Factors That Influence Green Practices Adoption Amongst Logistics Services Providers

Mohd Rizaimy Shaharudin[*1], Jamaludin Akbar[2], Nurdiyana Nazihah Zainal[3], Siti Fairuza Hassam[4], Amir Imran Zainoddin[5], Muhamad Fadli Mohamad Nizam[6]

[1,2,3,4,6] *Faculty of Business & Management, Universiti Teknologi MARA, 08400 Merbok, Kedah, Malaysia*
[*1]rizaimy@kedah.uitm.edu.my
[2]jamal691@@kedah.uitm.edu.my
[3]nurdiyana20@kedah.uitm.edu.my
[4]fairuza@kedah.uitm.edu.my
[6]fadzlipali2910@gmail.com
[5]*Graduate School of Business, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia*
[5]amirimran.zainoddin@gmail.com

Abstract **- The purpose of this study is to identify the factors that influence the green practices adoption amongst third party logistics services providers in Penang, Malaysia. The factors used in the study included technology (relative advantages, compatibility, and complexity), organisation (organisational support and quality of human resources), and environment (stakeholder pressure, governmental support, and environmental uncertainty). Purposive sampling has been used as the sampling method in this study. The data gained from the questionnaires have been analysed using SmartPLS 3.0 software. The findings show that relative advantages, compatibility, organisational support, quality of human resources, stakeholder pressure, and governmental support influences the green practices adoption. On the other hand, complexity and environmental uncertainty were found to have insignificant impacts towards the green practice's adoption. The outcome of this study demonstrates practical implications for the managers by providing evidence of the critical factors to adopt the green practices amongst the third-party logistics services providers.**

Keywords – Third Party Logistics, Technological, Organisational, Environmental, Green Practices, Adoption

1. Introduction

Third-party logistics services providers (3PLs) lately have been recognised for their service offerings which can cause a greater impact on the environment, particularly services associated with transport and logistics activities [1]. The activities contribute to greenhouse gas releases and pollution of the environment. In Malaysia, there are about 22,000 logistics firms providing an assortment of services in the logistics industry [2]. It was predicted that logistics companies in Malaysia have contributed about 70% of the environmental degradation, and this has been considered as a very high percentage for a small and medium industry, which has contributed to the environmental problems. In Malaysia, green practices are still new amongst the 3PLs with only a few companies having fully implemented the green practices in their operations.

Moreover, the high demand of logistics services can cause some serious problems in the future. 3PLs that are not green compliant may create high carbon emissions in the air. The trucking services provided by logistics services providers are contributing to higher carbon footprints in Malaysia. The transport industry was recoded as the second major contributor to greenhouse gas emitters (GHG) in the country, and attained the top ranking of carbon dioxide (CO2) emissions released amongst the ASEAN countries [3]. Since one of the basic services of 3PLs is the transportation service, the use of trucks mostly consuming Euro III fuels could accelerate the high

International Journal of Supply Chain Management
IJSCM, ISSN: 2050-7399 (Online), 2051-3771 (Print)

carbon footprints being released. Malaysia is trying to re-pledge to reduce 45% of its carbon dioxide (CO2) emissions by 2030 in order to avoid the climate change and global warming problems [4]. However, according to [3], the country has been recorded as being amongst the highest greenhouse gas emitter (GHG) compared to the other developing countries in Southeast Asia. To add to the worst, Malaysia continues to raise its emission levels, despite many other countries having successfully lowered their GHG emissions. The GHG emissions by several developed countries have even recorded lower levels compared to Malaysia, which has the highest emission level [5]. Hence, this has pressured the country to reduce the GHG emissions at the domestic and international levels.

As such, it is a timely call for a study to be conducted in order to identify the factors that influence the green practices adoption amongst the 3PLs due to the services in Malaysia expanding and growing domestically and internationally. Technology (relative advantages, compatibility, and complexity), organisation (organisational support and quality of human resources), and environment (stakeholder pressure, governmental support, and environmental uncertainty) could be the factors that influence the green practices adoption amongst the 3PLs in Malaysia. According to the World Bank, the Malaysian logistics performance index has been ranked in the 41st place from 160 countries across the world [6]. With this high achievement, Malaysia can be categorised as one of the major logistics players in its global presence. Hence, as one of the major players in the world's logistics industry, 3PL firms in Malaysia need to further increase their environmental performance in order to support the global environmental efforts and customer requirements, as well as improve their position in the industry.

The present study has followed and adopted the framework of the study by [7], with some minor changes to reflect the appropriateness of the context of the study amongst the 3PLs in Penang, Malaysia. The paper is organised with a literature review on green practices adoption, the technological factor (relative advantages, compatibility, and complexity), organisational factor (organisational support and quality of human resources), and environmental factor (stakeholder pressure, governmental support, and environmental uncertainty) which were discussed after the introduction section. Next, a conceptual research model is proposed and followed with the explanation of the empirical study using a survey to validate the proposed theoretical framework. Finally, the conclusion and recommendations are discussed at the end of the paper.

