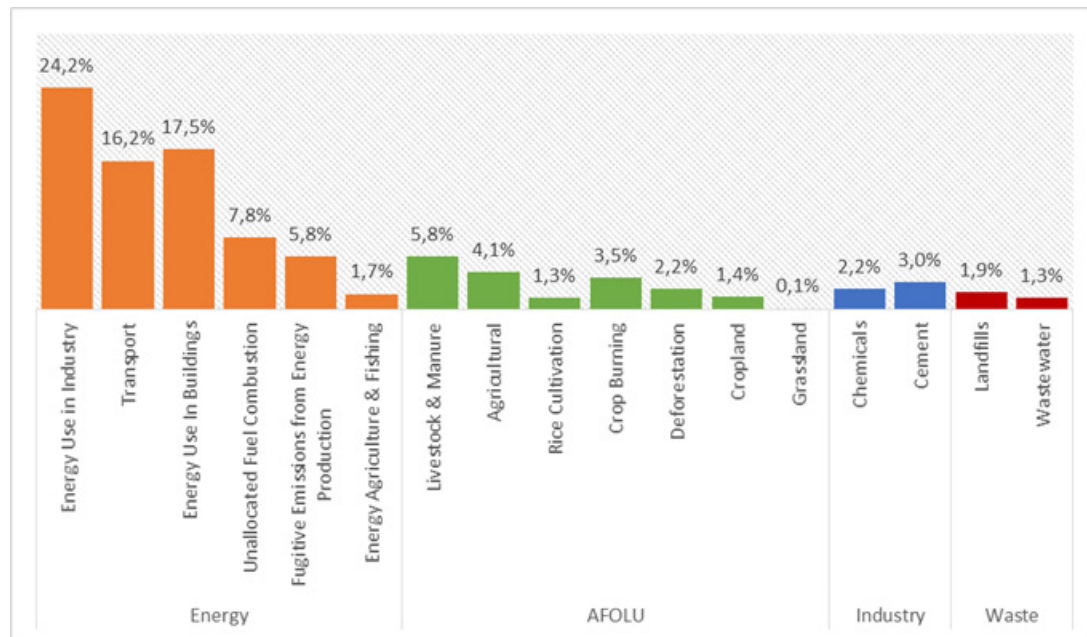| No	Sector	GHG emissions (%)
1	Energy	35
2	Agriculture, Forestry and Other Land Use (AFOLU)	24
3	Industry	21
4	Transport	14
5	Buildings	6

FIGURE 1. The global gas emissions by sector [3]

Supply Chain Management (SCM) as a part of the industry is the integration or co-ordination of business processes and supply chain strategies to meet end customer needs [4]. Business processes related to the supply chain are the processes of purchasing, manu-facturing, marketing, logistics, and information systems. The strategies needed in imple-menting SCM are customer focus, efficiency, quality, and environmental sustainability [4]. To maintain environmental sustainability, companies or industries must implement sev-eral strategies to reduce the environmental impact of the products and services they produce [5].

In recent years, environmental management in a business or company has the focus known as GSCM [6]. GSCM is the concept that links environmental management with supply chain management [7]. Another definition of GSCM is an approaching system tak-en by the company to become an environment-friendly company [8]. GSCM is also known as an organizational philosophy to reduce environmental risk in a business process [9]. The performance and environmental performance balance are increasingly considered impor-tant for companies to face competition, comply with government regulations and fulfill the requirement of the community or customers [10]. They also found that although envi-ronmental awareness is increasing, the implementation of GSCM is still very slow in some companies and industries.

The GSCM has been adopted by most businesses and integrated into their business processes as long-term environmental responsibility [6]. The companies with green activ-ities in their business processes tend to have a better position in the market [11]. Thus, green technology adoption in operations has been recognized as having high advantages to the environment and other business aspects [12]. The increasing value of GSCM due

to depleting raw material supplies, overflowing waste sites, and emissions have gained the attention of many researchers, leading to many research activities in investigating the factors that influence GSCM implementation [13].

