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# THE INFLUENCE OF SUSTAINABLE LOGISTIC PRACTICES AND SUPPLIER SUPPORT ON LOGISTICS TRANSPORT PERFORMANCE: AN EMPIRICAL REVIEW ON MALAYSIAN LOGISTICS SERVICE PROVIDERS

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**Abstract**
The article aims to focus on sustainable logistics practices and how their transport service providers performance is while offering transport services to manufacturers. The literature on sustainability indicators integrating social, environmental and economic dimensions are seldom appeared in the literature particularly in the logistics freight transport segment. In fact, the social aspect of sustainability practices was totally neglected in the literature and hence a study of this nature is initiated. The mediating effect of buyer supplier relationship between practices and performance has been further investigated. The framework has been developed from extensive synthesis of literature related to Sustainable Logistics Practices and Logistics Transport Performance with the mediating effect of supplier support. The study highlights on the manufacturers' perceptions on transport logistics services. The existing research gaps on sustainable logistics were critically evaluated and is addressed through the research framework. This paper used triple bottom line approach to gauge the performance of trasnport service provider, TBL approach was less explored, therefore this research helps to address the gap identified under the sustainability logistics. In particular, most of the research on logistics practices either focus on individual dimension or combination of two dimensions based on environmental and economic aspects only. The present paper is among the few studies to conceptualize sustainability logistic practices for logistic freight transport sector in developing a holistic business model which includes social dimension as well.

**Research paper**

**Keywords:** Sustainable Logistics Practices; Logistics Transport Performance; Logistics Service Provider; Supplier Support

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## Introduction

Lately, logistics system is exposed to globalization and the main challenges for logistics firms to remain efficient in their process. To manage the impact of globalization, logistics firms are encouraged to integrate sustainable concepts in their logistics activities due to the environmental regulations and pressure from consumer faced by logistics firms. The integration of sustainability regarded as important as more and more companies are looking forward for sustainable services and products (Chu et al., 2019).

The benefits of sustainability measures are gaining popularity as organizations look ways forward to adopt sustainability practices as ways to produce their products and services and operate using sustainability business methods to remain competitive in the market (Gupta & Singh, 2020a). The main intention of circular economy is reducing environmental degradation that originates from unsustainable business practices from organizations (Song & Wang, 2017). Hence, many organizations worldwide including logistics service providers are looking for ways to be sustainable. Therefore, many organizations including logistics service providers (LSPs) are adopting and implementing sustainable practices for optimum use of scarce resources and taking steps for a better global future (Gupta & Singh, 2020b). The sustainability awareness created by NGOs and activities group such as Greenpeace and Human Rights Watch among the public on business firms supply chain misconduct. Therefore, this has increased the business firms to carefully manage their supply chain including several layers partners and supplier. The potential misconduct of any suppliers including service providers will impose risk to business firms' reputation and market value (Thakur & Mangla, 2019; Hajmohammad, Shevchenko, & Vachon, 2021).

Sustainability in logistics may be considered either as a practice or performance in supply chain management (SCM) and is gaining popularity among researchers and practitioners in the recent past in the day-to-day operations. Recently, the problems like unpredictable climate change, financial crisis, unnecessary hikes in oil and raw material price, the fear on depletion of natural resources, growing public interest towards environment, immense pressure exerted from law and regulation as well as mass media (Teuteberg & Wittstruck, 2010) have changed the buying behavior and strategies of customers (Nejati et al., 2011; Ebrahimi et al., 2021; Moghadamzadeh et al., 2021). More and more business customers are sustainable conscious and shifted interest to look for a sustainable manufacturer or suppliers to be a part of their supply chain (Salamzadeh et al., 2021 a,b). For example, the big players such as Apple, Nike, and The Gap are now actively monitoring their suppliers' labor practices and working environment to avoid reputational damages caused due to supplier's bad practices (Klassen & Vereecke, 2012). Consciousness from customers is a wakeup call for managers to look into every aspect of their supply chain from upstream to downstream to ensure sustainable practices embedded (Bouzon et al., 2012; Vachon & Klassen, 2006; Radović-Marković et al., 2019).

This research was conducted in the context of Malaysian logistics transport sector. According to Mokhtar, Suhaime, Haliza, Ahmad Faizal, and Antashah (2014) logistics industry in Malaysia is no longer treated as a supporting industry but as strategic industry on its own and serves as a crucial sector to represent our national competitiveness. Logistics industry in Malaysia is closely related to international trade and industrialization (Hameed et al., 2021). Development in this industry creates ways for Malaysia to enter

the global market (Mokhtar et al., 2014). Many studies have focused on sustainability practices within the supply chain context (Seuring & Müller, 2008; Srivastava, 2007). However, there is less work done to understand sustainability practices of LSPs and their performance (Dey et al., 2011). Based on the past literatures, there have been limited studies on sustainable logistics and its relationship with logistics transport performance. The study tested the research framework related to sustainable logistics practices using (TBL) approach and supplier support and how these variables influence the logistics performance. The research objectives of the present study are to identify the sustainable practices followed by logistics service providers and how its influence logistics performance of Malaysian LSPs, secondly to analyze the relationship between sustainable practices and supplier support and finally if there is any relationship between supplier support and logistics transport performance. The research gap are clearly shown in Table 1.