2. Literature Review

2.1 Green Practices

Green Practices are the practices that have been formed in order to reduce the negative impacts of operations on the environment [8]. There are several green practices activities that can be identified, such as green purchasing, green supply chain management, green manufacturing, green packaging, and also reverse logistics. Green practices adoption is categorised as one of the environmental management practices**.** According to [9], environmental management practices (EMPs) have been set up in order to minimise environmental negative effects and, indirectly, to ensure that the practitioners take good care of the natural environment. The awareness of the importance of environmental performance has introduced green logistics and it has become essential in the business activities [10]. In the logistics sector, the green practices have, typically, been termed as green logistics due to the suitability of the context of the activities performed in the logistics business. Amongst the environmental practices as part of the ongoing relationships with the customers, they include the managing of transport services, behavioural aspects, logistics system design, emissions control, and environmental competence [11].

[12] have categorised green logistics as strategising about, controlling, managing, and executing the system of logistics through the latest logistics technology and environmental management that targets to decrease the pollutant emissions. [13] mentioned that green logistics are focusing on developing and distributing goods in an ecological way, that take into account the environmental and social factors. Furthermore, green logistics is a concept that focuses on practising to minimise or eliminate the impact of activities on the environment. Green logistics can also be defined as an effort to assess and minimize the environmental impact of logistics activities [14].

2.2 Technological Factor

The technological factor consists of three variables which are consistently related to technology innovation in the environmental practices. The three variables are relative advantage, compatibility, and complexity [7]; [15]; [16].

2.2.1 Relative Advantage

Relative advantage can be defined as implementing an innovation to provide superior products or services. Relative advantage is something valuable, in which a firm observes the innovation offering as an improvement over current methods of accomplishing a similar task [17]. Firms are more inclined to implement a technology that is able to provide superior performance and greater economic increases than the other technologies.

Relative advantage is the perception that an innovation is more advantageous than its current activities. According to [17], there is a positive significant relationship between relative advantage and green practices adoption. 3PLs that adopt new technologies or innovation will be able improve the firm's green practices adoption, by improvising and facilitating the eco-processes implemented in the organisation. Thus, this has led to the following hypothesis.

H1: Technological relative advantage will positively impact the green practices adoption.

2.2.2 Compatibility

Compatibility is the perception that the extent of innovation which is constant with the present principles, previous experience, and the needs of potential adopters [17]. [18] found in their study that compatibility significantly influenced the attitudes towards green management practices among the Taiwanese logistics companies. The technology that firms adopt should be compatible with the present processes due to its never-ending process. It has been supported by [19] that, the higher the perceived compatibility that the innovation has, the higher the environmental effectiveness that can be gained. In addition, [20] also insisted that, compatibility significantly influences the intention of the adopters to implement the new technologies, including the green process in the organisation. Based on this, the following hypothesis has been formulated:

H2: Technological compatibility will positively influence green practices adoption

2.2.3 Complexity

Complexity is perception towards the extent of innovation as being difficult to comprehend and execute in real practice. Complexity could limit the knowledge transfer and dispersion of innovation [15]. The complexity of adopting a green practice consists of many processes that needed to be learned and adapted. Complexity was found to have a negative relationship with the adoption of innovation [21], such as green practices adoption. It is because the green practices are much easier to be adopted if the process is simple and efficient.

As such, the more complexity that the green practices have, the harder it is to adopt the new and innovative green practices. On the other hand, the minimum amount of complexity in adopting green practices stimulate the firms' adoption intentions [22], as it is easy to learn and adapt in the organization. Thus, this has led to the following hypothesis.

H3: Technological complexity will negatively influence green practices adoption.

2.3 Organisational Factor

The organisational factor refers to the organisational resources and organisational learning competencies that are pertinent in improving the firm's green performance [23]; [24] and green practice adoption [25]; [26]. Firms with competence human resources will have greater capabilities to get used to the technological innovation. Hence, the support from the organisations as well as the quality of the human resources might affect the green innovations' adoption in the organization [27]. The organisational factor was represented by two variables in the study; the organisational support and the quality of the employees, which have been deemed as being appropriate with the context of this study.

2.3.1 Organisational Support

Organisational support is the degree to which a company supports its workforces using a specific technology or system that facilitates the green practices adoption. The organisation will provide incentives for innovation adoption and ensure the

availability of the required resources for successfully adopting the innovation [28]; [29] in the environmental practices. Organisational support is required to increase an employee's creativity and also his or her performance [30], especially in the practices related to the environment. As such, organisational support for innovation can give employees motivation and support them to adopt green innovations [31]. This is supported by [32] who discovered that the organisational support had inspired the green practice among logistics companies in China. Thus, this has led to the following hypothesis.

H4: Organisational support will positively impact the green practices adoption.

