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Society 5.0: Green Logistics Consciousness in Enlightening Environmental and Social Sustainability

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Abstract. Currently, there is growing attention towards improving sustainability, including the worldwide agenda in moving towards Society 5.0. Since the formulation of Sustainable Development Goals (SDGs), the green logistics issue has been widely recognized as one crucial element to reducing environmental and social impact. Nevertheless, only a few studies in this area were established since the ignorance regarding this issue was immense globally, including in the Malaysian context. This paper intends to examine the relationship of organizational performance consciousness, economic performance consciousness, and environmental performance consciousness towards green logistics consciousness in enlightening environmental and social sustainability in the Malaysian situation. The data of 387 respondents throughout Malaysia were collected using a convenience survey sampling technique. This data was initially analyzed via descriptive, validity, reliability, and normality test using *IBM SPSS Statistics*. All hypotheses were analysed using the hierarchical regression analysis, which confirmed that organizational performance consciousness, economic performance consciousness, and environmental performance consciousness directly influence green logistics consciousness in Malaysia. This study is significant and crucial for business strategies formulation, predicting and assessing the potential environmental and social impacts of a proposed project, including evaluating alternatives, designing appropriate mitigation, management and monitoring measures via several entities such as government and policymakers.

1. Introduction

The sustainability issue is getting the global concern in moving forwards from Fourth Industrial Revolution (IR 4.0) road to Society 5.0. This Society 5.0 is a super-smart society [1]. In other words, the focal point of Society 5.0 is creating a society to handle different challenges within the community through innovations and integration from IR 4.0 such as IoT, robots, artificial intelligence (AI), big data, and economic alliances. On the other hand, green aspects and eco-friendly sustainability continue to be a crucial challenge that still sparks a heated debate among scholars and policymakers. This imperative issue is receiving huge attention worldwide bringing to the sustainability blueprint formulation of Sustainable Development Goals (SDGs). The SDGs emphasize 17 goals in achieving a better and more sustainable future for all by the year 2030 [2], including the logistics industry.

In Malaysia, the logistics industry plays a vitally important role to reduce the effect of the economic slump. Intrinsically, this industry is considered a pertinent industry that endures as top-performing industry during an unprecedented situation Coronavirus Disease (Covid-19) pandemic situation.

Additionally, this industry also remains resilient and precisely a beneficiary of the Covid-19 pandemic. Unpredictably, this extraordinary event acts as a growth catalyst to spur logistics activities including warehousing, e-retailing businesses, e-commerce, as well as a favourite investment industry. Further, the potential local and international investors also are aggressively considering an investment in logistics as their vital asset at this moment [3]. However, the rising investment in the logistics industry has caused an increase in the environmental and social sustainability issue. As revealed by Malaysian Transport Minister Anthony Loke, the logistics industry in transportation activities was statistical recorded as the second largest emission source in Malaysia, contributing to 21% of overall carbon emissions [4].

Accordingly, only a few studies on this topic have been conducted since there is still ignorance regarding this issue in the Malaysian context. This indicates that the level of green logistics consciousness in Malaysian society needs serious concern and research. Therefore, this paper intends to examine the green logistics consciousness by relating to the organizational performance consciousness, economic performance consciousness, and environmental performance consciousness in enlightening environmental and social sustainability in the Malaysian situation. The researchers believe that the level of consciousness on organisational performance, economic performance, and environmental performance will directly influence the level of green logistics consciousness. Hence, this study can be the initial indicator to show the readiness of Malaysians to obligate in Nationally Determined Contribution (NDC) to the Paris Agreement via reducing greenhouse gas emissions by 45% by 2030.

2. Literature Review
Undoubtedly, logistics is a vital element of Supply Chain Management (SCM) [5]. As defined by The Council of Supply Chain Management Professionals (2007), logistics management is a part of SCM that includes activities of planning, implementing, controlling the effectiveness and efficiency of forward and reverse flows, and products or services storage. Additionally, logistics also involves the process of exchanging information starting from the point of origin to the point of consumption to meet the requirement of potential consumers.

2.1. Organizational performance and green logistics
The implementation of green logistics in the organization highlights many advantages. This practice reflects the inventory levels reduction, increase volume of goods delivered on time, better capacity utilization; promote products or services quality, increase product variety, and decrease scrap value [6]. Likewise, the implementation of green logistics also benefited organizations via reduced materials purchasing cost, cut cost for energy consumption, decrease the waste treatment fees, and decrease the waste discharge fees, while simultaneously trying to eradicate any environmental destructiveness [7]. Judging these advantages of green logistics to the organizational performance, the firms should have enough knowledge and awareness to embed green logistics in their organizations. As suggested by Singh et al. [8] the organizations that support their teams to build sufficient environmental knowledge and competencies are able to share opinions and offer comprehensive ideas for better effective environmental practices implementation. Based on the above discussion, this study believes that organizational performance consciousness can directly influence green logistics consciousness. Accordingly, the first hypothesis for this study was:
*Hypothesis 1 (**H1**). Organizational performance consciousness has a directly significant positive influence on green logistics consciousness.*

