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**A Study of Customer Service, Customer Satisfaction and Service
Quality in the Logistics Function of the UK Food Processing
Industry**

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Volume II

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CHAPTER TEN

THE MAIN STUDY

10.1 INTRODUCTION

Chapter Nine discussed the pilot study for this thesis based on the first stage of the Churchill et al. framework. This chapter discusses the main study, which is the second stage or step 5 of that framework. The second stage comprises collecting new data and performing CFA and SEM to test reliability and validity of variables and constructs. First, the second stage of Churchill et al. framework and the CFA and SEM techniques will be reviewed. Next, the resultant PZB Model and hypotheses to be tested will be discussed followed by the data collection method utilised and a descriptive data analysis. Then, CFA and SEM pertaining to the PZB Model will be undertaken followed by a discussion and analysis of a respecified PZB Model presented as an alternative. Finally, discussions and implications of the research and chapter conclusions will set the stage for a theoretical interpretation in Chapter Eleven.

10.2 MAIN STUDY FRAMEWORK, CONFIRMATORY FACTOR ANALYSIS AND STRUCTURAL EQUATION MODELLING

10.2.1 The Churchill et al. Framework and Unidimensionality

The first stage of the Churchill et al. framework involves establishing a domain of research and constructs, generating variables or items and then collecting data to ‘purify’ measures (Churchill 1979, Dunn, Seaker and Waller 1994). Most research articles using the Churchill et al. framework have not gone beyond this stage (Flynn and Percy 2001) to assessing construct validity in the second stage by testing the ‘purified’ measures and scales with a new set of data.

The sub-dimensions of construct validity are unidimensionality, reliability, convergent validity and discriminant validity (Churchill 1979, Dunn, Seaker and Waller 1994, Mentzer and Flint 1997, Steenkamp and van Trijp 1991). Scales must be unidimensional and reliable before convergent and discriminant validity can be assessed. If support is found for them, then construct validity is supported (Churchill 1979, Dunn, Seaker and Waller 1994).

Criterion-related validity refers to how well a scale correlates with the criterion it is trying to predict. If the criterion exists in the present it is termed concurrent validity, if it exists in the future it is termed predictive validity (Dunn, Seaker and Waller 1994). Criterion-related validity is not assessed within the Churchill et al. framework but will be discussed in Chapters Eleven and Twelve.

Flynn and Percy (2001) argued Churchill's 'purification' technique simply consists of determining scale reliability and deleting items that perform poorly in terms of reliability. Scale reliability is determined by calculating coefficient alpha (Churchill 1979, Dunn, Seaker and Waller 1994). Churchill argued this indicator is "pregnant with meaning because the square root of coefficient alpha is the estimated correlation of the k-item test with errorless true scores" (1979 p.68).

Guidelines for coefficient alpha values range from 0.50 and 0.60 for exploratory work (Nunnally and Bernstein 1994) to 0.90 and 0.95 where important decisions are to be made on the basis of results (Smith 1999). A rule of thumb guideline for most applications is to accept alpha values above 0.70 (Spector 1992) or 0.80 (Carmines and Zeller 1979), which represent respectively 0.84 to 0.89 correlation with errorless true scores. As noted in Chapter Nine, a coefficient alpha value of 0.70 is used in this thesis.

Churchill proposed 'purification' using the above methods should "produce internally consistent or internally homogeneous set of items" (1979 p.70). However the utilisation of coefficient alpha does not adequately examine unidimensionality in

terms of inter-item and item-to-total correlation and expected factor structures (Flynn and Percy 2001, Garver and Mentzer 1999, Gerbing and Anderson 1988).

Unidimensionality refers to the existence of a single trait or construct underlying a set of measures (Gerbing and Anderson 1988, Steenkamp and van Trijp 1991). Good measurement scales are unidimensional if items have acceptable fit on one factor or dimension (Hair, Anderson, Tatham and Black 1995). Gerbing and Anderson (1988) thus considered unidimensionality is necessary but not sufficient for construct validity whereas Churchill (1979) argued only for consistency in that context.

The use of coefficient alpha assumes that unidimensionality exists (ibid.). However, coefficient alpha is only a measure of reliability and cannot be used to infer unidimensionality (Nunnally and Bernstein 1994, Steenkamp and van Trijp 1991). Confirmatory factor analysis (CFA) provides a stricter interpretation of unidimensionality and thus may provide different conclusions about scale acceptability (Gerbing and Anderson 1988, Garver and Mentzer 1999).

The second stage in the Churchill et al. framework should therefore incorporate some form of factor analysis to ensure unidimensionality, indeed Churchill suggested factor analysis “can be used to confirm whether the number of dimensions conceptualised can be verified empirically” (1979 p.69).

10.2.2 Confirmatory Factor Analysis and Structural Equation Modelling

SEM is a multi-variate analysis technique that combines methodological contributions from psychometric theory and structural equations associated with econometrics (Diamantopoulos 1994). Its objective is to explain structures or patterns amongst a set of latent variables and constructs typically measured by manifest variables by analysing the correlation or variance/covariance input matrices of all variables (Hair, Anderson, Tatham and Black 1995).

SEM is a popular technique in the U.S., particularly in marketing applications, but has found very little acceptance among UK researchers (Diamantopoulos 1994) and is a relatively untried technique in logistics applications (Garver and Mentzer 1999). SEM is also known as latent variable analysis, covariance structure analysis and LISREL analysis (LInear Structural RELationships), named after one of the first computer analysis programmes developed by Jöreskog and Sörbom (Diamantopoulos 1994, Hair, Anderson, Tatham and Black 1995, Steenkamp and van Trijp 1991).

A construct achieves meaning in two ways: through observed indicators for which it is causally antecedent and through those for which it is not, and through the set of relationships of the construct with other constructs as specified by some theory or the nomological network (Gerbing and Anderson 1988). Thus, construct validity is necessary for theory testing and building.

Whilst correlation matrices may be used as inputs, Hair, Anderson, Tatham and Black recommended using variance/covariance matrices for theory testing as they “satisfy the assumptions of the methodology and are the appropriate form of the data for validating causal relationships” (1995 p.636). Variance/covariance matrices are used in this thesis for these reasons.

There are two parts to a covariance structure model: the measurement part describes how the latent variables or constructs are operationalised via the manifest variables whilst the structural part specifies relationships between the latent variables or constructs themselves. The analysis is confirmatory in nature i.e. it seeks to determine the extent to which the a priori structure is consistent with empirical data (Diamantopoulos 1994).

CFA differs from EFA in that a model is specified a priori and relationships between manifest and latent variables are tested to determine their existence and importance (Hair, Anderson, Tatham and Black 1995, Loehlin 1998, Sureshchandar, Rajendran and Anantharaman 2002). EFA is a useful preliminary technique for scale construction but CFA is required to adequately evaluate and refine scales to meet

unidimensionality, this is a primary conceptual difference between the techniques (Gerbing and Anderson 1988).

A measurement model specifies manifest or indicator variables for exogenous (i.e. independent) and endogenous (i.e. dependent) latent variables or constructs. It is analysed by CFA to assess the reliability of each latent variable or construct to estimate causal relationships (Hair, Anderson, Tatham and Black 1995, Loehlin 1998, Schumacker and Lomax 1996).

A structural model is a set of one or more dependence relationships linking the latent constructs and is useful in representing the interrelationships of variables between dependence relationships (*ibid.*). Structural dependence relationships are estimated by regression or path analysis (Garver and Mentzer 1999). This type of solution provides two advantages: a test of the theoretical structure of the measurement model or the relationship of constructs with measures, and tests without bias that measurement error introduces (Steenkamp and van Trijp 1991).

The use of CFA, regression or path analysis and related components meets methodological requirements and rigour for the second stage of the Churchill et al. framework. Specialist computer programmes to solve measurement and structural models include LISREL as noted above and Amos® developed by Arbuckle and Wothke (1999). The latter is a graphical programme that interfaces freely with SPSS® and is used for this thesis.

The SEM is often presented in the form of a path diagram that is a “graphical portrayal of the complete set of relationships among the model’s constructs” (Hair, Anderson, Tatham and Black 1995 p.621). Path diagrams are a useful descriptive device but can also be used to “solve for a numerical value of each curved and straight arrow in a diagram to indicate the relative strength of that correlation or causal influence” (Loehlin 1998 p.8). The presentation of models for SEM is based on conventional notation and standard construction rules. Diamantopoulos (1994)

provided an explanatory checklist of such notations and rules, which is reproduced as Figure 10.1.

1. An *endogenous* latent (unobservable) variable is denoted by η (read: eta) and placed in a circle.
2. An *exogenous* latent (unobservable) variable is denoted by ξ (read: ksi) and placed in a circle.
3. A *manifest* (observable) variable used as an indicator of an *endogenous* latent variable is denoted by y and placed in a box.
4. A *manifest* (observable) variable used as an indicator of an *exogenous* latent variable is denoted by x and placed in a box.
5. The error (residual) term for a *latent endogenous* variable is denoted by ζ (read: zeta); this reflects "error in equations" *i.e.* random disturbances.
6. The *error* (residual) term for an *indicator y* of a latent endogenous variable is denoted by ϵ (read: epsilon) and for a latent exogenous variable by δ (read: delta); these reflect "errors in measurement".
7. A *causal linkage* between two variables is represented by a one-way straight arrow starting from the (hypothesized) cause and pointing to the (hypothesized) effect. Each linkage is referenced by a small Greek letter (see 8 below) and two subscripts, the first indicating the target of an arrow (*i.e.* the effect) and the second its origin (*i.e.* the cause). No one-way arrow can point to a latent exogenous variable ξ .
8. A causal relationship between two endogenous latent variables is denoted by β (read: beta), while that between an exogenous and an *endogenous* latent variable is denoted by γ (read: gamma).
9. The relationships between latent variables and their *measures* (*i.e.* the manifest variables) are represented by one-way straight arrows originating from the latent variables and denoted by λ (read: lambda).
10. The impact of *residual* terms is also represented by straight arrows, always originating from the error variables ζ , δ and ϵ and pointing to the relevant latent or manifest variables (*i.e.* η , y and x respectively).
11. A *non-causal* linkage between two variables is represented by a curved double arrow, connecting the variables concerned. Such linkages are *only* permitted between the exogenous latent variables (*i.e.* ξ) and between error terms (see 12 below).
12. A *non-causal relationship* between two exogenous latent variables is denoted by ϕ (read: phi) and between the error terms of endogenous latent variables by ψ (read: psi).
13. The *measurement model* for the *exogenous* latent variables, specifying the relationships between the ξ - and x -variables is always placed to the *left* of the path diagram.
14. The *measurement model* for the *endogenous* latent variables, specifying the relationships between the η - and y -variables is always placed to the *right* of the path diagram.
15. The *structural model*, specifying the relationship between the ξ - and η -variables is placed in the centre of the path diagram.

