

Buyer Preferences for Outsourced Logistics Services (3PL)

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ABSTRACT

Most work on supply chain design begins with cost, delivery time, quality and efficiency and frequently ignores the human factor interacting with that decision. In this study we explore the relative importance of various supply chain product components to reveal the decision-making trade-off that occurs when buyers select an outsourced service provider. Our research approach overcomes many of the limitations seen in prior studies that rely on simple rankings by survey respondents by identifying directly the customer's utility for different service provider attributes. The results confirm the importance of various performance-level attributes and point us towards a new set of higher order capabilities based on professionalism and proactive innovation.

Keywords: buyer preferences, logistics services, Best-worst Experiment, decision making,

INTRODUCTION

Panellists at a recent Wharton Global Forum (8-9 June, 2006) described logistics as "...the connective tissue that makes the global economy work." George Day, the forum moderator, emphasised how logistics can be a huge opportunity for competitive advantage and form the basis of new and innovative business models (Knowledge@Wharton 2006). It is this type of thinking that has elevated third-party logistics services (3PL) to new levels of importance, both operationally and strategically. Initially, 3PLs were engaged predominantly for transportation and warehousing services. However, as a greater number of traditional in-house value chain activities - most notably procurement and production - have been outsourced, logistics companies have increased their capabilities to deliver 'value added' service throughout the supply chain. As a result, today's 3PLs are offering an increased range of services and doing so on a global basis. A number of the notable players in the industry - e.g., DHL, FedEx and UPS - offer highly integrated global services that have been fuelled by their increased range and depth of capabilities and expanding global reach.

The growth of this industry has delivered remarkable financial results over the past decade. In 1995 the overall value of logistics costs in the USA was reported to be approximately US\$773 billion. In 1996, the 3PL market that formed a focused part of logistic business activities had an estimated value of US\$31 billion, and by 2004 this had grown to \$US85 billion. Interestingly, the cost of logistics as a percentage of US gross domestic product (GDP) declined over the same period from 10.4% in 1995 to 8.6% in 2004 (Capgemini 2005). Equivalent figures have been reported in Europe (Logistics 2004) and in Australia (DOTARS 2002). These results are due to a combination of factors that have reduced costs such as: improved logistics practices and education; economies of scale for both the 3PLs and their customers (Lieb & Miller 2002); and technological advances (Peters & Lieb 2000).

Given the strategic importance of supply chain activities it will come as no surprise that the selection and purchase of transportation and logistics services is a complex process that comprises many parts. Firstly, a company must decide which activities to outsource. Secondly, it must select the most appropriate service

provider to perform these activities. To date, the academic and practitioner literature has largely focussed on the 'build versus outsource' debate (Clegg et al. 2005) together with commentaries on the positive and negative aspects of relationship(s) between the 3PL provider and their customers (e.g. Power & Moosa 2006). Only a small corpus of research has begun to explore the nature of consumer demand in the supply chain industry (Verma et al. 2006).

This study will explore new ground and open up the 'black box' of customer decision making in a business-to-business (B2B) setting by concentrating on the relative importance of those factors contributing to the selection of 3PL service providers. More specifically, we shed new light on those attributes considered most important in the selection of a 3PL provider by using a market utility-based approach based on maximum difference scaling known as a Best-worst Experiment. This approach has been shown to be very effective for understanding customer needs and preferences when exploring new service designs (Goodale et al. 2003). For example, Verma et al. (2004) has demonstrated its use in service capacity scheduling in e-financial services and Goodale et al. (2003) has used it to develop a holistic approach to market-based service capacity scheduling that improved understanding of customer preferences for service attributes' (Goodale et al. 2003, p165). Iqbal et al. (2003) used discrete choice analysis data collected from over 2,000 customers across the United States to show that the level of development of services and exposure to information influences the features of transaction-based e-services. The value of this mode of research is not just in understanding these decisions but in being able to influence management decisions about the strategic, operational and tactical aspects of their businesses directly.