2.3.2 Quality of Human Resources

Environmental practices are a kind of complicated process and require the support from the workforces in the organisation. Firms with high human resource capabilities could lead to the successful implementation of the green strategy [33]. They can learn from the training provided to them, easily, and enhance their knowledge to improve the green practices adoption [7]. Therefore, organisations with competent employees will benefit from the adoption of green technology and this will eventually assist them in implementing the effective green practices in the organisation. Thus, this has led to the following hypothesis.

H5: Quality of human resources will positively influence green practices adoption.

2.4 Environmental Factor

The environmental factors are related to the determining factors outside of the firm which may affect the firm's business process. Past studies have mentioned a number of variables concerning the environmental factors which have been discussed in the literature. Nevertheless, only three variables were found to be frequently used in many of the studies - stakeholder pressure, governmental support, and environmental uncertainty. Hence, they were appropriate to be utilised in this study [7].

2.4.1 Stakeholder Pressure

Stakeholders are individuals or groups who are directly affected by the firm's activities. The stakeholders play an important role in environmental issues. It is the most significant factor influencing a company's environmental practices [34]; [35]. In this case, firms produce externalities from the conduct and activities which impacted the stakeholders [36]. The pollution caused by the firm's activities can be the externality which becomes the reason for the stakeholders to force the firm to adopt the green practices in the organization [37]. Thus, this has led to the following hypothesis.

H6: Stakeholder pressure will positively influence green practices adoption.

2.4.2 Governmental Support

Governmental support contributes significantly to the firm's green practices adoption. The support can be in many forms, such as providing the incentives and tax exemption to reduce the environmental risks and increase the environmental practices amongst the industries in the country. A study by [25] has highlighted the influence of governmental support in motivating the firms to take part in the environmental initiatives.

In a study related to industrial ecology, [38] suggested that the imposition of the environmental regulations by the government has forced the companies to adopt the green process in their reverse operations. With the lack of the governmental support, the green innovation initiatives amongst the manufacturing firms in Malaysia are struggling at a lower level of implementation [39]. Thus, this has led to the following hypothesis.

H7: Governmental support will positively influence green practices adoption.

2.4.3 Environmental Uncertainty

Environmental uncertainty refers to the ambiguities in the market competitiveness and green technological advancement changes that have pressured the managers to be proactive and innovative to improve the performance in the uncertain environments [7]. The environmental uncertainty motivates 3PLs to increase their efforts in adopting the environmental innovations in their practices [27]. The effect of environmental uncertainty also has motivated firms to adopt the green practices, such as green purchasing, internal management, and green logistics [40]. To maintain the competitiveness and survival, firms need to use more environmental strategies to counter the

uncertainties in the market. Thus, this has led to the following hypothesis.

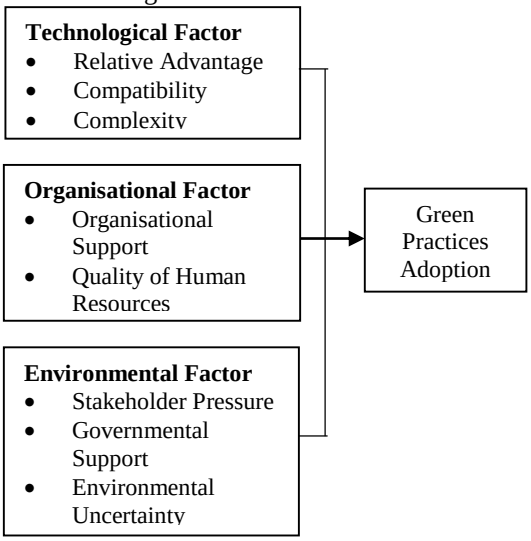
H8: Environmental uncertainty will positively influence green practices adoption.

3. Research Model

The study has proposed the research model as shown in Figure 1. From the review of the literature, the study has proposed that technological (relative advantages, compatibility, and complexity), organisational (organisational support and quality of human resources), and environmental (stakeholder pressure, governmental support, and environmental uncertainty) factors could influence the green practices adoption amongst the 3PLs in Penang, Malaysia. Through the basis of the contingency theory, it has been argued that the firm's systems and processes can only work effectively by aligning them to certain related factors that could support the firms to achieve high performance [41].

In this case, 3PL firms need to identify the most winning factors that could influence the green practices adoption and, eventually, improve the firm's performance. The factors delineated in this study, technology (relative advantages, compatibility, and complexity), organisation (organisational support and quality of human resources), and environment (stakeholder pressure, governmental support, and environmental uncertainty) are significant enough to influence the firm's green practices adoption. These factors could prevent the uncertainties that cause the 3PLs to take the "one size fits all" measures in the green practices adoption which, eventually, could affect the firm's strategic decision selection towards the implementation of the environmental initiatives in the organisation.