Figure 10.1: Notations and Rules for Path Diagrams

(Source: Diamantopoulos 1994 pp.134-135)

Schumacker and Lomax cautioned against using path analysis as a method to establish causality between constructs as it “tests theoretical relationships” but “unfortunately has been termed causal modelling” (1996 p.39). Hair, Anderson, Tatham and Black concurred that causation is rarely found, however “in practice

strong theoretical support can make empirical estimation of causation possible” (1995 p.618). Loehlin (1998) also provided a summary of various critiques of latent variable modelling. Whilst recognising a difference between “descriptive models describing relationships” and “structural models which purport to give causal explanations” he nevertheless argued latent variable models “can be helpful in describing causal relationships involving measured and unmeasured variables” (1998 p.235).

There are seven steps in the SEM process (Hair, Anderson, Tatham and Black 1995, Diamantopoulos 1994):

1. Conceptualise and develop the theoretical model,
2. Construct a path diagram,
3. Specify the SEM in terms of the measurement and structural models, identify any correlation of constructs and indicators, and consider any research design issues such as sample size and model estimation method,
4. Assess identification of the SEM if it is unable to generate unique estimates and correct any offending estimates,
5. Evaluate model goodness-of-fit overall and for the measurement and structural parts,
6. Interpret and modify the model to improve goodness-of-fit, where theoretically justifiable, and
7. Cross-validate the model with other (new and different) data sets.

The next section discusses the first two steps whilst section 10.6 discusses steps 3 to 6. Step 7 is not a feature of this thesis, but will be addressed in discussions of future research in Chapter Twelve.

10.3 THE PZB MODEL, MAIN STUDY MODEL AND VARIABLES FOR STUDY

10.3.1 The PZB Model

The first stage of the Churchill et al. framework called for EFA to assess whether any variables were underlying constructs in the pilot study. EFA was used as recommended (Churchill 1979) as relationships between manifest and latent variables were unknown or uncertain (Child 1990, Hair, Anderson, Tatham and

Black 1995). However a limitation to the EFA approach is that items may be “loaded only on a statistical basis and not any theoretical justification, thereby affecting the valid identity of factors” (Sureshchandar, Rajendran and Anantharaman 2002 p.20). As noted in Chapter Nine, emergent constructs were statistically robust but did not relate to other studies and added confusion to the transaction-relationship dichotomy.

A model introduced in Chapter Nine from PZB (1994) and reproduced as Figure 10.2 represents a revised theoretical approach to understanding the pilot study findings for examination in the second stage of the Churchill et al. framework. PZB (1994) and Parasurman and Grewal (2000) have posited this new model in response to criticisms about the original PZB (1988) SERVQUAL instrument. This new model, hereinafter termed the PZB Model, has not yet been empirically tested.

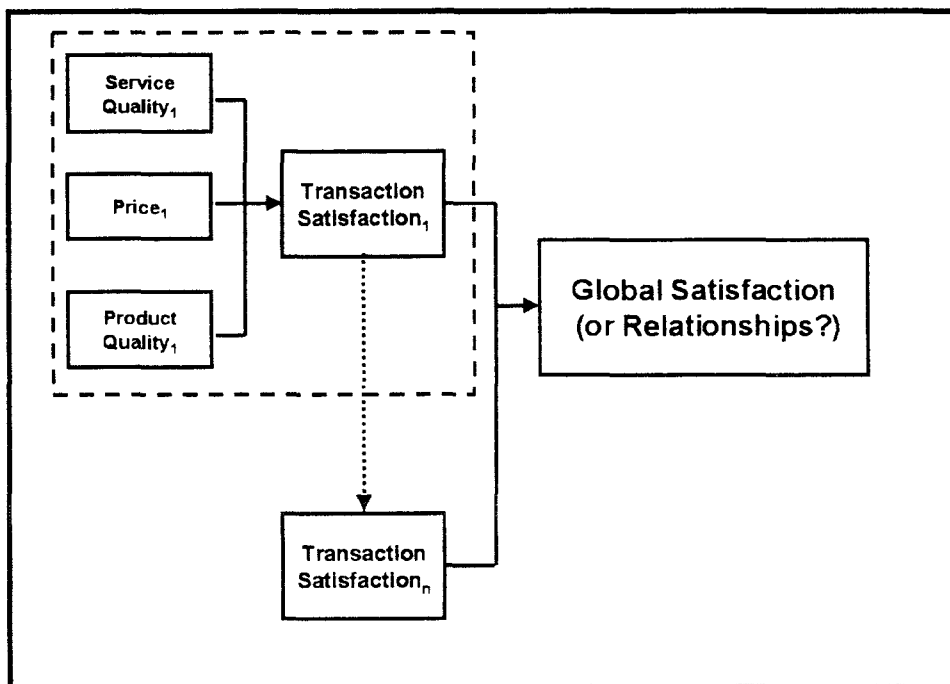


Figure 10.2: PZB Transaction-Specific Satisfaction and Service Quality Model

(Source: Parasuraman, Zeithaml and Berry 1994 p.122)

The PZB Model proposes that a customer’s overall satisfaction with a transaction, or transaction satisfaction (TS), “to be a function of his or her assessment” of three latent or unobservable constructs of “service quality (SQ), product quality (PQ) and price (PR)” (1994 p.121). The three constructs are first-order constructs and indicate manifest or observable variables. For example, service quality might indicate variables of order cycle time and delivery time whilst price might indicate variables of quoted price and opportunities to negotiate discounts. They are also endogenous as

they are indicated by constructs in the postulated model and are thus dependent (Diamantopoulos 1994). Endogenous constructs or variables are “dependent or outcome variables in at least one causal relationship” whereas exogenous constructs or variables act “only as a predictor or ‘cause’ for other constructs or variables in a model” (Hair, Anderson, Tatham and Black 1995 p.619). TS is an endogenous second-order construct that is indicated by the constructs PR, SQ and PQ, whilst global satisfaction (GS) is a third-order endogenous construct explained by the summation of a number of TS events.

10.3.2 The Main Study Model

An amended PZB Model is used in the main study to examine the importance of transaction variables, particularly price, which emerged from the pilot study. Amendments include issues emerging from the pilot study: relationships and their effect on customer service and satisfaction, and a firm’s ongoing consideration of and intentions towards its suppliers if satisfied on an ongoing basis. PZB (1994) did not consider or discuss these issues, nor did they consider potential measures or constructs of global satisfaction or possible dimensions indicating it.

Relationship items are proposed in terms of two first-order endogenous constructs. Relationship service (RS) includes ongoing customer service items from the original 16 variables, whilst relationship quality (RQ) includes items derived from Morgan and Hunt (1994) and Garbarino and Johnson (1999). The outcome of RS and RQ is a second-order endogenous construct termed relationships (RE). This construct is posited to either directly affect GS or indirectly affect it through mediation by TS. It is further posited that GS is indicated by six variables relating to dyadic exchange characteristics regarding suppliers.

The amended PZB Model, which is the proposed main study model for this thesis, is shown in Figure 10.3 and follows SEM rules and notation presented by Diamantopoulos (1994) in Figure 10.1. Due to space considerations manifest variables are not individually shown in Figure 10.3. Consequently, the relationship between them and their respective constructs (denoted by λ) and related error terms

for these variables and the latent exogenous and endogenous constructs (denoted by δ and ϵ respectively) are also shown in aggregate.

