

Sustainability strategy : the case of logistics service providers

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2012

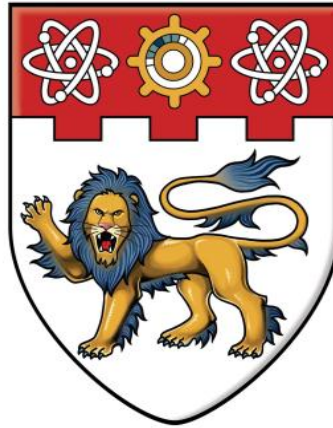
Lim, J. M. (2012). Sustainability strategy : the case of logistics service providers. Final year project report, Nanyang Technological University.

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SUSTAINABILITY STRATEGY: THE CASE OF LOGISTICS SERVICE PROVIDERS

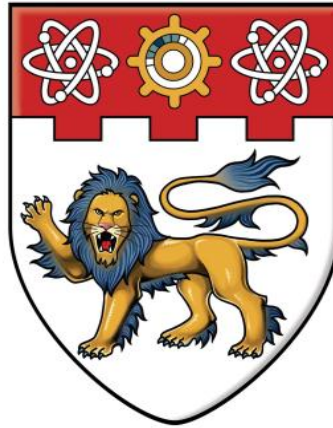


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2012

SUSTAINABILITY STRATEGY: THE CASE OF LOGISTICS SERVICE PROVIDERS



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A Final Year Project presented to the Nanyang Technological University
in partial fulfillment of the requirements for the Degree of
Bachelor of Science (Maritime Studies)

2012

ABSTRACT

Logistics service providers are beginning to understand that sustainability can be a great source of competitive advantage and those who manage to translate sustainability into sources of differentiation will emerge as winner in this new competitive landscape. Accordingly, many have devised and implemented some sort of sustainability strategy. Unfortunately, the quest to sustainability is not always smooth-sailing and problems often arise as a result of inadequate stakeholders' participation in sustainability-related decision-making and sustainability strategy not being developed within business context. This paper thus seeks to explore and analyze how participation from different stakeholder groups may affect the outcome of sustainability strategy and how this is affected by the level of integration between business strategy and sustainability strategy. Through a survey conducted among 96 logistics service providers and the use of Structural Equation Modeling technique, full information maximum likelihood, it is shown that higher level of participation from internal and value chain stakeholders can lead to better integration between business strategy and sustainability strategy. In addition, it was established that the level of integration positively correlates with sustainability performance. The findings shed light on what managers and public officials can do to help logistics service providers achieve better sustainability performance.

ACKNOWLEDGEMENTS

The author would like to express his sincere and heartfelt gratitude to his project supervisor, Assistant Professor Lam Siu Lee, Jasmine, for her continual guidance and support throughout the course of this research project.

In addition, the author would like to thank the two survey reviewers for their invaluable advice and all other maritime and logistics professionals who have participated in the survey.

Finally, the author wishes to acknowledge the funding support for this project from Nanyang Technological University under the Undergraduate Research Experience on Campus (URECA) programme.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

In recent years, three powerful forces namely, globalization, climate change and information technology, have amplified the salience of sustainability to business. In particular, there has been heightened public concerns about environmental and social issues such as resource depletion, pollution and unfair treatment of workers (e.g. EurActiv, 2008; Kan, 2011; Revkin, 2002; Rosenthal, 2009). Consequently, the issue of sustainability is gaining mindshare in board rooms around the world (Naik, Ward, Godfrey, & Hanifan, 2011; Porter & Kramer, 2006).

As companies start to make business decisions based on the need for sustainability and turn in to its potential marketing value (Greenbiz, 2007; Maersk Line, 2010), they demand their Logistics Service Providers (LSPs) to do likewise (PricewaterhouseCoopers, 2009; Waters, 2010). Acceding to these requests is not always easy and some LSPs may even view this as a hindrance to growth. Others have however, recognized it as a business opportunity (Accenture, 2009; Berthon, Lowitt, & Hoffman, 2008). These farsighted players understand that sustainability can be a great source of competitive advantage. Those who manage to translate sustainability into sources of differentiation and a key value driver for their customers, stakeholders and, ultimately, their bottom lines, will emerge as winner in this new competitive landscape (Engardio, Capell, Carey, & Hall, 2007; Esty & Winston, 2006; Hart, 2005; KPMG International, 2011). Thus, many have devised and implemented some sort of sustainability strategy.

Unfortunately, not all those who are committed to the quest for sustainability are able to succeed. In fact, previous literature suggests that investment in improving the environment and society seldom brings about positive financial returns (Walley & Whitehead, 1994). Whilst this has changed over the years, many companies still find such investment rarely outperforming market benchmarks (Mansdorf, 2010; The Economist, 2007). These are often caused by inadequate stakeholders' participation in sustainability-related decision-making (Burke & Logsdon, 1996; M. S. Reed, 2008) and sustainability strategy not being developed within business context (Boston, 2010; UN Global Compact-Accenture CEO Study, 2010).

1.2 OBJECTIVES

The objective of this study is to explore and analyze how participation from different stakeholder groups may affect a LSP's sustainability performance. An important mediating factor, which is

likely to affect this, is the level of integration between its business strategy and sustainability strategy (Burritt & Saka, 2006; Wagner, 2011).

In order to achieve the objective, this paper seeks to answer the following questions:

- [1] What is sustainability strategy in the context of LSP;
- [2] What are the drivers influencing them to pursue the cause;
- [3] What are the measures of integration and sustainability performance &
- [4] How does these constructs (i.e. stakeholders' participation, level of integration between business strategy and sustainability strategy, and sustainability performance) affect each other?

1.3 SCOPE

For the purpose of this study, LSP may be defined as provider of logistical services and consists of only second-party (2PL) and third-party LSP (3PL). 2PLs are providers handling basic logistics services and includes carriers and warehouse space providers (Kersten & Koch, 2010). 3PLs, on the other hand, are providers of an entire bundle of coordinated logistics services (Selviaridis & Spring, 2007). Another common category is the fourth-party LSP (4PL) which are those who manage material and information flows in entire supply chains of diverse companies as a neutral agent (Kersten & Koch, 2010). As 4PLs typically do not own assets and are restricted in terms of the range of sustainability activities they can perform, they are not included in this study.

A survey will be conducted to obtain data on LSP's stakeholders' participation, level of integration between its business strategy and sustainability strategy, and its sustainability performance. The results obtained will then be empirically evaluated using Structural Equation Modeling technique, full information maximum likelihood, via SPSS AMOS.

In the sections that follow, literature concerning corporate sustainability is reviewed. The theoretical framework and methodology will then be presented. Finally, the findings are discussed along with suggestions on implication for both future research and practice.

CHAPTER 2: LITERATURE REVIEW & THEORETICAL DEVELOPMENT

While the topic of sustainability has been widely discussed, previous studies have tend to focus on industries that deal directly with resources such as mining (e.g. Figueroa, 2010; Hilson & Murck, 2000; Kumah, 2006; Mudd, 2007; Yu, Zhang, & Zhou, 2008) and energy (e.g. Petrie, 2007; Spalding-Fecher, 2003). Whilst recent years have seen increasing interest in sustainable logistics, most of these studies tend to focus on the design of sustainable logistics network (e.g. Chaabane, Ramudhin, & Paquet, 2012; El korchy & Millet, 2011; Frota Neto, Bloemhof-Ruwaard, van Nunen, & van Heck, 2008; Lee, Dong, & Bian, 2010) rather than on sustainability strategy of Logistics Service Provider (LSP).

This section thus, provides a review of relevant literature and identifies the gaps in previous literature. It begins by defining corporate sustainability and what it means for LSP. This is followed by a discussion on the seven drivers of sustainability. Finally, a conceptual framework to analyze the relationship between LSP's stakeholders' participation, integration between its business strategy and sustainability strategy, and outcome of their sustainability strategy is proposed.