Figure 1: Research Model



4. Methodology

4.1 Research Design

The study utilised the cross-sectional design and was quantitative in nature. The study focused on the 3PL companies in Penang, Malaysia. This location was selected due to the availability of the biggest international port and airport facilities in the North region of Malaysia. Penang is a major hub with local and international 3PL companies operating at a larger scale; thus, they were deemed fit as the 3PL companies for this study, especially because the large scale of the 3PLs made them more likely to adopt the green practices due to international operations' requirements.

4.2 Sample Profile

The population of the study consisted of 3PL companies registered with the Penang Freight Forwarders Associations (PFFA) and the Associations of Malaysian Hauliers (AMH) until the year 2006. Based on the number of members of both associations, the study had drawn a sampling frame of 260 3PL companies in Penang, Malaysia [42]; [43]. Census sampling was applied with 260 questionnaires being sent by post and email to the Operation Managers, Fleet Managers, and Distribution Managers to get their responses on the questions. After several follow-ups were made through telephone calls and e-mails, the total final samples of usable sets of questionnaires received were 81 sets or 31% of the response rate. The majority of the responses were received from the Operation Managers (43%) with working experience between 16 to 20 years (24.69%). The majority of the firms were PFFA members (73%) and amongst them, they had been operating for more 21 years (35.80%). Most of the companies were multi-national corporations (50.7%).

4.3 Analysis of Relationship

This study adopted two stages of analysis. In the first stage, the measurement model was assessed to ascertain its reliability and validity, through testing of the individual loading of each item, composite reliability, average variance extracted (AVE), and discriminant validity. In the subsequent stage, the structural model was measured to test the hypotheses developed in the study.

4.4 Assessment of Measurement Model

In the assessment of the measurement model, the reflective constructs were assessed to determine the acceptance of the reliability and validity of the constructs. Table 1 shows that the composite reliability of all of the constructs in the study surpassed the 0.7 threshold, as suggested by [44].

Table 1: Result of the Measurement Model

Construct	No. of Items	Factor Loadings	Composite Reliability	AVE
Relative Advantages	4	0.728-0.934	0.913	0.724
Compatibility	3	0.640-0.926	0.886	0.727
Complexity	4	0.808-0.874	0.909	0.714
Organisational Support	4	0.840-0.922	0.940	0.797
Quality of Human Resources	4	0.616-0.928	0.812	0.729
Stakeholder Pressure	3	0.831-0.949	0.934	0.825
Governmental Support	3	0.687-0.928	0.873	0.708
Environmental Uncertainty	4	0.661-0.872	0.867	0.717
Green Practices Adoption	4	0.680-0.877	0.878	0.725

The factor loadings above 0.6 also clearly indicated that the reliability of each individual item was highly achieved [45]. Consequently, the convergent validity was assessed, and the results of the AVE of all of the constructs were above 0.5, which signified that the adequate level of convergent validity had been achieved [46].

The assessment of the discriminant validity was conducted by examining the cross loadings of the constructs [47] and making a comparison between the square root of the AVE and the inter-correlations with the latent variables [46]. The results shown in Table 2, revealed that the square root of the AVE for each construct was higher than the inter-correlations between the latent variables. Hence, this clearly indicated an adequate discriminant validity, which was sufficient for further assessment of its structural model performance.

4.5 Assessment of the Structural Model

The predictive relevance measure suggested by [48] and [49] has been adopted in this study to assess the model fit. In this case, the cross-validated redundancy value was computed based on the blindfolding process in the SmartPLS, as proposed by [50]. The results unveiled that the values of the predictive capability for all of the exogenous variables were above zero, indicating that the model had achieved significant predictive relevance and model fit.

Table 2. Discriminant Validity

	1	2	3	4	5	6	7	8	9
[1] Compatibility	**0.852**								
[2] Complexity	-0.277	**0.845**							
[3] Environmental Uncertainty	0.377	-0.209	**0.792**						
[4] Governmental Support	0.228	-0.279	0.420	**0.837**					
[5] Green Practices Adoption	0.485	-0.412	0.534	0.534	**0.790**				
[6] Organisational Support	0.339	-0.246	0.688	0.493	0.704	**0.892**			
[7] Quality of Human Resources	0.217	-0.091	0.190	0.014	0.473	0.362	**0.727**		
[8] Relative Advantages	0.387	0.073	0.440	0.150	0.523	0.534	0.538	**0.851**	
[9] Stakeholder Pressure	-0.082	0.779	-0.081	-0.354	-0.321	-0.120	0.192	0.262	**0.908**

Note: The diagonals represent the square root of the AVE, whilst the other entries represent the correlations between the constructs

The non-parametric bootstrapping method was applied with 1000 subsamples being generated to measure the structural model [51]. The results are shown in Figure 2. The significance level of the path coefficients in the structural model was assessed, with the t-values for a one-tailed t-test being 1.645 (5% of the significance level) and 2.326 (1% of the significance level) [52].