The remaining sections of this paper set about developing a ratio scale for buyer preferences that captures the relative importance of different attributes in the supply chain. First, we briefly review the random utility literature and describe the best-worst scaling approach. Second, we describe the development of the experimental instrument. Lastly, we discuss preliminary results based on a sample of Australian managers and provide directions for future research.

THEORETICAL BACKGROUND

An effective method for evaluating customer demand for various service features (such as those offered by 3PL providers) is to model consumer preferences as a response to experimentally designed service profiles. This approach, commonly known as probabilistic discrete choice analysis (DCA), has been used to model choice preferences of decision makers in a variety of organisational areas spanning marketing, operations management, transportation and economics (e.g., Verma et al. 2006).

The statistical model (i.e., multinomial logit) underpinning DCA draws on Thurstone's (1927) original propositions in Random Utility Theory (RUT) to provide a well-tested theory of human decision making that has been generalised by McFadden (1974). This theory allows scholars to conceptualise individual choice as a process of decision rule formation Louviere et al. (2000). When selecting any product, service, or combination of both, a customer will consciously or unconsciously compare alternatives and make a decision that involves tradeoffs of the components of those choices. The result of this process is a 'choice outcome' (Hensher et al. 2005), which can be decomposed and identified based on the pattern of choices conditional on the options available.

Best-worst Scaling

There are number of different DCA methods that allow a researcher to elicit stated preferences that can be used as a basis of understanding and predicting actual behaviour *in the marketplace*. One relatively simple method particularly useful in narrowing down and getting a quick snapshot of preferences is best-worst scaling. The formal statistical and measurement properties for best-worst scaling analysis can be found in Marley and Louviere (2005).

Fundamentally best-worst scaling is an ordering task that requires respondents to make a selection from a group of items and choose the 'best' (most preferred) and 'worst' (least preferred) items in a series of blocks of $N > 2$ items. The items could be attributes of a product, options in a decision, or bundles of services and products. The approach is particularly effective in creating a preference ordering for the items

when the number of items is large, as individuals are better able to determine which 2 of group of items are ‘best’ and ‘worst’ than they are the specific ordering of 1, 2, ..., 5, 6. Best-worst scaling has the added benefit that it is quick and simple to execute, provides results that are empirically consistent with more complex ordering tasks and theoretically in line with the precepts of random utility theory.

The cognitive process undertaken in the selection of the ‘best-worst’ or ‘least-most’ important items is statistically equivalent to:

- Identifying every possible pair of items available;
- Calculating the difference in utility between the two items in every pair; and
- Choosing the pair that maximises the difference in utility between them.

Thus, the pair of items chosen maximises the difference in the marginal utilities on offer between each of the various items in each block of items presented to the decision maker. Empirically, the distance between items is modelled as a difference where the relative ordering of the items is proportional to the number of times it is mentioned ‘best’ less the number of times it is mentioned ‘worst’ (Szeinbach et al. 1999).

In this study, the intent is to determine the relative ordering of the attributes relevant to the decision of purchasing logistics services of a 3PL. This allows us to reduce a relatively large number of attributes associated with the decision down to a manageable number of important components that can be scrutinized in more detail.

INSTRUMENT DEVELOPMENT AND EXPERIMENTAL DESIGN

When selecting a logistics service provider there are many factors to be considered. For example, in any B2B purchase decision there is a series of ‘logics’ that interact and are traded-off in the final selection (Gattorna 2006). To capture the full range of attributes that are potentially important in the selection of a logistics service provider amongst all the alternatives available, an extensive pre-testing procedure was

employed. The range of attributes selected were sourced from extensive rounds of qualitative work that included reviewing the academic literature, industry reports and websites, along with insight gained from extensive discussions with experienced academics and practitioners.