2.1 CORPORATE SUSTAINABILITY

The idea of Corporate Sustainability (CS), initially proposed about two decades ago, revolves around the central thesis that the goals of environmental conservation and the goals of business need not be disparate and conflicting (Barbier, 1987; Dyllick & Hockerts, 2002; Hawken, Lovins, & Lovins, 1999; Jr, Schmidheiny, & Watts, 2002). However, in recent years, there are growing censuses and sentiments that CS entails more than having non-conflicting environmental and business goals. Accordingly, a variety of definitions have emerged (e.g. Cesar, 1994; Elkington, 1998; Kolstad & Krautkraemer, 1993; Maersk Line, 2010; Munasinghe, 1994; Pearce & Turner, 1990; Pezzey, 1992; Schaltegger & Burritt, 2006; World Business Council for Sustainable Development, 2008).

Schaltegger & Burritt (2006), for example, defined CS in a broad approach relating to the contextual integration of economic, environmental and social characteristics. They additionally proposed that the challenge to CS relate not only to the dimensions but also their interrelationships. This concurred with the view of Elkington (1998) and his widely-accepted triple bottom line (3BL) definition.

On the other hand, Munasinghe (1994) defined CS as involving the improvement of the range of opportunities that will enable individual human beings and communities to achieve their aspiration and full potential over a sustained period of time, while maintaining the resilience of economic, social and environmental system. This definition highly resembles that adopted by the World Business Council for Sustainable Development, which is a CEO-led, global association of about 200 leading international companies dealing exclusively with business and sustainable development (World Business Council for Sustainable Development, 2008).

While slight differences exist, these definitions largely suggest that businesses must consider the repercussion of their decision and operation on the society. CS no longer only relates to the economic and environment dimension but also the societal dimension. The subsequent inclusion of societal dimension thus, sees the convergence between the concept of CS and Corporate Social Responsibility (e.g. Dyllick & Hockerts, 2002; Lehtonen, 2004; Mel, 2003; van Marrewijk, 2003; van Marrewijk & Werre, 2003). This brings about the next question on what exactly is sustainable logistics.

2.2 SUSTAINABLE LOGISTICS

The term sustainable logistics is often used interchangeably with logistics social responsibility and green logistics. Essentially, the concepts are largely similar and may be viewed as consisting of purchasing, transportation, packaging, warehousing and reverse logistics aspects (Ciliberti, Pontrandolfo, & Scozzi, 2008) (shown in Figure 1).



Figure 1 - The five Aspects of Sustainable Logistic

Purchasing social responsibility can be defined as the inclusion in purchasing decisions, the sustainability issues advocated by organizational stakeholders (Maignan, Hillebrand, & McAlister, 2002). The underlying principle is that if a company adopts social and/or environmental standards, the purchasing function can be used to transfer them to suppliers, thereby generating a chain effect (Ciliberti, et al., 2008; Morton, Green, & New, 1996; Preuss, 2000). LSP may adopt various strategies and practices as suggested by Maignan et al (2002) and Carter and Jennings (2000, 2004).

Sustainable transportation, on the other hand, is defined as transportation that meets mobility needs while preserving and enhancing human and ecosystem, health, economic progress, and social justice now and for the future (Deakin, 2001). The main environmental impacts are associated with emissions of greenhouse gases and other harmful pollutants. Solutions aimed at achieving sustainable transportation include development of clean vehicle technologies, de-speeding the supply chain, optimized network and provision of door-to-door delivery (Dekker, Bloemhof, & Mallidis, 2012; World Economic Forum, 2009).

Sustainable packaging has four main criteria (James, Fitzpatrick, Lewis, & Sonneveld, 2005). Firstly, it should add real value to society by effectively containing and protecting products as they move throughout the supply chain and by supporting informed and responsible consumption. Secondly, it should be designed to use materials and energy as efficiently as possible throughout the product life cycle. Thirdly, it should be made up of materials that are cycled continuously through natural or technical systems, so minimizing material degradation and/or the use of upgrading additives. Lastly, it should be made up of components that are safe and non-polluting.

Sustainable warehousing includes activities such as selecting optimum terminal and warehouse location, proper storage and disposal of dangerous materials, pursuing energy-saving initiative, and efforts to create safe working environment for workers (C.R Carter & Jennings, 2000; 2002).

Finally, reverse logistics includes all issues related to source reduction, recycling, substitution, reuse, and disposal of materials (Stock, 1992). Since waste volume grows in parallel to GDP, there is huge potential in addressing the issue of sustainability through increases in the take-up of recycling and reverse logistics activities (World Economic Forum, 2009).

2.3 DRIVERS OF SUSTAINABILITY STRATEGY

This report has identified seven key sustainability drivers which have driven and shaped the sustainability strategy of LSP. Broadly speaking, these drivers represent changing supplies available to businesses, changing demands being placed on businesses and changing rules of the game that businesses need to comply with (see Figure 2).

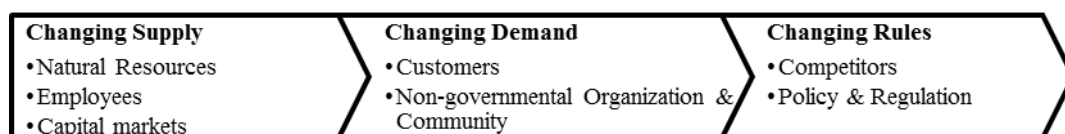


Figure 2 - Seven Drivers of Sustainability

2.3.1 Natural Resources

Sustainability is both influencing and bringing about changes to the critical supplies that LSP relies on to create value. In particular, they are experiencing rising operating costs due to depletion of and heightened competition for Earth's natural resources.

As awareness of climate change increases, more regulations are being developed that will alter the price of carbon at all levels of the local and global economies. China for example, looks likely to commit to a number of ambitious targets, such as its 40 to 45 percent carbon intensity reduction pledge for 2020 (over 2005 levels) and its 15 percent primary energy supply target from nuclear and renewable energy resources (PricewaterhouseCoopers, 2010). These new rules will affect fossil-fuel-based energy and resource pricing and availability, creating a ripple effect throughout a LSP's entire value chain.

The price of attending to sustainability is unfortunately, not cheap. The UN Framework Convention on Climate Change estimates that private sector will need to invest more than US\$600 billion every year through 2030 to stabilize carbon dioxide emissions alone (Lacy, Arnott, & Lowitt, 2009). Nonetheless, there are potentially huge benefits for doing so as well. Many companies have been able to improve their bottom line or gain competitive advantages while attending to sustainability. Maersk's Waste Heat Recovery (WHR) system and slow-steaming for instance, has not only helped reduce fuel consumption and emission but also improves the company's profit (Maersk, 2011; Maersk Line, 2010).

2.3.2 Employees

In the face of global competition for talent, one way for LSP to retain and attract talent is to take sustainability seriously. This is because employees today are more concerned about the companies' efforts to attend to sustainability (Ray & Anderson, 2000).

TNT Express, the global leader in the category for Industrial Goods & Services in Dow Jones Sustainability index, for example found that its connection with World Food Programme has helped to attract applicants for their job offers (The Economist, 2008). In addition, they have also been voted as top employer in France, Germany, Portugal and Italy (TNT, 2012). This was not surprising given that a 2008 study by Aspen Institute's Center for Business Education indicated that 25 percent of the graduates of Master of Business Administration are seeking jobs with the potential to make a contribution to society, up from 15 percent in 2007 (Bronk, 2008).

2.3.3 Capital Market

LSPs are also discovering that the capital markets are focusing on their sustainability initiatives when making stock recommendation and financing decisions. In response, investment houses such as JPMorgan, Citigroup, Morgan Stanley and Credit Suisse, have proactively developed lending guidelines that takes into account sustainability (Equator Principles, 2011).

Sustainability performance is also increasingly being used by investors as an indicator of business performance and a reflection of the quality of management. The Dow Jones Sustainability Index for example, assesses how a company recognizes the risks and opportunities arising from sustainability issues in its business strategy (The Dow Jones Sustainability Indexes, 2010). The Carbon Reporting Project and CERES's Investor Network on Climate Risk, on the other hand, represents the commitment of institutional investors to urge companies to annually publish data about their carbon emission and address sustainability respectively (Carbon Disclosure Project, 2009; CERES, 2010).