The oil and gas industry has an important role in the development of environmental sustainability due to the wide use of products in the economic and social fields [14]. Indonesia ranks the 27th largest oil and gas reserves in the world with more than three thousand Million Barrel Per Day (MBPD) oil reserves. Indonesia also produces more than 900 000 BPD and ranked the 22nd in the world. The characteristics for the application of GSCM in the oil and gas industry are zero emission, zero waste of resources, zero waste in administration activities, zero use of toxics, zero waste in product lifecycle, green input, and green output [15]. The contribution of this research is to determine the factors that influence Indonesia's oil and gas industry workers in implementing GSCM.

There are several factors affecting a company in implementing GSCM practices. The research by [6] found out several factors affecting the organization in implementing green supply chain management and assessed their impact on the company's performance. Another research was taken by [16] in Mozambique and found that government policy is the key factor in implementing GSCM. The research by [5, 17] found that external pressure from the customer has a positive impact on the implementation of GSCM in China's logistics and Brazil's automotive industry. In India's manufacturing industry, the key factors of practicing GSCM are government regulation, pressure from costumer, and motivation of the industry itself [9, 18]. Another research was held in Thailand's electronics industry by [19, 20] which found that the main driving factors affecting the implementation of GSCM are government regulation, and organizational, physical, and relational resources. However, the typical research on the oil and gas industry is difficult to find in several references.

The oil and gas industry has an important role in the development of environmental sustainability due to the wide use of products in the economic and social fields. The main idea of sustainable development is a balance between environmental, economic, and social fields. The application of GSCM in the oil and gas industry will reduce or eliminate the negative impact of business activities. The balance between economic, environmental, and social aspects can be achieved through managerial behavior [14].

This article is organized as the following. Section 2 presents the data collection method, the conceptual model, the defined hypotheses, and the analysis method. Section 3 describes the descriptive statistics of respondents, data analysis results using SEM-PLS, verifications of hypotheses, and industrial implications of the findings. The research conclusion and further research are presented in the last section.

2. **Research Method.** To assess the intention of practicing GSCM, the Theory of Planned Behavior (TPB) is adopted in this research. The TPB is a further development of the Theory of Reasoned Action (TRA), which has limitations in evaluating human behavior [21]. TPB has the same concept as TRA, namely, intention or individual interest factor in implementing or carrying out a new habit. Intention defined as the factor that motivates people to do a habit indicates how much desire and effort is made by personnel to implement new habits. The intention is determined by three factors, namely, attitude, subjective norm, and perceived behavioral control. Based on TPB, we posit the conceptual model and hypotheses as shown in Figure 2.

Attitude toward the behavior is assumed to be a function of readily accessible belief regarding the behavior's likely consequences, termed behavioral beliefs [22]. A behavioral belief is the person's subjective probability that performing a behavior of interest will lead to a certain outcome or provide a certain experience [23]. Another research [24] argued that the perceived usefulness is the extent to which a person accepts a new habit or method would be good and at no cost to that individual while the perceived ease of use
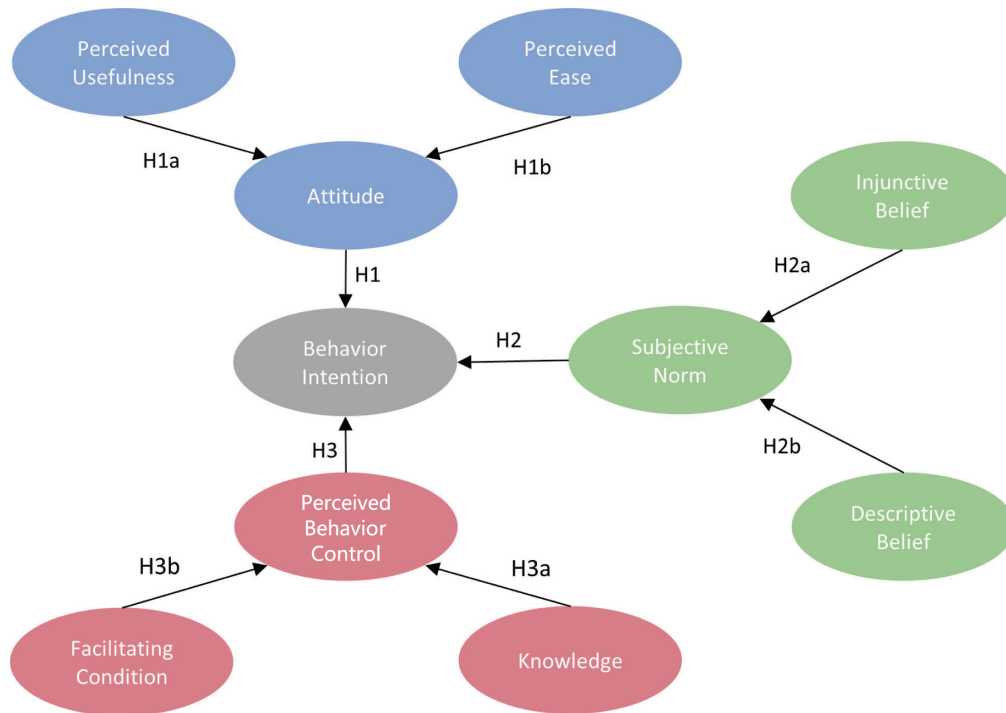
FIGURE 2. The conceptual model