The result from this preliminary work enabled us to develop a series of 21 attributes in five general categories that were potentially relevant to the evaluation and selection of a 3PL. These were: (a) External Face of the Company: *brand* and *culture*; (b) Internal Capabilities: *professionalism*, *relationship orientation*, *proactive innovation*, *global network*, *customer service support*, *customer service recovery*, *risk management*, and *quality certification*; (c) Customer Charges: *parity price* and *surcharge option* in contract; (d) Account Management Process: *account representative presence*, *top management team availability*, *management reporting*, *billing service*, and *track & trace*; and (e) Performance: *reliable performance*, *delivery speed*, *supply chain capacity*, and *supply chain flexibility*. Operational definitions were developed to capture the domain for each of the 21 attributes to ensure that each decision-maker understood the meaning of these attributes in exactly the same way (refer Appendix A: Attribute Definitions).

Best-worst scaling applies experimental design techniques that allow us to discern the utility associated with an attribute without having to consider every possible combination of alternatives available. A complete block factorial design was used to ensure that each possible attribute pair (available to be chosen) is displayed the same number of times; in other words, the design is fully balanced (Burgess & Street 2004). This design ensured that each attribute is orthogonal (known as an Orthogonal Main Effects Design or OMEP) and with all possible subsets of choices given by 2^5 factorial. Example sets are provided in Appendix B: Sample of Best-worst Experiment, which shows that each individual respondent was required to evaluate the ‘most’ and ‘least’ preferred attributes from 21 different choice sets, with five service attributes in each set. In addition to the experimental best-worst task, respondents answered a series of structured firmographic questions as well to provided open-ended descriptions of the process by which they choose a 3PL.

RESULTS

Forty middle-to-senior managers completed the Best-worst Experiment. The distribution of respondents by industry is shown in Figure 1: Distribution of Respondents by Industry; in all cases the respondents were from companies that employ the services of a 3PL provider.

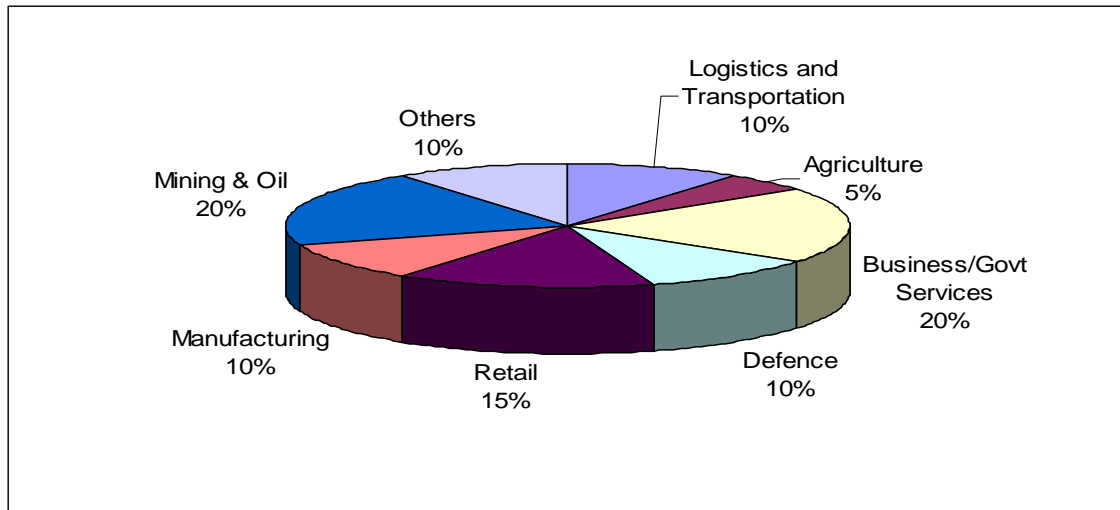


Figure 1: Distribution of Respondents by Industry

The best-worst scores were calculated using the following steps:

1. The results were separated into two frequency groups according to the number of times the attribute was selected by respondents. Respondents were required to identify “the feature that matters most to you” (‘Best’) or “the feature that matters least to you” (‘Worst’) (refer to Table 1: Ranked Results from ‘Best-worst’ Experiment). The ‘Best’ column illustrates the frequency that the particular attribute was ranked ‘best’ out of an attribute group. For example, the top scoring attribute was *reliable performance* (selected 156 times), followed by *supply chain flexibility* (selected 103 times), through to the lowest scoring attribute *surcharge option* (selected only twice), when considering selection of the feature that matters ‘most’ to respondents. Thus *surcharge option* was selected - as a ‘Best’ attribute in a group - the least number of times by the respondents.

