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Could the service consumption-production interface lift national logistics performance?

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ABSTRACT

This research contains a four layer framework which aims to identify the performance factors. The proposed model is tested and validated by 43 samples data by using variance-based SEM approach (PLS). It extends the body of research in integration and sustainable supply chain management. The four layers contain the integration factors, inland depot service quality, hauliers firms' sustainable performance and national logistics performance. A questionnaire survey and two expert groups were deployed. Survey respondents were managers of haulage companies which made up 30% of the 140 active companies. Annual revenue for a firm ranges from Ringgit Malaysia 1.25 million to 5 million. Each firm made an average of 170 trips to the depots daily. The theoretical contributions are the validation of industry-derived integration factors and the unwitting revelation that the stakeholder theory is unfazed by the downside of the agency theory. This surprisingly confirmed depot could still influence hauliers favourably. The practical contributions are the usefulness of the integration factor questionnaire items for future haulage studies, and that depots and hauliers should collaborate to lift national logistics performance.

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1. Introduction

This study consists of a four layer conceptual framework. The framework sequentially links integration factors, depot service quality, hauliers firms' sustainable performance, and finally the national logistics performance or the logistics performance index. The national logistics performance and the logistics performance index are used interchangeably in this study. This study was primarily triggered by the perennial problem of waiting at the depot-haulier container transaction interface (Ruban, 4th May, 2012) and the desire of the Malaysian government to achieve top ten ranking in the logistics performance index (Economic Planning Unit, 2016). The waiting for containers at the depot-hauliers interface could adversely impact the national logistics performance. This prompts two questions. First, what integration factors could influence depot service quality? Second, could depot service quality affect hauliers firms' sustainable performance and together lift the national logistics performance? The PLS-SEM was used to answer

these questions because it is able to simultaneously analyse more than one causal relationship (Lai et al., 2011; Hair et al., 2010). This study promotes the development of theories useful to supply chain management and makes recommendations to improve firms' sustainable performance to lift national logistics performance. It also verifies the industry-derived integration factors for future use with some fine tuning. Surprisingly, the unsuspecting tension at the testy depot-hauliers interface finds the stakeholder theory is unfazed by the downside of the agency theory.

The introduction of containers has facilitated world trade growth (The Economist, May 18th, 2013) and is the driver of 20th century economic globalization (Bernhofen et al., 2012). Logistics facilitation will play a significant role in supporting higher rates of economic growth worldwide (World Economic Forum, 2013). Malaysia is no exception to these phenomena (Tarudin, 2013). Containers are predominantly used because they facilitate inter-modal transport between sea, air and land (World Shipping Council, History of Containerization, 2016). In Malaysia, the most visible and frequent actor in the inland logistics supply chain are the road hauliers (Nasir, 2014) and they have a very important role to move containerized goods for economic value-adding processes along the supply chain. With logistics as the backbone of the economy (Arvis et al., 2014), hauliers are expected to contribute to the overall national logistics performance. This is because inland container

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freight movement is initiated by the shipper who instructs the freight forwarder to arrange for an empty container. The freight forwarder informs the haulier to pick up the container at the depot to be delivered to the shipper. At the depot, the haulier would queue to receive the container. This service interface is non-contractual.

This depot-hauliers interface perennially experiences queuing ([Ruban, 4th May, 2012](#)) and is serious enough to threaten the triple bottom line of depots and hauliers. Compounding this situation is the fact that hauliers must pick the empty container only from a particular depot as directed by the ship liner. This is primarily due to the matching of shipper's schedule with the schedule of port-of-call of liners. This is the nature of haulage business ([World Shipping Council, How liner shipping works, 2016](#)).

In a container transaction, it is fairly remote for the depot operators to work in the best interest of the immediate customers, the hauliers. This is because of the agency theory and the transaction between the depots and hauliers is non-contractual. If the depot-hauliers transaction is not fully collaborated, the introduction of integration factors is suggested in this study to mitigate the situation and convey a positive chain effect to national logistics performance.

With most studies showing integrative efforts directed towards the first-tier supplier or customer ([Lin and Tseng, 2014](#); [Murphy and Richard, 2003](#); [Tseng, 2009](#)), hauliers should focus on external integration to support the haulage functional competitive capabilities ([Mackelprang et al., 2014](#)). As such, two expert groups of hauliers were deployed to formulate the integration factors. These factors would be tested to determine if they could influence the service quality of depot operators, hauliers' sustainable performance and national logistics performance.

Past supply chain research addressed several performance issues related to the impact of integration ([Flynn et al., 2010](#); [Mackelprang et al., 2014](#)), supplier relationships ([Prajogo and Olhager, 2012](#)), intra- and inter-organizational performance ([Schmitz and Platts, 2004](#)), and reverse logistics ([Richey et al., 2005](#)). This study addresses performances which are located at the backend of the framework. They are the hauliers' performance and national logistics performance or the logistics performance index (or in short, index.) The competitive index comprises six measures used in ranking national logistics performance. While the World Bank ([Arvis et al., 2014](#)) publishes the index, it still recommends "researchers to take on a deeper, finer, country-specific assessment of the determinants of logistics performance" ([Arvis et al., 2014](#)). This country-specific research by the authors will complement the World Bank logistics report. In doing so, it attends to three major practical issues. It is a search for factors to mitigate the perennial queuing problems encountered at the depot-hauliers interface ([Ruban, 4th May, 2012](#)); to address the decline in logistics productivity ([Wong et al., 2015](#)) and the difficult to manage sustainability of operations management ([Wong and Wong, 2014](#)). In sum, this research seeks to determine the integration factors that could effectuate a chain effect from depot to hauliers to enhance the Malaysian logistics performance index ranking prescribed in the Eleventh Malaysia Plan, 2016–2020.

This paper is organized as follows. Section 2 contains literature review; Section 3 methodology; Section 4 results; Section 5 implications; and Section 6 conclusions.

2. Literature review

This section contains literature relevant to the variables in this study. It is intended to develop understanding of the variables at hand, refine the research questions, identify information that should be gathered and identify sources for questionnaire items ([Cooper and Schindler, 2011](#)). In addition, two major theories –

the stakeholder theory and agency theory – provide the ligaments to these variables are also discussed. This section concludes with hypotheses development.

2.1. Integration factors

The objective of integration is to achieve operational efficiencies and strategic effectiveness in the supply chain through collaboration ([Richey et al., 2010](#)). Therefore, supply chain integration is to coordinate planning and realization processes by providing the right information to the right decision-maker ensuring overall coordination ([Andersson et al., 1989](#)). Incidentally, strategic supply chain integration does not have a universally accepted definition ([Mackelprang et al., 2014](#); [Ahi and Searcy, 2013](#)). Instead, it is broadly associated with the level to which a firm strategically links and aligns processes with suppliers and customers ([Zhao et al., 2010](#); [Jayaram and Tan, 2010](#)).

[Flynn et al. \(2010\)](#) define supply chain integration as "the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational processes in order to achieve effective and efficient flows of products and services, information, money and decisions providing maximum value to the customer." Based on the preceding, supply chain integration (SCI) encompasses information flow, materials or goods or services flow (physical flow), and cash flow. These three flows collectively shape SCI ([Zolait et al., 2010](#); [Rai et al., 2006](#)). From the context of this study, SCI was conceptualized as having only two flows which is information flow, and material or goods or service flow (physical flow). Even though SCI consist of financial or cash flow, it was intentionally left out as there was no cash flow between the depots and hauliers. As such, due to the context of this study, cash flow is set aside.

In order to differentiate SCI which consist of three dimensions and this study which only covers two dimensions which are information flow, and material or good or services flows (physical flow), the SCI conceptualization is named as integration factors. Integration factors consist of two dimensions which are information flow and material flow which collectively shape SCI in this research.

In this study, integration factors play the role of an independent variable.

2.2. Depot operator service quality

Service quality was introduced to industrial marketing in the 1980s by the likes of [Lovelock \(1983\)](#), [Grönroos \(1984\)](#), [Parasuraman et al. \(1985\)](#), and later [Bienstock et al. \(1997\)](#), [Mentzer et al. \(1999\)](#) and [Mentzer et al. \(2001\)](#). Parasuraman et al. (1985) introduced the service quality gap to indicate the shortfall of customer perception vis-a-vis expectation. [Bienstock et al. \(1997\)](#) subsequently extended the concept of the delivery of intangible services to include the delivery of tangibles. They call this physical distribution service quality (PDSQ). It consists of timeliness, availability and order condition. The PDSQ model shows the distinction between technical quality and functional quality of [Grönroos \(1984\)](#). Technical quality denotes service outcome and functional quality the service delivery process. [Mentzer et al. \(1999\)](#) and [Mentzer et al. \(2001\)](#) view PDSQ as an important component in the broader concept of logistics service quality (LSQ). Subsequently, they included PDSQ in their LSQ research.

The LSQ in [Mentzer et al. \(1999\)](#) is a second order construct consisting of nine dimensions. However, [Mentzer et al. \(2001\)](#) rearranged these nine dimensions into two major processes. The first process, order placement, has personnel contact quality, order release quantities, information quality and ordering procedures. The second process, order receipt, has order accuracy, order condition, order quality, order discrepancy handling, and timeliness.

The study found LSQ is a sequential process instead of a second order-construct.