2.2. Economic performance and green logistics
Not limited to organizations, green logistics implementation would increase economic performance through green logistics activities for instances, investment in green logistics training, investment in green logistics operational cost, investment in green logistics purchasing cost, investment in environmentally materials, despite the fact, eradicating the negative economic performance [9]. Similarly, green practices in supply chain management and logistics directly bring economic benefits in terms of cheaper cost, increase operational efficiency, and improve performances [10]. Aldakhil et al.

[11] verified that green practices in logistics processes were positively linked with sustainable economic and eco-friendly development. Consequently, this current study believes that economic performance consciousness in society may directly influence the green logistics consciousness. Thus, the second hypothesis for this study was formulated as:

*Hypothesis 2 (**H2**): Economic performance consciousness has a directly significant positive influence on green logistics consciousness.*

2.3. Environmental performance and green logistics
It is difficult to determine the real-time when scholars started discussing environmental topics connected to logistics. However, the topic sparked a heated debate among researchers after the 1990s [12] since the environmental crises became a worldwide issue due to globalization [13]. Green logistics is principally referred to as 'going green' in emphasizing environmental preservation including any action in the effort to sustain the natural and ecological balance [14]. Khan and Dong [15] stated that the government and regulatory authorities should be firmed to execute the environmental policies as well as encourage green or renewable energy as a substitute for fossil fuel in the logistics industry and manufacturing sector to provide better environmental sustainability. Besides that, Aldakhil et al. [11] found that green practices in logistics operations were positively associated with the sustainability of environmental conservation. Based on these several prior studies, this present study believes that environmental performance consciousness can directly affect the green logistics consciousness among the communities. Hence, the third hypothesis in this study was developed as:

*Hypothesis 3 (**H3**): Environmental performance consciousness has a directly significant positive influence on green logistics consciousness.*

3. Research methods
The research philosophy for this study is positivism leads to focus on the quantitative approach of research design mainly. Besides that, this study used primary data for data analysis where the data precisely collected to cater and answer the specific problems [16] by employing a self-administered survey via a structured questionnaire. Meanwhile, the *Google Form* was used as a platform for questionnaire distribution to enjoy several benefits such as more effortlessly manage records, including saving time and cheaper. This research instrument was mainly developed based on the variables of this study. All the variables were measured with a 5-point Likert scale with endpoints from 1 to 5 ranging from strongly disagree to strongly agree. All the items of green logistics consciousness, organizational performance consciousness, economic performance consciousness, and environmental performance consciousness were measured using five-item scales adopted from many prior works such as Agyabeng-Mensah and Tang [17], Agyabeng-Mensah et al. [18], Baah et al. [19] and Zameer et al. [20].

Moreover, this study employed the convenience sampling technique since this non-probability sampling was the most suitable technique for this nature of the study. This sampling comprises the sample taken from the accessible part of the population [16]. Despite that, the chosen sample was selected based on specific criteria where they should be aged above 18 years old since this present study prominence the issue of green logistics consciousness where several terms might be unfamiliar for an individual under this age. Additionally, an appropriate sample size for this study was 384 out of the total maximum population as suggested by Krejcie and Morgan [21]. Finally, 387 cross-sectional data was accepted and analyzed. This data was analyzed using descriptive, validity, reliability, normality, and regression analysis *via IBM SPSS Statistics* software. The details of the key findings and discussion were explained in the subsequent section.

4. Results and discussion
This section interprets and elucidates the main results of this study. It consists of descriptive analysis, validity, reliability, normality test and finally, hierarchical regression analysis as following sub-sections.

4.1. Descriptive analysis

Initially, the pre-test of 30 available respondents indicated that all preliminary results satisfied all the pre-survey analysis. Following that, a large-scale survey was conducted within two months. The study received 400 responses, where 387 were useable. The survey response rate serves as evidence that the study and survey were conducted efficiently with an active response rate of 96.8 percent. The details of the respondents are shown in Table 1.

Table 1. Demographic characteristics of respondents.