The ‘Worst’ column shows the frequency that an attribute was selected as the ‘least’ important feature

by respondents. This column is read in the opposite way-to the 'Best' column - the attribute selected the least number of times as 'least important', was *reliable performance* (selected only once), by respondents out of the set of 21 options; indicating that it is actually considered to be one of the more important features. It is worth noting that the attributes in this column appear to be almost perfect reciprocals of the 'Best' column, implying consistency in the decisions (or selection of features as 'most' or 'least' important) made by the respondents. For example, the top scoring attribute in the 'Worst' column was *surcharge option* (selected 118 times), followed by *brand* (selected 90 times), through to *reliable performance* (selected only once) as the lowest scoring attribute when considering selection of the feature that matters 'least' to respondents. Thus *reliable performance* was selected - as a 'Worst' attribute in a group - the least number of times by respondents.

2. The frequencies of the selected 'Best' and 'Worst' responses provide a complete ordering from the highest to lowest ranked attribute.
3. The weights used for each attribute are easily obtained by creating a score based on the possible subsets of ranked choices for each set. For example, in the case of a 5 attribute set the weights for each choice are as follows: choice 1 (best) = 16, choice 2 = 8, choice 3 = 4, choice 4 = 2 and choice 5 (worst) = 1. This weighting process is in accord with the ranking theorem proposed by Luce and Suppes (1965). In this study only two weights were used: the largest (choice 1 = 16) and the smallest (choice 5 = 1), as respondents selected only the 'best' and 'worst' attribute in each group.
4. The 'Best minus Worst' column is the difference between the results in the 'Best' and 'Worst' columns; otherwise known as the 'maximum difference' scale (Marley & Louviere 2005), and gives the ranked ordered position, and relative importance, of the attributes. This difference is also calculated for the weighted values of 'Best' and 'Worst'.
5. The square root (SQRT) of the 'Best/Worst' provides a ratio scale of the weighted value of 'Best' divided by the weighted value of 'Worst' based on the mathematical proofs that $\text{SQRT} [f(b)/f(w)] = f(b)/\sqrt{k}$, where k is a constant, provided by Marley and Louviere (2005). Figure 2: Ratio Scale of Relative Importance for each Attribute, plots the graph for the SQRT of the 'Best/Worst' ratio.

Attribute Name	'Best' (freq)	'Worst' (freq)	Best (weighted)	Worst (weighted)	Best minus Worst	Best minus Worst (weighted)	SQRT of (Best/Worst weighted)
<i>account representative presence</i>	4	60	124	964	-56	-840	0.3587
<i>billing service</i>	2	77	109	1234	-75	-1125	0.2972
<i>brand</i>	8	90	218	1448	-82	-1230	0.388
<i>culture</i>	25	15	415	265	10	150	1.2514
<i>customer service recovery</i>	19	25	329	419	-6	-90	0.8861
<i>customer service support</i>	41	13	669	249	28	420	1.6391
<i>delivery speed</i>	73	14	1182	297	59	885	1.9949
<i>global network</i>	24	50	434	824	-26	-390	0.7257
<i>management reporting</i>	18	53	341	866	-35	-525	0.6275
<i>parity price</i>	24	66	450	1080	-42	-630	0.6455
<i>proactive innovation</i>	73	21	1189	409	52	780	1.705
<i>professionalism</i>	81	5	1301	161	76	1140	2.8427
<i>quality certification</i>	8	74	202	1192	-66	-990	0.4117
<i>relationship orientation</i>	48	29	797	512	19	285	1.2477
<i>reliable performance</i>	156	1	2497	172	155	2325	3.8102
<i>risk management</i>	26	16	432	282	10	150	1.2377
<i>surcharge option</i>	2	118	150	1890	-116	-1740	0.2817
<i>supply chain capacity</i>	56	15	911	296	41	615	1.7543
<i>supply chain flexibility</i>	103	4	1652	167	99	1485	3.1452
<i>top management team availability</i>	13	67	275	1085	-54	-810	0.5034
<i>'track & trace'</i>	36	27	603	468	9	135	1.1351