The authors recognize [Mentzer's et al. \(2001\)](#) process model is not synchronized with [Grönroos's \(1984\)](#). While this study recognises each model has its merits, it instead is aligned to the LSQ concepts in [Mentzer et al. \(1999\)](#) which have been verified by [Chin \(2014\)](#). The LSQ questionnaire items relate to the reduction of resource use to improve efficiency and sustainability. This is consistent with [Tseng et al. \(2008\)](#) who subscribe to the fact that "sustainable services are needed to satisfy customer needs and improve social and environmental performance over the entire lifecycle (versus competitors) to survive in the competitive market." In addition, a sustainable service could minimize adverse environmental impact and funnel improved social and environmental benefits to all producers and consumers ([Tseng et al., 2015](#); [Ramanathan et al., 2014](#); [Dües et al., 2013](#); [López and Zúñiga, 2014](#); [Lun, 2011](#); [Lai et al., 2011](#)). Therefore, this study has service quality consisting of personnel contact quality, information quality, ordering procedure, order discrepancy handling, order quality, order condition, order accuracy, order release quantities and timeliness.

Elsewhere, [Kersten and Koch \(2010\)](#) cite [Engelke's \(1997\)](#) three dimensions of service quality namely service potential, service process and service outcomes. While service process and service outcomes are similar to [Grönroos's \(1984\)](#) functional quality and technical quality respectively, the service potential is not suitable for this study because it describes the qualification, resources and organizational conditions of a LSP. The authors opine service potential is only suitable if the respondents are from the firm itself. Since this present study has the hauliers as the respondents, hauliers would be unable to accurately assess the service potential of depot. Therefore, this dimension is excluded from this study.

In this study, depot service quality plays the role of an independent and mediating variable.

2.3. Hauliers firms' sustainable performance

This study involves the actors of port-oriented supply chain to influence national logistics performance. Queuing time at the depot could affect the hauliers' economic, social and environmental performance, and supply chain efficiency especially if actors pursue goals independently ([Lee and Billington, 1992](#)).

[Dominique et al. \(2013\)](#) and [Ahi and Searcy \(2013\)](#) point out that actors and stakeholders along the supply chain could benefit from the value created by supply chain management. Creating value is performance itself and it is measured by quantifying the effectiveness and efficiency of processes ([Neely et al., 1995](#)). Literature has clearly indicated a dearth of performance measurement systems for supply chain study over the past decade ([Gunasekaran et al., 2004](#); [Shepherd and Gunter, 2006](#)). Performance measures and metrics are important because they affect planning and control at the strategic, tactical and operational level. They also set objectives, evaluate performance, and determine future courses of actions ([Hajmohammad et al., 2013](#); [Gunasekaran et al., 2004](#)).

Financial and non-financial performance measures were introduced in the balance score card by [Kaplan and Norton \(1992\)](#). This distinction between cost and non-cost measures is critical because supply chain performance could be misrepresented if only cost indicators are used ([Chen and Paulraj, 2004](#)). The dawn of sustainability research has increasingly ushered in more performance measures ([Vasileiou and Morris, 2006](#); [Diabat and Govindan, 2011](#); [Lun 2011](#); [Olugu et al., 2011](#); [Andiç et al., 2012](#)). These have added new dimensions of environmental performance measurement ([Hajmohammad et al., 2013](#)) worsening the already complex performance measures ([Bai et al., 2012](#)).

[Gunasekaran et al. \(2004\)](#) suggested performance evaluations could be better addressed using a trivial few which are most crit-

ical to success. Interestingly, the plea for effective performance measurement systems and metrics development is also critical for making the business case for sustainability in the supply chain ([Keating et al., 2008](#)). An overly loaded number of measurement items are both inefficient and costly when only a few key measures could provide the required information ([Bai et al., 2012](#)). Therefore, this study treats sustainable performance as a unidimensional variable and uses six questionnaire items.

In this study, hauliers firms' sustainable performance plays the role of independent and mediating variable.

2.4. National logistics performance

There are abundant inter- or intra-firm performance variables in literature relating to logistics performance but lack the measure of the entire firm's logistics performance ([Andersson et al., 1989](#)). A search in literature has also confirmed this type of *firm-entire* measurement deficiency also occurs in the *nation-entire* logistics performance. However, this has been addressed since 2007 by the World Bank which studied country-based logistics competitiveness ([Arvis et al., 2014](#)). The World Bank study is consistent with the recognition of an increasingly competitive global economy shifting from inter-company to between supply chain competition ([Ha and Tong, 2008](#); [Zhang, 2006](#); [Kim, 2006](#); [Shen et al., 2013](#)). In doing so, the World Bank has elevated the study of logistics supply chain competitiveness to the *inter-national* dimension. It measures the entire on-the-ground efficiency of trade supply chains represented by the logistics performance index ([Arvis et al., 2014](#)). Recent research shows the index has a mediating role between Global Competitiveness Index and Gross Domestic Product ([Civelek et al., 2015](#)) and it could be leveraged in three of its dimensions (tracking, tracing and timeliness in international transportation) by the Global Competitiveness Index ([Çembercici et al., 2015](#)).

Economic growth and the competitiveness agenda count on logistics performance improvement ([Arvis et al., 2014](#)). The widely accepted international ranking for countries in national logistics performance is based on the logistics performance index and also the fact that 160 countries participated in the survey with Indonesia cited as seriously using the results to improve country competitiveness ([Arvis et al., 2014](#)). This makes the index a strategic measure and superordinate goal of a nation.

A search in the mainstream academic logistics journals and professional bulletins did not yield a publication that comes quite as close to the comprehensiveness of this global survey in comparing *inter-national* logistics performance. This survey is published biennially by the World Bank in *Connecting to Compete 2014: Trade Logistics in the Global Economy, The Logistics Performance Index and Its Indicators* ([Arvis et al., 2014](#)). The study states that "the components of the logistics performance index help countries understand the challenges that they and their trading partners face in making their national logistics perform strongly. This allows leaders in government, business, and civil society to better assess the competitive advantage created by good logistics and to understand the relative importance of different interventions," ([Arvis et al., 2014](#)). The *inter-national* index analyzes countries along six components. These components basically measure connectivity for trade facilitation and therefore represent the supply chain efficiency ([Arvis et al., 2014](#)).

In this study, national logistics performance is the dependent variable.

2.5. Stakeholder theory

A stakeholder is "any group or individual who can affect or is affected by the achievement of an organization's objectives" ([Freeman, 1984](#)). The stakeholder theory asserts businesses are

accountable for their stakeholders, and firms react to stakeholders' claims to legitimize its presence (Freeman, 1984). These claims differ by situation in addition to their importance and relative power (Freeman, 1984; Hill and Thomas, 1992). In this context, firms which have limited resources would respond to stakeholders who are powerful and important (Buyssse and Verbeke, 2003; Mitchell et al., 1997).

The stakeholder theory also suggests that companies produce externalities that affect several parties (stakeholders) internal and external to the firm. Externalities often cause stakeholders to put pressure on companies to reduce adverse impact and increase favourable ones. The stakeholder theory would expect all actors along the supply chain to contribute towards national logistics performance with the expectation this would multiply its business and profit. In the context of this study, the interactions of firms such as depots and hauliers could also contribute positively to the main outcome (Freeman, 1984) which is the national logistics performance. Such a view is explained as follows. Depots could contribute towards improving the national logistics performance. An improved national logistics performance index would in turn benefit all firms economically at the very least by attracting shipping liners to berth at national seaports (Arvis et al., 2014). This increases business opportunities and also the gross domestic product to benefit the national economy (Hanouz et al., 2014). Therefore, depots and hauliers are stakeholders to national logistics performance and vice versa.

2.6. The agency theory

The agency theory is about an entity, the principal, which authorizes another party, the agent, to act on the former's behalf (Eisenhardt, 1989). Eisenhardt (1989), Mitnick (1973), Ross (1973) and Sajad Fayezi et al. (2012) suggest that the agency theory is relevant when controls and decision-making about certain tasks are delegated to the agent. In acting for its principal, the agent as the principal's representative or employee is expected to perform for the benefit of the principal (Mitnick, 1973). However, conflicts of interest arising from self-interest could compromise the agent's commitment towards its agency performance. The compromises could take the form of the amount of effort to be exerted, risk being borne, shirking, and perquisites trade-offs between the pursuits of sales versus profits (Sarkis et al., 2011). These parallel the possibility of abuse of power by agents (Eisenhardt, 1989).

Though the abuse of power is generally found within the organization, this self-interest could be detrimental to its supply chain partners or customers and consequently supply chain effectiveness (Ketchen and Hult, 2007a,b). The latter is the superordinate goal of national logistics performance and appropriately reflects Ketchen and Hult's (2007a,b) claims. These arguments are now applied in the next section.

2.7. Conceptual framework and theoretical foundations

This research is set against the background of the longer than expected waiting time for the empty container transaction at the depot-hauliers interface (Ruban, 4th May, 2012). The relationship of the depot-hauliers in the conceptual framework (Fig. 1) is an

agent-agent relationship and the self-interest of agents could compromise the national logistics performance. In practice, few depot operators are appointed by the ship liner companies making the depot industry oligopolistic. On the other hand, there are numerous Malaysian hauliers making the market relatively free. Being a free market, shippers have more choices of haulier companies. This would mitigate the adverse aspects of agency relationships. And since the depot industry is oligopolistic and the hauliers are a free market, the asymmetrical power in the depot-hauliers interface is intensified as it tilts in favour of depots in practice. Hence, the achievement of the national logistics performance could be critically affected by the agency theory situated in the depot-hauliers linkage.

The stakeholder theory is the overarching theory in this study and is the foundation of the conceptual framework. The stakeholder theory (Section 2.5) explains the linkage from integration factors through depot and hauliers to national logistics performance. The main outcome of this research is the superordinate goal of national logistics performance with two actors along the logistics supply chain.

Definitions of the research variables used in this study are tabulated below.

2.8. Hypotheses development

There is relatively little corollary national logistics performance research findings except for the biennial studies by World Bank since 2007 (Arvis et al., 2014) and the two most recent logistics performance index studies of Civelek et al. (2015) and Çemberci et al. (2015). Therefore, the hypotheses development will rely upon the theories supporting the conceptual framework and similar logistics-context findings. The following hypotheses development will follow Baron and Kenny (1986) method of proving mediation.