2.3.4 Customer

LSPs are also experiencing changes in the demands on the value they provide and the methods they employ to do so. Consumers today are more informed and aware of how sustainability issues can affect their lives. As indicated in a recent worldwide survey, 85 percent of consumers were either 'extremely' or 'somewhat' concerned by climate change and 81 percent thought it would directly impact their lives (World Economic Forum, 2009).

Accordingly, this resulted in changes in their buying behavior. This was revealed in the 2007 BBMG Conscious Consumer Report where 87 percent of consumers would like companies to commit to environmentally friendly practices to support fair labour and trade practices (Bemporad & Baranowski, 2007). Research by the Carbon Trust also found that 64 percent of consumers in United Kingdom are more likely to buy a low-carbon product, and similar trends are seen across much of the European Union (World Economic Forum, 2009). Consequently, retailer, distributors and manufactures are too, demanding their LSP to do likewise (PricewaterhouseCoopers, 2009; Waters, 2010).

While addressing this changing consumer expectation and behavior may be challenging, it also holds the promise of a material impact on companies' growth and bottom line. While there are no clear signs that customers will reward LSP for superior performance in sustainability (e.g. in the

form of price premium), they are starting to separate “the sheep from the goats”. A strong value position on sustainability can thus, serve as a key differentiator and ultimately help secure stronger customer relationships.

2.3.5 Non-governmental Organization (NGO) and Community

Businesses must also answer to an expanding group of stakeholders, including NGOs and the community. All of them have fresh and different demands as well as increasing power to threaten a LSP’s commercial viability.

The development of Information and Communication Technology (ICT) has resulted in NGOs being more successful than ever at rallying public support to hold large corporation accountable for their impact on society and the environment. In the case of Nike, it faced an extensive consumer boycott after the New York Times and other media outlet reported abusive labour practices at some of its Indonesian suppliers in the early 1990 (Porter & Kramer, 2006). More recently, Apple was also being slammed for the poor working conditions at its China supplier’s factory (Kan, 2011).

Well aware of the power of NGOs, many LSPs are finding it worthwhile to establish good relationship or even to collaborate with them. TNT for example, is collaborating with the World Food Programme to fight hunger while DHL, UPS and Agility are working closely with United Nation in distributing humanitarian aids (The Economist, 2008; World Food Program, 2007).

2.3.6 Policy and Regulations

With transport and logistics sector’s energy use projected to grow by an annual rate of 1.9 percent and accounting for 13 percent of greenhouse gas emission worldwide and roughly double that (and growing) in some regions, it does not come as a surprise that there are likely to be more policy and regulations (PricewaterhouseCoopers, 2010; Trilling, 2002).

New regulations and policy on sustainability create winners and losers. While it can disrupt or even destroy existing business models and industry structures, it can also create new market opportunities and help differentiate “the sheep from the goats”. Damco, the logistic arm of the AP Moller-Maersk Group, for example, was able to capitalize on the growing demand of customer with regards to carbon reporting. It introduced several innovative products such as SupplyChain

CarbonDashboard and SupplyChain CarbonCheck™ in response and succeeded in attracting several global companies (Damco, 2009, 2010).

LSPs are also starting to realize the advantage of self-regulation in helping companies preempt government mandates and many have established their own environmental or social guidelines. Apart from preempting government mandates, this helps drive innovation through more indirect incentive-based approaches. At the same time, laggards will be compelled to rise up to the standards set by the collective.

2.3.7 Competitor

A final driver for sustainability strategy is commercial competitiveness or simply what the competitors do. Competitors can alter the rule of game because when competitors are performing well in their sustainability effort, they raise the bar for other players.

With customers starting to place more emphasis on a company's sustainability performance, it is clear that the space for differentiation is becoming increasingly competitive and a myriad of environmental and social initiatives are quickly becoming a standard part of LSP (Maersk Tanker, 2011). LSP must thus, be on toes or risk being abandoned by their customers, employees and stakeholders who in return sought the services of their better-performing competitors.

2.4 THEORETICAL DEVELOPMENT

After understanding sustainable logistics and the various sustainability drivers, it becomes clear that for LSP to succeed in their sustainability strategy, they must address the different needs and priorities of various stakeholder groups. This may be done by seeking their participations during the formulation of sustainability strategy.

Previous literature has claimed many benefits that stakeholders' participation has on the performance of sustainability-related decision (Martin & Sherington, 1997; M. Reed, 2007; M. Reed & Dougill, 2010). For example, Dougill et al. (2006) argued that by taking local interests and concerns into account at an early stage, it may be possible to improve the project design and increase the likelihood that local needs and priorities are successfully met. In addition, Brody (2003), Beierle (2002) and Sultana & Abeyasekera (2008) have empirically evaluated or based on case studies, arrived at similar conclusion where the presence of specific stakeholders greatly increases the quality of local plan.

Nonetheless, attempts to investigate the validity of the claim have been limited (M. S. Reed, 2008; Wagner, 2011) and none was related to the logistics industry. Operating in a different business environment, the effect that stakeholders' participation has on the outcome of sustainability-related decision for LSP may be different as well. Existing evidence however, suggests that participation from different stakeholder groups do correlate, *ceteris paribus*, with the outcome of sustainability strategy.

An important variable likely to mediate the effect of stakeholders' participation on performance of sustainability strategy is the level to which sustainability strategy are integrated with the business strategy of the firm (Burritt & Saka, 2006; Wagner, 2011).

The structure-conduct-performance (SCP) paradigm is relevant when considering mediation by integration in models linking firm's external and internal dimension (Kotler, Berger, & Bickhoff, 2010; Scherer, 1980). The literature stressed that integration is achieved through a process based on tacit capabilities which are difficult to imitate (e.g. business strategy development and quality management activities) in turn making the level of integration correlate to proactivity (Aragón-Correa & Sharma, 2003; Hart, 1995). This suggests integration as a mediator between the stakeholder participation and sustainability performance. The theoretical model postulated is shown in Figure 3.

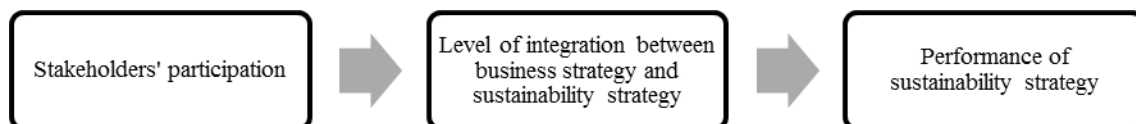


Figure 3 - Theoretical Model

2.4.1 Link between Stakeholders' participation & Integration

As concerning stakeholders' participation, existing literature has suggested various stakeholder typologies. Henriques and Sadorsky (1999) developed four stakeholder categories, namely regulatory, organizational, community and mass media, out of 12 individual stakeholders. On the other hand, Buysse and Verbeke (2003) grouped 14 individual stakeholders into four stakeholder categories, namely regulatory, external primary, internal primary and secondary stakeholders. Murillo-Luna, Garcés-Ayerbe, and Rivera-Torres (2008), instead, identified five stakeholder categories out of again 14 individual stakeholders and they are corporate government, internal economic, external economic, regulatory and external social stakeholders. Superimposing the above three categorization schemes, Wagner (2011) came out with four stakeholders categories,

namely internal, regulatory, value chain and public stakeholders. This paper will adopt the four stakeholders categories identified by Wagner (2011).

A firm's action is typically driven by stakeholders. Stakeholders' participation in sustainability-related decision-making process may thus affect the level to which sustainability issues are integrated with the business strategy. Since internal and value chain stakeholders are concerned about the firm's profitability and survivability, their participation in decision-making process should lead to higher degree of integration between LSP's business strategy and sustainability strategy. Unlike internal and value chain stakeholders, regulatory and public stakeholders are more concerned about whether the firm's operation harms the environment and/or society. Nonetheless, their participation in decision-making process is also likely to lead to higher degree of integration between LSP's business strategy and sustainability strategy.