By referring to the summary of the results presented in Table 3, there were positive and significant paths leading from relative advantage towards green practices adoption (path coefficient=0.183, p<0.05), compatibility to green purchase adoption (path coefficient=0.182, p<0.05), organisational support to green purchase adoption (path coefficient=0.293, p<0.05), quality of human resource to green purchase adoption (path coefficient=0.291, p<0.01), stakeholder pressure to green purchase adoption (path coefficient=-0.343, p<0.01), and governmental support to green purchase adoption (path coefficient=0.198, p<0.01). Hence, the results supported H1, H2, H4, H5, H6, and H7.

Table 3: Path Analysis Result and Hypothesis Testing

Hypothesis	Path	Coefficient	S.D	t value	Supported/Not Supported
H1	TRA -> GPA	0.183	0.099	1.854	Supported
H2	TCP -> GPA	0.182	0.090	2.035	Supported
H3	TCX -> GPA	0.052	0.125	0.416	Not Supported
H4	OOS -> GPA	0.293	0.143	2.049	Supported
H5	OHR -> GPA	0.291	0.089	3.285	Supported
H6	ESP -> GPA	-0.343	0.136	2.518	Supported
H7	EGP -> GPA	0.198	0.065	3.059	Supported
H8	EEU -> GPA	0.028	0.120	0.230	Not Supported

Note: TRA=Relative Advantage, TCP= Compatibility, TCX= Complexity, OOS= Organisational Support, OHR= Quality of Human Resources, ESP= Stakeholder Pressure, EGP= Governmental Support, EEU= Environmental Uncertainty, and GPA=Green Practices Adoption

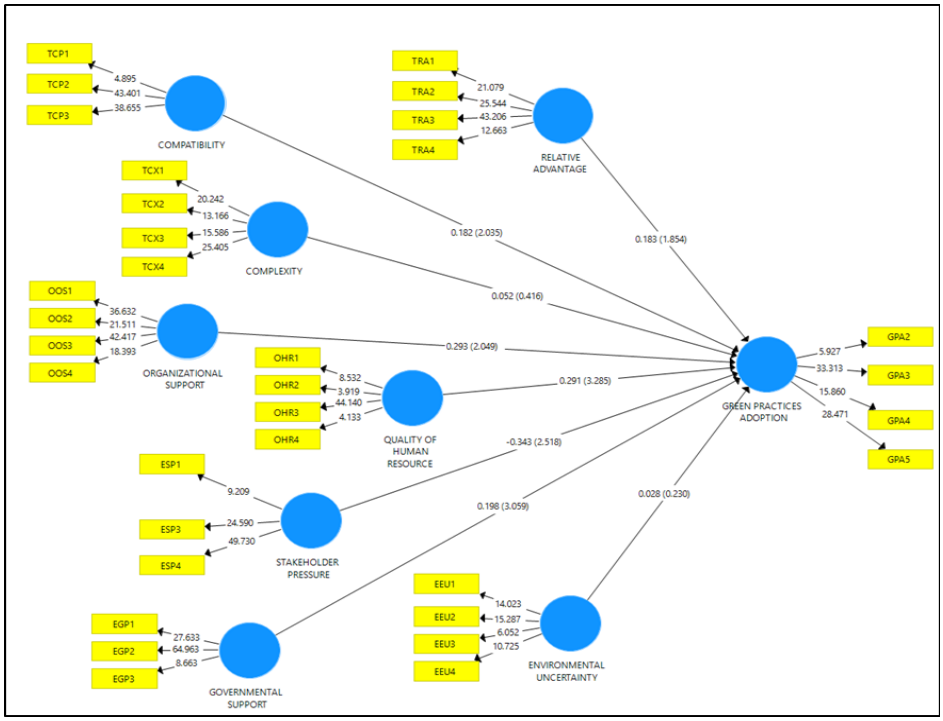


Figure 2: Structural Model

5. Discussion

The aim of this study has been to determine the factors, such as technology (relative advantages, compatibility, and complexity), organisation (organisational support and quality of human resources), and environment, (stakeholder pressure, governmental support and environmental uncertainty) which have a significant influence towards the green practices adoption. The framework of the study was developed using the foundation of the contingency theory, on which the 3PLs internal system and process alignment towards the green practices adoption is contingent upon the critical factors of technology (relative advantages, compatibility, and complexity), organisation (organisational support and quality of human resources), and environment (stakeholder pressure, governmental support, and environmental uncertainty).

The results unveiled that, technological relative advantages significantly influenced the green practices adoption. One of the main reasons for this was that the 3PLs will gain more of a comparative advantage than their competitors through the improvement of the services and image in the eyes of the customers. By implementing a technological innovative process and system in reverse logistics and closed-loop supply chain activities, the product returns and recovery could be well managed and ultimately increased the high service offerings to the customers [53]. Significantly, 3PL organisations tend to adopt green practices because of the relative advantages that they will gain which, eventually, could improve their environmental performances as well.