Literature extols integration as the answer to better supply chain performance (Currie, 2000; Sanders and Premus, 2002; Patterson et al., 2003). Logistics supply chain integration is a key component of supply chain management and it connotes cooperation and collaboration (Chen et al., 2004; Mackelprang et al., 2014). The numerous studies by Frohlich and Westbrook (2001), Narasimhan et al. (2010), Rosenzweig et al. (2003), Gimenez and Ventura (2005), Germain and Iyer (2006), and Koufteros et al. (2005, 2010) attest to the importance of integration-performance issues.

In supply chain performance, integration, collaboration, and information sharing are inextricably tied together (Sanders and Premus, 2005). Information sharing refers to the extent of the exchange of critical information that could facilitate inter-firm collaboration among supply chain members (Li et al., 2009). The reciprocity or bi-directional information flow (Fawcett et al., 2007) is fundamental to establish close coordination and cooperation in supply chains (Park et al., 2015; Cheng et al., 2013; Lee and Whang 2000) to match supply and demand (Lee et al., 1997).

Quality is universally also known as meeting customers' demand. The container transactions at depots consist of both services and goods reflecting Bienstock's et al. (1997) and Mentzer's et al. (1999) intangible and tangible logistics services. Depots produce the goods and services for consumption by hauliers. In practice, collaboration between depots and hauliers would be

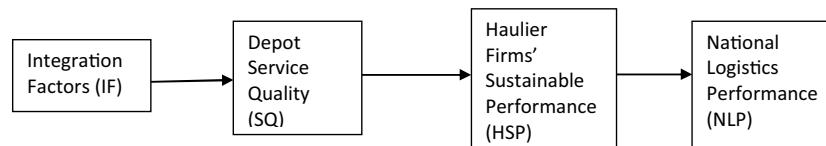


Fig. 1. Conceptual framework.

required to satisfy their customers in the logistics supply chain. Since market dynamics could create adverse bullwhip effects, these have increasingly persuaded organizations to share information for a quick and effective response (Gao and Zhong, 2015). [Frohlich and Westbrook \(2001\)](#), [Germain and Iyer \(2006\)](#), and [Wong et al. \(2011\)](#) show higher levels of integration will increase performance. The following hypothesis is proposed.

H1. Integration factors have a positive relationship with depot service quality.

Several service quality studies relate quality perceptions with satisfaction. Though controversial findings exist, substantial evidence points to perceptions of service quality influencing satisfaction based on customers' judgement ([Cronin et al., 2000](#); [Jiang et al., 2000](#); [Brady and Robertson, 2001](#)). Additionally, service quality research also explored the relationship of quality with satisfaction specifically in the logistics environment. These researches include research in PDSQ ([Bienstock et al., 1997](#)), the logistics services and satisfaction relationship ([Sharma et al., 1995](#)), and the varied LSQ framework with satisfaction ([Mentzer et al., 1999, 2001](#)). More recent efforts examined market share ([Murphy and Poist, 2000](#); [Stank et al., 2003](#); [Davis and Mentzer, 2006](#)) and the relationship between LSQ, satisfaction, and customer loyalty ([Soh et al., 2015](#)).

The Depot Service Quality in this study consists of the following dimensions: personnel contact quality, information quality, ordering procedure, order discrepancy handling, order quality, order condition, order accuracy, order release quantities and timeliness. The poor quality of each dimension would affect hauliers in terms of longer waiting time with prolong engine idling, wasted man-hours, fewer trips (lower asset utilization), unnecessary return trips, rising vehicular emission polluting the environment, and more maintenance repairs. These directly affect the hauliers firms' sustainable performance (economic and environmental.)

[Saura et al. \(2008\)](#) propose a subjective perspective of LSQ by the transfer of quality evaluation to the customer. With quality usually defined as meeting customers' requirements, [Saura's et al. \(2008\)](#) perspective is valid. In this research the authors have replaced customer satisfaction with hauliers firms' sustainable performance which remains largely untested until now. The evaluation of the relationship between depot service quality and hauliers performance by hauliers themselves is consistent with [Saura's et al. \(2008\)](#) proposition. In this instance, hauliers firms' sustainable performance is dependent upon depot operators. As described earlier, an asymmetrical power structure exists between depot operators and hauliers which tilts in favour of the former. Would such a power structure also affect hauliers' performance? Such tension begs the following hypothesis.

H2. Depot service quality has a positive relationship with hauliers firms' sustainable performance.

Research into firm performance can be found in literature, and firm performance in supply chain research is addressed in several ways for example, performance issues related to the impact of integration ([Flynn et al., 2010](#); [Mackelprang et al., 2014](#)), supplier relationships ([Prajogo and Olhager, 2012](#)), intra- and inter-organizational performance ([Schmitz and Platts, 2004](#)), and in reverse logistics ([Richey et al., 2005](#)).

The study on supply chain started approximately 18 to 23 years ago and evolved through supply chain management to environmentally sound supply chain ([Seuring and Muller, 2008](#)). The 1990s saw the word sustainability entered into the vocabulary of corporate environmental management. Though sustainability bears three distinct definitions – the inter-generational philosophical stance, the multi-dimensional and multi-scale term for business management – this study adopts the philosophical dimension of

"making sure that future generations are not negatively impacted by decisions we make today" ([Seuring and Muller, 2008](#)). This philosophical dimension is consistent with hauliers firms' sustainable performance dimensions which consist of improved economic and environmental outcomes. Literature has articles related to sustainable supply chain management outcomes such as [Tseng et al. \(2015\)](#) in the four aspects of sustainability, internal operations, learning and growth, and stakeholder; [Carter and Easton \(2011\)](#) in environmental and/or social performance, and economic performance; [Ashby et al. \(2012\)](#) in providing literature evidence that the study of environmental and social dimensions is prevalent; and [Schaltegger and Burritt \(2014\)](#) in the research of sustainability performance measurement. However, a literature search has not yielded a direct relationship between hauliers firms' sustainable performance and national logistics performance.

A report on the index was first published by the World Bank in 2007 ([Arvis et al., 2014](#)). The index was deployed by [Civelek et al. \(2015\)](#) and [Çembercici et al. \(2015\)](#). [Civelek et al. \(2015\)](#) found the logistics performance index is a mediator between Global Competitiveness Index and Gross Domestic Product while [Çembercici et al. \(2015\)](#) found three indices (international transportation, tracking and tracing, and timeliness) are moderators in the relationship between Global Competitive Index and Gross Domestic Product. These results imply the index is at least significant at macro level studies.

[Schmitz and Platts \(2004\)](#) explicitly stated that the supply chain's overall performance depends on the joint performance of all supply chain members. In the context of this study, the national logistics performance index is the supply chain's overall performance. The former is dependent upon hauliers firms' sustainable performance in the conceptual framework. Therefore, in order to hypothesize the linkage between hauliers firms' sustainable performance and the national logistics performance, this study would analyse the perceived contribution of hauliers towards the national logistics performance. The hauliers firms' sustainable performance consists of the improvement of hauliers' operational performance and is expected to contribute towards the national logistics performance, for example, the hauliers improved preparation of documentation and container goods augurs well for efficient customs and border clearance (a national logistics performance dimension.) The hauliers documented haulage procedures, and effective and efficient asset management are also expected to affect quality of trade and transport infrastructure, ease of arranging competitively priced shipments, competence and quality of logistics services, and meeting schedules. In addition, with modern technology such as the global positioning system, haulage company procedures require them to track or monitor their prime movers for better asset management and container goods security.

Theories are commonly used to justify hypotheses derived from a conceptual framework in research. They systematically interrelate concepts, definitions, and propositions that are advanced to explain and predict phenomena ([Cooper and Schindler, 2011](#)). The stakeholder theory in Section 2.5 describes a stakeholder as "any group or individual who can affect or is affected by the achievement of an organization's objectives" ([Freeman, 1984](#)). In this context, all actors in the logistics supply chain have a stake in the national logistics performance. Consequently, hauliers also have a stake in the national logistics performance index because they would benefit from an improved index which could increase GDP ([Hanouz et al., 2014](#); [World Economic Forum, 2013](#)).

Based on literature, examples, and theory the following is hypothesized.

H3. Hauliers firms' sustainable performance has a positive relationship with national logistics performance.

Literature suggests the impact of supply chain integration on performance is controversial (Dröge et al., 2012; Mackelprang et al., 2014). The apparent inconsistency of the findings and doubt about the integration–performance relationship suggests a missing variable (Dröge et al., 2012). This study proposes that integration factors are mediated consecutively by depot and hauliers to influence national logistics performance. As pointed out earlier, the integration factors in this study consist of two dimensions which are information flow and material flow and which collectively shape SCI in this study. With the stakeholder theory (Freeman, 1984) providing the ligament to hold the integration-depot-hauliers-national logistics performance linkage, this study would establish the consecutive mediation using the Baron and Kenny (1986) methodology.

This study envisages that depots would also require the cooperation of hauliers to achieve its service quality in terms of hauliers turning up punctually to collect empty containers. Likewise, the returns of empty containers to the depot for storage would have the hauliers inform the depots of their arrivals. This latter information must be conveyed to the depots to schedule crew, equipment and space to receive the containers. On the other hand, the hauliers would also depend on the depots to provide empty containers in the most efficient manner. This mutual dependency rests on the resource dependence theory of Pfeffer and Salancik (1978). The resource dependence theory also illuminates the social control of organizations and involves among others, issues of power asymmetry (Pfeffer and Salancik, 1978).