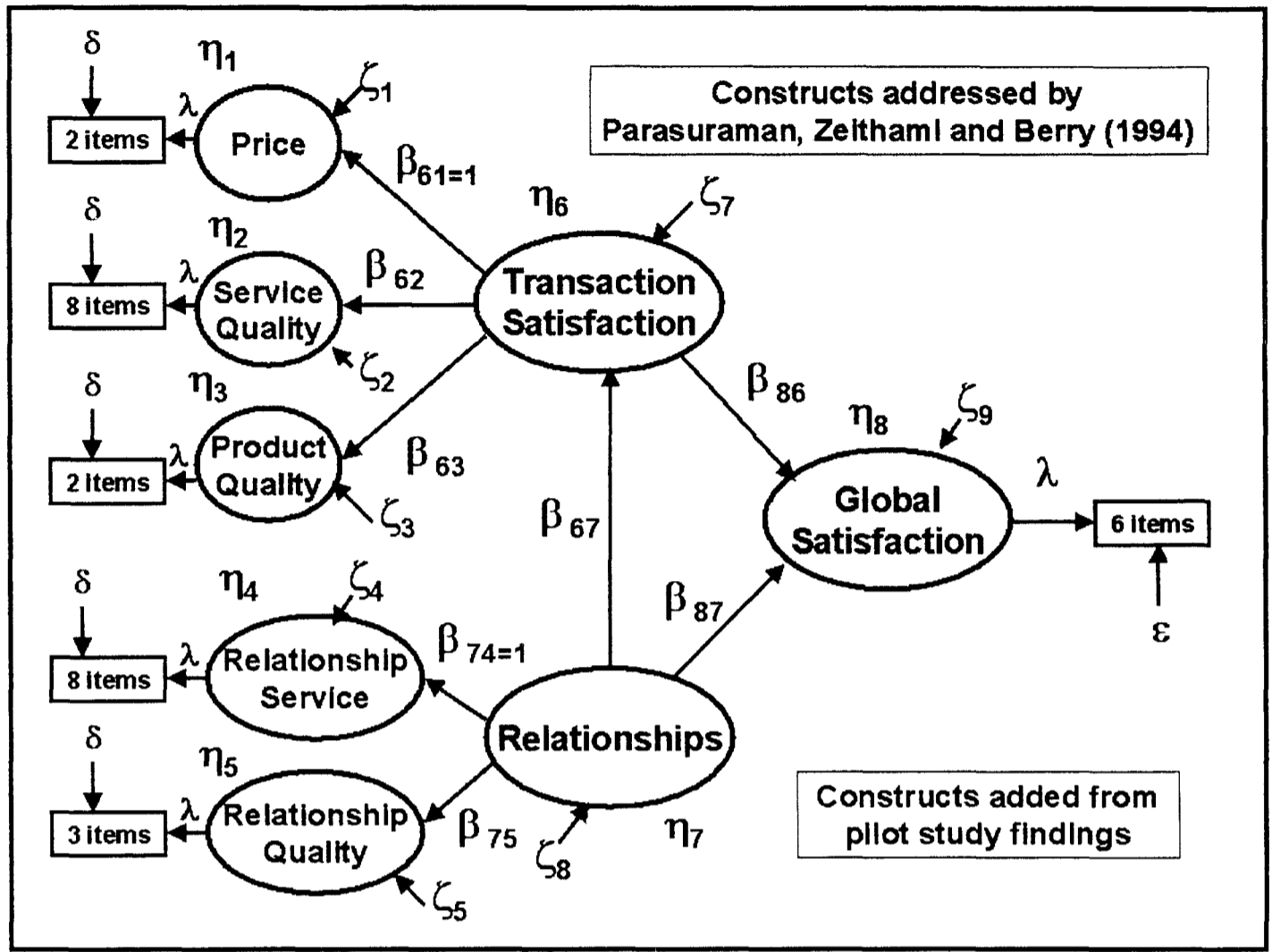


Figure 10.3: Proposed Model for Main Study

10.3.3 Variables for Study

The next step is to present the manifest variables or items to be measured. All 29 manifest variables for the main study are shown in Table 10.1. All 16 variables tested in the pilot study were retained, as discussed in Chapter Nine and were allocated to constructs of PR, SQ, PQ and RS where appropriate in accordance as to whether they were transaction or relationship orientated to satisfy the PZB Model constructs. Three variables were refined and divided to provide seven new variables for respective constructs and reduce confusion in meaning.

Complete and accurate orders became two distinct items: complete orders and accurate orders. OSD became three distinct items: products arriving undamaged, products arriving according to specification and consistent product quality. Lastly,

ongoing information became two distinct items: delivery information and ongoing communication. Three new variables measure the RQ construct: trust, commitment and integrity. These variables were derived from Morgan and Hunt (1994) and Garbarino and Johnson (1999).

Original 16 Pilot Study Variables	Main Study Variables	Variable Code
Price		PR1
Accurate Invoices		PR2
Availability		SQ1
On-Time Delivery		SQ2
Complete and Accurate Orders	1) Complete Orders	SQ3
	2) Accurate Orders	SQ7
Appropriate OCT		SQ4
OSD	1) Products Arrive Undamaged	SQ5
	2) Products Arrive to Specification	PQ2
	3) Consistent Product Quality	PQ1
Consistent OCT		SQ6
Ongoing Information	1) Delivery Information	SQ8
	2) Ongoing Communications	RS2
Easy Ordering		RS1
Action on Complaints		RS3
Return Policy		RS4
After Sales Support		RS5
Delivery Time		RS6
Helpful CSRs		RS7
Customised Services		RS8
N/A	Trust	RQ1
N/A	Commitment	RQ2
N/A	Integrity	RQ3
N/A	Supplier Importance	GS1
N/A	Overall Supplier Quality	GS2
N/A	Feelings towards Supplier	GS3
N/A	Relationship Power	GS4
N/A	Ability to Switch	GS5
N/A	Future Purchase Intention	GS6

Table 10.1: Variables for Main Study

Six variables measure the endogenous global satisfaction (GS) construct. Supplier importance was tapped in the pilot study as a demographic variable. Overall supplier quality and feelings towards suppliers were derived from Oliver's ongoing satisfaction operators (1997). Relationship power and the ability to switch were derived from Daugherty, Stank and Ellinger's proposed model of satisfaction leading to market share through loyalty (1998). Future purchase intention was derived from Oliver's cycle of satisfaction (1997) as a surrogate for financial performance, since firm financial statements were not used in this study. Table 10.1 also records for all 29 manifest variables either their evolution from the original 16 variables or entry as new variables. The construct codes and variable number for data analysis are also shown for reference.

10.3.4 Hypotheses for the Main Study

Friedman wrote, "construction of hypotheses is a creative act of inspiration, intuition and invention" (1953 p.43). However he also argued for rigour as "empirical evidence is vital at two different, though closely related stages: in constructing hypotheses and in testing their validity" (1953 p.12). Loehlin noted "causal models are inherently hypothetical" (1998 p.235). Further, an essential feature of a causal linkage, as described in Figure 10.1 by Diamantopoulos (1994), is the "assumption that a change in the variables at the tail of the arrow will result in a change in the variables at the head of the arrow" (Loehlin 1998 p.4).

Thus, hypotheses about latent construct relationships in Figure 10.3 can be derived to determine the validity and strength of the relationships. Causal relationships in Figure 10.3 are denoted per Figure 10.1 by the symbol β for relationships between endogenous latent constructs (Diamantopoulos 1994).

The PZB Model proposes PR, SQ and PQ affect a customer's transaction satisfaction, which then affects their overall or global satisfaction with a firm's service quality (PZB 1994). The expectancy-disconfirmation paradigm discussed in Chapter Four conceptualises satisfaction as a result of positive disconfirmation.

The PZB Model also shows a direct causal linkage between TS and GS. GS is also considered to affect firm loyalty and future behaviour from “the general notion that service quality” in conjunction with product quality and price “enhances perceived value, which, in turn, contributes to customer loyalty” (Parasuraman and Grewal 2000 p.168).

Resultant hypotheses for the PZB Model relationships of the main study model are therefore presented as follows:

- H₁:** PR positively indicates TS, i.e. $\beta_{61} > 0$.
- H₂:** SQ positively indicates TS, i.e. $\beta_{62} > 0$.
- H₃:** PQ positively indicates TS, i.e. $\beta_{63} > 0$.
- H₄:** TS positively affects GS, i.e. $\beta_{86} > 0$.

Studies discussed in Chapter Nine posit RS and RQ positively indicate satisfactory RE (Morgan and Hunt 1994, Garbarino and Johnson 1999). Further, satisfactory RE is posited to positively affect GS towards a supplying firm (Daugherty, Stank and Ellinger 1998).

However, the PZB Model does not consider that satisfactory RE positively affects TS, i.e. the relationship between satisfactory RE and GS is not mediated through TS (Daugherty, Stank and Ellinger 1998, Parasuraman and Grewal 2000, PZB 1994).

Resultant hypotheses for the relationship constructs of the main study model are therefore presented as follows:

- H₅:** RS positively indicates RE, i.e. $\beta_{74} > 0$.
- H₆:** RQ positively indicates RE, i.e. $\beta_{75} > 0$.
- H₇:** RE positively affects GS, i.e. $\beta_{87} > 0$.
- H₈:** RE does not positively affect TS, i.e. $\beta_{67} \leq 0$.

The next section discusses how the main study model and variables were operationalised for data collection and analysis.

10.4 DATA COLLECTION METHOD

10.4.1 Sample and Survey Contact

The industry of study selected was the meat, poultry and game, seafood and dairy sub-sectors of the UK food processing industry. The sample for the study was drawn from a database listing of UK food processors entitled *The Grocer Directory of Manufacturers & Suppliers 2000* purchased from the publisher William Reed. The over 7,000 firms in this listing represented almost 90% of total UK food producers.

The sample selected was drawn from the database listing for the meat, poultry and game, seafood and dairy food sub-sectors. There were a total of 1,215 firms listed in these sub-sectors after deleting duplicate listings and Scottish listings surveyed in the pilot study, and all were selected for surveying in the main study. The sample included 79 firms from Scotland that were not in the original database.

This sample is also a census of the database and is considered representative of the total population for data analysis purposes as it represents about 36% of the total sub-sector size of 3,390 as shown in Table 10.2. The sub-sector breakdown of 553 meat, poultry and game, 343 dairy and 319 seafood firms is skewed relative to their proportionate size in the total market but is less skewed as compared to value added to the economy in 1999.