In addition, this study discovered that, technological compatibility significantly influenced the green practices adoption. The findings are consistent with the studies by [18] and [20]. The 3PLs with the technological compatibility and, which are well blended with the existing process, are able to adopt the green practices successfully. This can ensure the harmonious joining of the green process with the existing process without much complication or difficulties. A well matched green practice process with the company's system could reduce the failure of the continuous process in the long run. As such, green practices with the technological compatibility with the present technologies will be more preferable to be adopted amongst the 3PLs in Penang.

Moreover, this study found that organisational support significantly influenced the green practices adoption. This is supported by the study by [32] who discovered that organisational support had significant positive influences on green practice infusion for the logistics companies in China. It indicates that the 3PL organisations intending to introduce green practices in their operations must have strong organisational support to reduce the employee's pressure in implementing the green practices. Organisational support, such as sufficient resources, rewards, motivation, and inspiration from the top management, is crucial to employees in making the green practices adoption a great success.

Furthermore, the results revealed that the quality of human resource significantly influenced the green practices adoption. In this context, human resource skills and capabilities in the 3PL organisations are required and important in order to adopt the green practices. Since, the green practices are relatively new and this will definitely increase the amount of work more than the current process. With the quality of employees, such as creativity and problem solving attributes, many tasks and jobs related to green processes can be expedited within a short period of time. Hence, 3PL organisations with the competent human resources can increase the acceptance towards the company's attitude on environmental efforts [18] and, eventually, increase the success in the green practices adoption.

On the other hand, this study discovered that stakeholder pressure negatively influenced the green practices adoption amongst the 3PLs in Penang. Although inconsistent with the previous study, the outcome was expected, especially when the 3PLs are operating within the minimum pressure from the stakeholders. This clearly indicated that even with the minimum pressure by the stakeholders, the situation could still not deter the 3PLs from embracing the green practices adoption. For instance, although not many customers demand the ISO 14001 certified environmental management system (EMS), nevertheless, this has not stopped the 3PL firms

from establishing the green process and being certified with the ISO 14001 EMS standard. In relation to this, past literature works were inconsistence in explaining the influence of the external forces towards the 3PLs green practices adoption [54]. Hence, the effects are still inconclusive and may shift as a result of the greater forces from the stakeholders in the future.

It has been revealed that, the governmental support significantly influenced the green practices adoption. Many studies in the past concurred that the government intervention motivates the 3PLs adoption of green initiatives, such as in the study by [55] and [56]. By providing financial incentives, technical resources, pilot projects, tax breaks, and facilities, the green practices which are well-supported by the government could possibly increase the willingness to participate amongst the 3PLs. In Malaysia, the government has provided incentives to the transportation sector since the year 2014, in the form of investment tax allowances and income tax incentives for the purchase of green technology assets and the adoption of the green technology services and systems [57].

For complexity and environmental uncertainty, the results revealed that the relationships of these two determinants towards the green practices adoption were not significant and the hypotheses were not supported. In this case, the 3PLs did not perceive complexity and environmental uncertainty as the influencing factors towards the green practices adoption. This was because the majority of the 3PLs were still in the earlier stages of the basic implementation of the green practices and, therefore, they were not completely experiencing the issues of complexity and environmental uncertainty in the existing process. However, these determinants need to be further analysed for better understanding of the reasons behind the non-significant effects.

6. Conclusion

This study has examined the influential determinants which impact the green practices adoption at 3PL firms in Penang, Malaysia. The three main latent variables of technology, organisation, and environment with the key observed variables have been tested individually to determine the impact on the green practices adoption. For the technological variable, out of three key factors, the two factors of relative advantages and compatibility indicated positive influential impacts towards the green practices adoption. The findings signified that, comparative advantages against the competitors as well as compatibility with the existing system play influential roles in the adoption of green practices amongst the 3PLs. Furthermore, for the organisational variable, both organisational support and quality of human resources indicated positive impacts on the green practices adoption. This signified that focus on the internal organisation is crucial in the adoption of green processes and systems in the 3PL practices. Lastly, for the environmental variable, the two determinants of stakeholder pressure and governmental support play prominent roles in the 3PL adoption of the green practices. This indicated that even with the lack of stakeholder pressure, the 3PLs were still determined to adopt the green practices as such actions are valuable to attract the customers to use their services. On the other hand, the existence of the Malaysian government's assistance has also increasingly motivated the 3PLs to adopt the green practices. Besides that, two factors were found to have insignificant impacts towards the green practices adoption. The 3PLs in Penang were relatively new with the basic adoption of the green practices and factors such as the complexity and environmental uncertainty not really being depressing during the early stages of implementation. The findings of this study demonstrate practical implications for the managers by providing evidence of the critical factors towards the green practices adoption amongst the 3PLs in Penang, Malaysia. Future research is suggested to include other potential factors which could influence the green practices adoption amongst logistics services providers.

References

[1] Yahya, N., Nair, S. R., & Piaralal, S. K. (2014). Green Practices Adoption Framework for Small and Medium Sized Logistics Firms in Malaysia. *Sains Humanika*, 2(3), 79–84.