**Theoretical Concept and Hypothesis Development**

The recent paper by Melkonyan et al. (2020) argued that logistics strategies should include sustainability to improve the logistics services delivery to clients (customer). Sustainable logistics practices in the present study represent how logistics service providers (LSPs) use their resources and convert these resources into sustainable practices for their outsourcing services to shippers to achieve better logistics performance. The sustainable practices are regarded as activities executed by LSPs while providing transport services and logistics performances is regarded as performance of a specific business processes. In explaining sustainable logistics practices of LSP and their logistics transport performance, RBV theory is apt because

LSPs performance is mainly dependent on how LSPs use their resources to deliver the desired services to clients (Karia & Wong , 2013) and RBV theory claims that different TSPs will have different level of performance in marketplace with different set of capabilities and organizational routines (Guerrero et al., 2014, 2015). Lee et al. (2012) argued that interdependence in business relationship helps focal firms and partnering firms to combine their resources together into a bundle of resources and by cultivating such relationship, it also creates specific capabilities that make the organizations superior to other firms in the same marketplace, thus enables firms to gain sustainable competitive advantage and better organizational performance. Therefore, based on RBV theory supplier support in the present study can be viewed as the capability derived from sustainable logistics practices to achieve better logistics performance. his research treated buyer supplier relationship as capabilities of logistics service provider (LSP) should encompass especially in the outsourcing context. Supplier support is known as the practices related to relationship, trust, information sharing, support, commitment executed by LSPs to ensure they have smooth business transactions with their clients (customers).

***Research Gap***

The discussion of Chhabra et al., 2018 explained that sustainable logistics creates the ability for logistics firms to provide logistics services which are inline with sustainability guidelines that balances the environmental, social, and economic aspects (Salamzadeh et al., 2022). To explain what sustainable logistics is, the inputs given by Wichaisri and Sopadang (2013) was useful and the research gap for all the variables are discussed in Table 1. A

through literature review reveals some clear research gap for the research framework for the present paper.

**Table 1.** The Research Gap for the Research Framework

| No | Areas | Gaps Identified |
|---|---|---|
| **1.** | Sustainable Logistics Practices (Independent Variable) | Previous studies have investigated sustainable practices merely on supply-chain management aspects (Sarkis et al., 2011; Seuring & Müller, 2008; Caniato et al., 2012; Marshall et al., 2014, Subramaniam & Gunasekaran, 2015) but little is known about sustainable practices on logistics perspectives (Wolf & Seuring, 2010; Dey et al., 2011; Zailani et al.,2011; Marchet et al., 2014).<br>Ignorance about logistics sustainability (Alkhatib et al., 2015).<br>Lesser research is executed on sustainable holistic integrated model (Seuring & Muller, 2008; Brandenburg et al., 2014; Chhabra et al.,2018) |
| **2.** | Environmental Sustainability (Dimension -1) | The environmental sustainability practices were less researched and empirically tested from road freight transporter (Marchet et al., 2014; Evangelista, 2014; there is a call for more research under environmental sustainability within companies, there is a need to call more attention to environmental sustainability within companies that either carry out logistics and transportation activities in-house or outsource them to third parties (Raut et al.,2018). |
| **3.** | Social Sustainability (Dimension-2) | Sustainable practices are more related to economic and environmental issues, leaving social aspects in the background (Chhabra et al., 2018; Khan et al., 2019. |
| **4.** | Economic Sustainability (Dimension-3) | Economic sustainability mostly linked with costing, profit margin and investment factors (Tay et al., 2015) but not on practices experienced in logistics field.<br>Frost & Sullivan consultants (2013) commented that contract logistics in Malaysia must be aware of green issues and coordinate sustainable logistics practices as per customer requirements at a minimum cost.<br><br>Research related to economic sustainability and its connection of economic sustainability which simultaneously investigates the environmental sustainability are still found weak in the management literature (Arya et al.,2020) |
| **5.** | Logistics Transport Performance (DV) | Whether greening the logistics activities will lead to better logistics performance, there is no clear-cut empirical consensus (Pazirandeh & Jafari, 2013; Evanglista, 2014). |

| No | Areas | Gaps Identified |
|---|---|---|
| | | Alternative measurements other than ABC, Economic Value Analysis (financial measurement) are the need of hour (Alkhatib et al., 2015) for logistics performance (non-financial measurement).<br>Elaborate literature review available on sustainable performance but not on logistics performance in road transport sector.<br>More papers found discussing on urban transport (passenger) compared to freight transport and logistics (Rodrigue, 2006; Richardson, 2005) and road freight transport are mainly involved in the technical aspects. |
| **6.** | Supplier Support | Integration of buyer supplier relationship in sustainable literature is gaining popularity especially in the context of logistics services (Large et al., 2013). There is little evidence to show how buyer supplier relationship plays an important role to enhance implementation of sustainable practices on logistics performance. |

## Theory development and research hypotheses

The theoretical foundation for the conceptual framework, was primarily drawn from resource based view (RBV), new resource based view (NRBV) and resource dependence theory (RDT). Resource based view theory will be the main underlying since logistics transport performance of logistics service providers (LSPs) is primarily based on resources and capabilities. The independent variables (predictors) in this research namely pricing practices, labor practice and service offerings are considered as LSPs internal resources and capabilities of RBV whereas logistics service execution is emerged under the NRBV theory. RBV theory gained popularity only through Prahalad and Hamel (1990) a paper on "The core competence of the corporation" published in Harvard Business Review and Barney (1991) paper on "Firm resources and sustained competitive advantage" published in Journal of Management (Karia, 2011). The extension of RBV theory is dynamic resource-based view of firm by Helfat and Peteraf (2003); Karia (2011) and natural resource based theory (NRBV) by Hart (1995). The existence of sustainability in SCM used

modified theories for RBV and the modified theory by Hart (1995) to explain the relationship between natural resources of firms and its competitive advantage (Pullman et al. 2009. Under NRBV, the potential strategies mainly refers to environmental practices such as pollution prevention, minimizing emissions and waste, product stewardship and overall efforts undertaken by firm to reduce their environmental burden. The reason for the inclusion on environmental criteria in NRBV is because; environmental resources were neglected by firms as a contribution factor in firms'performance. Pullman et al. (2009) used NRBV theory to support their framework on environmental practices. Therefore, sustainable logistics practices in the present study represents how logistics service providers (LSPs) use their resources and convert these resources into sustainable practices for their outsourcing transport services to achieve better logistics performance for delivery. The sustainable practices is regarded as activities executed by LSPs while providing transport services and logistics transport performances is a performance of a specific business processes of LSPs. To explain about sustainable logistics practices of LSP and their logistics transport performance, RBV theory is highly suitable because LSPs performance are mainly dependent on how LSPs use their resources to deliver the desired services to manufacturers (Karia & Wong, 2013; Soleimani et al., 2022) and RBV theory claims that different LSPs will have different level of performance in the market place with different set of capabilities and organizational routine.