Thus, the following hypotheses are proposed:

H1 – LSP's internal stakeholder's participation positively correlates with the level of integration between LSP's business strategy and sustainability strategy

H2 – LSP's value chain stakeholder's participation positively correlates with the level of integration between the LSP's business strategy and sustainability strategy

H3 – LSP's regulatory stakeholder's participation positively correlates with the level of integration between LSP's business strategy and sustainability strategy

H4 - LSP's public stakeholder's participation positively correlates with the level of integration between LSP's business strategy and sustainability strategy

2.4.2 Link between Integration and Performance

While there is no empirical research available concerning the link between integration and performance in the case of LSP, literature suggests that a positive correlation exist.

Boston (2010), for example, pointed out that sustainability of and by itself is not completely sustainable unless it is developed within a business context. Similarly, Kaplan and Norton (2001) noted that different strategies coming from different function of an organization can become a barrier to strategy implementation. Burke and Logsdon (1996) and Carroll and Hoy (1984) also stressed the importance for sustainability policies to be related to a company's business strategy.

The only empirical study done, as far as the author is concerned, is by Wagner (2011) who surveyed companies from varying industries to understand the link between integration and environment performance. This study is by far, the most relevant to the topic and provided cursory indication of a possible positive link between a LSP's level of integration between business strategy and sustainability strategy, and its sustainability performance.

The following hypothesis is thus proposed:

H5 - Level of integration between LSP's business strategy and sustainability strategy positively correlates with the performance of their sustainability strategy

A good measure of sustainability performance is the extent to which benefits are being enjoyed by the firm as a result of sustainability strategy. Some of these benefits include advantage in employees recruitment and retention, cost savings, corporate image and relationship, new market opportunities and improved customer loyalty (Bemporad & Baranowski, 2007; Berthon, Abood, & Lacy, 2010; Berthon, et al., 2008; Bronk, 2008; Maersk, 2011; Maersk Line, 2010). Since these benefits may be enjoyed at different time span, it would also be meaningful to differentiate the extent of benefits enjoyed at both short (≤ 1 year) and long (>1 year) term (Davis, 1973; Steiner, 1980).

A summary of the hypotheses and the link between each construct is shown in Figure 4.

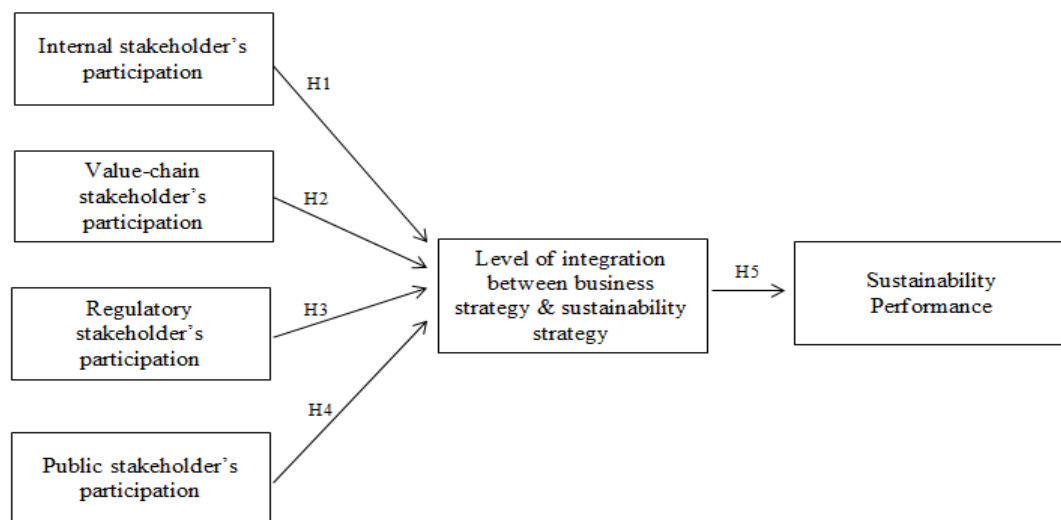


Figure 4 - Hypothesized Relationships

CHAPTER 3: METHODOLOGY

3.1 SURVEY DESIGN

In order to design and validate an appropriate survey instrument, a desk research on literature and relevant sources, such as market reports and company databases, was undertaken. A thorough desk research was helpful in identifying options and measures for the respective constructs. Based on the desk research, an initial survey instrument was created.

The initial survey instrument was reviewed by two industry experts for content validity, clarity and understandability. One of industry experts is the Global Head of Sustainability of a world's leading logistic service provider while the other is an experienced professional who has served as Senior Vice-President in one of the leading shipping lines. Feedbacks obtained through the reviews were taken into consideration and modifications were made accordingly. A summary of the source of the measures for each of the constructs may be found in Table 1.

A continuous scale from 1.0 – 5.0 was adopted in the survey because of its suitability for the statistical method chosen. The scale of 1.0 represent “least extent” while 5.0 for “very large extent”. Likert-type scales were not used because data collected would not be normally distributed and full information maximum likelihood estimation may not be able recover the parameters of models estimated on such data (D. Kaplan, 2000). In addition, the categorization may also unduly affect standard errors and test statistics (D. Kaplan, 2000). The survey instrument is shown in Appendix A.

3.2 SAMPLE

After finalizing the main survey instrument, a population set comprising of about 440 member companies were obtained from the Singapore Logistics Association online directory (Accessed on 14 September 2011). Disregarding duplicated contacts, a total of 394 companies were selected. 200 shipping companies listed in World Shipping Directory (Accessed on 12 October 2011) were also included. The sample companies were largely international companies and only one representative were chosen from each companies. The chosen respondents were mainly manager directly in-charge of sustainability, Corporate Social Responsibility or Health, Safety, Security and Environment (HSSE). If such person could not be identified, other senior managers such as the Chief Executive Officer and Managing Directors were chosen.

Table 1 - Construct, item, measure and related literature

Construct/ Item	Measures	Source	
Stakeholder Groups			
S1	Internal Stakeholders	Board of directors	Berthon, Abood & Lacy (2010)
S2		Employees	Berton, Lowitt & Hoffman (2008); Berthon, Abood & Lacy (2010)
S3	Value Chain Stakeholders	Suppliers	Berthon, Abood & Lacy (2010)); Wagner (2011)
S4		Competitor	Wagner (2011)
S5		Customers	Berton, Lowitt & Hoffman (2008); Berthon, Abood & Lacy (2010); Wagner (2011)
S6		Financial institution	Berton, Lowitt & Hoffman (2008)
S7		Insurance companies	Wagner (2011)
S8	Regulatory stakeholders	Governments	Berthon, Abood & Lacy (2010); Wagner (2011)
S9		Regulators	Berthon, Abood & Lacy (2010)
S10	Public	Communities	Berthon, Abood & Lacy (2010)
S11		NGOS	Berthon, Abood & Lacy (2010)
S12		Media	Berton, Lowitt & Hoffman (2010); Wagner (2011)
Integration			
I1	These issues are fully embedded into the strategy and operation of my company.		Berton, Lowitt & Hoffman (2010)
I2	My company’s board discusses and acts on these issues as part of its agenda.		Berton, Lowitt & Hoffman (2010)
I3	My company incorporates these issues into discussions with financial analysts		Berton, Lowitt & Hoffman (2010)
I4	Internal management communicates frequently about sustainability goals and priorities.		Pagell, 2004
I5	Formal meetings are routinely scheduled among various department to discuss about these issues.		Pagell, 2004
I6	These issues were taken into account during employee performance appraisal.		
Performance			
P1	Better employees recruitment and retention		Berton, Lowitt & Hoffman (2008); Bronk (2008); Berthon, Abood & Lacy (2010)
P2	Cost savings		Maersk (n.d)
P3	Improved corporate image and relationship with stakeholders		Berton, Lowitt & Hoffman (2008, 2010)
P4	New market opportunities (e.g. Attract new customer & ability to enter new market)		Carbon Trust Survey (2006); Bemporad & Baranowski (2007)
P5	Improved customer loyalty		Maersk Line (2010)
Time			
T1	Short Term		Davis (1973); Steiner (1980)
T2	Long Term		Davis (1973); Steiner (1980)

Due to the perceptual nature of the study, there is, inevitably, possibility of biasness from respondents. In order to reduce the likelihood and extent of biasness, anonymity of response was emphasized. Respondents were also informed that their response will be combined with others and will never be linked to them or their company. To further increase the confidence and provide assurance to the respondents, direct contact number and email address of the author were made available to them.