is the degree to which a person believes that using a particular system would be free of physical and mental effort. Similarly, [25] stated that the perceived ease of use is the degree to which an innovation is easy to understand or use. Thus, in this study we posit hypotheses:

H1: The attitude affects positively on the behavior intention.
H1a: The perceived usefulness has a positive impact on attitude.
H1b: The perceived ease has a positive impact on the attitude.

The subjective norm is influenced by two types of normative belief termed injunctive belief and descriptive belief. Injunctive belief is the expectation or subjective probability that a given referent individual or group such as a supervisor or manager approves or disapproves of performing the behavior [22]. Another statement is that injunctive belief is the extent to which accepting a technology is seen as a job requirement and approved by a supervisor. Descriptive beliefs are a belief as to whether important others themselves perform the behavior or an expectation as to whether coworkers are likely to accept it or not [22]. Thus, we propose hypotheses:

H2: The subjective norm affects positively the behavior intention.
H2a: The injunctive belief has a positive impact on subjective norm.
H2b: The descriptive belief has a positive impact on the subjective norm.

The perceived behavioral control is a belief related to the existence of several factors that support the implementation of a new habit. The supporting factors include the capabilities and skill of the personnel, the time availability, money, and other resources. Trust and customer needs, communities, markets, and government are the things that influence the habit changes in a company [6]. Therefore, in this study, we will also test three hypotheses about perceived behavioral control below:

H3: The perceived behavioral control affects positively behavior intention.
H3a: The knowledge has a positive impact on the perceived behavioral control.
H3b: The facilitating condition has a positive impact on the perceived behavioral control.

Data collection was carried out by observing several employees of oil and gas companies, both from the upstream and downstream sectors. Questionnaires are prepared based on theory, practices, and factors that influence the implementation of GSCM in the oil and gas industry which are known through a literature review.

3. **Research Results.**

3.1. **Descriptive statistics.** This study utilizes the purposive sampling technique where the respondents are chosen according to the observer's judgment about their knowledge of the subject matter. The respondent's profiles are as follows. They are mostly male (93%). Nearly 70% are younger than 35 years old. About 67% hold a bachelor degree. About 89% of the respondents are working in the downstream sector such as refining, marketing, and distribution with various levels of position and experience. About 90% are located in Sumatera, Java, and Bali islands. About 91% have less than 20 years of working experience.

3.2. **Data analysis.** We use SmartPLS to analyze the reliability and validity of participants' responses. As shown in Table 2, the results indicate that all constructs in this study are more than 0.70 in the composite reliability. The Average Variance Extracted (AVE) values of the latent variables are higher than 0.5 [26]. These results show that the constructs are reliable, valid, and be able to proceed to the next step.