***The Relationship between Sustainable Logistics and Logistics Performance***

Past research highlights that generally whether it is internal or external environmental practices, research findings reveals that there is a positive relationship with economic and environmental performance (Pullman et al., 2009; Rao & Holt, 2005; Zhu & Sarkis, 2004; Dana et al., 2022 a, b, c). Zailani et al. (2012) investigated sustainability from the purchasing context and studied the significance of environmental purchasing and sustainable packaging practices on sustainable performance from the aspect of social, environment, economic and operational performance. Results from the paper shows that environmental purchasing has positive relationship with economic, social and operational outcomes, whereby sustainable packaging has positive relationship all the outcomes under sustainability. Laosirihongthong et al. (2013) investigated proactive and reactive practices of green supply chain management (GSCM) and performance covering economic, environmental, and intangible performance. The paper concluded that legislation and regulation practices was regarded as crucial practices for firms environmental, economic, and intangible performance, whereas reverse logistics was least practice by firms and was not significant with any of the performance dimension. The link between sustainability strategy and logistics performance was studied by Pazirandeh and Jafari (2013) and in this research paper the relationship between sustainability strategy of a firm and initiatives in greening their transportation and procurement operations are found significant. On the other hand, greening the transportation procurement have a significant positive impact on logistics performance, but the study was not able to establish an empirical support whether greening the transport operations affects positively or negatively the logistics performance. Based on the arguments above and underpinning theory of natural resource-based view (NRBV) theory, the

study proposed the following sub hypothesis from the clients points of views that:

**H1a:** Higher implementation of logistics service execution practices by the transport service providers (TSPs) will lead to better logistics transport performance.

In order to obtain economic sustainability, the environmental and social sustainability should be inline as well due to the fact that firms which only considered in making profits without ensuring their activities does not results in any type of degradation to environment and social has a poor tendency for long term survival (Yusuf et al., 2013; Radović-Marković & Salamzadeh, 2012). Therefore, Ülkü and Bookbinder (2012) commented that a customer's decision whether to use logistics service provider (LSPs) is determined based on their price and delivery time offered by LSPs. The component of price and delivery are sensitive issues in logistics management. Demir et al. (2015) studied on models and pricing cost firms incur from the negative factors (pollutions) caused by logistics transportation logistics of various mode. Followed by Mesa-Arango and Ukkusuri (2014) showed that price is a attribute shippers have the willingness to pay if it is attractive as there are studies to portray that choosing trucking services is not just about low cost but beyond that, even the trucking service is higher in price but with good quality of drivers, proper distance coverage and reliable, shippers are willing to pay higher price to obtain the logistics service. How shippers select their third party logistics (3PL) to support freight logistics service was studies by Banomyong and Supat (2011) and commented selection of 3PL are based on

service attributes from SERVQUAL model and the literature from this paper was used as the base to adapt the items for service offerings. The construct of service offerings was identified as a dimension under economic sustainability based on Ghadimi and Heavey (2014) and their research on sustainable supplier selections for medical device industry. Followed by Othman, Zahari and Radzi (2013) pointed out the importance of service delivery especially in the service market. Their paper studied how Malaysian restaurants recover their services after having service delivery failures. Based on the arguments above and underpinning theory of resource-based view (RBV) theory, the study proposed the following hypothesis from the clients' points of views that:

**H1b:** Higher implementation of pricing practices by the transport service providers (TSPs) will lead to better logistics transport performance.

**H1c:** Higher implementation of service offerings practices by the transport service providers (TSPs) will lead to better logistics transport performance.

The research on social sustainability has been neglected in the literature and more research papers are concerned about environmental sustainability and long-term economic sustainability. The practices on environment and social sustainability were researched by Pullman et al. (2009) from the food supply chain perspectives and highlighted that social sustainability practices can affect performance. Social sustainability merely focuses on the internal and external communities where the firms operate. This paper highlights about how social sustainability practices will improve the environmental, quality and cost performance of processing facility of food and beverage

firms. The findings showed that with proper implementation of social sustainability practices, the quality and cost performance of processing facilities improves but environmental performance does not improve with increased implementation of social sustainability practices. In addition, social sustainability practices was also studied by Marshall et al. (2014), whereby by social sustainability was studied from social supply chain practices based on process and market. The social practices related to process covers monitoring of supplier's social practices and implementation social system procedures with suppliers. Furthermore, social sustainable practices related to market includes introduction of new product and process related to supplier which encompasses fair margins, worker welfare and health and safety throughout the supply chain. Klassen and Vereecke (2012) claimed firms' needs to give importance for social issues in supply chain and social issues in supply chain incurs from the product or process-related operations which affect the welfare, community development and safety of employee and society (Hosseini et al., 2022).

**H1d:** Higher implementation of labor practices by the transport service providers (TSPs) will lead to better logistics transport performance.