In practice, the power at the depot-hauliers interface is perceived to tilt in favour of depots. For this reason, this study suggests integration factors should first positively affect depots without which any positive integration impact on hauliers would be futile based on the incident described by Ruban, 4th May (2012)). In addition, the depot to hauliers' linkage in the conceptual framework represents the practice in the haulage industry. This process orientation connects one activity to another and it portrays the interconnectedness of organizational activities (Ketchen and Hult, 2007a,b; Ashmos and Huber, 1987) explaining the sequence of the linkage of integration-depot-hauliers-national logistics performance.

Based on the preceding, this study divides integration-depot-hauliers-national logistics performance linkage into two parts to test for mediation. The first is the integration-depot-hauliers mediation linkage and the second the depot-hauliers-national logistics performance linkage.

First, the direct linkage between integration factors and hauliers sustainable performance would rest on similar literature of integration-performance for H1 because hauliers are collaborators in integration factors. Frohlich and Westbrook (2001), Germain and Iyer (2006), and Wong et al. (2011) show higher levels of integration will increase firm performance. This directly also links integration factors to hauliers firms' sustainable performance because the integration factors in Appendix A is expected to affect the economic and environmental dimensions of hauliers. This will be tested to fulfil Baron and Kenny (1986) Step 1. Therefore, the following hypotheses will test the first integration-depot-hauliers' mediation linkage.

H4. Integration factors have direct effects on hauliers firms' sustainable performance.

H4a. Depot service quality mediates the effects of integration factors on hauliers firms' sustainable performance.

Second, the direct linkage between depot service quality and national logistics performance is theorized on the stakeholder theory (Freeman, 1984). Depots have a stake in national logistics performance because an improved national logistics performance would provide a better GDP to benefit the actors of the supply chain

(Hanouz et al., 2014). Similarly, the national logistics performance has a stake in depot service quality because the latter is a provider of logistics services in the supply chain. Therefore, the stakeholder theory directly links the effects of depot service quality to national logistics performance. The International Transport Forum (2016) confirms that logistics performance is the result of actions from a wide array of private and public actors of which depots are one. This reinforces the application of the stakeholder theory in this study.

A supplier could improve its performance by implementing its own supplier quality (commitment to quality, ability to meet delivery due dates and commitment to continuous improvement) and supplier commitment (willingness to share confidential information) (Soh et al., 2016). Noting this, the depots would benefit themselves if they enhance their own service quality and commitment. This finding by Soh et al. (2016) should motivate depots (as suppliers) to provide quality service to enhance its own performance. The improved service quality is also expected to directly improve hauliers firms' sustainable performance given the background of this study.

The bottom line of world-class firm performance require superior process measurement both within the firm and across organizational boundaries (Shepherd and Günter, 2006; Gunasekaran et al., 2001; Schilling and Steensma, 2001). It indicates the performance of an organization could have its effects rippled across organizational boundaries to affect another entity. Arvis et al. (2014) point out the national logistics performance is the result of coordinated performance of the national supply chain network. Therefore, the performance or service quality of depots could be mediated by hauliers to affect the superordinate goal of national logistics performance. The oft cited "strength of the logistics supply chain is only as strong as its weakest link" (Arvis et al., 2014) attests to rippled effects of an entity across the logistics network. In addition, with an increasingly competitive global economy that is no longer between companies but supply chains (Ha and Tong, 2008; Zhang, 2006; Kim, 2006), the hauliers would rely on its suppliers to deliver quality service for them to influence national logistics performance. Therefore, the following will test the second depot-hauliers-national logistics performance mediation linkage.

H5. Depot service quality has direct effects on national logistics performance.

H5a. Hauliers firms' sustainable performance mediates the effects of depot service quality on national logistics performance.

Mackelprang et al. (2014) noted that with a rise in integration practices, a growing number of research studies have attempted to empirically validate the relationship between strategic supply chain integration and performance but with controversial results. The integration-depot-hauliers-national logistics performance linkage of the conceptual framework in this study uses a consecutive mediation and suggests the indirect effect of integration factors to national logistics performance. With the development of H4, H4a, H5 and H5a hypotheses, the consecutive mediation linkage could be established since depots and hauliers are mediators and they are also both directly linked in H2. However, a direct linkage between integration factors and national logistics performance must also first be established to satisfy Baron and Kenny (1986) Step 1.

Since the objective of integration is to achieve operational efficiencies and strategic effectiveness in the supply chain through collaboration (Richey et al., 2010), the integration factors which are based on material and information flow would similarly contribute to the achievement of the aforesaid objective. Therefore, the following hypotheses will be tested.

H6. Integration factors have direct effects on national logistics performance.

Table 1
Definitions of variables.

Nos.	Variable	Definition	Adapted from
1	Integration factors	It is the extent of information sharing and the well-coordinated physical flow of materials in a supply chain across firms.	Rai et al. (2006) on information integration and Prajogo and Olhager (2012) on physical flow integration
2	Depot service quality	It is the concept of a service quality expanded into a logistics context by incorporating the functional and technical quality aspects of logistics services.	Bienstock et al. (1997), Mentzer et al. (1999), Rafiq and Jaafar (2007), Soh et al. (2015)
3	Hauliers Firms' Sustainable Performance	The economic and environmental performance which meets the needs of the present generation without compromising the ability of future generations to meet their own needs.	World Commission on Environment and Development WCED (1987), Zhu et al. (2007), Rao (2002), Seuring and Muller (2008)
4	National Logistics Performance	The measurement of the entire on-the-ground efficiency of trade supply chains represented by the logistics performance index	Arvis et al. (2014)

H6a. Depot service quality and hauliers firms' sustainable performance mediate the effects of integration factors on national logistics performance.

3. Methodology

The following describes the methodology for this research. It consists of the procedures and profile details of the expert group which produced the industry-derived integration questionnaire items.

3.1. Methodology

This study comprises a survey questionnaire with integration factors (IF) derived from the consensus of expert group discussion. These questionnaire items were worded as desired outcomes representing several collaborative processes. The rest of the questionnaire items were adapted from literature to suit the haulage industry and pre- and pilot-tested to confirm the ease-of-use and ease-of-understanding. The service quality questionnaires were adapted from Mentzer et al. (1999) and Soh et al. (2015), hauliers sustainable firms' performance for economic and environment from both Zhu's et al., (2007) and Rao (2002), and national logistics performance from the World Bank (Arvis et al., 2014) (Table 1). The sampling frame consists of members of the Association of Malaysian Hauliers (AMH) and other non-member hauliers. Though there are altogether 200 companies, about 50 companies are less than active except for an occasional haulage. A total of 43 completed responses were received forming a 30% response rate via email. Partial least squares (PLS) technique was used to analyse the data. Since the questionnaires were largely adapted to suit the haulage industry and derived from the expert group discussion, the data were first purified to exclude multicollinearity and cross construct; con-

Table 2
Expert group questions.

No.	Questions
1	How is information shared between the hauliers and depots for container pick up or drop off activity?
2	What type of information is currently shared between the depots and the hauliers?
3	What type of information from the depots that you think would further help hauliers operations?
4	How do you make arrangements to pick up or drop containers with the depots?
5	What are the steps your driver has to take to either pick up or drop containers at the depots?
6	What are the factors of the depot that help you and your drivers in allowing a faster pick up or drop off of containers?
7	What other aspects that could make the drop off or pick up of containers faster in the depots?

firmed for convergent and discriminant validity; and followed by reliability test (Shang, 2009; Chin, 2014). Structural measurement assessment followed to test the hypotheses.

3.2. Measures

3.2.1. Integration factors

Two expert groups were deployed to derive the IF to measure the desired outcomes or intended realizations which hinge largely on information sharing (Andersson et al., 1989) and material flow. Each expert group consisted of six experts and the latter were selected in consultation with the AMH Council (Council 2013–2015). Seven questions (Table 2) on IF were identified and selected based on port-related supply chain literature (Cheon and Deakin, 2010; Woo et al., 2011, 2013). These questions were made the basis to guide the group in providing their views on the integration topic. The two groups consisted of altogether 12 haulage experts among whom were senior managers, a regional manager, a business development manager and a group general manager. They had a mixture of work experiences in depot and haulage ranging from 5 to 35 years with an average of 19 years. Each group session was moderated by the authors and lasted for 60 min. A recording of each session was made with the consent of the participants to ensure important information was not overlooked. The authors decided to end the discussion at the close of the second group discussion as no new significant factors emerged during the session. The factors that emerged based on the extraction of the terms used and the underlying meaning by the experts revolved around two factors which are the flow of information and the flow of containers and are in line with the findings of scholars (Prajogo and Olhager, 2012; Zolait et al., 2010; Leuschner et al., 2013). Both flows are described from the aspect of prime movers moving the empty containers in and out from the depots. Thirteen IF factors questionnaire items were finally derived from the two groups after performing goodness-of-fit analysis. The questionnaires are found in Appendix A.

The goodness-of-fit analysis for the pilot study is as follows.

Some of the initial 16 IF questionnaire items from the expert group were re-inverted before CFA was performed. First, the Scale Reliability Test was carried out using SPSS (Version 14). The analysis followed few rounds, and based on the values of Cronbach Alpha, a number of statements were excluded from IF at the end of each round until we obtained its best value (see Table 3). The value of Cronbach Alpha is greater than the commonly accepted level of 0.7.

3.2.2. Depot service quality

Questionnaire items for depot service quality were adapted from Mentzer et al. (1999) who conceptualized LSQ as a second

Table 3

Summary of Statistics for Pilot Study.

Construct	No. of Indicators used	Excluded after pilot testing	Selected For the Main Survey	Value of Cronbach Alpha for selected items
IF (Integration Factor)	16	3	13	0.868

order construct with nine dimensions. These nine items are personnel contact quality, information quality, ordering procedure, order discrepancy handling, order quality, order condition, order accuracy, order release quantities and timeliness. [Mentzer et al. \(2001\)](#) further tested the model of LSQ with a directional process and found the nine dimensions very important to assess customer satisfaction. These nine dimensions adapted in this study have similarly been verified by [Chin \(2014\)](#) and [Soh et al. \(2015\)](#).