Table 1: Ranked Results from 'Best-worst' Experiment

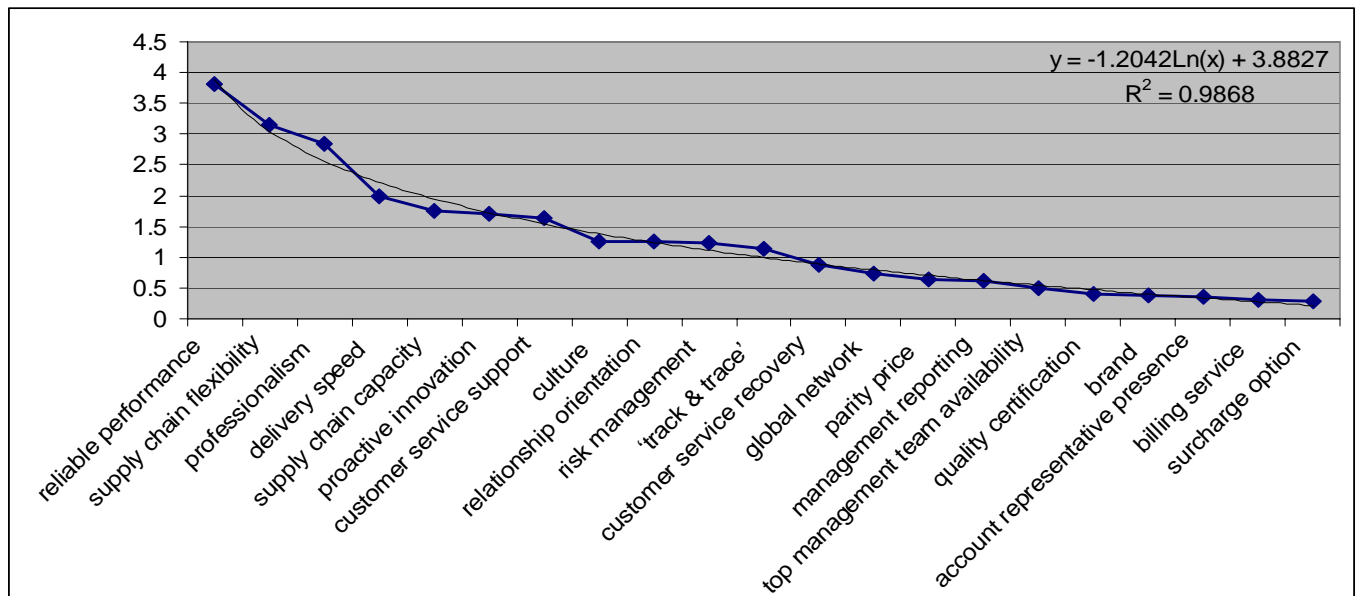


Figure 2: Ratio Scale of Relative Importance for each Attribute

DISCUSSION

Traditionally supply chain research has been dominated by investigations of functional components, such as facilities location and transportation (Geoffrion & Powers 1995), inventory management (Cohen & Lee 1998), materials management, purchasing and distribution (Turner 1993). This explicitly assumes that the decision criteria are functional and related to those aspects of the choice that matter to the direct cost or efficiency of the supply chain. In this study we have taken a different approach and asked “What factors matter to the decision makers when choosing a supply chain provider?” What this reveals is that although performance measures such as reliability, delivery speed, flexibility and capacity are important, but they are not the only factors that matter to the customer. Our results highlight the extent to which higher-order capabilities, such as *reliable performance* and *supply chain flexibility* matter in the choice of a 3PL. In addition, we not only show which attributes of 3PLs matter to the decision maker, but the extent to which they matter *relative to one another*.