[2] Mohan, K. & Zailani, S. (2011). *Service supply chain: How does it effects to the logistics service effectiveness?*, Supply Chain Management Dilek Onkal, IntechOpen, DOI: 10.5772/15948.

[3] Ghadimzadeh, A., Makmom, A. A., Hosea,

M. K., Asgari, N., Shamsipour, R., Askari, A., Narany, T. S. (2015). Review on CO_2 Emission from Transportation Sector in Malaysia. IOSR *Journal of Environmental Science, Toxicology and Food Technology*, 9(5), 61-70.

[4] Goh, M. (2015). *Malaysia pledges to cut CO2 emissions intensity by 45% by 2030*. Channel News Asia. Retrieved from https://www.channelnewsasia.com/news/asia/malaysia-pledges-to-cut-co2-emissions-intensity-by-45-by-2030-8232684

[5] Salahudin, S.N., & Abdullah, M.M. (2013). Emissions: Sources, Policies and Development in Malaysia. *International Journal of Education and Research*, 1(7), 1–12.

[6] The World Bank (2018). *Logistics Performance Index*. Retrieved from https://lpi.worldbank.org/international/global

[7] Lin, C. Y., & Ho, Y. H. (2011). Determinants of Green Practice Adoption for Logistics Companies in China. *Journal of Business Ethics*, 98(1), 67–83.

[8] Jansson, J., Marell, A., Nordlund, A., Jansson, J., & Marell, A. (2010). Green consumer behavior: Determinants of curtailment and eco-innovation adoption. *Journal of Consumer Marketing*, 4(27), 358–370

[9] Eltayeb, T. K., Zailani, S., & Ramayah, T. (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. *Resources, Conservation and Recycling*, 55(5), 495–506.

[10] McKinnon, A. (1995). Editorial. *International Journal of Physical Distribution & Logistics Management*, 25(2), 3-4.

[11] Martinsen, U., & Huge-Brodin, M. (2014). Environmental practices as offerings and requirements on the logistics market. *Logistics Research*, 7(115). doi:10.1007/s12159-014-0115-y.

[12] Chang, Q., & Qin, R. (2008). Analysis on development path of Tiajin green logistics. *International Journal of Business Management*, 3(9), 96-98.

[13] Seroka-Stolka, O. (2014). The development of green logistics for implementation sustainable development strategy in companies. *Procedia Social and Behavioral Sciences*, 151, 302–309.

[14] Schary, P. B., & Skjøtt-Larsen, T. (2001). *Managing the global supply chain*. (2 ed.) København: Handelshøjskolens Forlag.

[15] Rogers, E. M. (2003). *Diffusion of Innovations.* New York: Free Press.

[16] Sia, C. -L., Teo, H. -H., Tan, B. C. -Y., & Wei, K. -K. (2004). Effects of environmental uncertainty on organizational intention to adopt distributed work arrangements. *IEEE Transactions on Engineering Management*, 51(3), 253–267.

[17] Hwang, B. N., Huang, C. Y., & Wu, C. H. (2016). A TOE approach to establish a green supply chain adoption decision model in the semiconductor industry. *Sustainability*, 8(2). 1-30.

[18] Ho, Y., & Lin, C. (2012). An empirical study on Taiwanese logistics companies' attitudes toward environmental management practices. *Advances in Management & Applied Economics*, 2(4), 223–241.

[19] Etzion, D. (2007). Research on organizations and the natural environment. *Journal of Management*, 33(4), 637–664.

[20] Ozaki, R. (2011). Adopting sustainable innovation: What makes consumers sign up to green electricity? *Business Strategy & Environment*, 20(1), 1–17.

[21] Brown, D. H., & Kaewkitipong, L. (2009). Relative size and complexity: e- business use in small and medium sized tourism enterprises in Thailand. *Journal of Enterprise Information Management*, 22(1/2), 212-231.

[22] Chou, C., Chen, K., & Wang, Y. (2012). International Journal of Hospitality Management Green practices in the restaurant industry from an innovation adoption perspective: Evidence from Taiwan. *International Journal of Hospitality Management*, 31(3), 703–711.

[23] Hart, S. L. (1995). A natural resource-based view of the firm. *Academy of Management Review*, 20(4), 986–1014.

[24] Russo, M. V., & Fouts, P. A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, 40(3), 534–559.

[25] Lee, S. (2008). Drivers for the Participation of Small and Medium-Sized Suppliers in Green Supply Chain Initiatives. *Supply Chain Management: An International*

Journal, 13(3), 185–198.

[26] Zhu, Q., Sarkis, J., Cordeiro, J. J., & Lai, K. -H. (2008). Firm-level correlates of emergent green supply chain management practices in the Chinese context. *Omega*, 36(4), 577–591.

[27] Lin, C. -Y., & Ho, Y. -H. (2008). An empirical study on logistics service providers' intention to adopt green innovations. *Journal of Technology Management and Innovation*, 3(1), 17-26.