3.2.3. Hauliers firms' sustainable performance

Different researchers use different measures for firm performance. [Richey et al., 2010](#) have firm performance measures related directly to integration factors. [Zhu et al. \(2007\)](#) and [Rao \(2002\)](#) deploy the three separate sustainable categories of economy, social and environmental performance. However, this research utilises a unidimensional construct of hauliers' performance by adapting [Zhu's et al., \(2007\)](#) and [Rao \(2002\)](#) with a set of six indicators consisting of improvements in cost reduction, waste elimination, service quality, productivity, flexibility and delivery performance. Waste elimination is included because it reduces economic profitability and it is also the apparent initiator of supply chain management studies ([Tseng, 2009](#)). The six dimensions represent the degree of improved economic and environmental performance of hauliers' firms. Furthermore, the unidimensional construct of firms' performance would preserve parsimony ([Sekaran and Bougie, 2013](#)). These sustainable measurements are apt as they reflect concerns raised by [Wong et al. \(2015\)](#) that third-party logistics productivity declined from 2007 to 2012. Therefore, this study is intended to determine if hauliers' sustainable performance has the currency to lift national logistics performance.

3.2.4. National logistics performance

The measures for the national logistics performance were adapted from the international logistics performance index which analyzes countries in six components ([Arvis et al., 2014](#)). The six components are: (1) The efficiency of customs and border clearance ("Customs"), (2) The quality of trade and transport infrastructure ("Infrastructure"), (3) The ease of arranging competitively priced shipments ("Ease of arranging shipments"), (4) The competence and quality of logistics services—trucking, forwarding, and customs brokerage ("Quality of logistics services"), (5) The ability to track and trace consignments ("Tracking and tracing"), and (6) The frequency with which shipments reach consignees within scheduled or expected delivery times ("Timeliness") ([Arvis et al., 2014](#)). They were adapted for the ease-of-understanding by hauliers who have intimate knowledge of these components because they traverse the logistics supply chain.

The questionnaire items are listed in [Appendix A](#).

4. Results

The results contain both descriptive and inferential statistics. SmartPLS version 3 software was used in the data analysis.

Table 4

Respondents profile.

Items	Details	Values
1	Position Director/CEO/COO General Manager/Senior Manager Manager/Assistant Manager Senior Executive/Executive Others, please specify	9 16 11 4 3
2	Years working in this position 0–5 years 6–10 years 11–15 years 16–20 years More than 20 years	19 13 5 3 3
3	Years working in this company 0–5 years 6–10 years 11–15 years 16–20 years More than 20 years	11 17 10 4 1
4	Company revenue last year (Ringgit Malaysia in millions) Less than 5 5 to less than 20 20 to less than 40 40 to less than 60 60 to less than 80 More than 80	10 11 6 8 4 4
5	The number of depots your company has to deal with Average	26
6	Daily average number of trips your prime movers make to the depot to load and offload containers Average per prime mover	2
7	Number of your company prime movers in this region Average per company	50
8	Location of the region this questionnaire is given Penang Port Port Klang Kuantan Port Pasir Gudang/Tanjung Pelepas Port Others, please specify	5 32 1 4 Ipoh

4.1. Respondent profile

The total number of respondent companies in this survey is 43 making up 30% of the active haulage companies in the sampling frame. About 16% of the respondents were at senior management level, 63% middle management level, and 9% others ([Table 4](#)). Annual company revenue ranged between RM1.25 million to RM5 million with each company making an average of 170 trips daily to the depot.

The respondents' profile is tabulated as follows.

4.2. PLS measurement model

A series of tests were applied to assess the measurement model. [Table 5](#) shows the loadings of all items which are greater than 0.5. To assess the convergent validity, factor loadings, composite reliability (CR) and average variance extracted (AVE) were determined. [Table 6](#) exhibits the convergent validity which reveals all the item loadings exceeded the recommended value of 0.5 ([Hair, Black, Babin, & Anderson, 2010](#)). The CR values describe the degree to which the construct items represent the latent constructs, which are in the range of 0.856 and 0.969 and exceeded the recommended

Table 5
Loadings.

	Hauliers Sustainable Performance	IF	IP	IQ	National Logistics Performance	OA	OC	ODH	OQ	ORQ	PCQ	TIME
HSP1	0.863											
HSP2	0.828											
HSP3	0.753											
HSP4	0.733											
HSP5	0.819											
IF 10		0.834										
IF 11		0.709										
IF 12		0.799										
IF 13		0.785										
IF 3		0.8										
IF 4		0.825										
IF 6		0.837										
IP 1			0.809									
IP 2			0.902									
IP 3			0.896									
IP 4			0.770									
IQ 2				0.938								
IQ 3				0.954								
IQ 4				0.939								
NLP1					0.759							
NLP2					0.808							
NLP3					0.938							
NLP4					0.962							
NLP5					0.937							
NLP6					0.920							
OA 1						0.935						
OA 2						0.879						
OA 3						0.916						
OA 4						0.615						
OC 1							0.743					
OC 6							0.903					
OC 7							0.795					
ODH 1								0.874				
ODH 2								0.957				
ODH 3								0.949				
OQ 1									0.810			
OQ 2									0.871			
OQ 3									0.911			
OQ 4									0.805			
ORQ 1										0.772		
ORQ 2										0.880		
ORQ 3										0.774		
PCQ 1											0.794	
PCQ 2											0.865	
PCQ 3											0.913	
PCQ 4											0.848	
TIME 1												0.847
TIME 2												0.861
TIME 3												0.841
Time 5												0.783

Note: HSP (Hauliers Firms' Sustainable Performance); IF (Integration Factors); IP (Instruction Procedures); IQ (Information Quality); NLP (National Logistics Performance); OA (Order Accuracy); OC (Order Condition); ODH (Order Discrepancy Handling); OQ (Order Quality); ORQ (Order Release Quantity); PCQ (Personnel Contact Quality); TIME (Timeliness).

Table 6
Cronbach Alpha, Composite Reliability and Average Variance Extracted (AVE).

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
HSP	0.859	0.899	0.641
IF	0.907	0.925	0.639
IP	0.866	0.909	0.716
IQ	0.939	0.961	0.891
National Logistics Performance	0.946	0.958	0.793
OA	0.859	0.908	0.716
OC	0.748	0.856	0.667
ODH	0.918	0.949	0.86
OQ	0.872	0.912	0.723
ORQ	0.739	0.851	0.657
PCQ	0.878	0.916	0.733
SQ	0.944	0.95	0.716
TIME	0.855	0.901	0.695

value of 0.7 (Hair et al., 2010). In addition, the AVE measures "the degree to which a latent construct explains the variance of its items" (Hair, Hult, Ringle, & Sarstedt, 2014) and are greater than 0.5. The AVEs are in the range of 0.641 and 0.891. Furthermore, Table 8 shows that there is no issue of multicollinearity as all the VIF values are below the minimum threshold level of 5 (Hair et al., 2011).

4.2.1. Discriminant validity

Discriminant validity measures "the extent to which a construct is truly distinct from other constructs, in terms of how much it correlates with other constructs, as well as how much indicators represent only a single construct" (Hair et al., 2014). To assess discriminant validity, the square root of the AVE is calculated which should be greater than each of the construct correlations (Hair et al., 2014). Table 7 shows that all the square root of the AVE exceeded the correlations with other variables. In sum, the measurement model displays adequate discriminant validity.

Table 7

Discriminant Validity of Constructs.

	HSP	IF	IP	IQ	NLP	OA	OC	ODH	OQ	ORQ	PCQ	SQ	TIME
HSP	0.801												
IF	0.653	0.799											
IP	0.473	0.231	0.846										
IQ	0.52	0.445	0.75	0.944									
NLP	0.397	0.248	0.188	0.235	0.891								
OA	0.35	0.115	0.458	0.426	0.312	0.846							
OC	0.341	0.376	0.433	0.541	0.325	0.33	0.817						
ODH	0.464	0.335	0.576	0.54	0.086	0.44	0.265	0.927					
OQ	0.583	0.369	0.388	0.35	0.341	0.362	0.389	0.547	0.85				
ORQ	0.359	0.412	0.373	0.467	0.282	0.229	0.584	0.552	0.472	0.81			
PCQ	0.64	0.495	0.649	0.687	0.216	0.26	0.412	0.708	0.507	0.434	0.856		
SQ	0.649	0.502	0.806	0.83	0.331	0.555	0.644	0.788	0.683	0.661	0.817	0.846	
TIME	0.392	0.49	0.403	0.5	0.219	0.191	0.508	0.41	0.402	0.522	0.424	0.662	0.834

Table 8

Variance Inflation Factor (VIF).

	HSP	IF	IP	IQ	NLP	OA	OC	ODH	OQ	ORQ	PCQ	SQ	TIME
HSP					2.292								
IF	1.337				1.775								1
IP													
IQ													
NLP													
OA													
OC													
ODH													
OQ													
ORQ													
PCQ													
SQ	1.337			1	1	1		1	1	1			1
Time				1	1	1.76	1	1	1	1			

Table 9

Predictive relevance.

	SSO	SSE	Q^2 (=1-SSE/SSO)
HSP	215	140.78	0.345
IF	301	301	
IP	172	95.168	0.447
IQ	129	50.289	0.61
NLP	258	231.112	0.104
OA	172	136.93	0.204
OC	129	96.575	0.251
ODH	129	61.218	0.525
OQ	172	117.038	0.32
ORQ	129	94.218	0.27
PCQ	172	90.509	0.474
SQ	1,333.00	1,229.63	0.078
TIME	172	123.09	0.284

4.2.2. Predictive relevance $Q^2 > 0$

For SEM models, Q^2 values larger than zero for a specific reflective endogenous latent variable indicate the path model's predictive relevance for a particular construct. Q^2 values of zero or below indicate a lack of predictive relevance. As a relative measure of predictive relevance, values of 0.02, 0.15 and 0.35 indicate that an exogenous construct has a small, medium, or large predictive relevance respectively for a selected endogenous construct. Table 9 displays Q^2 values.