Socio-Demographic Features		Frequency (*n*=387)	Percentage (100.0%)
Gender	Male	199	51.4
	Female	188	48.6
Age	18 – 20 years old	81	20.9
	21 – 30 years old	147	38.0
	31 – 40 years old	92	23.8
	41 – 50 years old	50	12.9
	≥ 51 years old	17	4.4
Marital status	Married	123	31.8
	Single father/mother	59	15.2
	Single	205	53.0
Academic Qualification	Primary	7	1.8
	Secondary	10	2.6
	Post-secondary	126	32.6
	Tertiary	215	55.5
	Postgraduate	24	6.2
	**Others	5	1.3
Employment Status	Government sector	75	19.4
	Private sector	85	22.0
	Self-employed	66	17.0
	Student	139	35.9
	Unemployed	22	5.7
$\approx$ *Monthly Income per month*	< 250 USD	143	37.0
	250 - 600 USD	114	29.4
	601 - 968 USD	81	20.9
	> 968 USD	49	12.7

Notes: 1) $\approx$ means approximately equal; 2) conversion rate of 1USD=RM4.14 as at 22 May 2021.
Source: Developed by researchers based on the sample output from this study.

The distribution of the respondents' characteristics shows that the result was approximately equal between the male (51.4%) and female (48.6%) sample with 38 per cent of them was aged between 21 to 30 years old. The majority of the respondents were probably below 30 years old, and over half of them (53%) was still single and still completing a tertiary level of academic qualification (55.5%). Hence, in no doubt, the response showed almost 36 per cent of them were still studying compared to those found to be working in the government or private sector, including self-employment with an average monthly income of below 250USD (RM1,000).

According to the respondents' background, the majority of the sample in this current study was categorized as a youth. The youth was preserved as an imperative indicator of the state and nation [22]. As such, the youth generation ultimately will oversee and ensure the earth's sustainability. Hence, the Malaysian youth generation is a significant group to play a key part in the country's sustainable development.

On another note, Table 2 depicts the main results of mean and standard deviations (*SD*) of the four constructs: green logistics performance consciousness, organizational performance consciousness, economic performance consciousness, and environmental performance consciousness.

Table 2. Descriptive analysis of the model.

Variables	Mean	Standard Deviations *(SD)*
Green Logistics' Consciousness	4.1943	0.76725
Organizational Performance Consciousness	4.2610	0.77151
Economic Performance Consciousness	4.2165	0.77415
Environmental Performance Consciousness	4.2163	0.76658

Source: Developed by researchers based on the sample output from this study.

According to the measurement for all constructs, the scales 1 to 2 were equal to low, scale 3 is recited as moderate, and scales 4 to 5 were considered high. As shown in Table 2, all the constructs express the mean value between 4.19 and 4.26. Consequently, judging from the mean values of all constructs above scale 4, where it was considered high, it concludes that many respondents surpassed the high-level consciousness on green logistics via the main pillars: organizational performance, economic performance, and environmental performance.

4.2. Validity, reliability, and normality test
The validity, reliability, and normality test were used to assess the confirmation and correction of used items in constructs. The details of the results were demonstrated in Table 3.

Table 3. Validity, reliability, and normality analysis of the model.

Variables	Cronbach's Alpha (α)	Skewness	Kurtosis
Green Logistics' Consciousness	0.961	-1.067	0.967
Organizational Performance Consciousness	0.973	-0.967	0.768
Economic Performance Consciousness	0.954	-0.918	0.686
Environmental Performance Consciousness	0.966	-0.954	0.660

Source: Developed by researchers based on the sample output from this study.

The internal accuracy of the constructs was verified by using Cronbach's Alpha value of above 0.70 as suggested by many prior works [see 16]. Based on Table 3, the Cronbach's Alpha value for all constructs in this study depicts more than 0.70 with the range of 0.95 to 0.97. Acknowledging these values, the study concluded that the research frameworks were at appropriate standards. Formerly, Bougie and Sekaran [16] advised that the Cronbach's Alpha value close to 1 defines the higher the internal consistency reliability.

Besides that, this study also tested the normality of data distribution via skewness and kurtosis value. As summaries in Table 3, all constructs in the study satisfied the value of −1.0 to +1.0 skewness and kurtosis, which considered acceptable to determine the normal distribution of data [23]. To conclude, the data distribution in this model was validated as normally distributed data. Thus, the regression analysis was carried out to test all formulated hypotheses as discussed in the following sub-section.

4.3 Hypothesis test: hierarchical regression analysis
This section describes the overall result of hypotheses tested by using regression analysis. Regression offers a further detailed analysis that comprises an equation that can be used for estimation and/or optimization. Hierarchical regression is an analysis that can display the variables of study interest and

explain a statistically significant amount of variance in dependent variable (*DV*) after counting for all other constructs. The Hierarchical Regression analysis for this study was depicted in Table 4.

Table 4. Results of the hierarchical regression.