[28] Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in it innovation adoption research. Journal of Information Technology, 21(1), 1–23.

[29] Lee, H. Y., Lee, Y. -K, & Kwon, D. (2005). The intention to use computerized reservation systems: The moderating effects of organizational support and supplier incentive. *Journal of Business Research*, 58(11), 1552–1561.

[30] Gu, Y. D., & Peng, J. S. (2008). Independent innovation strategy—from the successful experience of innovative enterprises in Nanjing. *Theory Horizon*, 5, 64-65.

[31] Acharya, S. (2013). Implementation of Green Innovation in the Logistics Industry. *World Journal of Social Sciences*, 3(5), 34–38.

[32] Ho, Y. -H., Lin, C. -Y., & Tsai, J. -S. (2014). An Empirical Study on Organizational Infusion of Green Practices in Chinese Logistics Companies. *Journal of Economic and Social Studies*, 4(2), 159–189.

[33] Christmann, P. (2000). Effects of ''best practices'' of environmental management on cost advantage: The role of complementary assets. *Academy of Management Journal*, *43*(4), 663–680.

[34] Buysse, K., & Verbeke, A. (2003). Proactive environmental strategies: a stakeholder management perspective. *Strategic Management Journal*, 24(5), 453– 470.

[35] Gonzalez-Benito, J., & Gonzalez-Benito, O. (2006). The role of stakeholder pressure and managerial values in the implementation of environmental logistics practices. *International Journal of Production Research*, 44(7), 1353–1373.

[36] Sarkis, J., Zhu, Q. and Lai, K.H. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics*, 130(1), 1-15.

[37] Kim, S. –T & Lee, S. –Y (2012). Stakeholder pressure and the adoption of environmental logistics practices. *The International Journal of Logistics Management*, 23(2), 238-258.

[38] Shaharudin, M.R., Govindan, K., Zailani, S., Tan, K.C., 2015. Managing product returns to achieve supply chain sustainability: an exploratory study and research propositions. *Journal of Cleaner Production*, 101, 1–15.

[39] Abdullah, M., Zailani, S., Iranmanesh, M., & Jayaraman, K. (2016). Barriers to green innovation initiatives among manufacturers: The Malaysian case. *Review of Managerial Science*, 10(4), 683–709.

[40] Lo, S. M., & Shiah, Y. -A (2016). Associating the motivation with the practices of firms going green: the moderator role of environmental uncertainty. *Supply Chain Management: An International Journal*, 21(4), 485-498.

[41] Joiner, T.A (2007). Total quality management and performance: The role of organization support and co-worker support. *International Journal of Quality and Reliability Management*, 24(6), 617-627.

[42] AMH (2016). *Associations Malaysia Haulier*. Retrieved from http://amh.org.my/

[43] PFFA (2016). *Penang Freight Forwarders Associations*. Retrieved from http://pffa.org.my/list-of-members/

[44] Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2013). *A Primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks: Sage.

[45] Hair, J. F., Ringle, C. M., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis (Seventh).* Prentice-Hall International Inc.

[46] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.

[47] Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40(3),414–433.

[48] Stone, M. (1974). Cross-validatory choice and assessment of statistical predictions. *Journal of the Royal Statistical Society,*

Series B (Methodological), 36(2),111–147.

[49] Geisser, S. (1975). The predictive sample reuse method with applications. *Journal of the American Statistical Association*, 70(350), 320–328.

[50] Chin, W. W. (2010). How to write up and report PLS analyses. In: Vinzi V. E., Chin W. W., Henseler J., & Wang H. (eds). *Handbook of partial least squares: Concepts, methods and applications in marketing and related fields*. Berlin: Springer.

[51] Wetzels, M., Odekerken-Schroder, G., & van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Quarterly*, 33(1),177–195.

[52] Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011) PLS-SEM: indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-152.

[53] Shaharudin, M. R., Zailani, S., & Ismail, M. (2014). Third party logistics orchestrator role in reverse logistics and closed-loop supply chains. *International Journal of Logistics Systems and Management*, 18(2), 200–215.

[54] Evangelista, P., Santoro, L., & Thomas, A. (2018). Environmental sustainability in Third-Party Logistics Service Providers: a systematic literature review from 2000–2016. *Sustainability*, 10(5), 1-34.

[55] Perotti, S., Micheli, G. J. L., & Cagno, E. (2015). Motivations and barriers to the adoption of green supply Chain practices among 3PLs. *International Journal Logistics System Management*, 20, 179–198.

[56] Rossi, S., Colicchia, C., Cozzolino, A., & Christopher, M. (2013). The logistics service providers in eco-efficiency innovation: An empirical study. *Supply Chain Management: An International Journal*, 18, 583–603.

[57] MIDA (2018). *Tax incentives for green industry*. Retrieved from http://www.mida.gov.my/home/tax-incentives-for-green-industry/posts/