UK Food Sub-sectors	Sub-sector Size	%	Sample Size	%	1999 Value (£ billion)	%
Meat and meat products, including poultry/game	2,449 ¹	72.2	553	45.5	11.61	26.6
Dairy products, including eggs, oil and fats	400 ²	11.8	343	28.2	7.62	17.5
Fish and fish products	541 ³	16.0	319	26.3	2.19	5.0
Totals	3,390	100.0	1,215	100.0	43.62 ⁴	100.0

Table 10.2: UK Food Chain Sub-sector and Sample Sizes

(Sources: ¹Gunthorpe, Ingham and Palmer 1995, ²Wilson, Traill and Strak 1995, ³Department for Environment, Food and Rural Affairs 2002, ⁴Fenn 2000)

This sample was considered sufficient to provide enough responses to perform confirmatory factor analysis and structural equation modelling with appropriate rigour (Hair, Anderson, Tatham and Black 1995, Marsh, Balla and McDonald 1988, Mentzer and Flint 1997). The sample size also meets Sterling and Lambert's (1987) concern that empirical logistics research has suffered from small sample sizes.

10.4.2 Survey and Instrument Details

All firms received a professional and personal covering letter shown as Appendix Eight. The format of the letter sent was also designed to establish research credibility, discuss the research, respondent benefits and survey mechanics, note the response deadline, assure respondent confidentiality, and offer to send participants a copy of survey results as an incentive. A letter, shown as Appendix Nine and a copy of the questionnaire were also sent to twenty industry associations including The National Game Dealers' Association, British Pig Association and British Meat Manufacturers' Association. The association list was derived from the database and the purpose of the letter was to advise survey dates and purpose in case any association received member queries.

The research survey instrument was a self-administered questionnaire reproduced as Appendix Three. Measurement of demographic questions for control data about respondents and 'yes-no' questions was made at the nominal or ordinal level for frequency and cross tabulation analysis. Measurement of attitudes for latent exogenous and endogenous constructs were made at the interval level using a 5 point Likert scale for multivariate quantitative analysis (Hair, Anderson, Tatham and Black 1995, Remenyi, Williams, Money and Swartz 1998, Robson 1993). Descriptive statistics were derived from the data using SPSS[®] 10.0 for Windows (Norusis 1993), whilst confirmatory factor analysis and structural equation modelling were conducted using Amos[®] 4.0 (Arbuckle and Wothke 1999).

The instrument was pre-tested by administering it to firms that had been pre-contacted and participated in the pilot study. A random sample of 11 firms was selected, again using www.randomizer.org from the remaining 57 respondents not

sampled for post-pilot study interviews. The sample were all telephoned and asked to participate. Six firms agreed to do so and were sent a mock-up of the final instrument together with an SASE and covering letter shown in Appendix Ten.

Four completed surveys and comment sheets were returned. The pre-test yielded only one comment about the survey “possibly slanted towards manufacturing with high throughput” from a small seafood business with “the bulk of [their] suppliers coming in once or twice a year”. Pre-test respondents took between 15 and 20 minutes to complete the questionnaire.

Section 1 of the questionnaire listed twelve different customer service variables that are measures of price, service quality and product quality according to the PZB 1994 model in Figure 10.1 and the list in Table 10.1. Respondents were asked to indicate the importance of each variable as it pertained to their firm’s expectations of suppliers using a five point Likert scale with anchors of very unimportant and very important (Questions 1-12).

Section 2 asked respondents to consider their most recent delivery of supplies and first indicate whether it was provided by the supplier or by a 3PL firm. Second, respondents were asked to indicate how the delivery performance of the twelve customer service variables compared to their expectations using a five point Likert scale with anchors of much worse than I expected and much better than I expected (Questions 13-24). These measures provided data about the firm’s perceptions of an actual delivery event performance. The multiplied product of the data from the Section 1 and 2 measures provides weighted SERVPERF measures.

Section 3 queried the type of supplies, typicality and frequency of delivery and importance of the supplier (Questions 25-32). Some of these questions provided measures about global satisfaction and one measure of firm intentions.

Section 4 asked respondents to consider supplier relationships and first rate the importance of relationship service and quality from suppliers using a five point

Likert scale with anchors of very unimportant and very important for eleven variables contained in Table 10.1 (Questions 33-43). Two other questions in this section provided measures of global satisfaction (Questions 44-46).

Section 5 asked for demographic and control information about the firm and respondent (Questions 47-55). The purpose here was to determine whether firm characteristics affected the respondent's attitude towards variables under consideration. The last question investigated the firm's current use of technology.

Lastly, respondents were provided with an opportunity to request a copy of the survey results as their incentive to participate (Diamantopoulos and Schlegelmilch 1996, Earp and Hunter 1999).

10.4.3 Survey Process and Response

The letter and questionnaire packages were mailed with second-class postage fifteen days before the response deadline noted in the covering letter. As with the pilot study responses were tracked according to their postmark date and compared to the mailout date. The response pattern is shown in Figure 10.4. The first responses were postmarked two days after the mailout date whilst the last response received from the initial mailout was postmarked 64 days after the mailout date.

The initial survey mail-out yielded 210 responses (17%) from the 1,215 questionnaires posted, which was consistent with the pilot study unsolicited mailout rate. In an attempt to increase responses a follow-up reminder card, shown as Appendix Eleven, was mailed to 300 firms selected at random from the 1,005 non-respondents firms, using the www.randomiser.org website. This number of mailouts was selected due to budget constraints and to reflect about 25% of the sample. The follow-up card was posted 30 days after the initial mailout date. The last response was postmarked 18 days after the second mailout date or 16 days before the last response from the initial mailout, thus total survey response time for the main study was 64 days.

The response pattern for the follow-up group is also shown in Figure 10.4. The second mailout yielded only 7 additional responses from this follow-up group of 300 for a 2.3% proportionate response rate and a total of 217 (18%) responses for the entire survey. This is consistent with the pilot study where the second mailout also did not generate a good response, and reinforces that researchers have one chance at getting firms to respond in this industrial sub-sector.

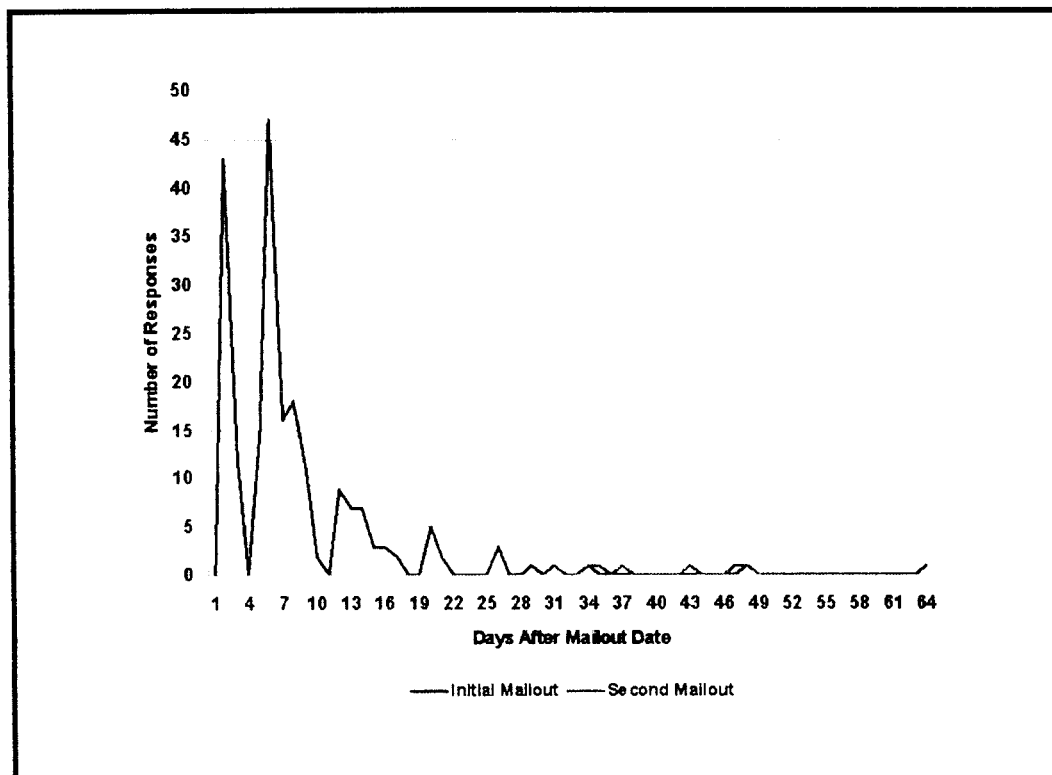


Figure 10.4: Main Study Response Pattern

There were 201 usable questionnaires from the total 217 returned. Four firms declared they were no longer trading, three firms noted they didn't have time to complete it, and one firm declined due to company policy. Eight firms noted they were not applicable for the research due to either being small farms without suppliers or exporters and distributors not involved in processing.

10.5 DESCRIPTIVE DATA ANALYSIS

10.5.1 Examination of Data, Normality and Non-response Bias

Questionnaire data were entered into SPSS® 10.0 for Windows (Norusis 1993). The data were also reviewed for errors and 'cleaned' where necessary (Hair, Anderson, Tatham and Black 1995, Oppenheim 1992, Remenyi, Williams, Money and Swartz

1998). The demographic and control data of the 201 respondents were collected from Section 5 of the questionnaire and administration of questionnaires throughout the mailout procedure.

Data from questions 1-24, 26, 30-32 and 45-46 related to the PR, SQ, PQ, RS, RQ and GS constructs and question 55 related to the use of technology were 5 point Likert scales as discussed in the last section. They are considered interval and metric data for statistical analysis purposes as discussed in Chapter Nine (Hair, Anderson, Tatham and Black 1995, Remenyi, Williams, Money and Swartz 1998).

The data were first examined for normality and survey bias. Normal (Q-Q) probability plots were generated for the twelve weighted SERVPERF PR, SQ and RQ variables, eleven RS and RQ variables, and six GS variables. Figure 10.5 shows the probability plot for the weighted SERVPERF variable SQ1, denoted by CS1 in the plot. Normality is indicated if response plots are clustered around the straight line (Norušis 1993). All normal probability plots were examined and the data considered normal for statistical analysis, thus the data were not transformed.