4.3. PLS structural model results

The structural model analysis involves three stages of analysis. The first stage identifies the values of path coefficients, the coefficients of determination R^2 and lastly the effect size of exogenous variables in the model.

R^2 is used to measure the model's explanatory power, interpreted in the same way as for regression analysis. The explained variation should exceed 10% to qualify for suitable explanatory

power. The analysis reveals that the structural model explains about 16.8% of the variation in National Logistics Performance. Bootstrapping was used with 2000 re-samples to obtain the t-statistics for testing the statistical significance of the model's paths/relationships.

The path between IF and SQ is highly significant ($\beta=0.502$, $t=4.538$, $p=0.001$) fully supporting H1 (Table 10). The path from SQ to Hauliers' Sustainable Performance is also significant ($\beta=0.429$, $t=3.599$, $p=0.001$) supporting H2. The direct path between Haulier's Sustainable Performance and National Logistics Performance is significant ($\beta=0.337$, $t=1.713$, $p=0.087$) providing support for H3. The direct path from IF to Hauliers Sustainable Performance is significant ($\beta=0.437$, $t=3.270$, $p=0.001$) supporting H4. The direct paths from SQ to National Logistic Performance as well as from IF to National Logistics Performance have been found not significant, thus not supporting H5 and H6 respectively.

4.3.1. Mediation analysis

In accordance with Baron and Kenny's (1986) mediational procedure, the relationships amongst the variables must satisfy all of the following conditions: (1) the independent variable must influence the dependent variable, (2) the independent variable must influence the mediator, (3) the mediator must influence the dependent variable, and (4) the effect of the independent variable on the dependent variable must diminish after controlling for the effects of the mediator. If all of these conditions are satisfied and the influence of the independent variable becomes not significant in the presence of the mediator, the effects of the independent variable are said to be "completely" or "fully" mediated by the mediator. If all of the conditions are satisfied, but the influence of the independent variable remains significant in the presence of the mediator, the effects of the independent variable are said to be "partially" mediated. If any of these conditions are not satisfied, there is no mediation (Baron and Kenny, 1986; Tepper et al., 1996).

Therefore, following Baron and Kenny's (1986) mediational procedure, the existence of a significant direct relationship between IF and National Logistics Performance (NLP); IF and Hauliers Sustainable Performance (HSP); as well as SQ to National Logistics Performance are determined in the absence of their respective mediator variables. As it is evident from Table 11 that IF to HSP is significant ($\beta=0.651$, $t=8.397$, $p=0.000$). Similarly IF to NLP is also significant ($\beta=0.291$, $t=1.791$, $p=0.07$). Lastly, the path from SQ to NLP has been found to be significant ($\beta=0.334$, $t=3.094$, $p=0.002$).

Fig. 2 below is the graphical representation of the model while Table 10 provides the detail analysis of mediation results after bootstrapping.

As Table 11 demonstrates, there is a significant impact of IF on NLP ($\beta=0.291$, $t=1.791$, $p<0.07$) in the absence of mediators, and thus, the first condition is fulfilled. With regards to the second and third condition, the results in Table 10, also confirm a significant

Table 10

Hypotheses results.

Path	β	T Statistics ($ t /STDEV $)	P Values	Hypothesis
Hauliers Sustainable Performance to National Logistics Performance	0.337	1.713	0.087	H3 Accepted
IF to Hauliers Sustainable Performance	0.437	3.270	0.001	H4 Accepted
IF to National Logistics Performance	-0.037	0.170	0.863	H6 Rejected
IF to SQ	0.502	4.538	0.001	H1 Accepted
SQ to Hauliers Sustainable Performance	0.429	3.599	0.001	H2 Accepted
SQ to National Logistics Performance	0.131	0.681	0.496	H5 Rejected

Table 11

Hypotheses results.

Path	β	T Statistics ($ t /STDEV $)	P Values	
IF to Hauliers Sustainable Performance	0.651	8.397	0.000	Accepted
IF to National Logistics Performance	0.291	1.791	0.07	Accepted
SQ to National Logistics Performance	0.334	3.094	0.002	Accepted

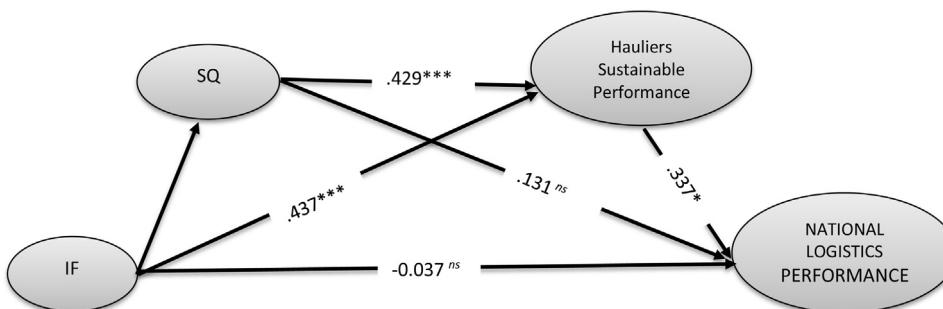


Fig. 2. Bootstrapping output. ns = not significant.

impact IF on SQ ($\beta = 0.502$, $t = 4.538$, $p < 0.001$) as well as HSP on NLP ($\beta = 0.337$, $t = 1.713$, $p < 0.087$). It is also revealed that the path from SQ to HSP is also significant ($\beta = 0.429$, $t = 3.599$, $p < 0.001$). The third condition, which refers to the direct relationship between IF and NLP, in the presence of mediators is statistically not significant having ($\beta = 0.131$, $t = 0.681$, $p < 0.496$). Furthermore, in the fourth step comparing the path value to IF and NLP, it is found that this value has become not significant in the presence of the mediating variables (SQ and HSP) thus demonstrating a full mediating role of SQ and HSP is revealed and confirmed in the relationship between IF and NLP.

Again applying the [Baron and Kenny \(1986\)](#) procedure the mediating role of SQ in the relationship between IF and HSP was examined. The results in [Table 11](#) show that there is a significant impact of IF on HSP ($\beta = 0.651$, $t = 8.397$, $p < 0.000$) in the absence of mediators, and thus, the first condition is fulfilled. With regards to the second condition and third condition, the results in [Table 11](#) also confirm the significant impact of IF on SQ ($\beta = 0.502$, $t = 4.538$, $p < 0.001$) and SQ on HSP ($\beta = 0.429$, $t = 3.599$, $p < 0.001$) respectively. The fourth condition, which refers to the direct relationship between IF and HSP, in the presence of mediators is statistically significant having ($\beta = 0.437$, $t = 3.270$, $p < 0.001$). Furthermore, in the fourth step comparing the path value to IF and HSP, it is found that this value has reduced in the presence of the mediating variables (SQ) thus demonstrating, a partial mediating role of SQ and in the relationship between IF and HSP.

Lastly, in applying the same procedure, the mediating role of HSP in the relationship between SQ and NLP was examined. The results in [Table 11](#) show that there is a significant impact of SQ on NLP ($\beta = 0.334$, $t = 3.094$, $p < 0.002$) in the absence of mediator HSP, and thus, the first condition is fulfilled. With regards to the second and third condition, the results also confirm the significant impact of SQ on HSP ($\beta = 0.429$, $t = 3.599$, $p < 0.001$) and HSP on NLP ($\beta = 0.337$, $t = 1.713$, $p < 0.087$) as shown in [Table 10](#). The fourth con-

Table 12
Effect size.

Dependent Variable	Independent Variables	R ² Included	R ² Excluded	Effect size (f ²)
HSP	SQ	0.564	0.423	0.32
NLP		0.168	0.158	0.01
SQ	HSP	0.255	0.255	0
NLP		0.121	0.121	0
HSP	IF	0.564	0.419	0.33
NLP		0.168	0.168	0

dition, which refers to the direct relationship between SQ and NLP, in the presence of mediator (HSP), is statistically not significant having ($\beta = 0.131$, $t = 0.681$, $p < 0.496$). Furthermore, in the fourth step comparing the path value to IF and HSP, it is found that this value has become not significant when mediating variables (HSP) is introduced, thus demonstrating, a full mediating role of HSP in the relationship between SQ and HSP.

4.3.2. Effect size

[Hair et al. \(2013\)](#) suggest that the individual effect size should be considered as (i) small if the below f² value ranges between 0.02 and 0.15, (ii) moderate if the f² value ranges between 0.15 and 0.35; and (iii) large if the f² value is greater than 0.35.

The results are given in [Table 12](#). The findings suggest that (i) SQ has an individual moderate effect size on HSP, (ii) IF has a moderate effect size on HSP. The individual effect sizes of the independent variables on their respective dependent variables in the remaining hypothesized relationships are not substantive (i.e. f² value < 0.02).

5. Implications

The following are the implications from direct and mediation effects of this study.

5.1. Integration factors – depot and hauliers

Integration factors have a significant influence on depot service quality (H1, [Table 10](#)). Arguments against this could stem from alleged biasness of the questionnaire items for hauliers as it was the hauliers who prepared the questionnaire items. However, the two expert groups comprised some hauliers who were also depot operators. The results show both depot and hauliers should collaborate to improve depot service quality. Noting the downside of the agency theory that could adversely affect the attitudes of agents along the logistics supply chain, both actors should come together to review the outcome-based integration factors to claim and fulfil their respective responsibilities.