***The Relationship between Supplier Support and Logistics Performance***

Buyer supplier relationship plays a vital role in physical distribution and logistics management and a proper management of buyer supplier relationship in supply chain will lead to success, as executing strategic relationships with crucial suppliers is indeed a way for value creation (Ambrose, Marshall, & Lynch, 2010). To conceptualize the research idea, theories such as

transaction cost theory, social exchange theory and resource dependence theory are used as the underpinning theory to support the relationship testing. The paper by Hollos et al. (2012) extended the application of resource-based view and resource dependence theory by applying these theories to support their research model on sustainable supplier cooperation. The 'sustainable supplier co-operation' was referred as process, initiated by the buying firm with a series of activities over a period time with their suppliers and creates dyadic benefits. Resource Dependence Theory (RDT) is applicable when resources are used to project the performance, however the theory recognizes firms as open systems which depend on external environment and therefore managers need to work to reduce their uncertainty and dependency on suppliers. With that, the theory also further elaborates that firms will make sure they access to critical resources at all the times to reduce the interdependency on supplier. Despite the usefulness of RDT, it has not been applied to the field of sustainable supplier co-operations and it is proven useful in explaining buyer–supplier relationships. Paulraj and Chen (2007) adopted resource dependence theory to investigate direct effect of supply chain uncertainties on strategic supply management with a second-order construct comprising strategic purchasing, long-term relationship orientation, inter-firm communication, cross-organizational teams, and supplier integration. In addition, since buyer supplier relationship is lately connected with either with sustainable practices or sustainable performance. There is research call to relate the buyer supplier relationships domain such as collaboration and cooperation with sustainability as a whole (Hollos et al., 2012). Based on the arguments above and

underpinning theory of resource dependence theory (RDT), the study proposed the following main hypothesis and sub hypotheses from the client points of views that:

**H2:** Higher implementation of supplier support practices by the transport service providers (TSPs) will lead to better logistics transport performance

***Mediating Effects of Buyer Supplier Relationship on the Relationship between Sustainable Logistics Practices and Logistics Transport Performance***

The study has identified the predictor variables and dependent variable and will further test the framework by incorporating the mediator variable to know whether the relationship between logistics transport performance is better with or without the presence of buyer supplier relationship. In this research, buyer supplier relationship is assumed as mediator. The mediating variable works as a generative mechanism by helping the predictor variable to influence the dependent variable of interest (Baron & Kenny, 1986; Cho et al., 2008).

Lately, many firms prefer to engage in cooperative buyer-supplier relationships over the long term as cooperative relationship, as organizations are increasingly aware of the importance of suppliers' role in supply chain (Soh et al., 2016). This paper used buyer supplier relationship as a mediator to test the relationship between supplier infrastructures, supplier quality and supplier commitment on supplier performance and addresses the gap in the literature to investigate the impact of buyer supplier relationship on performance. In this research, buyer supplier relationship will explain the relationship strength between transporters and their clients. The dimensions for buyer

supplier relationship included in this paper are information sharing, business understanding, commitment, trust and involvement. The results of the study showed that supplier quality and supplier commitment enhanced with presences of buyer supplier relationship (Soh et al.2016). On the other hand, Wong, Hung, and Chow (2007) the role of relationship quality as the mediator on customer relationship for firms in Hong Kong. The paper pointed out that information sharing is an important contributing factor for relationship quality, which also helps firms to understand their customers. Hence, good practice of information sharing helps customer to gain confidence and trust when firms regularly share relevant information. Furthermore, the findings indicated that, there is a significant relationship between information sharing and the expectation of continuing interaction and customers' willingness to with presence of relationship quality. Buyer supplier relationship are closely related to integration and collaboration, whereby da Silveira and Arkader (2007) investigated the relationship of direct and mediation between customer coordination investment, supplier coordination investment and delivery performance. Thus, the paper also included discussion on several literature related to performance improvement with supply chain relationship, as such supply chain coordination and performance such as interaction of supplier and customer on delivery performance enhanced better with the presence of internal coordination as a mediator, performance increases when integration is good with supplier and buyer rather than focusing only on either party and highlighted that relationship customer service mediates the relationship between supply chain integration and financial performance. However, end results of their study revealed that coordination investment with supplier and customers improves delivery speed, delivery reliability, and manufacturing

lead-time. Customer coordination investment mediates the relationship between supplier investment and delivery reliability, whereas supplier investment coordination plays the mediator relationship between manufacturing lead-time and customer coordination investment. Based on the arguments above and underpinning theory of resource-based view theory (RBV), the study proposed the following sub hypothesis from the manufacturers' points of views that:

**H3a**: Supplier support mediates the relationship between logistics service execution and logistics transport performance.
**H3b:** Supplier support mediates the relationship between pricing practice and logistics transport performance.
**H3c:** Supplier support mediates the relationship service offerings and logistics transport performance.
**H3d:** Supplier support mediates the relationship between labor practice and logistics transport performance.