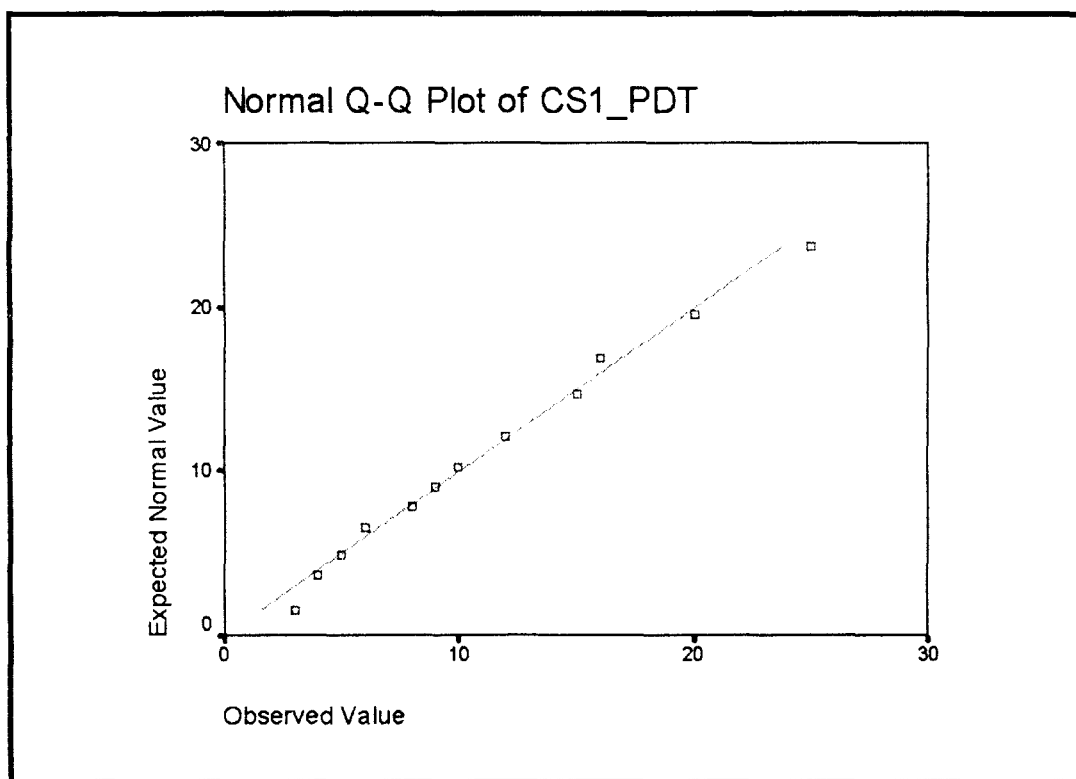


Figure 10.5: Normal Probability Plot

As discussed in Chapter Nine, respondents were again split into first (early) and last (late) quartiles according to when responses were received to compare differences in

responses and test non-response bias (Lambert and Harrington 1990). The last quartile of respondents contained all of the follow-up card mailout respondents as well as initial mailout respondents.

A t-test was applied to all 29 manifest variables and absolute t-test values were less than 1.96 at the 5% significance level for all 30 variables. Two-tailed probabilities were significant and ranged from 21% to 88% for the variables. Thus, there were no statistically significant differences in means for the 29 variables and it is inferred that responses from first quartile (early) and last quartile (late) respondents were the same and non-response bias was therefore non-existent.

Data from questions 25, 27, 28, 29, 47, 49-51 and questionnaire tracking were nominal or ordinal and therefore non-metric (Hair, Anderson, Tatham and Black 1995). Again, nominal and ordinal data are the lowest level with respect to measurement and the only meaningful quantitative analysis that can be performed are frequency counts and cross-tabulations (Hair, Anderson, Tatham and Black 1995, Remenyi, Williams, Money and Swartz 1998).

Data from questions 44, 48 and 52-54 were ratio or metric as numerical responses have absolute and meaningful magnitudes as well as a true zero (Hair, Anderson, Tatham and Black 1995). Ratio data are the highest level with respect to measurement and can be analysed by the full range of statistical techniques (Hair, Anderson, Tatham and Black 1995, Remenyi, Williams, Money and Swartz 1998).

10.5.2 Respondent Demographic Data

A majority of the 201 respondents were meat, poultry and game producers (56%, n=113) with about 22% each consisting of dairy (n=45) and seafood (n=43) producers. This compares closely to the survey breakdown in Table 10.2 but the meat, poultry and game sub-sector is again somewhat underrepresented.

The mean number of years in business was 30 (n=199). Over 73% of respondent firms (n=147) had less than 50 employees and fell within the European Community's

small to medium enterprise (SME) category (The European Commission 1999). This is 6% higher than the pilot study findings. Almost 40% (n=79) were in the micro-firm category of less than 10 employees (ibid.) whilst only 10% (n=19) had 250 or more employees.

Respondents were asked whether their firm used computer technology such as EDI or the Internet for the purchase of supplies. Almost 55% (n=108) responded at the anchor 'not at all' whilst a further 21% (n=42) selected point 2 next to that anchor. Only 3% of respondents (n=6) selected the very frequently whilst a further 12% (n=25) selected point 4 next to that anchor. Thus, over 75% of respondent firms (n=150) have not embraced various technological innovations such as EDI and ECR.

Respondents were asked whether they were the only individual in the firm responsible for purchasing and arranging the delivery of a supplier's products. Sixty-five per cent (n=131) were not solely responsible for purchasing whilst 70% (n=141) were not solely responsible for arranging delivery. Nevertheless, respondents were selected from the database according to title and are considered key informants for this study.

10.5.3 Supplier and Delivery Data

The mean number of average suppliers dealt with was 51 (n=197) whilst the mean number of average deliveries received per week was 62 (n=194). Respondents recorded a mean of 81% for the overall percentage of suppliers they have good relationships with (n=168).

Delivery methods means were 41% for supplier delivery, 19% for own delivery, and 40% for 3PL delivery (n=196). These values are almost identical to the pilot study findings.

For the specific delivery under investigation in Section 2, 82% of deliveries (n=122) were provided by the supplier whilst 18% (n=26) were provided by a 3PL service provider.

The types of supplies for the specific delivery were raw materials and supplies for processing (49%, n=97) and packaging materials (30%, n=60). Thus, a majority of responses related to operational activities for respondent firms.

An overall breakdown of the percentage of annual purchases from the specific supplier was: up to 10% - 55%, 11-50% - 36% and more than 50% - 9% (n=199). Dissatisfied respondents did not record significant percentage differences regarding annual purchases.

The frequency of deliveries from the specific supplier were primarily one to three times per week (36%, n=71) and one to three times per month (41%, n=81). Only 9% of deliveries were daily (n=18), whilst 15% of deliveries were on a once to three times yearly basis (n=30).

Similar to the pilot study 83% (n=167) of respondents were satisfied the supplier's performance for the specific event surveyed, whilst 17% (n=34) were dissatisfied.

10.5.4 Tests of Association

Various cross tabulations were examined for relationships amongst demographic and satisfied/dissatisfied respondents. Cross tabulations were performed using a Pearson χ^2 test. Tests where more than 20% of cells with expected frequencies of less than 5 were discarded as χ^2 tests would be statistically meaningless (Robson 1993). These tests primarily pertained to demographic data, except for seafood producers who were proportionately more dissatisfied than other groups ($\chi^2=9.6$, $p<.05$).

Dissatisfied respondents as a group are more likely to switch suppliers ($\chi^2=10.1$, $p<.05$) and felt power rested with suppliers ($\chi^2=15.4$, $p<.05$). Dissatisfied respondents are also more unsatisfied in their feelings toward suppliers, whilst satisfied respondents tend to be the opposite ($\chi^2=90.8$, $p<.01$).

More dissatisfied respondents proportionately consider supplier quality to be poor ($\chi^2=53.8$, $p<.01$) and have intentions of purchasing less in the next year ($\chi^2=50.8$, $p<.01$). Conversely, satisfied respondents proportionately consider supplier quality to be good and have intentions of purchasing more in the next year.

10.5.5 Importance of SERVPERF Variables

Most of the 12 customer service variables in Section 1 of the questionnaire appeared important as visual exploration of the data frequencies revealed numerous responses of 4 ratings on the Likert scale. Supplier performance however was rated less as visual exploration revealed numerous responses of 3 ratings.

Table 10.3 shows means and rankings for all 12 PR, SQ and PQ variables for importance, SERVPERF and weighted SERVPERF. Weighted SERVPERF was calculated by multiplying the importance rating by the SERVPERF rating for every respondent.

Code	Main Study Variable	Importance Mean	Rank	SERVPERF Mean	Rank	Weighted SERVPERF Mean	Rank
PR1	Price	4.1	9	3.4	8	14.9	8
PR2	Accurate Invoices	4.3	7	3.7	1	15.9	5
SQ1	Availability	4.2	8	3.3	11	13.8	9
SQ2	On-Time Delivery	4.7	3	3.5	5	16.4	4
SQ3	Complete Orders	4.4	5	3.6	3	15.9	5
SQ4	Appropriate OCT	3.9	11	3.4	8	13.5	11
SQ5	Products Arrive Undamaged	4.8	1	3.7	1	17.8	1
SQ6	Consistent OCT	4.0	10	3.4	8	13.6	10
SQ7	Accurate Orders	4.4	5	3.5	5	15.7	7
SQ8	Delivery Information	3.7	12	3.2	12	11.9	12
PQ1	Consistent Product Quality	4.8	1	3.5	5	16.8	3
PQ2	Products Arrive to Specification	4.7	3	3.6	3	17.3	2

Table 10.3: Importance Rankings of Price, Service Quality and Product Quality Variables

Rankings were assigned in descending order of mean value and are considered ordinal data. A Spearman correlation analysis of rankings between importance and weighted SERVPERF shows very little difference in rankings ($\rho=.96$, $p<.01$). However analysis of rankings between SERVPERF and weighted SERVPERF is less significant ($\rho=.83$, $p<.01$). This finding supports the use of SERVPERF weighted by importance (Ennew, Reed and Binks 1993) and does not support Cronin and Taylor's assertions (1992) that SERVPERF alone is a more appropriate measure of customer attitudes towards service quality. The weighted SERVPERF scores will be used in the SEM analysis discussed in the next section.