Independent Variables (IV)	Model		
	1	2	3
Organizational Performance Consciousness	0.812***	0.655***	0.361***
Economic Performance Consciousness	-	0.593***	0.560***
Environmental Performance Consciousness	-	-	0.552***
Constant	0.863***	0.856***	0.828***
R^2	0.667	0.668	0.681
Adjusted R^2	0.666	0.666	0.678
ΔR^2	0.667	0.001	0.013
F	727.955***	365.001***	257.142***

Notes: 1) Dependent variable (DV) was Green Logistics Consciousness; 2) *** $p<0.001$ were significant at 0.001 level. Source: Developed by researchers based on the sample output from this study.

In **Model 1**, the organizational performance construct was included. The model explains the 66.7% level of the green logistics consciousness variation *(R^2=0.667)*. However, when economic performance consciousness was included in **Model 2,** the model only explains an additional 0.1% of the variation level of the green logistics consciousness (ΔR^2=0.001). Although there was a slight increase in R^2 in **Model 2**, this change in R^2 was significantly explained by the model at a 0.1% significance level (*F*=727.955). Similarly, in **Model 3**, when the environmental performance consciousness construct was included in the model, it displays the same result whereas the model explains an additional 1.3% of the level of the green logistics consciousness variation (ΔR^2=0.013). Again, these changes in R^2 were significantly explained by the model at 0.1% significance level (*F*=257.142).

In order to verify all the formulate hypotheses (*H1-H3*), this study used the regression model as in **Model 3** which included all the variables in this study. The extraction of **Model 3** is summarizing in Table 5. The decision for all hypotheses testing was also pointed out in this table.

Table 5. Hypotheses testing results.

Hypothesis	Standardized Beta Coefficient (*β*)	Decision
H1: Organizational performance consciousness has a direct significant positive influence on green logistics consciousness.	0.361***	*Supported*
H2: Economic performance consciousness has a direct significant positive influence on green logistics consciousness.	0.560***	*Supported*
H3: Environmental performance consciousness has a direct significant positive influence on green logistics consciousness.	0.552***	*Supported*

Note: ***Significant level at *p*<0.001.
Source: Developed by researchers based on the sample output from this study.

As discusses in the literature review section, sustainability conservation promises many advantages such as efficient increment which benefits the cost and time reduction [20]. From the Table 5, it was clearly illustrated that all hypotheses: *H1*, *H2,* and *H3* were supported by the study at $\beta = 0.361$ (p < 0.001), $\beta = 0.560$ (p < 0.001) and $\beta = 0.552$ (p < 0.001) respectively. Generally, the study's findings

confirm the level of organizational performance consciousness, economic performance consciousness, and environmental performance consciousness directly and positively influence green logistics consciousness. These results aligned with many prior works [e.g., 6,8,11,14,15,17,18,19,24].

This present study determines the level of organizational performance consciousness, economic performance consciousness, and environmental performance consciousness towards green logistics consciousness in enlightening environmental and social sustainability in the Malaysian context. In specific, this study also has the potential of becoming a holistic and sustainable strategy to support the current policies of Shared Prosperity Vision (*SPV 2030*) under Key Economic Growth Activities (*KEGA 8*), Malaysian Science, Technology, Innovation and Economy (*MySTIE*) under the Malaysian socio-economic driver of business and financial services and Goal 9 of Sustainable Development Goals (*SDGs*). Adding on, the Malaysian Government also displayed a high obligation to adhere SDGs. Besides that, through the recently updated Malaysian Code of Corporate Governance 2021 (*MCCG 2021*), the sustainability issue has taken centre phase with the full of Practice 4.0 being keen to it. They discussed board responsibilities in the aspect of sustainable priorities, strategies, and targets. The economy and society would also benefit from the findings such that the green practices may improve performance in terms of organizational, economic, environment, and hence the likelihood of logistics players. Simultaneously, green logistics would contribute more to the production, productivity, and income of the economy.

5. Conclusion
The rapid growth of industrial globalization and modernization brought about various environmental and social sustainability issues. The green logistics practices via operational optimization and environmental externalities reduction may achieve a sustainability balance among organizational, environmental, and economic social objectives for an organization. This paper intends to examine the relationship of organizational performance consciousness, economic performance consciousness, and environmental performance consciousness towards green logistics consciousness in enlightening environmental and social sustainability in the Malaysian context. Data of 387 respondents were conveniently collected via a structured questionnaire preliminary tested using descriptive, validity, reliability, and normality analysis. The results of the hierarchical regression analysis showed that the consciousness of organizational performance, environmental performance, economic performance have a directly significant and positive influence on green logistics consciousness in enlightening environmental and social sustainability. The recent study emphasized that the consciousness of green logistics practices was undeniable since it gives many benefits mainly in moving forward to Society 5.0 instead of achieving the agenda of *SDGs*. This study was also significant to several entities such as government and policymakers, which was crucial to business strategy formulation, predicting and assessing the potential environmental and social impacts of a proposed project: including evaluating alternatives, designing appropriate mitigation, management and monitoring measures.

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