An online survey was adopted for data collection because of its convenience for the respondents and due to cost consideration. The survey was created via online survey site. An invitation email was sent out to the representative of the company on 19 September 2011. 3 reminder emails were sent out subsequently between October and December 2011, at an interval on 1 month. A sample of the invitation and reminder email is available in Appendix B and C respectively.

The low response rate triggered the need to expand the sample size. Accordingly, 90 working professionals from the Master of Science (Maritime Studies), Nanyang Technological University, were surveyed using printed questionnaires similar to the online version on 16 October 2011. Only 30 of these surveys were taken into consideration after eliminating those which were of unrelated sectors and removing duplicated response from same company by selecting the one holding position most relevant to sustainability or by seniority of position.

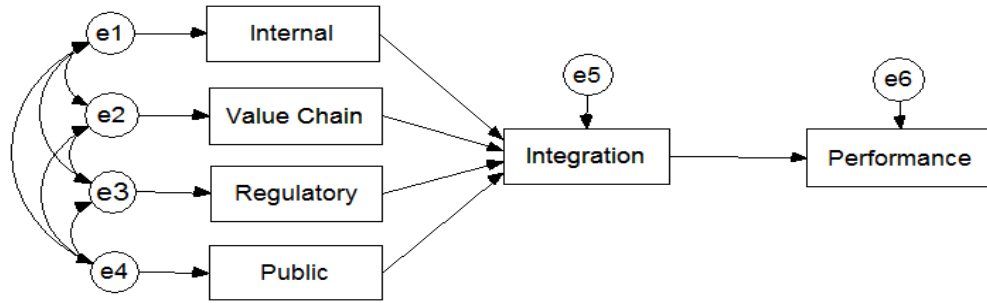
Table 2 - Profile of survey respondents

		No. of firms	%
Annual Turnover	<S\$250k	1	1.0
	S\$250K- S\$500K	4	4.2
	S\$501K- 1 Million	5	5.2
	1+ Million – 5 Million	17	17.7
	5+ Million – 20 Million	16	16.7
	20+ Million – 50 Million	6	6.3
	50+ Million – 100 Million	10	10.4
	>100 Million	37	38.5
No. of Employees	<10	4	4.2
	10 to 25	10	10.4
	26- 50	14	14.6
	51-100	7	7.3
	101-250	10	10.4
	>250	51	53.1
Sector	Container	8	8.3
	Tanker	12	12.5
	Bulk	11	11.5
	Logistics	45	46.9
	Not Specified	20	20.8

66 companies out of the 594 responded to the online survey representing a response rate of 11.1%. With the 30 surveys collected from the working professionals in the Master program, a total of 96 responses were collected. The profile of the survey respondents is shown in Table 2.

CHAPTER 4: FINDINGS & DISCUSSION

Analyses by Structural Equation Modeling were carried out with SPSS AMOS. Full information maximum likelihood estimation of the parameter was carried out using survey data as input. The measurement model is presented in Figure 5 and the analysis summary may be found in Appendix D (short term benefits) and E (long term benefits).



** Not e1 – e6 represents random error/ noise*

Figure 5 - Overall structural equation model

4.1 MODEL FIT

Evaluation of the model was done through chi-square test, Root Mean Square Error of Approximation (RMSEA), Goodness-of-fit index (GFI) and Normed Fit Index (NFI). The chi-square test is an absolute test of model fit: if the probability value (P) is below 0.05, the model is rejected (James Arbuckle & Wothke, 2001). In this case, the probability value is much higher at 0.218 and 0.121 respectively. The other measures of fit such as RMSEA, GFI and NFI are descriptive. Steiger & Lind (1980) recommended RMSEA to be less than 0.1 and in this model, the RMSEA is 0.068 and 0.093. Therefore, there is adequate fit. This is also supported by the GFI value of 0.981 and 0.976 and NFI of 0.945 and 0.935. Hence, it is concluded that the model fits the data reasonably well.

With regards to reliability of the constructs, the Cronbach's α is used. Nunnally (1978) recommended that a minimum value of 0.70 is acceptable for existing scales and a value of 0.60 is appropriate for newly developed scales. For this model, the Cronbach's α for integration, short term benefits and long term benefits are much higher at 0.837, 0.707 and 0.828 respectively. Therefore, the scales are good measures of the respective constructs.

4.2 STRUCTURAL MODEL & HYPOTHESIS TESTING

The results from evaluation of the structural model are presented in Figure 6, Figure 7 and Table 3. Firstly, from both the structural model in Figure 6 and 7, it can be seen that the standardized path coefficient from internal stakeholders to integration is significant (0.370; $p < 0.001$). Thus, internal stakeholders' participation does positively correlates with level of integration, lending support to H1. As pointed out by one of the survey reviewers, this may be because when there is high level of participation from internal stakeholders, they are likely to take ownership of the sustainability program and be willing to go the extra-mile to ensure its success. Another possibility is that strong participation from internal stakeholder may be a reflection of an intrinsically motivated company, where employees and board members have interest in sustainability effort. Regardless the case, high level of participation from internal stakeholders is likely to lead to better integration between business strategy and sustainability strategy.

The standardized path coefficient from value chain stakeholders to integration is also statistically significant, but less strong with $p = 0.003$ and a path coefficient of 0.289. This lends support to H2 where value chain stakeholders' participation positively correlates with level of integration. This correlation may be explained by Operant Conditioning. Value chain stakeholders have the ability to provide "reinforcers" and "punishments" to LSP. They may withdraw partnership in cases of non-compliant or provide more business opportunities in exchange for compliant with their sustainability requirements. As such, high participation from value chain stakeholders will result in LSP placing more emphasis on their sustainability strategy and ensure better integration with business strategy.

The standardized path from regulatory stakeholders to integration is, however, not found to be significant ($p = 0.846$). Thus, no support for H3 was found. In fact, there may be a negative correlation as pointed out by the survey reviewers. This is because request from regulatory stakeholders may be taken to be mandatory and resources may be used to ensure compliance of such request rather than on other aspect that enhances integration.

Similarly, the standardized path from public stakeholders to integration is also not statistically significant ($p = 0.440$), and thus no support for H4 is demonstrated. This may be explained by the fact that logistics is a business-to-business industry and have little visibility to the public (Eccles, Ioannou, & Serafeim, 2012). Public stakeholders which include communities, public and media generally do not directly interfere or participate in how LSP operates, and thus, do not affect the

level of integration between business strategy and sustainability strategy. It is, however, possible that their influence is indirect, working through business-to-consumer businesses, which are among the value-chain stakeholders of LSP.

With regard to the level of integration and performance, the standardized path coefficients for both short (≤ 1 year) and long term (> 1 year) are significant. The standardized path coefficient for short term (≤ 1 year) is 0.524 with $P < 0.001$. The standardized path coefficient for long term (> 1 year) is 0.568 with $P < 0.001$. The results provided fresh and new empirical support to the comments and views of Boston (2010), Burritt & Saka (2006) and those expressed in the UN Global Compact – Accenture CEO study (2010). They have previously concluded that integration between business strategy and sustainability strategy will lead to better sustainability performance, although there was no empirical evidence and they did not focus on specific industry. Table 3 provides a summary of the integration between business hypotheses.