The eight most important weighted SERVPERF variables are products arriving undamaged (SQ5), products arriving to specification (PQ2), consistent product quality (PQ1), on-time delivery (SQ2), accurate invoices (PR2), complete orders (SQ3) and accurate orders (SQ7) and price (PR1). This finding is highly consistent with the pilot study findings. The four most important pilot study variables were on-time delivery, OSD (amended to SQ5, PQ1 and PQ2), complete and accurate orders (amended to SQ3 and SQ7) and price. The fifth most important variable, action on complaints was amended to a relationship service variable, but the sixth most important pilot study variable was accurate invoices.

10.5.6 Importance of Relationship Variables

Table 10.4 shows means and rankings of importance for all 11 RS and RQ relationship variables. The five most important are trust, commitment, action on complaints, integrity and delivery time. The three new variables of RQ are ranked highly, whilst action on complaints discussed above is also ranked high in importance similar to the pilot study.

Code	Main Study Variable	Mean	Rank
RS1	Easy Ordering	4.2	6
RS2	Ongoing Communications	4.2	6
RS3	Action on Complaints	4.5	3
RS4	Return Policy	4.0	9
RS5	After Sales Support	4.0	9
RS6	Delivery Time	4.4	4
RS7	Helpful CSRs	4.1	8
RS8	Customised Services	3.8	11
RQ1	Trust	4.7	1
RQ2	Commitment	4.6	2
RQ3	Integrity	4.4	4

Table 10.4: Importance Rankings of Relationship Service and Relationship Quality Variables

10.5.7 Global Satisfaction Variables

Table 10.5 shows overall means and means of dissatisfied respondents for the six GS items. Supplier importance had the highest mean overall (4.2, n=201) indicating the specific supplier was quite important to respondents. Overall supplier customer service quality had an overall mean of 3.9 (n=201) indicating respondents consider the specific supplier's customer service is quite good.

Respondents' use of the specific supplier in the next year was also expected to be quite frequent (mean of 3.9, n=200). Respondents were also quite satisfied as regards their feelings about the specific supplier's services (mean of 3.8, n=201).

In terms of power and potential conflict issues, overall respondents considered relationship power with suppliers was somewhat in their favour (mean of 3.4, n=201) and that the ability to switch suppliers was somewhat easy (mean of 3.3, n=201).

Dissatisfied respondents (n=34) had lower means, which were significant at the .05 level when compared to satisfied respondents (n=167), except for GS1-supplier importance. These findings support the tests of association reported in section 10.5.5.

Code	Main Study Variable	Overall Mean	Satisfied Respondent Mean	Dissatisfied Respondent Mean
GS1	Supplier Importance	4.2	4.2	3.7
GS2	Overall Supplier Quality	3.9	4.0	3.1
GS3	Feelings towards Supplier	3.8	4.0	2.7
GS4	Relationship Power	3.4	3.5	3.0
GS5	Ability to Switch	3.3	3.4	3.0
GS6	Future Purchase Intention	3.9	4.1	3.1

Table 10.5: Means of Global Satisfaction Variables

The next section discusses the SEM analysis for the proposed main study model as shown in Figure 10.3.

10.6 PROPOSED MAIN STUDY MODEL SEM ANALYSIS

10.6.1 Model Specification, Data Input, Sample Size, Estimation and Identification

This section discusses steps 3 to 6 of the SEM process as noted in section 10.2. Step 3 consists of specifying the measurement and structural models, considering research design issues and identifying any correlation of constructs and indicators. The measurement and structural models were specified in section 10.3.2 and shown in Figure 10.3.

As noted in section 10.3 manifest variables in the measurement model are termed indicators as they are used to measure or indicate the latent constructs (Hair, Anderson, Tatham and Black 1995). Essentially they are reflective indicators as “it is assumed that one or sometimes more underlying unobservable constructs ‘cause’ the observed variables” (Diamantopoulos 1994). The analyst has complete control over where the manifest variables are assigned to a construct (Hair, Anderson, Tatham

and Black 1995), however assignment must be justifiable according to the theory used (Fornell 1983).

Hair, Anderson, Tatham and Black (1995) recommended the variance/covariance matrices be used for data input when theory testing is being performed as they satisfy the assumptions of the methodology and are the appropriate form of data for validating causal relationships. If the analyst is only concerned with patterns of relationships and not with total explanation, then the standardised variance/covariance or correlation matrices are appropriate. However Hair, Anderson, Tatham and Black (1995) cautioned that correlation matrix analysis provides more conservative estimates of various coefficients and the analyst should interpret results carefully. This study is explanatory but is not concerned with true theory building. Accordingly the standardised variance/covariance or correlation matrices will be used as data input.

A sample size of 200 has been proposed as critical in SEM (Bentler 1990, Hair, Anderson, Tatham and Black 1995, Spector 1992). Small sample sizes are not compatible with maximum likelihood (ML) estimation of covariance structure models however ML can be justified when the sample size minus the number of parameters to be estimated exceeds 50 (Fornell 1983). The sample size provides a basis of the sampling error (Hair, Anderson, Tatham and Black 1995). Too small a sample tends to produce unstable results in the covariance estimates (Flynn and Percy 2001, Fornell 1983). Also, the χ^2 goodness of fit statistic may not be χ^2 distributed and hence probability values used to evaluate the null hypothesis may not be correct (Bentler 1990).

However, too large a sample also affects the χ^2 goodness of fit statistic, which is directly dependent on sample size (Anderson and Gerbing 1988). In large samples any null hypothesis model's implied variance/covariance matrix $\Sigma = \text{matrix } \Sigma(\theta)$ may be rejected (Bentler 1990) as the sample covariance matrix \mathbf{S} will converge to Σ (Bentler and Bonett 1980), and the χ^2 goodness of fit statistic will thus always be significant. The sample size for the main study is 201, which meets the proposed

critical size to minimise the problems discussed above. There was very little missing data of manifest variable responses, which could reduce the effective sample size, however the AMOS[®] software computes full information maximum likelihood (FIML) estimates (Arbuckle and Wothke 1999) such that all 201 responses were usable.

The goal of SEM is to obtain estimates for each of the parameters specified in the model to produce Σ such that the parameter values are as close as possible to S (Schumacker and Lomax 1996). The estimation process involves using a particular fitting function to minimise the difference between Σ and S . Estimation methods include ML, ordinary least squares (OLS) and generalised least squares (GLS). ML has desirable asymptotic properties (i.e. large sample properties) such as minimum variance and unbiasedness, and is iterative so initial parameter estimates do not have to be provided (ibid.). Moreover, ML parameter estimates are rather robust against moderate violations of the multivariate normality assumption provided the sample size exceeds 100 (Steenkamp and van Trijp 1991). ML estimation is used for the main study for these reasons. Further, the study's sample size minus the number of parameters to be estimated exceeds 50 as called for by Fornell (1983).

Model identification relates to potential problems in structural model identification that would cause the SEM computer software to 'blow up' (Hair, Anderson, Tatham and Black 1995). An identification problem occurs when there are an infinite number of solutions for the proposed model, i.e. there are not enough constraints on the model and data to obtain unique estimates (Schumacker and Lomax 1996). Model parameters must be specified as free, fixed or constrained (ibid.). A free parameter is unknown and is to be estimated whilst a fixed parameter is fixed to a specific value, typically 0 or 1. A constrained is unknown but is constrained to equal one or more parameters, for example the error terms of two or more manifest variables. Again, such specification must be linked to the theoretical construction of the model as discussed above (Hair, Anderson, Tatham and Black 1995).

There are three levels of model identification dependent on the information in **S** (Schumacker and Lomax 1996). First, a model can be just-identified or saturated if all parameters may be uniquely identified because there is just enough information in **S**. Second, a model can be over-identified if there is more than one way to estimate a parameter because there is more than enough information in **S**. Third, a model can be under-identified if one or more parameters cannot be identified because there is insufficient information in **S**. In this case the model estimates are not to be trusted, however the model may become identified if additional constraints are imposed (ibid.).

The analyst can look to three common sources for an identification problem: (1) a large number of estimated parameters relative to the number of covariances in **S** indicated by a small number of degrees of freedom, (2) a nonrecursive or reciprocal effect between constructs where estimation gets caught in a continuous feedback loop, and (3) a failure to fix the scale of a construct (Hair, Anderson, Tatham and Black 1995, Schumacker and Lomax 1996). The AMOS[®] software recognises when a model is unidentified, and provides intuitive information in a ‘pop-up’ dialogue box to allow the analyst to determine the source of the problem as well as suggestions on how the analyst can correct the problem (Arbuckle and Wothke 1999).