The key and common element in integration is coordination based on the sharing of information ([Park et al., 2015](#); [Cheng et al., 2013](#); [Lee and Whang 2000](#)). Improvements can be directed at, for example, the timely dissemination of information and the upgrading of information technology. Other improvements could include the acquisition of more efficient hoisting equipment, scheduled maintenance, and the introduction of practical and efficient work procedures. The local authorities should consider providing sufficient land space to accommodate storage and facilitate retrieval of containers. Therefore, integration factors must be brought to the table of both actors in the spirit of raising service quality.

5.2. Depot-hauliers – the service consumption and production interface

The depot service quality relationship with hauliers firms' sustainable performance is significant (H2, [Table 10](#)). This is important because the service quality is the trigger of this study. The results also prove depots could affect the economy and the environmental aspects of the hauliers. This validates the concerns of hauliers.

An improvement of depot service quality for example, could reduce waiting time, save fuel, cut vehicular emissions, lower maintenance costs, allow more haulage trips, and improve downstream delivery schedule for hauliers. With a speedier process, depots could also perform more container transactions to increase revenue. The shorter waiting time could also assuage queuing frustrations.

Depot service quality could improve with an efficient container inventory management. This would require an improved storage and retrieval management system. With TEUs at port terminals increasing over the years, the local authorities should see to the land requirements of depots. Nationally, total freight volume grew 20.7% from 453.7 million tonnes in 2010 to 548 million tonnes in 2014, and total trade increased 23.9%, from Ringgit Malaysia 1.17 trillion in 2010 to Ringgit Malaysia 1.45 trillion in 2014 ([Economic Planning Unit, 2016](#)). In 2014, the Port Klang Authority (which accounted for about 40.1% of the country's total maritime trade) registered a growth of 5.8% in handling containers with 10,945,804 total container throughput, as compared to 10,350,409 in 2013 ([Port Klang Authority, 2014](#)). This raises the question as to whether capacities of logistics supply chain actors have increased to accommodate recent development to prevent bottlenecks.

The authors surmise any port expansion plans or TEUs increase should have depot capacities grow in tandem. If it is otherwise, future expansion or increase in utilization should involve all port-oriented supply chain actors to sustain the economy and environmental aspects of this port-oriented logistics supply chain. The authors suggest the principals should be involved to improve

the efficiency of depot operators. The outcome of the unsuspecting tension between the stakeholder theory and the agency theory surprisingly confirms depot could still influence hauliers favourably.

5.3. Hauliers are direct contributors to national logistics performance

Hauliers could directly influence the national logistics performance (H3, [Table 10](#)). Hauliers traverse almost the entire supply chain in inland haulage stopping to deliver or pick up containers empty or laden in Malaysia. This research found hauliers' sustainable performance influencing national logistics performance. The sustainable performance of hauliers like other actors would depend on their internal operations, suppliers and customers. This begs an explanation as to how the economic and environmental performances of hauliers positively influence the national logistics performance.

The hauliers are in fact the doers, participants and "co-owners" of the six components of the logistics performance index of "Customs", "Infrastructure", "Ease of arranging shipments", "Quality of logistics services", "Tracking and tracing", and "Timeliness" putting the hauliers directly and indirectly as a conduit responsible for the fulfilment of the index. Practically, hauliers interact with almost all other actors in the logistics supply chain. They are the apparent conduits for actors in the inland logistics supply chain network. Therefore, the hauliers firms' sustainable performance should be derived from the cumulative interactions with these actors. This makes the hauliers' significant direct relationship with the index of six components unsurprising. However, it imposes an unenviable direct responsibility on hauliers to also improve their haulage service quality in order to curtail the decline in productivity of third-party logistics ([Wong et al., 2015](#)).

Since the six components of the index basically measure connectivity for trade facilitation and the efficiency of the supply chain ([Arvis et al., 2014](#)), the results confirm hauliers facilitate trade. This empirical finding also confirms the extensive and important role of hauliers in the logistics supply chain network. Therefore, the local authorities and all actors in the logistics supply chain should collectively step up efforts to facilitate the role of hauliers ([Ramanathan et al., 2014](#)) to improve the superordinate goal of national logistics performance.

5.4. Integration factors and hauliers firms' sustainable performance

[Table 11](#) shows integration factors could directly and positively affect hauliers' sustainable performance. As mentioned earlier, integration factors consist of the desired outcomes or intended realizations which hinge largely on information sharing. The collaboration between depot and hauliers would bring about a reduction in waiting time which is translated into improved productivity, fuel savings, and lower engine emission. This is not surprising. Therefore, collaboration efforts must be stepped up by both depots and hauliers.

Hauliers could play its role by complying with depot loading schedule. In order to ensure compliance, hauliers should have an adequate number of properly maintained prime movers. However, they must also manage their downstream activities to improve asset utilization and scheduling. Noting this responsibility, hauliers have the challenging role to manage several other stakeholders in the supply chain such as the multiple shippers and port authorities ([Hoof and Thiell, 2014](#)). Adverse traffic conditions could also be a hindrance to productivity and delivery. Therefore, hauliers must consistently seek traffic information to avoid delays. They should

also update both suppliers and customers of their status to manage suppliers' and customers' expectations.

5.5. Depot service quality and national logistics performance

Table 11 shows depots could directly and positively affect national logistics performance. This is consistent with the study by the [World Economic Forum \(2013\)](#) because depots are also logistics service providers along the supply chain. They are important partners to hauliers to make integration factors efficacious (H1, [Table 10](#)).

Though depots appear to be just container warehouses with a less visible role in the supply chain, they are custodians of containers which facilitate world trade growth ([The Economist. May 18th, 2013](#)) and are drivers of 20th century economic globalization ([Bernhofen et al., 2012](#)). As pointed out earlier, containers are predominantly used because they facilitate inter-modal transport between sea, air and land ([World Shipping Council, History of Containerization, 2016](#)).

Container warehousing management could make or break the supply chain. Depots must ensure the availability of containers at least for local needs. Since containers belong to ship liners, the release of containers should match each ship liner for loading purposes. Containers must be of correct size and clean for suitable use by shippers. The timely issuance of containers to reduce waiting time is a major responsibility of depots to the entire supply chain network because of its rippled effects to national logistics performance. Therefore, a heightened concern to reduce waiting time by depots could prevent a recurrence of the undesired episode ([Ruban, 4th May, 2012](#)) which triggered this study.

5.6. Integration factors and national logistics performance

Table 11 shows integration factors could directly and positively influence national logistics performance. This is unsurprising because depot-hauliers need to collaborate for a more efficient and effective material and information flow. The reciprocity or bi-directional information flow ([Fawcett et al., 2007](#)) is fundamental to establish close coordination and cooperation in supply chains ([Park et al., 2015; Cheng et al., 2013; Lee and Whang 2000](#)) to match supply and demand ([Lee et al., 1997](#)). Collaboration outcomes affect the on-the-ground efficiency of trade supply chains embedded in the logistics performance index ([Arvis et al., 2014](#)) and questionnaire items L2, L4, L5 and L6 in [Appendix A](#).

The results extend the conventional research of firm collaboration-performance to that of firm collaboration-national logistics performance paving the way for further research in this superordinate goal. Interestingly, the results most distinctly demonstrate that the stakeholder theory is unfazed by the agency theory.

5.7. Depot service quality partially mediates the relationship between integration factors and hauliers sustainable performance

H4 in [Table 10](#) shows integration factors could still directly influence hauliers' sustainable performance in the presence of the integration-depot-hauliers' linkage. This means some of the direct impact of integration factors on hauliers is conveyed through depot operators to hauliers. Effectively, depot service quality partially mediates the relationship between integration factors and hauliers sustainable firms' performance (H4a).

In spite of the perceived power asymmetry between depots and hauliers, this result augurs well for this port-oriented logistics supply chain. It confirms the much needed depot-hauliers collab-

oration failing which hauliers would face incessant challenges to achieve sustainable performance.

5.8. Hauliers firms' sustainable performance fully mediates the relationship between depot service quality and national logistics performance

H5 in [Table 10](#) shows depot service quality does not directly influence national logistics performance in the presence of the depot-hauliers-national logistics performance linkage. This result is unexpected because originally depot service quality could influence national logistics performance in [Table 11](#). Noting this change, the influence of depots on national logistics performance is fully mediated by hauliers to national logistics performance (H5b). For this reason and in the interest of the stakeholder theory, depots should provide quality services to hauliers.

Hauliers play a very important role to convey the depot service quality to influence national logistics performance because in practice the hauliers are the main operational interactors with depots. Since depots could influence national logistics performance through hauliers, the local authorities, ship liners and hauliers themselves should assist depots in the production and delivery of the latter's service quality.

5.9. Integration factors could indirectly and positively influence national logistics performance

Table 11 shows integration factors directly and positively influence national logistics performance. However, [Table 10](#) shows integration factors no longer directly influence national logistics performance (H6) in the presence of integration-depot-hauliers-national logistics performance linkage. These findings together with Sections 5.7 and 5.8 above confirm the integration-depot-hauliers-national logistics performance linkage is significant. This is because Section 5.7 explicates the mediation occurring in the integration-depot-hauliers linkage (H4b) while Section 5.8 explicates the mediation occurring in the depots-hauliers-national logistics performance linkage (H5b). These consecutive mediations statistically validate the chain effect (H6a) of the conceptual framework in [Fig. 1](#).

The expression that a supply chain network is only as strong as its weakest link is portrayed in the framework. Since the partially mediated integration-depot-hauliers linkage could be the bottle neck in this straight chain, depots should play a stronger role to mediate integration factors to influence hauliers' performance and national logistics performance.