From the standpoint of the 3PL provider, this line of thinking is consistent with the resource based view (RBV) of the firm literature (Barney 1991), which emphasises that an organisation should develop capabilities to acquire, integrate, reconfigure and release resources that are embedded in a social, structural and cultural context. Developing these capabilities is a long-term process; but this is exactly why they can be a source of sustainable competitive advantage. Our results reveal that customers value these resources when developed and available from a 3PL. From a more operational standpoint our results provide guidance to 3PLs on how to evaluate aspects of their service provision offering. This is particularly valuable for the manager who is bombarded by lists of all the attributes that they believe create customer value, without any effective guide as to the relative value (or validity) of this ordering (Anderson et al. 2006). ‘Best practice’ suppliers have been shown to base customer value propositions on a select few attributes that clearly matter most to their target customers. These supply chain leaders go on to demonstrate the value of these attributes and show that they can provide superior performance; for these

companies all communication with customers is in ways that convey a sophisticated understanding of their customer's own business priorities.

Despite great advances in the performance of logistics activities the industry has come under new cost pressures due to factors such as increased fuel prices, interest rates and larger inventories. Not surprisingly, 3PL companies are re-evaluating their strategic responses and planning activities to evaluate the relative importance of factors other than price and price sensitivity. The results reported here support Gattorna's claim (2006) that the secret to designing a supply chain is to start by understanding the needs and preferences of 'customers' and then reverse engineer business processes, company culture and leadership to support the requirements of the market.

CONCLUSION AND FUTURE WORK

In attempting to estimate why customers purchase 3PL services from specific companies, research to date has largely focused on price and performance related attributes. Although price is an obviously important factor in a consumer's decision, it is also important to recognize that demand for 3PL services is a function of all the other factors that make up the experience, such as: *reliable performance*, *supply chain flexibility* and *professionalism* etc.

Further, a growing body of research exists to suggest that binary ('best-worst' or 'yes-no' or 'least-most') responses are simple and reliable estimates of customer demand. It is cognitively easy for respondents to indicate that "I prefer A" or "I do not like B" and "I think A is the most important attribute, and B is the least important attribute in the set of {A B C D E}". Furthermore, the approach is scale free and avoids problems that commonly arise in traditional research where respondents are required to rate attributes according to a set scale (e.g., 1 to 5 or 1 to 7). The problem with traditional likert scales is that the scores can mean different things to different respondents. Additionally, respondents often suffer from biases such as 'yea-saying', 'nay-saying' and 'middle of the road'. The best-worst scaling procedure used in this study

forces the respondent to select items of relative importance through trade-offs and therefore provides data that is scale free.

An important limitation in this study is the assumption that all respondents are willing to purchase services from a 3PL provider. In other words, demand is conditional on respondents 'buying' (or more accurately in the supply chain industry, simply *choosing*) a 3PL provider. Future work should provide an opt-out option to capture either unconditional demand where a respondent may desire to stay with some status quo or "not demand or require" the services of a 3PL provider.

In summary, this study has provided greater understanding of what attributes are considered important to customers of a 3PL service provider. These results offer several attractive value propositions to these service companies because it shows where resources should be allocated (whether they are positive such as performance reliability or negative such as billing service). The next stage of this research is to extend this approach to address the issue of *how* people choose within an option. This will require identification of different levels for each attribute so that respondents can evaluate preferences in line with more traditional choice modelling research.

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Appendix A: Attribute Definitions

Account Representative Presence – refers to the level of contact provided by the Account Representative. A high presence Account Representative would call you, make a presentation, or address your concerns many times a month.

Billing Service – accuracy, flexibility and currency of billing service.

Brand – reflects overall competence that the supplier will deliver. In a supply chain context we can distinguish between a market leader (>40% market share) and a new player in the market (<10% market share).