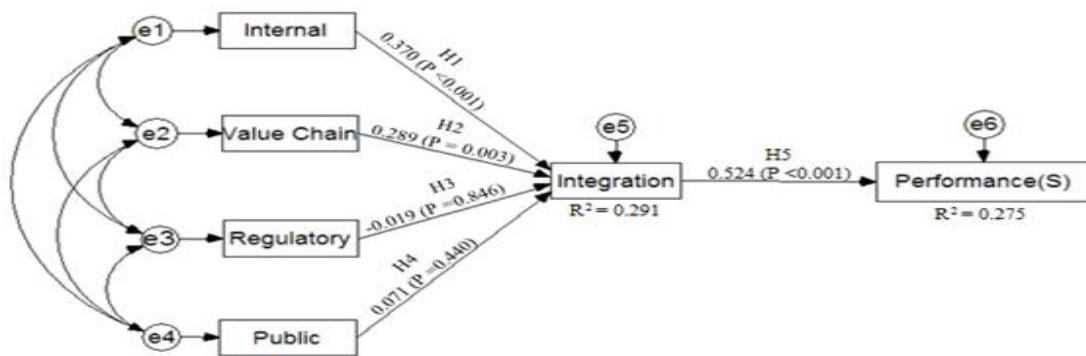


Figure 6 - Estimates of structural model (Short Term Benefits)

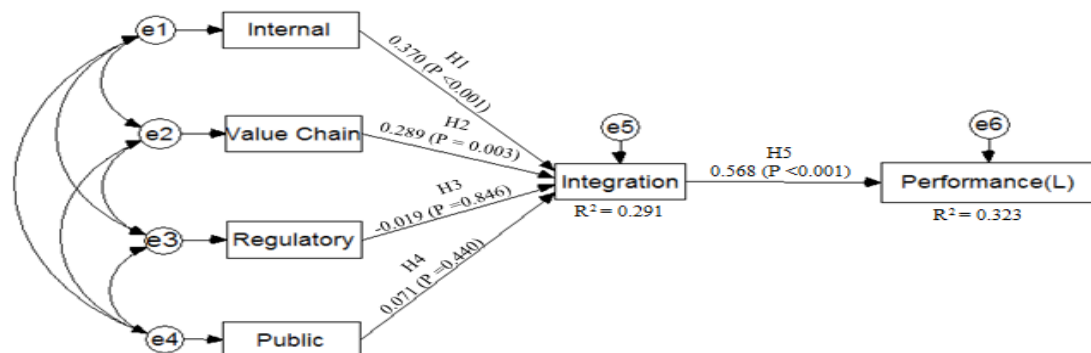


Figure 7 - Estimates of structural model (Long Term Benefits)

Table 3 - Summary of hypotheses testing

H1	Internal stakeholder's participation → Level of integration	Supported
H2	Value Chain stakeholder's participation → Level of integration	Supported
H3	Regulatory stakeholder's participation → Level of integration	No support
H4	Public stakeholder's participation → Level of integration	No support
H5	Level of integration → Sustainability performance	Supported

The coefficient of determination, R^2 , of the model is 0.275 and 0.323 respectively. This is an acceptable range for this model because a LSP's level of integration between business strategy and sustainability strategy, and sustainability performance depends on other factors such as business environment, political development and technological advancement too. However, since these factors are largely not within the control of the LSP, they are not being considered in this model.

Table 4 - Standardized total effects

	Internal Stakeholders	Value Chain Stakeholders	Integration
Integration	.370	.289	.000
Performance (Short term)	.194	.151	.524
Performance (Long term)	.210	.164	.568

The standardized total effects of each variable on the resulting variable are shown in the Table 4. As can be seen, participation from internal stakeholders has a greater effect on the level of integration than participation from value chain stakeholders. It is also noted that the effect of participation from internal and value chain stakeholders on sustainability performance are greater over the long term analysis than the short term analysis. Similarly, the effect of integration between business strategy and sustainability strategy on sustainability performance is stronger over the long term analysis. This seems to suggest that sustainability effort pays off better over the long run.

4.3 IMPLICATIONS

The findings from this research have important implications for both managers of LSP and public officials.

By understanding that participation from internal and value chain stakeholder correlates positively with level of integration between business strategy and sustainability strategy, and that

the level of integration positively affects sustainability performance, managers of LSP can adjust their efforts to achieve more desirable outcome. Apart from generic stakeholder's analysis where managers identify the priorities of different stakeholder groups, they may want to do more. This may be in the form of better communication of sustainability effort, such as having focus group discussion or the use of Delphi techniques involving internal and value chain stakeholders to better understand and analyze their needs and opinions.

To encourage internal stakeholder's participation, top-down commitment is also important as it helps signal organizational focus on sustainability effort. Reward and promotion systems may also be used to recognize those people who achieve, or help to achieve, sustainability objectives (International Institute for Sustainable Development, 1994). On the other hand, value chain stakeholder's participation may be enhanced by developing a "collaborative partnership". This means that managers of LSP should work closely with their value chain stakeholders to create win-win situation instead of trying to meet or set stringent requirements which may affects profitability. By working together to achieve sustainability objectives, managers of LSP can help value chain stakeholders appreciate the need for such actions and ensure better coordination and alignment of strategies.

Since the effect of stakeholder's participation and level of integration between business strategy and sustainability strategy on sustainability performance are stronger over the long run, managers must avoid being short-sighted and should recognize that sustainability effort may not pay off immediately. In fact, sustainability efforts often entail short-term costs and will only pay off in the long run (Davis, 1973; van Marrewijk, 2003). Therefore, in selecting sustainability project, managers must consider not just the returns on investment but also the strategic factors (Mansdorf, 2010). Some projects may not have as good return as other competing projects, but they are considered strategic and critical to the long-term success of the business. In fact, Maersk Line has admitted that CSR and sustainability decisions can increase ship's operating cost but investors are impressed (IHS Fairplay, 2011). Thus, a comprehensive cost-benefit analysis that takes into accounts both financial and strategic factors over the long run should be used to assess sustainability investment.

As regards to public officials, they may want to avoid direct interference with sustainability strategy formulation process. They should, instead, focus on changing social expectations about what LSP should and should not do. When all stakeholders understand the need for sustainability,

they will differentiate ‘the sheep from the goats’. This will provide additional motivation for LSPs and make their quest for sustainability more rewarding and meaningful.

Similarly, when attempting to promote sustainability in the logistics industry, public officials may target some programs at its value chain stakeholders. Such program may include tax schemes to encourage sustainability from LSP’s customer and requirements for responsible lending by banks. When value chain stakeholders become interested in sustainability effort, they would require LSP to do likewise and will increase their participation in the formulation process, leading to better integration between business strategy and sustainability strategy and thus, better sustainability performance.

CHAPTER 5: CONCLUSION & RECOMMENDATION

Focusing upon an industry sector with a highly uncertain environment, this study contributes in several ways.

Firstly, unlike prior research, this paper provides a more differentiated understanding of the relationship between stakeholder's participation and sustainability performance, and how this is shaped by the level of integration between business strategy and sustainability strategy, in the case of logistics service providers (LSP). It is perhaps, the first study that empirically evaluates the relationships between these constructs in the case of LSP.

Secondly, the findings of this study shed light on what managers of LSP can do to achieve better sustainability performance. They should focus on generating interest, seeking involvement from internal stakeholders and collaborating with value chain stakeholders. They should also avoid being short-sighted and recognize that sustainability effort may take time to pay off. In selection of sustainability project, both strategic factors and financial returns should be considered.

Thirdly, by understanding the correlations, public official will be able to craft adequate policy initiatives and regulation. They should avoid direct interference with LSP's sustainability formulation process and instead, focus on changing social expectations about what LSP should and should not do.

Regarding research limitation, even after several attempts, efforts to increase the number of survey responses were futile. Nevertheless this sample size allows for a degree of confidence in expanding from the study finding, and thereby has fulfilled the research objective.