The results also show both depots and hauliers are consecutive mediators between integration factors and national logistics performance. This is unsurprising because the collaboration of the two supply chain actors should affect national logistics performance. In spite of the distance of integration factors from national logistics performance, its impact is aided by the double mediation. This signifies the usefulness of integration factors and mediating roles of depot and hauliers to national logistics performance. The overall results confirm depots and hauliers are allies in lifting the national logistics performance. With the model's R² value of 16.8%, the integration-depot-hauliers-national logistics performance link is vitally important to the national economy. This corroborates with Sections 5.2, 5.6 and 5.7 that the stakeholder theory is unfazed by the downside of agency theory and the power asymmetry at the depot-hauliers interface.

6. Conclusions

This section concludes with the theoretical contribution and the practical roles of integration factors, depots, hauliers and national

logistics performance. It also describes the benefits, limitations and suggestions for future research.

To recapitulate, this study addresses the integration-depot-hauliers-national logistics performance linkage. The trigger of this study is the perennial problem of waiting at the depot-hauliers interface. The results reveal some surprising theoretical contributions and the roles of each stakeholder.

Two major theories are deployed to formulate the conceptual framework to investigate what could lift national logistics performance. The two theories are the stakeholder theory and the agency theory. This study reveals both depot and hauliers have a common stake in the national logistics performance through their mediating roles. Both actors expect more logistics business and revenue from an improved national logistics performance based on the stakeholder theory. This theoretically should drive both actors to work more efficiently to promote their common interest. However, since both actors are agents, the agency theory would compromise the interest of their principals, immediate customers and consequently the national logistics performance. This compromise creates tension between the stakeholder and the agency theory. However, this study proves the stakeholder theory has emerged favourably in this tension.

Theoretically, the industry-derived integration factors from the two expert groups are validated and could be used in future haulage studies with further fine tuning.

The practical role and contribution of each variable are summarized in the following paragraphs. Firstly, integration factors could positively influence depot service quality. Depots should seriously consider collaboration with hauliers to raise their service quality. Integration factors are also consecutively mediated by depot and hauliers to impact national logistics performance. Therefore, collaboration by both actors is necessary to lift the superordinate goal of national logistics performance.

Secondly, depots are important stakeholders to hauliers because they could directly elevate hauliers firms' sustainable performance. Though depots could not directly influence national logistics performance, they could mediate integration factors to affect both hauliers and national logistics performance. Noting this, the role and contribution of depots should not be trivialised because integration involving depots is a way to improve national logistics performance. In practice, depots could halt the entire logistics supply chain network because they are the keepers and issuers of containers which are essential to facilitate inter-modal transportation. In addition, the oligopolistic nature of the depot industry makes depots more indispensable and powerful.

Thirdly, hauliers directly contribute to national logistics performance. They also mediate integration factors and depot service quality to influence the national logistics agenda. Against the background of this study, depots should be motivated to collaborate with hauliers to improve national logistics performance. The authors opine hauliers would be most willing to initiate this win-win collaboration to facilitate the depot-hauliers container transaction interface noting the better β and p values for hauliers when comparing IF-DQ and IF-HSP in Tables 10 and 11 respectively. This also unwittingly supports the calls by hauliers to resolve the perennial challenges they face and should be heeded by the local authorities, and the ship liners who are principals to depots.

Fourthly, the integration-depot-hauliers linkage could improve the national logistics performance which is vital to the national economy. The integration factors of the depot-hauliers clearly could indirectly raise the national logistics performance index bringing about benefits to trade opportunities and poverty reduction (Arvis et al., 2014). Since the index contains the two key dimensions of better efficiency of border administration, and transport and communications infrastructure, it would spur GDP growth (Hanouz et al., 2014). The reduction in supply chain trade barriers would

improve the efficiency of the movement of goods and help recover resources (Hanouz et al., 2014) which otherwise would be wasted. These expanded trade opportunities, GDP growth, and the recovery of resources bode well for the triple bottom line of the logistics supply chain actors. In addition, support from local authorities, the law and customs enforcement authorities should be solicited in this superordinate goal endeavour (Ramanathan et al., 2014; Pettigrew and Tropp, 2006). The superordinate attribute of the national logistics performance should be promoted to help overcome group distinctiveness and conflict stemming from the social identity theory (Deschamps and Brown, 1983).

Strategically, a reduction in waiting time at the depot-hauliers interface would produce economic, social and environmental benefits to both actors over the long term. Economically, it would allow more rapid transactions when addressing the perennial problems of queuing and the decline in productivity of third-party logistics (Wong et al., 2015). Socially, it would improve the depot-hauliers relationship and allow hauliers to make more trips. Environmentally, a shorter queuing time would help to reduce vehicular emissions and cut fuel waste. Therefore, by aligning the two different actors through integration factors, depot operators and hauliers could foster a sustainable consumption and production interface to lift national logistics performance. This conclusively answers the title of this study, "Could the Service Consumption-Production Interface Lift National Logistics Performance?"

The conceptual framework has been proven statistically valid and useful with an R^2 of 16.8% for national logistics performance. However, there are limitations in this study. This study is limited to depot operators and hauliers. Future investigation should include other actors along the supply chain to identify stakeholders (Hoof and Thiell, 2014) to improve the explanatory power of the conceptual framework. The authors opine it is also important to identify and alert stakeholders who could be weak linkages in raising the national performance index. This is essential because the strength of the logistics supply chain is only as strong as its weakest link (Arvis et al., 2014). The absence of a direct role of depot operators to raise national logistics performance should be investigated further because of its important role in the logistics supply chain. Though this study shows national logistics performance is affected at least by both depots and hauliers, the authors recommend an extended study involving more stakeholders and this would further confirm that the national logistics performance is attributed to systemic effects and not as alleged in the adverse anecdotes against hauliers described in the 2nd ICBER (2011) (Shariff et al., 2011).

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Appendix A.

Survey questionnaire items

Likert scale of 1 to 7 was used with 1 Strongly Disagree and 7 Strongly Agree

A. Integration Factors

1. Collection of empty containers from the depot and delivery of empty containers to the depot are closely coordinated with the depot.
2. Our transport activities are well connected with depot logistics activities.
3. The loading and offloading of empty containers at the depot are smooth.
4. The acceptance and release of empty container by the depot is smooth.
5. Our transport linkage with the depot is characterized by excellent yard facilities in the depot.
6. Our truck entry and exit to load or offload empty containers with the depot is smooth.
7. Performance data are shared by the depot.
8. Container movement schedules and status in depot are shared by the depot.
9. Depot and my company collaborate in arriving at respective demand forecast.
10. Container inventory/container availability status in the depot is shared by the depot.
11. Prime mover entry and exit status at depot are shared by the depot.
12. Empty container loading and offloading status at the depot are shared by the depot.
13. Pending loading and offloading jobs at the depot are shared by the depot.

B. Personnel Contact Quality

1. The designated depot operator contact person makes an effort to understand my company's situation.
2. The designated depot operator contact person has the ability to resolve problems.
3. The product/service knowledge of depot operator's personnel is sufficient.
4. The operational experience of depot personnel is sufficient.

C. Instruction Procedures

Instruction procedures from the depot operator...

1. Are effective
2. Are easy to follow
3. Are simple
4. Do not take much effort
5. Do not take much time
6. Are flexible

D. Order Discrepancy Handling

1. When we report to the depot of the unsuitable quality of container loaded for export delivery, depot response to correctly exchange suitable container has been satisfactory
2. The report process of unsuitable container quality for empty container pick up for export delivery at the depot is sufficient
3. Reply by depot on our report on container quality unsuitability for empty container pick up for export delivery has been satisfactory

E. Information Quality

The information communicated by the depot operator...

1. Is timely
2. Is accurate
3. Is adequate

4. Is complete
5. Is credible

F. Ordering Release Quantities

1. The containers are always available at the depot.
2. I have never been told to come back another time to collect the container.
3. I have never been told by the depot operator to go to another location to collect the empty container.

G. Order Accuracy

The container loaded on the trailer chassis...

1. Is not the wrong type
2. Is not the wrong container operator
3. Does not contain wrong container size
4. Is not the wrong grade

H. Order Condition

1. Empty containers received from this depot operator are undamaged.
2. Empty containers received from this depot operator are rusty.*
3. Empty containers received from this depot operator are dusty.*
4. Empty containers received from this depot operator are dented.*
5. Empty containers received from this depot operator cannot sit safely on the trailer.*
6. Empty containers received from this depot are not wet.
7. Empty containers received from this depot have no odor.

*Reverse coding required.

I. Order Quality

1. The depot operator always complies with the customer's choice of containers.
2. The depot operator will substitute acceptable containers as replacement when necessary.
3. The depot operator will always supply a container that is functional.
4. The depot operators will always supply containers which are safe.

J. Timeliness

1. I receive the empty container as per schedule.
2. I have never been told to wait because the empty container is on its way to the depot.
3. The depot operator is able to respond to rush orders.
4. The queuing time is short
5. The loading and off-loading time is short.

K. Hauliers Firms' Sustainable Performance

We have made...

1. Improvements in cost reduction
2. Improvements in waste elimination
3. Improvements in our service quality
4. Improvements in productivity
5. Improvements in flexibility
6. Improvements in delivery performance

L. National Logistics Performance

1. The customs, border clearance and port clearance are efficient.
2. Trade and infrastructure (port related facilities, depot related facilities, roads and highways infrastructure and facilities, roads off-limits time) are of high quality.
3. Deriving to a competitively priced haulage charges is easy.
4. Port, depot, customs clearance and other related logistics services which affect the container movements are both competent and of high quality.
5. Tracking and tracing of containers and its accompanying shipment information are effective with other logistics service providers in the logistics chain (such as the port, depot and forwarders.)
6. Delivery and collection of containers to shippers and consignees premises are frequently within scheduled and expected time.

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