10.6.2 A Two-Step Approach

Anderson and Gerbing (1988) proposed a two-step approach to utilising SEM. Whilst the two-stage approach is not without debate most SEM researchers advocate the procedure (Garver and Mentzer 1999). Anderson and Gerbing (1988) considered the two-step approach minimises the potential for ‘interpretational confounding’ by avoiding interactions between the measurement and structural models when estimated simultaneously. Interpretational confounding “occurs as the assignment of empirical meaning to an unobserved variable which is other than the meaning assigned to it by an individual a priori to estimating unknown parameters” (ibid. p.418). Interpretational confounding arises when two situations are present: the indicators of the latent variable or construct have low covariance amongst themselves

and when the covariances of the indicators of the latent variable or construct with the indicators of other latent variables or constructs in the model are widely different (Anderson and Gerbing 1982).

Essentially, the analyst must consider the potential for within-construct versus between-construct effects in estimation, which can be substantial (Hair, Anderson, Tatham and Black 1995). The two-step approach provides the analyst with the opportunity to localise misfits to the structural or measurement parts of the model (Loehlin 1998). In the first step the analyst can validate the measurement model through CFA and tests for construct validity by testing construct unidimensionality, reliability, convergent validity, discriminant validity and predictive validity. All these tests, except concurrent and predictive validity, comprise the second stage of the Churchill et al. framework discussed in section 10.2. Predictive validity is a component of nomological validity and can be achieved by correlating constructs to other constructs that they should predict. Predictive validity can be tested in the measurement model if it contains the construct of interest and a construct it should predict (*ibid.*).

Once the measurement model is validated the analyst can conduct the second step of the procedure by estimating structural relationships between latent variables or constructs, and thus test the structural model. Anderson and Gerbing (1988) recommended estimating a series of nested structural models in this step for assessing the structural model. This test represents an assessment of nomological validity, where a construct relates to other research constructs in a way that is consistent with underlying theory (Anderson and Gerbing 1988, Dunn, Seaker and Waller 1994). However, Steenkamp and van Trijp (1991) warned that the usual structural model analysis technique of correlation or regressions analysis does not allow formal testing of the nomological network, and also does not eliminate the biasing effect of measurement error between the constructs. The Anderson and Gerbing two-step approach (1988) is used for the main study and the next two subsections deal with the measurement and structural model analyses respectively.

10.6.3 Measurement Model and Confirmatory Factor Analysis

The CFA process for refining and testing for unidimensional constructs begins with each latent variable or construct (Garver and Mentzer 1999). The first step is to determine whether the manifest variables and related constructs have satisfactory psychometric properties (Fornell and Larcker 1981, Nunnally and Bernstein 1994).

The properties of interest are unidimensionality, reliability that is also an assessment of convergent validity, average variance extracted and discriminant validity (Fornell and Larcker 1981). It should be noted that unidimensionality and reliability are distinct concepts, and reliability does not indicate unidimensionality (Garver and Mentzer 1999). The relationship quality (RQ) construct is utilised for illustration purposes and its independent CFA results are shown in Figure 10.6.

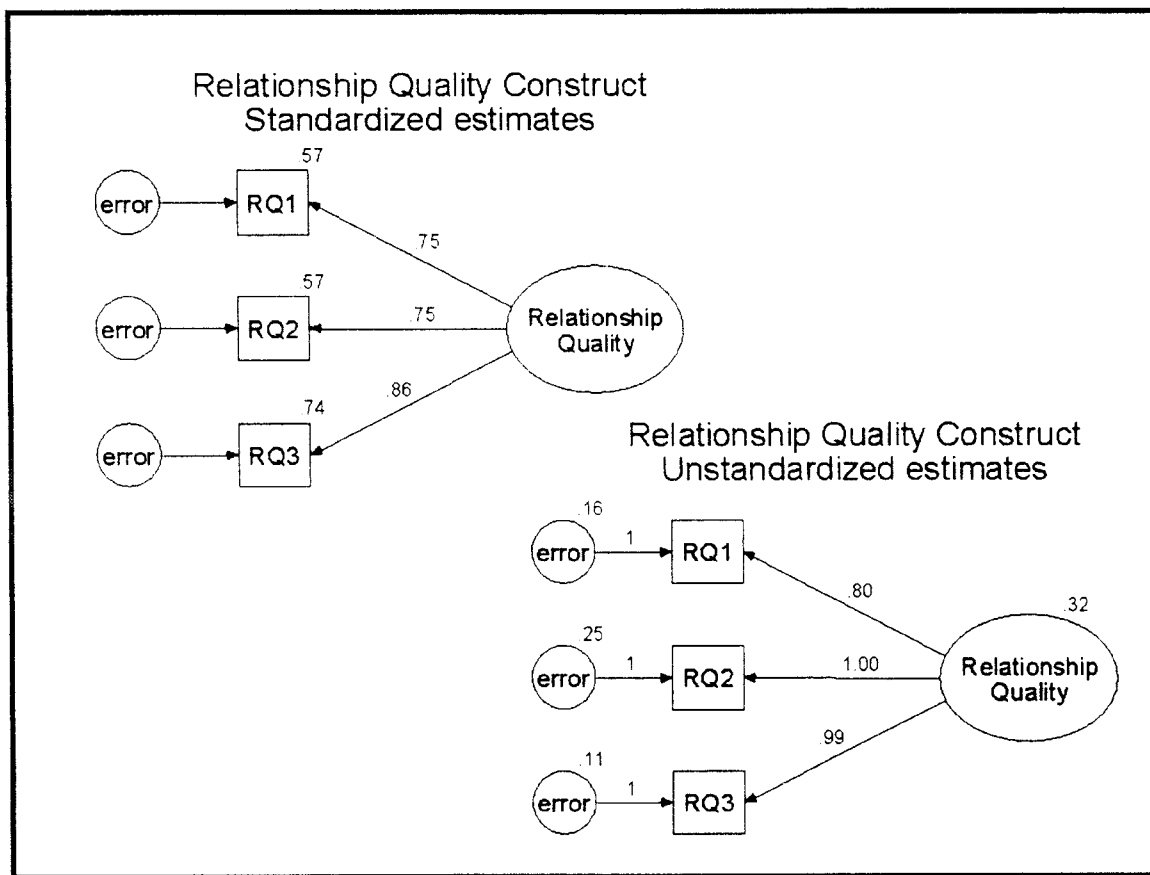


Figure 10.6: CFA Output for Relationship Quality Construct

Firstly, standardised loadings of manifest variables onto a construct and their error variances were checked. The loadings of the manifest variables were .75 each for RQ1 and RQ2 and .86 for RQ3 and are considered appropriate as they exceed 0.5 (Hair, Anderson, Tatham and Black 1995). All error variances were positive so there

is no identification problem related to negative variances, or what is termed a Heywood case (Fornell 1983, Hair, Anderson, Tatham and Black 1995).

Loadings and error variances were also examined for significance through critical ratios (CR). The CR found in the AMOS[®] software is defined as the estimate/standard error, and is the same as the t statistic found in the LISREL software. A CR that falls below 1.96 for a two-tailed test at .05 level is deemed insignificant (Arbuckle and Wothke 1999). RQ2 was fixed at a coefficient weight of 1.00 in order to identify the model so CR values are only produced for RQ1 (9.85) and RQ3 (10.09) and their respective error variances exceeded 1.96.

Anderson and Gerbing (1988) also noted convergent validity can be assessed by determining whether each variable's estimated coefficient is significant, i.e. greater than twice its standard error. Again, RQ2 was fixed at a coefficient weight of 1.00 so a standard error was not estimated. The estimated unstandardised coefficients and standard errors were .797 and .081 for RQ1 and .989 and .098 for RQ3, respectively. Thus, this construct exhibits convergent validity.

The squared multiple correlations (SMC) or R^2 values for each manifest variable are shown above each variable 'box' in the standardised estimates part of Figure 10.6 (ibid.). The SMC value of .74 for RQ3 indicates the proportion of variance in RQ3 that is explained by the construct relationship quality and the square root of the SMC is the loading. The variance that RQ3 accounts for by itself is $1 - R^2$ or $1 - .74 = .26$ (Loehlin 1998). High R^2 values also indicate good reliability although no rule of thumb has been provided for minimum values (Hair, Anderson, Tatham and Black 1995). An R^2 value of .25 was used for the main study as an indicator consistent with the test for loading, which is the square root of R^2 . This value indicates that at least 25% of a variable's variance is explained by the respective latent construct.

Two other tests include composite reliability and variance extracted (Fornell and Larcker 1981, Garver and Mentzer 1999, Hair, Anderson, Tatham and Black 1995). The AMOS[®] software does not compute either test and formulae are used to compute

values by hand. Coefficient alpha values were also calculated in SPSS[®] for Windows and again only the interitem correlations were obtained for PR and PQ.

Composite reliability is a measure of internal consistency of a manifest variable, depicting the degree to which it ‘indicates’ the latent construct, and a common threshold value for acceptability is .70 (Hair, Anderson, Tatham and Black 1995). The formula is:

$$\text{Composite reliability} = (\Sigma \text{standardised loadings})^2 + \{(\Sigma \text{standardised loadings})^2 + \Sigma \epsilon_j\}$$

The term ϵ_j is the measurement error for each manifest variable and is 1.0 minus the reliability of each manifest variable, defined as the square of the manifest variable’s standardised loading (ibid.). Standardised loadings are obtained from the AMOS[®] software output. For the RQ construct composite reliability was calculated to be:

$$(.75+.75+.86)^2 \div \{(.75+.75+.86)^2 + (.44+.44+.26)\} = .83$$

The variance extracted reflects the overall amount of variance in the manifest variables accounted for by the latent construct, and a common threshold value for acceptability is .50 (ibid.) however to be consistent with comments above a value of .40 is used for the main study. The formula is:

$$\text{Variance extracted} = \Sigma(\text{standardised loadings})^2 + \{\Sigma(\text{standardised loadings})^2 + \Sigma \epsilon_j\}$$

For the RQ construct composite reliability was calculated to be:

$$(.75)^2 + (.75)^2 + (.86)^2 \div \{(.75)^2 + (.75)^2 + (.86)^2 + (.44+.44+.26)\} = .62$$

The composite reliability and variance extracted for the RQ construct both exceed the recommended threshold, thus it exhibits unidimensionality, reliability and convergent validity. The 26 other manifest variables and their five respective constructs were assessed in a similar fashion. Table 10.6 shows the standardised loadings, R^2 , composite reliability and variance extracted for all 29 variables and six posited constructs. Eight variables did not meet the initial loading and R^2 values: PR1, RS1, RS2, RS3, RS4, GS1, GS4, and GS5. These ‘offending estimates’ were

deleted from further consideration in the model in accordance with recommended practice (Anderson and Gerbing 1988, Hair, Anderson, Tatham and Black 1995).