In addition, there may also be limitation due to nature of the method adopted. Surveys data are subjected to limitation such as the perceptual nature of the factors used to assess the various constructs, the possibility of mono-respondent bias and other common variance present in other empirical research studies. Similar to most studies, this study surveyed key personnel from individual companies, who are generally capable of such assessment. While this may be a potential limitation, it is also an opportunity for future research. In future, a broader respondent base within the organization may be used to allow researcher to identify and analyze the difference in opinions between senior management and junior employees.

Future research may also be done to explain the mechanism through which participation from various stakeholders group affects level of integration and hence outcome, which is not the focus of this paper. Other areas of focus include identification of other potential moderators and mediators such as company size, company's origin and location, and exploring the type of benefits associated with participation from the respective stakeholder group.

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APPENDIX A – SURVEY INSTRUMENT

Sustainability Strategy

Introduction



Thank you for participating in this short survey.

There are in total 7 questions and will only take you about 10 minutes to complete.

For the purpose of this survey, sustainability may be defined in a broad base contextual integration of economic, environmental and social characteristics. Sustainability-related issues may thus include, but are not limited to, Health, Safety, Security, Environment (HSSE) and Corporate Social Responsibility (CSR) policy.

Please be assured that data collected will remain confidential and will purely be used for academic research.

Sustainability Strategy

Sustainability Questions

For this page, you may input any value between 1.0 and 5.0 inclusive, for the options. 1.0 would represent "least extent" while 5.0 for "very large extent".

* 1. To what extent are the following groups of stakeholders involved in the planning or implementing of sustainability-related policy?

Internal (e.g. Board of directors & Employees)	<input type="text"/>
Value Chain (e.g. Suppliers, Customer, Financial Institution, Insurance Company & Competitor)	<input type="text"/>
Regulatory (e.g. Government & Regulators)	<input type="text"/>
Public (e.g. Communities, Non-Governmental Organization & Media)	<input type="text"/>

* 2. To what extent do you agree with each of the following statements about sustainability-related issues?

These issues are embedded into the strategy and operation of my company.	<input type="text"/>
My company's board discusses and acts on these issues as part of its agenda.	<input type="text"/>
My company incorporates these issues into discussions with financial analysts	<input type="text"/>
Internal management communicates frequently about sustainability goals and priorities.	<input type="text"/>
Formal meetings are routinely scheduled among various department to discuss about these issues.	<input type="text"/>
These issues were taken into account during employee performance appraisal.	<input type="text"/>

* 3. To what extent are these benefits being enjoyed by your company in the short term (≤ 1 year) as a result of implementing sustainability-related policy?

Better employees recruitment and retention	<input type="text"/>
Cost-saving	<input type="text"/>
Improved corporate image & relationship with stakeholders	<input type="text"/>
New market opportunities (e.g. Attract new customers & ability to enter new market)	<input type="text"/>
Improved customer loyalty	<input type="text"/>

* 4. To what extent are these benefits being enjoyed by your company in the long term (> 1 year) as a result of implementing sustainability-related policy?

Better employees recruitment and retention	<input type="text"/>
Cost-saving	<input type="text"/>
Improved corporate image & relationship with stakeholders	<input type="text"/>
New market opportunities (e.g. Attract new customers & ability to enter new market)	<input type="text"/>
Improved customer loyalty	<input type="text"/>

Sustainability Strategy

Profiling

Please select the option that best describe your company

5. Annual Turnover

- ☐ <S\$250k
- ☐ S\$250K- S\$500K
- ☐ S\$501K- 1 Million
- ☐ 1 Million – 5 Millions
- ☐ 5+ Million – 20 Million
- ☐ 20+ Million – 50 Million
- ☐ 50+ Million – 100 Million
- ☐ >100 Million

6. No. of Employees

- ☐ <10
- ☐ 10-25
- ☐ 26- 50
- ☐ 51-100
- ☐ 101-250
- ☐ >250

7. Others

Position:

Company:

APPENDIX B – SURVEY INVITATION (EMAIL)

Dear Mr. [First Name],

Re: Invitation to participate in Sustainability Strategy Survey

I am from Nanyang Technological University (Singapore) and am currently doing a research project on Sustainability Strategy in the case of Logistics Service Provider. This project seeks to understand how participation of various stakeholders affects the outcome of sustainability-related project. As such, you are invited to participate in this survey. Your input could potentially help shape the future of the logistics and maritime industry.

Here is the link to the survey:

<https://www.surveymonkey.com/s/BP2QMPW>

It will only take a few moments of your time and all information collected will purely be used for academic purpose. Your response will be combined with others, and will never be linked with you or your company.

Should you have any suggestions or queries, you may contact me at +65 9xxxxxxx (GMT +8) or limj0109@e.ntu.edu.sg

Thanks for your participation!

Best Regards,

Lim Jun Ming



Lim Jun Ming | Researcher | School of Civil and Environmental Engineering
Nanyang Technological University | N1, 50 Nanyang Avenue, Singapore 639798
Tel: +65 9xxxxxxx GMT+8h | Email: limj0109@e.ntu.edu.sg | Web: www.ntu.edu.sg

APPENDIX C – SURVEY REMINDER (EMAIL)

Dear Mr. [First Name],

Re: Reminder to participate in Sustainability Strategy Survey

I am from Nanyang Technological University (Singapore) and have previously sent out an invitation email seeking your participation in a survey on Sustainability Strategy. However, due to your busy schedule, you may have overlooked this. Thus, I am sending this reminder hoping that you could participate in this short survey. Your input could potentially help shape the future of the logistics and maritime industry.

Here is the link to the survey:

<https://www.surveymonkey.com/s/BP2QMPW>

It will only take a few moments of your time and all information collected will purely be used for academic purpose. Your response will be combined with others, and will never be linked with you or your company.

Should you have any suggestions or queries, you may contact me at +65 9xxxxxxx (GMT +8) or limj0109@e.ntu.edu.sg

Thanks for your participation!

Best Regards,

Lim Jun Ming



Lim Jun Ming | Researcher | School of Civil and Environmental Engineering
Nanyang Technological University | N1, 50 Nanyang Avenue, Singapore 639798
Tel: +65 9xxxxxxx GMT+8h | Email: limj0109@e.ntu.edu.sg | Web: www.ntu.edu.sg

APPENDIX D - ANALYSIS SUMMARY (SHORT TERM)

Title

FYP diagram: Friday, February 03, 2012 09:38 PM

Groups

Group number 1 (Group number 1)

Notes for Group (Group number 1)

The model is recursive.

Sample size = 96

Variable Summary (Group number 1)

Your model contains the following variables (Group number 1)

Observed, endogenous variables

Value Chain

Regulatory

Public

Internal

Integration

Performance

Unobserved, exogenous variables

e2

e3

e4

e1

e5

e6

Variable counts (Group number 1)

Number of variables in your model: 12

Number of observed variables: 6

Number of unobserved variables: 6

Number of exogenous variables: 6

Number of endogenous variables: 6

Parameter summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	6	0	0	0	0	6
Labeled	0	0	0	0	0	0
Unlabeled	5	6	6	0	0	17
Total	11	6	6	0	0	23

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	21
Number of distinct parameters to be estimated:	17
Degrees of freedom (21 - 17):	4

Result (Default model)

Minimum was achieved
Chi-square = 5.754
Degrees of freedom = 4
Probability level = .218

Group number 1 (Group number 1 - Default model)

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
Integration	<---Internal	1.600	.398	4.021	.000	
Integration	<---ValueChain	1.204	.410	2.940	.003	
Integration	<---Regulatory	-.085	.437	-.194	.846	
Integration	<---Public	.282	.366	.770	.441	
Performance	<---Integration	.358	.060	6.000	.000	

Standardized Regression Weights: (Group number 1 - Default model)

		Estimate
Integration	<--- Internal	.370
Integration	<--- Value Chain	.289
Integration	<--- Regulatory	-.019
Integration	<--- Public	.071
Performance	<---- Integration	.524