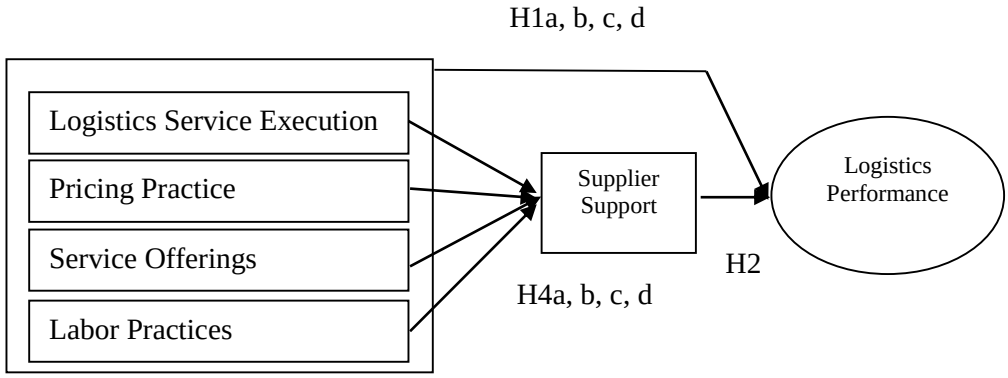


**Figure 1.** Research Framework

## Methodology and Data Collection

This study investigated whether sustainable logistics practices (independent variables) have any relationship on logistics transport performance of transporters (dependent variable). Secondly, the study examines the role of supplier support as mediator. The study performed a questionnaire survey on client (transport users) in Malaysia. The targeted respondents (unit of analysis) are referred as clients, shippers, or transport users who uses of transport services to move their goods/freights from one location to another. The study contexts cover Malaysia's pharmaceutical, food, medical devices, and chemical manufacturers. As sustainable issues are very prominent, four key industries were selected from the sample frame namely chemical, food, pharmaceutical and medical. The sampling technique used for this research is based on proportionate stratified random sampling and purposive sampling. Data collection was performed using cross-section method and the questionnaire execution was through online survey. A total of 830 questionnaires were distributed using online platform based on the FMM directory listing. In total, 207 questionnaires were received and however 194 questionnaires were usable for analyzing the research framework and 13 questionnaires was omitted from the analysis due to incomplete responses with 25.8% response rate. The questionnaire items were selected based adapted approach from prominent journals in the literature. The list of questionnaire items can be found in the Appendix 1. The sample respondent consists of senior or middle managers from logistics and transport attached to manufacturing companies from food, medical, chemical, and pharmaceutical industry.

Table 2 shows frequencies for industries are, food (50.5%), chemical (29.9%), medical / pharmaceutical (19.6%). Majority of the respondents are

male, 118 (60.8%) and female respondents were only 76 (39.2%). Most of the respondents (clients) seek transport service through channel two, 90 (46.4%), followed by channel one, 65 (33.5%), channel three, 63 (32.5%), channel four, 24, (12.4%) and channel five, 23 (11.9%).

In terms of education background, most of the respondents are degree holders, 77 (39.7%), with diploma/ certificate, 75 (38.7%), with master's degree, 40 (20.6%) and only 2 (1%) respondents are with doctorate degree. The respondents primarily fall under lower management job designation, 98 (50.5%), followed by middle management, 56 (28.9%) and top management, 40 (20.5%). The clients who are using transport services shared their perception that, mostly medium level firms prefer to seek outsourcing transport services, 69 (35.6%), secondly it is large level firms, 58 (29.9%), around 32 (15.5%), respondents reported MNCs, small firms, 26 (13.4%), lastly only, 9 (4.6%) highlighted micro level firms seek transport services. Based on the demographic results, fully Malaysian owned companies are major transport seeker, 124 (63.9%), local and foreign joint venture firms, 33 (17%), fully owned by foreign companies, 28 (14.4%) and contract manufacturers, 9 (4.6%). On the aspect of operations, most of the firms who participated in the survey are operating for more than 15 years in their respective industry, 85 (43.8%), firms operating between 11-15 years are, 46 (23.7%), 6 to 10 years, 35 (18%) and less than 6 years, 28 (14.4%). Under the list of services offered by transport service provider, most of the respondents primarily expressed that their transporter offers service to distribute their goods to end customer directly, 100 (51.5%), deliver the goods to the respective location, 93 (47.9%), packaging and repackaging, 68 (35.1%), dealing with shipping

agent/forwarders, 55 (28.4%), customer clearance, 32 (16.5%), provide storage area, 25 (12.9%), just in time delivery, 18 (9.3%). Mostly clients seek transport services to deliver their products to end customer, 112 (57.7%), warehouse, 102 (52.6%), Sea port, 49 (25.3%) and air cargo depot, 44 (22.7%). The clients (transport seekers) in Malaysia are mostly using local based transporter, 168 (86.6%) as compared to international based transporter are only, 26 (13.4%). The analysis of common method bias showed that first factor accounts for 41.609% of the variance and meets the common method bias criteria and shows no bias exists in the respondents' opinions. The study performed analysis using partial least squares (PLS) with SmartPLS software version 3.0 (Ringle et al., 2015). The study followed Hair et al. (2019) two step approach of measurement model and structural model testing.

**Table 2.** Respondents Profile of Transport Users

| Demographic | Categories | No. of Respondents | % |
|---|---|---|---|
| **Industry Type** | Food | 98 | 50.5 |
| | Chemical (non-food) | 58 | 29.9 |
| | Medical / Pharmaceutical (non-food) | 38 | 19.6 |
| **Transport Seeker** | Channel One<br>Manufacturer → Transport service provider | 65 | 33.5 |
| | Channel Two<br>Manufacturer → Third party logistics | 90 | 46.4 |
| | Channel Three<br>Third party logistics →<br>Transport service provider | 63 | 32.5 |
| | Channel Four<br>Freight forwarder →<br>Transport service provider | 24 | 12.4 |
| | Channel Five<br>Manufacturer → Freight Forwarder | 23 | 11.9 |
| **Gender** | Male | 118 | 60.8 |
| | Female | 76 | 39.2 |
| **Education** | Diploma / Certificate | 75 | 38.7 |
| | Degree | 77 | 39.7 |
| | Master Degree | 40 | 20.6 |

| Demographic | Categories | No. of Respondents | % |
|---|---|---|---|
| | Doctorate Degree | 2 | 1.0 |
| **Position** | Top Management | 40 | 20.5 |
| | Middle Management | 56 | 28.9 |
| | Lower Management | 98 | 50.5 |
| **Working Experience** | 1 to 3 years | 41 | 21.1 |
| | Between 3 – 5 years | 74 | 38.1 |
| | Above 5 years | 79 | 40.7 |
| **Intention to Outsource** | Micro level firm | 9 | 4.6 |
| | Small level firm | 26 | 13.4 |
| | Medium level firm | 69 | 35.6 |
| | Large level firm | 58 | 29.9 |
| | MNCs Firm | 32 | 15.5 |
| **Firm Ownership Status** | Fully Owned by Foreign Companies | 28 | 14.4 |
| | Local and Foreign Joint Venture | 33 | 17 |
| | Fully Malaysian Owned Company | 124 | 63.9 |
| | Contract Manufacturer | 9 | 4.6 |
| **Operating** | Less than 6 years | 28 | 14.4 |
| | 6- 10 years | 35 | 18 |
| | 11-15 years | 46 | 23.7 |
| | More than 15 years | 85 | 43.8 |
| **Types of service offered by transporters** | Deliver the goods to the respective location | 93 | 47.9 |
| | Distribution of goods to end customer | 100 | 51.5 |
| | Packaging and Repackaging | 68 | 35.1 |
| | Customs Clearance | 32 | 16.5 |
| | Just in time (deliver to production line) | 18 | 9.3 |
| | Provide storage area | 25 | 12.9 |
| | Dealing with shipping agent/forwarders | 55 | 28.4 |

## Results

### *Measurement Model Analysis*

Assessment measurement model determines the reliability and validity of the model, the study assessed the loading of items, composite reliability (CR) and average variance extracted (AVE) based Hair et al., (2019) thumb rule.