TABLE 2. The reliability and validity of the variables: Cronbach's α, Composite Reliability (CR), and Average Variance Extracted (AVE)

Latent variable	α	CR	AVE	Remarks
Attitude (AT)	0.765	0.863	0.679	Valid and reliable
Behavior Intention (BI)	0.884	0.928	0.812	Valid and reliable
Descriptive Belief (DB)	0.847	0.904	0.758	Valid and reliable
Facilitating Condition (FC)	0.907	0.931	0.732	Valid and reliable
Injunctive Belief (IB)	0.933	0.944	0.773	Valid and reliable
Knowledge (KL)	0.859	0.913	0.778	Valid and reliable
Perceived Behavioral Control (PBC)	0.876	0.923	0.800	Valid and reliable
Perceived Ease (PE)	0.835	0.900	0.750	Valid and reliable
Perceived Usefulness (PU)	0.812	0.877	0.643	Valid and reliable
Subjective Norm (SN)	0.697	0.834	0.630	Valid and reliable

The conceptual model evaluation is by the standardized root mean square residual, which indicates the average of the standardized residual between the observed and the hypothesized covariance matrices. A good fit adjustment is generally considered when the Standardized Root Mean Squared (SRMR) is less than 0.10 [27]. The present study shows the saturated model value is 0.085 and the estimated model value is 0.094 as can be seen in Table 3, which falls according to the required standards. Another parameter of model evaluation is NFI, the closer the NFI is to 1, the better the fit is.

Another model evaluation that has been done is by using the path coefficient to identify the significance of the path coefficient between variables; see Figure 3. The results that indicate the path coefficient between variables are shown in Table 4.

From the results, the developed hypotheses can be summarized as follows.

H1: Attitude affects positively behavior intention of GSCM application.

The sample data support the hypothesis that attitude affects positively and statistically significant behavior intention to adopt GSCM. It is shown by t-value of 5.553, larger than the t-table, and p-value of 0.000, smaller than α. Across this report, we use the t-table value of 1.6518 and the significance level α of 0.05. These results are relevant