Covariances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
e4 <--> e1	.124	.145	.855	.393	
e2 <--> e4	.366	.155	2.360	.018	
e2 <--> e1	.337	.143	2.353	.019	
e3 <--> e4	.383	.145	2.637	.008	
e3 <--> e1	-.153	.130	-1.178	.239	
e2 <--> e3	.466	.142	3.269	.001	

Correlations: (Group number 1 - Default model)

	Estimate
e4 <--> e1	.088
e2 <--> e4	.250
e2 <--> e1	.249
e3 <--> e4	.281
e3 <--> e1	-.122
e2 <--> e3	.356

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
e2	1.406	.204	6.892	.000	
e3	1.217	.177	6.892	.000	
e4	1.527	.222	6.892	.000	
e1	1.305	.189	6.892	.000	
e5	17.313	2.512	6.892	.000	
e6	8.240	1.196	6.892	.000	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Internal	.000
Public	.000
Regulatory	.000
Value Chain	.000
Integration	.291
Performance	.275

Matrices (Group number 1 - Default model)

Total Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	1.600	.282	-.085	1.204	.000
Performance	.572	.101	-.030	.431	.358

Standardized Total Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.370	.071	-.019	.289	.000
Performance	.194	.037	-.010	.151	.524

Direct Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	1.600	.282	-.085	1.204	.000
Performance	.000	.000	.000	.000	.358

Standardized Direct Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.370	.071	-.019	.289	.000
Performance	.000	.000	.000	.000	.524

Indirect Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.000	.000	.000	.000	.000
Performance	.572	.101	-.030	.431	.000

Standardized Indirect Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.000	.000	.000	.000	.000
Performance	.194	.037	-.010	.151	.000

Minimization History (Default model)

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	1		-.003	9999.000	80.784	0	9999.000
1	e	0	13.739		.640	17.587	18	.859
2	e	0	9.842		.430	8.084	1	.767
3	e	0	11.585		.148	5.828	1	1.104
4	e	0	12.326		.031	5.754	1	1.029
5	e	0	12.353		.001	5.754	1	1.002
6	e	0	12.353		.000	5.754	1	1.000

Model Fit Summary**CMIN**

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	17	5.754	4	.218	1.439
Saturated model	21	.000	0		
Independence model	6	104.251	15	.000	6.950

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.208	.981	.899	.187
Saturated model	.000	1.000		
Independence model	2.109	.707	.590	.505

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.945	.793	.983	.926	.980
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.267	.252	.261
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	1.754	.000	12.382
Saturated model	.000	.000	.000
Independence model	89.251	60.558	125.435

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.061	.018	.000	.130
Saturated model	.000	.000	.000	.000
Independence model	1.097	.939	.637	1.320

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.068	.000	.181	.327
Independence model	.250	.206	.297	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	39.754	42.459	83.348	100.348
Saturated model	42.000	45.341	95.851	116.851
Independence model	116.251	117.205	131.637	137.637

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.418	.400	.530	.447
Saturated model	.442	.442	.442	.477
Independence model	1.224	.922	1.605	1.234

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	157	220
Independence model	23	28

Execution time summary

Minimization: .010
 Miscellaneous: .064
 Bootstrap: .000
 Total: .074

APPENDIX E - ANALYSIS SUMMARY (LONG TERM)

Title

FYP diagram: Saturday, February 04, 2012 01:57 PM

Groups

Group number 1 (Group number 1)

Notes for Group (Group number 1)

The model is recursive.

Sample size = 96

Variable Summary (Group number 1)

Your model contains the following variables (Group number 1)

Observed, endogenous variables

Value Chain

Regulatory

Public

Internal

Integration

Performance

Unobserved, exogenous variables

e2

e3

e4

e1

e5

e6

Variable counts (Group number 1)

Number of variables in your model: 12

Number of observed variables: 6

Number of unobserved variables: 6

Number of exogenous variables: 6

Number of endogenous variables: 6

Parameter summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	6	0	0	0	0	6
Labeled	0	0	0	0	0	0
Unlabeled	5	6	6	0	0	17
Total	11	6	6	0	0	23

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	21
Number of distinct parameters to be estimated:	17
Degrees of freedom (21 - 17):	4

Result (Default model)

Minimum was achieved
 Chi-square = 7.305
 Degrees of freedom = 4
 Probability level = .121

Group number 1 (Group number 1 - Default model)

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
Integration	<---Internal	1.600	.398	4.021	.000	
Integration	<---ValueChain	1.204	.410	2.940	.003	
Integration	<---Regulatory	-.085	.437	-.194	.846	
Integration	<---Public	.282	.366	.770	.441	
Performance	<---Integration	.423	.063	6.728	.000	

Standardized Regression Weights: (Group number 1 - Default model)

		Estimate
Integration	<--- Internal	.370
Integration	<--- Value Chain	.289
Integration	<--- Regulatory	-.019
Integration	<--- Public	.071
Performance	<---- Integration	.568

Covariances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
e4 <--> e1	.124	.145	.855	.393	
e2 <--> e4	.366	.155	2.360	.018	
e2 <--> e1	.337	.143	2.353	.019	
e3 <--> e4	.383	.145	2.637	.008	
e3 <--> e1	-.153	.130	-1.178	.239	
e2 <--> e3	.466	.142	3.269	.001	

Correlations: (Group number 1 - Default model)

	Estimate
e4 <--> e1	.088
e2 <--> e4	.250
e2 <--> e1	.249
e3 <--> e4	.281
e3 <--> e1	-.122
e2 <--> e3	.356

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
e2	1.406	.204	6.892	.000	
e3	1.217	.177	6.892	.000	
e4	1.527	.222	6.892	.000	
e1	1.305	.189	6.892	.000	
e5	17.313	2.512	6.892	.000	
e6	9.179	1.332	6.892	.000	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Internal	.000
Public	.000
Regulatory	.000
Value Chain	.000
Integration	.291
Performance	.323

Matrices (Group number 1 - Default model)

Total Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	1.600	.282	-.085	1.204	.000
Performance	.677	.119	-.036	.510	.423

Standardized Total Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.370	.071	-.019	.289	.000
Performance	.210	.040	-.011	.164	.568

Direct Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	1.600	.282	-.085	1.204	.000
Performance	.000	.000	.000	.000	.423

Standardized Direct Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.370	.071	-.019	.289	.000
Performance	.000	.000	.000	.000	.568

Indirect Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.000	.000	.000	.000	.000
Performance	.677	.119	-.036	.510	.000

Standardized Indirect Effects (Group number 1 - Default model)

	Internal	Public	Regulatory	Value Chain	Integration
Integration	.000	.000	.000	.000	.000
Performance	.210	.040	-.011	.164	.000

Minimization History (Default model)

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	1		-.003	9999.000	87.997	0	9999.000
1	e	0	13.143		.665	19.933	18	.863
2	e	0	9.842		.462	10.806	1	.667
3	e	0	11.585		.157	7.488	1	1.127
4	e	0	12.326		.041	7.306	1	1.053
5	e	0	12.353		.004	7.305	1	1.007
6	e	0	12.353		.000	7.305	1	1.000

Model Fit Summary**CMIN**

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	17	7.305	4	.121	1.826
Saturated model	21	.000	0		
Independence model	6	112.297	15	.000	7.486

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.217	.976	.874	.186
Saturated model	.000	1.000		
Independence model	2.451	.686	.561	.490

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.935	.756	.969	.873	.966
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.267	.249	.258
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	3.305	.000	15.043
Saturated model	.000	.000	.000
Independence model	97.297	67.285	134.794

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.077	.035	.000	.158
Saturated model	.000	.000	.000	.000
Independence model	1.182	1.024	.708	1.419

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.093	.000	.199	.206
Independence model	.261	.217	.308	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	41.305	44.009	84.899	101.899
Saturated model	42.000	45.341	95.851	116.851
Independence model	124.297	125.251	139.683	145.683

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.435	.400	.558	.463
Saturated model	.442	.442	.442	.477
Independence model	1.308	.992	1.703	1.318

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	124	173
Independence model	22	26

Execution time summary

Minimization: .010
 Miscellaneous: .060
 Bootstrap: .000
 Total: .070