**Table 3.** Construct Validity And Reliability

| Construct | Items | Loading | AVE | Cronbach's Alpha | CR |
|---|---|---|---|---|---|
| Logistics Service Execution (LSE) | meets the speed control regulations set by the local authorities (e.g. spad, puspakom) | 0.820 | 0.665 | 0.899 | 0.922 |
| | skilled drivers with eco driving techniques | 0.834 | | | |
| | protect goods from poor weather conditions | 0.825 | | | |
| | periodically inspects working conditions of vehicles | 0.832 | | | |
| | proper vehicle selection for delivery as per product requirement (e.g. frozen food will use cold chain trucks) | 0.820 | | | |
| | proper environmental practices adopted | 0.767 | | | |
| Pricing Practice (PP) Reflective | provide reasonable service charges compared to competitors | 0.800 | 0.661 | 0.872 | 0.907 |
| | no exorbitant charges to support ad hoc request | 0.786 | | | |
| | quotes price based on product value | 0.840 | | | |
| | no price increase on special delivery arrangements | 0.827 | | | |
| Service Offerings (SO) Reflective | keeps documentation record for each delivery | 0.775 | 0.645 | 0.908 | 0.927 |
| | optimizes space storage in vehicle while loading | 0.808 | | | |
| | offers stage delivery upon request (e.g. transshipment) | 0.815 | | | |
| | offers charter basis delivery upon request | 0.805 | | | |
| | safety of goods is the priority | 0.800 | | | |
| | executes safety measures to secure the products (cargo) | 0.817 | | | |
| | engages competent drivers | 0.803 | | | |
| Labor Practice | never demands gifts / money for urgent shipments | 0.869 | 0.743 | 0.827 | 0.897 |
| | no manipulation in billing charges (e.g. impose extra charges for services not offered) | 0.858 | | | |
| | engages disciplined workers | 0.859 | | | |
| Supplier Support | cares for our company well being | 0.772 | 0.584 | 0.918 | 0.898 |
| | goes all around to support us during critical situations | 0.762 | | | |
| | can accommodate to changes if our company request | 0.750 | | | |
| | is trustworthy | 0.720 | | | |
| | provides schedule for pick up and delivery in advance | 0.744 | | | |
| | maintains electronic communications | 0.802 | | | |
| | has regular communication with us | 0.783 | | | |
| | practices transparency in their business activities | 0.776 | | | |
| Logistics Transport Performance | is punctual in delivering our goods to end customer | 0.757 | 0.665 | 0.937 | 0.947 |
| | delivers the exact quantity of goods as stated in the invoice | 0.770 | | | |
| | has sufficient manpower | 0.827 | | | |
| | has less customer complaints | 0.861 | | | |

| Construct | Items | Loading | AVE | Cronbach's Alpha | CR |
|---|---|---|---|---|---|
| | practices timely response to any of our requests | 0.871 | | | |
| | compensates for damages on timely manner | 0.806 | | | |
| | provides services that are expected based on contract terms | 0.819 | | | |
| | offers satisfactory logistics services | 0.809 | | | |
| | excute services within custom procedures | | | | |

Table 4, shows all the values are below 0.9 (Henseler et al.2015). HTMT estimates the correlations for factors and is useful to clearly explain the discriminate between the two constructs. The HTMT value should be smaller than one (Henseler et al.2016). The highest ratio for HTMT is 0.808, therefore discriminant validity is fulfilled.

**Table 4.** Construct Validity and Reliability

| | LAP | LSE | LTP | SS | PP | SO |
|---|---|---|---|---|---|---|
| Labor Practice | | | | | | |
| Logistics Service Execution | 0.723 | | | | | |
| Logistics Transport Performance | 0.567 | 0.534 | | | | |
| Supplier Support | 0.643 | 0.531 | 0.623 | | | |
| Pricing Practice | 0.687 | 0.773 | 0.566 | 0.583 | | |
| Service Offerings | 0.772 | 0.808 | 0.478 | 0.565 | 0.795 | |

## Structural Anlaysis

The research model has four independent variables; logistics service execution (LSE), pricing practice (PP), service offerings (SO) and labor practice (LP). Table 5.16 displays the directs effects results for PLS-SEM testing for logistics service execution (LSE), pricing practice (PP), service offerings (SO) and labor practice on logistics transport performance (LTP). The R2

value for logistics transport performance (dependent variable) is 0.345, which explains 34.5% of the variance in logistics transport performance can be explained by LSE, PP, SO and LP (exogenous variables in the study). The path coefficients results shows that standardized beta value from logistics service execution on logistics transport performance ($\beta$=0.183, $p<0.05$); pricing practice on logistics transport performance ($\beta$=0.288, $p<0.01$); labor practice on logistics transport performance ($\beta$=0.264, $p<0.05$) is significant. The summary results of direct effect between independent variable and dependent variable is shown in Table 5.