Culture – includes the unwritten rules that guide appropriate “norms” of behaviour. In other words, it is the “way we do things around here” and can either be similar to your own company or not.

Customer Service Recovery – prompt and empathetic recovery and resolution of errors or problems concerning customers.

Customer Service Support – prompt and effective handling of customer requests and questions.

Delivery Speed – amount of time from pickup to delivery.

Global Network – whether a supplier is fully represented at a global level and can reliably deliver to remote locations.

Management Reporting – report customizability, range and flexibility. Highly customized reports can be delivered at a frequency determined by the customer.

Parity Price – this is what the customer pays for the service or product. A parity price is one that matches (or is very close to) that of the competition.

Proactive Innovation – proactive activity aimed at providing new solutions to improve the customers business and address any potential problems and challenges.

Professionalism – Employees exhibit sound knowledge of products and services in the industry and display punctuality and courtesy in the way they interact and present to the customer.

Quality Certification – such as ISO certification, TAPA (Technology Asset Protection Association) and Corrective Action Process etc. This certification would also cover associated third parties (where relevant).

Relationship Orientation – characterised by sharing of information and trust in the exchange partner.

Reliable Performance – consistent “on time” delivery without loss or damage of shipment.

Risk Management – this relates to the security of supply chain systems. It could include, for example correct levels of insurance for the company and third parties, capability to ensure packages are as stated using X-ray equipment, or other audit trail systems.

Supply Chain Capacity – the ability to cope with significant changes in volumes e.g., demand surges and deliver through multi-modal transport services including: international express and domestic, by air; ocean; and land.

Supply Chain Flexibility – ability to meet unanticipated customer needs e.g., conduct special pickups, seasonal warehousing

Surcharge Option in Contract – the contract includes the right to add surcharges due to unanticipated costs e.g., fuel, unusual fluctuations in levels of currency exchange rate, security surcharges.

Top Management Team Availability – the frequency and quality of involvement by the “top management team” with your management team during the exchange relationship.

Track & Trace – transparency and “up to the minute” data about the location of shipments end-to-end.

Appendix B: Sample of Best-worst Experiment

Question Number	Which feature matters LEAST to you? (Select ONLY ONE)	Sets of features for you to consider	Which feature matters MOST to you? (Select ONLY ONE)
1	<input type="radio"/>	Professionalism	<input type="radio"/>
	<input type="radio"/>	Global Network	<input type="radio"/>
	<input type="radio"/>	Customer Service Support	<input type="radio"/>
	<input type="radio"/>	Surcharge Option Contract	<input type="radio"/>
	<input type="radio"/>	Top Management Team Availability	<input type="radio"/>

Question Number	Which feature matters LEAST to you?	Sets of features for you to consider	Which feature matters MOST to you?
2	<input type="radio"/>	Relationship Orientation	<input type="radio"/>
	<input type="radio"/>	Customer Service Support	<input type="radio"/>
	<input type="radio"/>	Customer Service Recovery	<input type="radio"/>
	<input type="radio"/>	Account Representative Presence	<input type="radio"/>
	<input type="radio"/>	Management Reporting	<input type="radio"/>

Question Number	Which feature matters LEAST to you?	Sets of features for you to consider	Which feature matters MOST to you?
3	<input type="radio"/>	Proactive Innovation	<input type="radio"/>
	<input type="radio"/>	Customer Service Recovery	<input type="radio"/>
	<input type="radio"/>	Risk Management	<input type="radio"/>
	<input type="radio"/>	Top Management Team Availability	<input type="radio"/>
	<input type="radio"/>	Billing Service	<input type="radio"/>

Question Number	Which feature matters LEAST to you?	Sets of features for you to consider	Which feature matters MOST to you?
4	<input type="radio"/>	Global Network	<input type="radio"/>
	<input type="radio"/>	Risk Management	<input type="radio"/>
	<input type="radio"/>	Quality Certification	<input type="radio"/>
	<input type="radio"/>	Management Reporting	<input type="radio"/>
	<input type="radio"/>	Track and Trace	<input type="radio"/>