TABLE 3. Model fit

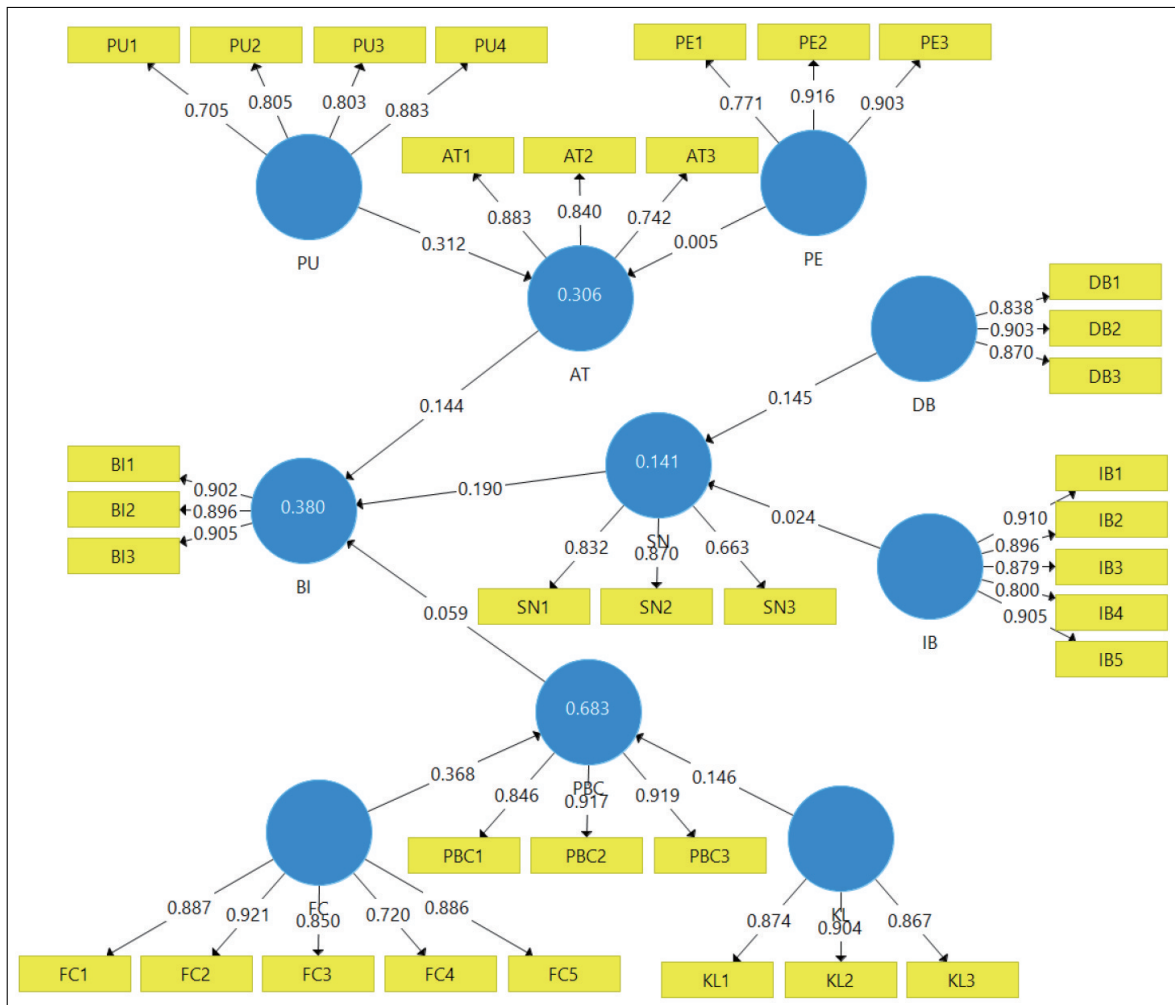|	Saturated model	Estimated model	Remarks
SRMR	0.085	0.094	SRMR < 0.95 indicates good fit
d_ULS	4.543	5.571	< 95% bootstrap quantile
d_G	2.132	2.197	> 95% bootstrap quantile
Chi-Square	2384.660	2408.670	Higher due to big sample size
NFI	0.667	0.663	NFI = 1.0 indicates best fit
RMS_Theta	0.170		RMS_theta < 0.12 indicates good fit

FIGURE 3. The final structural model

with the prior studies that attitude is the key point of cleaner production technology adoption [9, 28].

H1a: The perceived usefulness has a positive impact on attitude to adopt GSCM.

The perceived usefulness has a positive impact on attitude to adopt GSCM with p-value of 0.000, smaller than α, and the t-value of 7.999, larger than the t-table. Our finding is consistent with the conclusions of [23, 29] that the perceived usefulness of using the green policy is positively affecting their attitude toward the policy. Another research [17] also found that the main motivation for adopting GSCM is to reduce the cost of the supply chain itself.

TABLE 4. The statistical significance of the investigated relationships. The column headers 'O' means original sample, 'M' the sample mean, and 'STDEV' the standard deviation.

Relationships	O	M	STDEV	t-stat	p-values	Remarks
AT → BI	0.323	0.324	0.058	5.553	0.000	Not Rejected
DB → SN	0.479	0.458	0.096	5.000	0.000	Not Rejected
FC → PBC	0.537	0.541	0.062	8.649	0.000	Not Rejected
IB → SN	−0.195	−0.158	0.091	2.136	0.033	Not Rejected
KL → PBC	0.338	0.337	0.065	5.228	0.000	Not Rejected
PBC → BI	0.200	0.199	0.058	3.432	0.001	Not Rejected
PE → AT	0.065	0.069	0.077	0.838	0.402	Rejected
PU → AT	0.521	0.521	0.065	7.999	0.000	Not Rejected
SN → BI	0.356	0.357	0.058	6.133	0.000	Not Rejected

H1b: The perceived ease has a positive impact on attitude.

The result of this study shows that attitude is not influenced by the perceived ease of GSCM application. The conclusion is based on the p-value of 0.402, greater than α, and the t-value of 0.838, smaller than the t-table. Our finding is not relevant to the previous study by [23], which concluded that the perceived ease of use of the green policy is positively affecting on their attitude toward the policy.