**Table 5.** The Result of Direct Effect between Independent Variables and Dependent Variable

| Hypothesis | Relationships | Std. Beta | SE | t-value | Decision |
|---|---|---|---|---|---|
| H1a | LSE -> LTP | 0.183 | 0.087 | 2.094* | Supported |
| H1b | PP -> LTP | 0.288 | 0.076 | 3.760** | Supported |
| H1c | SO -> LTP | -0.065 | 0.091 | -0.717 | Not Supported |
| H1d | LP -> LTP | 0.264 | 0.083 | 3.172** | Supported |
| H2 | SS -> LTP | 0.359 | 0.069 | 5.227 ** | Supported |

* Significance at $p<0.05$, **$p<0.01$; LSE=logistics service execution; PP=pricing practice; SO=service offerings, LP=labor practice, bootstrapping (n=1000). Beta = regression weight, t values are computed through bootstrapping procedure with 194 cases

According to Preacher and Hayes (2011) mediation effects are considered happen when the indirect relationship between independent and dependent variable come out significant. As shown in Table 6 , the mediating variable of supplier support mediates the relationship of pricing practice on logistics transport performance indicating hypotheses H3c is supported ($\beta$=0.082, $p<0.01$). In addition, supplier support also mediates the relationship between labor practice and logistics transport performance, supporting H3d

(β=0.117, p<0.01). Whereas H3a and H3b is not supported, indicating supplier support have no mediation effects for service offerings (SO) and logistics service execution (LSE) on logistics transport performance (LTP).

**Table 6.** Indirect Effect between Independent Variables and Mediating Variable

| Hypothesis | Relationships | Std. Beta | SE | t-value | Decision |
|---|---|---|---|---|---|
| H3a | LSE –SS- LTP | 0.020 | 0.035 | 0.554 | Not Supported |
| H3b | PP –SS- LTP | 0.082 | 0.039 | 2.098** | Supported |
| H3c | SO –SS- LTP | 0.033 | 0.033 | 0.993 | Not Supported |
| H3d | LP –SS-LTP | 0.117 | 0.043 | 2.688** | Supported |

## Discussion

The research findings revealed that, from the transport user's perspective (clients), sustainable logistics practice used by transport service provider significantly helps to improve their logistics transport performance. According to Wu and Dunn (1995), among the logistics functions, transportation induces highest environmental hazard, hence sustainable logistics practice becomes a popular approach among service providers. Day et al. (2011) highlighted the importance of incorporating sustainable logistics practices for logistics service providers. Proper practice on sustainable logistics helps in reducing carbon footprint, reduces travel time, increases truck load utilization and improves proper planning on resource usage. At the same time, sustainable logistics practice creates an opportunity for transport service providers to reduce logistics crisis such as cargo theft, damage of cargo/products and mishandling of chemical substances and valuable medical devices instruments. Clients often request their transporters to increase the security measures to

avoid cargo theft that results in multimillion dollars loss to their manufacturing plants. Moreover, to date, an appropriate measurement for sustainable logistics practices has been less researched, therefore empirical research on sustainability logistics practices and how it influences transport performance of Malaysian transport service providers is timely. The relationship between sustainable logistics practices and logistics transport performance were examined. Sustainable logistics performance refers to practices designed with sustainability approach and observed by transport service provider during their service delivery to clients. To measure sustainable logistics practices, the study formulated logistics service execution to measure environmental aspects, pricing and service offerings to gauge the economic measure and labor as part of social aspect. The study investigated sustainable logistics practices of transportation in Malaysia based on food and non-food industry (food, chemical, medical, and pharmaceutical). Food industry in Malaysia is more dependable on the transport service providers for their product delivery, whereas the non-food industry seeks transport services on a moderate level.

Their research highlights the interest of transport seekers (clients) to hire a more sustainable transport service as a measure to improve their own environmental performance. Transport users prefer to use transport service provider who provides drivers trained with eco-capabilities, delivery services with proper environmental certifications, vehicles with proper maintenance and good protection of their goods. The transport users believe green measures practiced by transport service provider will contribute to their better performance, as well as the provider's performance by enhancing customer satisfaction through reduction in lead time, lesser loss and damage and timely delivery. Pricing practice and service offerings are the two dimensions used

under economic sustainability logistics practices to measure logistics transport performance. Transportation is one of the highest logistics costs users may need to spend to transit their goods from origin to desired destination. Freight cost and other related charges to move the goods are borne by clients. Good pricing is one of the factors transport users consider when any firms decide to outsource the transport services from transporters. Pricing are frequently related to revenue management in most industries, but it is also a useful tool for cost management. In logistics, especially for transportation, pricing is often linked with demands, empty equipment repositioning cost, quantifying certain value for payment or charges and inventory replenishment. In the scenario of outsourcing transportation services, Mesa-Arango and Ukkusuri (2014) stated that price is an important attribute client will consider when they decide to procure transport services. Service offering is a reflection on what type of services transport service provider offers to their clients and it is an important term emerged in logistics literature from 1990s. The study incorporated service offering as a variable to understand what type of sustainable logistics practices transport service provider crafted for their clients (Martikainen, Niemi, & Pekkanen, 2013). The relationship between service offerings and logistics transport performance is not significant based on the results from the PLS-SEM structural model. This result contradicts the hypothesis (H1C) postulated in chapter three. The insignificant relationship shown reflects those certain practices under service offering do not reflect sustainable logistics practices, thus do not contribute in logistics transport performance. Certain practices given by transporters are not economical and hence increase logistics cost to the clients.

The results indicate labor practice was found to have positive relationship with logistics transport performance. The paper by Brandenburg et al. (2014) clearly highlighted on lack of empirical evidence to support the social facets of sustainability. The present research is timely to address the above gap. The social aspect was studied through labor practice of transport service provider. Labor practice is an important variable to measure social aspect of transport service provider (Salamzadeh et al., 2019). Labor practice point outs mainly on discipline and ethics of drivers and other personnel working on the behalf of transport service providers to serve clients in the present research. Some of the measures include aspects on protection against child labor, ethical billing transaction, delivery of only authorized goods and complying with wage procedure for their employers (Carter and Jennings, 2004). Thus, this study proves and supports the social sustainability study by Vachon and Mao (2008). In this study, the relationship between supplier support and logistics transport performance was tested. The results show supplier support has positive relationship with logistics transport performance. The results are in line with previous study, where researchers studied on the importance of providing good supplier support to gain better logistics transport performance from the buyers' perspectives. Supplier support is measured based on clients' trust, communication ability, transporters' commitment and information sharing which reflect the effort taken by transporters to maintain their relationship strength with their clients to achieve better logistics transport performance Hollos et al. (2012) mentioned that sustainable supplier co-operation enhances the sustainability of the buying firm and improves the performance of both parties (buyer/supplier). In particular supplier support is a way to show

interaction exists between buyer and supplier especially in logistics outsourcing services. Transporters' continuous support as a supplier helps to provide adequate logistics services and better understand the demand of clients.

The mediator role of supplier support on the relationship between logistics service execution and logistics transport performance was not found to be significant. This finding is similar to Björklund (2011), that showed knowledge exchange and level of collaboration with transport service suppliers and buyers with regards to environmental aspects are low. However, this contradicts Wong et al. (2012) where the results showed that engaging supplier with higher environmental management capabilities will help focal firm for a better performance environmentally and financially. Their findings revealed that a green operation practice has positive impact on performance when focal firm's supplier environmental capability is high. The study hypothesized that supplier support mediates the relationship between service offerings and logistics transport performance. However, the results show that supplier support was not shown to mediate the relationship between service offerings and logistics transport performance. Service offerings refer to attributes such as reliability, flexibility, follow-up and prompt response practices offered by transporter in their transport service offerings to clients (Banomyong & Supatn, 2011) and it includes practices on safety and security measures. With regards to the insignificant mediating effects of supplier support on the relationship between service offerings and logistics transport performance, the reason might be due to charter basis delivery from transporters. Charter basis delivery focuses on single item per delivery, which is not cost saving for clients and does not have any effect to improve clients' economic performance, therefore clients are less satisfied with delivery service given

by transporters. Clients do not favor this particular practice under service offerings, even though transporters are willing to contribute towards client's logistics goals and give full commitment to deliver services as per contract term.

### *Theoretical and practical implications*

The study contributes to the sustainable logistics literature particularly by analyzing all three dimensions of triple bottom line from transportation point of view. In addition, the study contributes to the literature on the purchase of transport and application of triple bottom line in logistics. The novelty of study underlies in investigating on sustainability logistics practiced by incorporating environmental, social, and economics of transporters under one research model and consequently their influences on transporters logistics performance in Malaysia. By incorporating the triple bottom line model, the study shows transport service providers (TSP) operating in Malaysia are aware and have updated knowledge on sustainability management. Transport service providers implementation of sustainability is more voluntary. Through this research, it confirms that sustainable logistics practices can bring value to TSPs and better improves their delivery performance and customer satisfaction. second theoretical contribution of this study deals with introducing sustainable logistics practices as independent variables to measure logistics transport performance. To the best knowledge of the present researcher, there were no past studies exploring the transport service provider performance using sustainable logistics practice (logistics service execution, pricing practice, service offerings and labor practice) as predictors covering all the three dimensions. Most previous studies measured sustainability in the

context of performance logistics firm or organization rather than practices. The PLS-SEM structural analysis found a significant positive relationship between the predictor variables (logistics service execution, pricing practice, service offerings, and labor practice) and response variable (logistics transport performance). According to RBV theory, idiosyncratic resources are valuable, rare, inimitable, and non-substitutable and they influence firms' performance and sustainable competitive advantage (Karia & Wong, 2013; Maas et al., 2014).

Besides theoretical contribution, there are several other practical and managerial implications that can be drawn from the study to support practitioners (clients and service provider), policy makers, and chartered organization involved in the logistics field. The highlighted suggestion is also useful for the outsourcing logistics companies. The managerial contribution for the present study portrays how proper implementation sustainable practices can contribute to transport performance. Generally in Malaysia, logistics industry service provider can be divided as transport service provider and service provider (Zailani et al., 2015). Logistics service execution, pricing practice, and labor practices act as good predictors for performance in transportation sector.

In future, new players who aim to be successful service provider in the logistics outsourcing sector especially for transport service should incorporate sustainability practices throughout their logistics services to obtain and retain transport contract services from clients. For example, logistics manager should incorporate sustainability as a clause in the transport contract. Björklund and Forslund (2013) claimed that buyers of transport services are encouraging service provider to be included as one of the environmental criteria in the contracts.

### *Limitation and Direction for Future Research*

There limitations of the study include, first, the study designed the questionnaire based on literature available from previous sustainable supply chain management and was modified to cater for freight transport. To the best knowledge researcher, measurements were not available for sustainable transportation covering triple bottom line dimension. The study focused only on one logistics activity which is delivery services (transportation) and only covered four major states as most of the food, medical, pharmaceutical and chemical firms. The issue of location hindered the participation of similar firms from other states in Malaysia. The study seeks only clients' opinion (users), where the transporters' considerations on their sustainable practices were not included. The analysis method applied in the present study was VB-SEM using PLS and the latent variables in the study were all reflective measure only. Future research can investigate the effects of sustainable practices of transporters on clients' sustainable performance or operational performance. The insignificant results of service offerings on logistics transport performance can be further reinvestigated with modified measurement items. Moving on, the similar model can be tested in other areas of logistics functions such as warehouse and storage, packaging, labeling, inventory management, and reserve logistics. In addition, another way to strengthen the present findings is by performing dyadic study that measures both internal and external perspectives. Further research can also be carried out on some other new variables related to sustainable practices in transportation industry. The application of case study analysis for the model presented in this study is a contribution for qualitative research.

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