H2: The subjective norm affects positively on the behavior intention.

The influence of subjective norm to behavior intention on adopting GSCM is significant and positive with the p-value of 0.000, which is smaller than α, and the t-value of 6.133, larger than the t-table. These results are relevant with the study of [28], which found that the subjective norm or community pressure is the strongest aspect of the willingness to adopt cleaner production. In another way, these findings are not relevant to [6, 30] which found that the influence of subjective norms is not strong enough to promote sustainable organizational innovation.

H2a: The injunctive belief has a positive impact on the subjective norm.

The injunctive belief that assists an individual in determining a system affects the subjective norm to adopt GSCM negatively with the p-value of 0.033, smaller than α, and the t-value of 2.136, larger than the t-table. The results are not relevant with the results of [18, 20] which found that government pressure was the injunctive belief driving the company to adopt GSCM.

H2b: The descriptive belief has a positive impact on the subjective norm.

The descriptive belief positively affects the subjective norm to adopt GSCM. This is shown by the p-value of 0.000, which is smaller than the significance α, and the t-value of 5.000, larger than the t-table. These results are relevant with the findings of [19, 20] which found that organizational resources and collaboration to improve the environment were the drivers of GSCM application.

H3: The perceived behavior control affects positively on the behavior intention.

The perceived behavioral control affects the behavior intention positively with the p-value of 0.001, smaller than the significance level α, and the t-value of 3.432, larger than the t-table. The same results were found by [6, 28] that the influence of behavior control on the organizational intention for GSCM adoption was positive and significant.

H3a: The knowledge has positive impact on the perceived behavior control.

The knowledge has positive impact on the perceived behavior control to adopt GSCM with p-value of 0.000, smaller than the significance level α, and t-value of 5.228, larger than the t-table. This result agrees with [19, 20] which found that organizational resources

such as education, training, risk management and dedicated manpower for environmental aspect were the keypoints of GSCM adoption. Another research [31] also found the same result that major driven of adopting GSCM are employee quality, regulation and support from government.

H3b: The facilitating condition has positive impact on the perceived behavior control.

The facilitating condition affects the perceived behavior control for GSCM application positively with the p-value of 0.000, smaller than the significance level α, and the t-value of 8.649, larger than the t-table. This finding is supported by [22] which found that the factors affecting GSCM application were local community, company regulation, and corporate social responsibility. Company capability, ecological and climate change are also the driving force of green policy application [9].

3.3. **Practical implication.** GSCM in the oil and gas industry is an application adopted by the industry to reduce or eliminate the negative impact of business activities on the environment. The study results provide adequate knowledge for oil and gas industries on the factors affecting the intention to practice GSCM. The study found that the most influential factor is facilitating condition. This should be used by the oil and gas industry managed to increase the quality and quantity of infrastructure or facilities supporting the application of GSCM. An urgent action for the management is to upgrade equipment and technology to fulfill the sustainability targets such as low emission, zero waste, and zero use of toxic. They should also increase the worker's competencies and knowledge. The company may need to strengthen the trust in the usefulness of the GSCM practices by, for example, in-house and external training programs.

4. **Conclusion.** The discussion about GSCM practices and the driving factors of its application is carried out in various industries. In this context, this paper researches factors affecting green supply chain management implementation in Indonesia's oil and gas industry. According to the participant's argument, the key factor affecting the intention to practice GSCM is the facilitating condition or the existence of the supporting facilities for GSCM application. It shows that the existence and quality of infrastructures such as equipment compatibilities, competencies, and control belief strength are important for the continuous application of GSCM in the oil and gas industry. Other driving factors of adopting GSCM are the usefulness of adopting GSCM, knowledge, government regulations, company policy, and the descriptive belief or imitation of another typical organization applying GSCM in their business processes. Therefore, this paper contributes to the cleaner oil and gas industries by identifying the drivers for GSCM adoption aimed toward environmental improvement in Indonesia. Financial aspect is one of the most important parts of a business process. For further research, we suggest to take account of the relationship between the intention behavior to adopt GSCM in the oil and gas industry with its financial impacts.

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