Variable	Loading (>.50)	R ² (>.25)	Coefficient Alpha (>.70)	Composite Reliability (>.70)	Variance Extracted (>.40)
PR1	.33	.11	.24	.46	.33
PR2	.74	.55	-	-	-
SQ1	.56	.32	.86	.86	.44
SQ2	.64	.41	-	-	-
SQ3	.62	.41	-	-	-
SQ4	.69	.48	-	-	-
SQ5	.63	.40	-	-	-
SQ6	.77	.59	-	-	-
SQ7	.75	.56	-	-	-
SQ8	.60	.40	-	-	-
PQ1	.77	.60	.61	.76	.61
PQ2	.79	.63	-	-	-
RS1	.47	.27	.81	.79	.33
RS2	.46	.23	-	-	-
RS3	.49	.31	-	-	-
RS4	.47	.26	-	-	-
RS5	.57	.42	-	-	-
RS6	.65	.45	-	-	-
RS7	.76	.57	-	-	-
RS8	.64	.48	-	-	-
RQ1	.75	.57	.83	.83	.62
RQ2	.75	.57	-	-	-
RQ3	.86	.74	-	-	-
GS1	.19	.04	.66	.70	.33
GS2	.89	.79	-	-	-
GS3	.78	.61	-	-	-
GS4	.26	.07	-	-	-
GS5	.27	.07	-	-	-
GS6	.64	.41	-	-	-

Table 10.6: Initial Measurement Model Assessment with CFA

The PR construct was also deleted such that PR2 became a manifest variable that indicated directly to TS, as opposed to a one variable construct. Standardised loadings, R^2 , and measures of composite reliability and variance extracted were recalculated for the revised and smaller RS and GS constructs. The new values are shown in Table 10.7 and better meet the assessment thresholds, particularly the variance extracted threshold. Thus, the remaining 21 manifest variables and five constructs of SQ, PQ, RS, RQ and GS all exhibit unidimensionality, reliability and convergent validity.

Variable	Loading (>.50)	R^2 (>.25)	Coefficient Alpha (>.70)	Composite Reliability (>.70)	Variance Extracted (>.40)
RS5	.56	.43	.76	.84	.58
RS6	.57	.47	-	-	-
RS7	.85	.72	-	-	-
RS8	.70	.49	-	-	-
GS2	.87	.76	.81	.82	.61
GS3	.80	.64	-	-	-
GS6	.65	.42	-	-	-

Table 10.7: Revised Measurement Model Assessment with CFA

Once each construct in the measurement model is deemed unidimensional by itself, then all possible pairs of constructs on the left-hand side of the SEM should be checked for unidimensionality (Garver and Mentzer 1999). This latter process also provides an assessment of discriminant validity between constructs. Discriminant validity is assessed by comparing the difference in χ^2 statistics values between pairs of constructs when the correlation between them was unconstrained, i.e. a free parameter, and when it was constrained to a value of 1.0 (Anderson and Gerbing 1988, Garver and Mentzer 1999, Hair, Anderson, Tatham and Black 1995).

The assessment between the product quality (PQ) and relationship quality (RQ) constructs is utilised for illustration purposes and the constrained and unconstrained diagrams are shown in Figure 10.7. The χ^2 value for the constrained situation is

15.77 and 5 degrees of freedom whilst the χ^2 value for the unconstrained situation is 8.50 and 4 degrees of freedom. The difference in χ^2 values is 7.27.

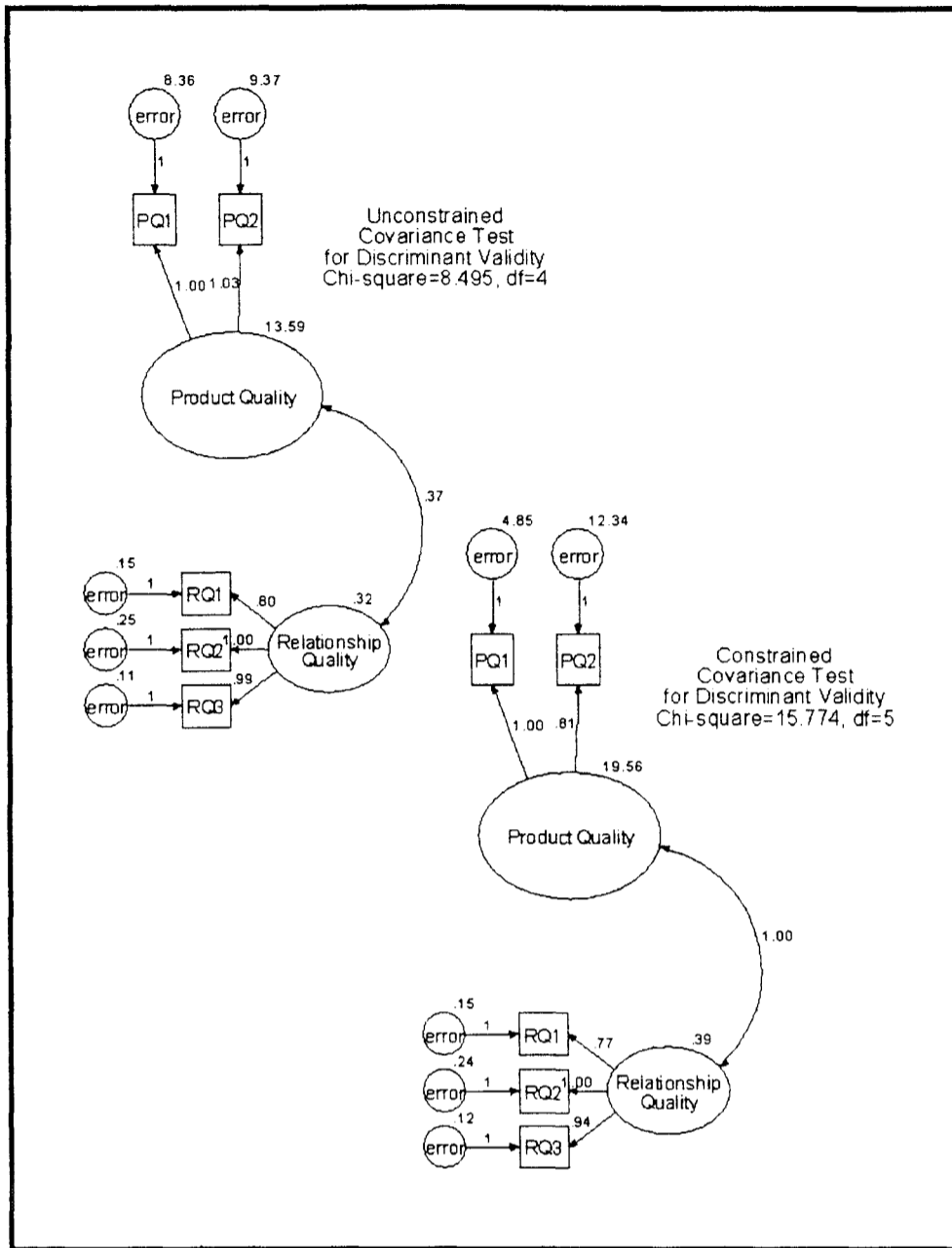


Figure 10.7: SEM Output for Constrained and Unconstrained Correlation Test of Discriminant Validity

As only one constraint is added in this test the change in the number of degrees of freedom is always one. The χ^2 values for one degree of freedom at the .05, .01 and .001 levels of significance are 3.84, 6.64 and 10.83 respectively (Malhotra and Birks 2000). Thus, the difference between PQ and RQ is significant at the .01 level and discriminant validity is exhibited between the two constructs. The χ^2 difference assessments for all possible pairs of the four left-hand side constructs are contained in Table 10.8. All tests are significant at the .05 level and discriminant validity is exhibited between all five left-hand side constructs.

Constructs	χ^2 Difference	Significance Level
SQ versus PQ	68.3	.001
SQ versus RS	9.1	.05
SQ versus RQ	11.4	.001
PQ versus RS	14.5	.001
PQ versus RQ	5.3	.05
RS versus RQ	117.9	.001

Table 10.8: Latent Construct χ^2 Difference Tests of Discriminant Validity

Another confirmation of discriminant validity is obtained with a χ^2 difference assessment of ‘nested’ structural models (Anderson and Gerbing 1988, Bentler and Bonett 1980, Fornell and Larcker 1983). Estimates are calculated of all manifest variables in the model with no constraints i.e. ‘free’ variables and known as model 0, all constrained to one latent variable and known as model 1, and the final structural model and known as model 2. The χ^2 and degrees of freedom differences are calculated and significant values indicate discriminant validity between the variables. Models 0 and 1 are shown in Figure 10.8 for illustration purposes and Table 10.9 shows the difference calculations. Both difference tests shown in Table 10.9 are significant at $p < .001$ and the proposed model thus exhibits discriminant validity.

	Model 0	Model 1	Model 2
χ^2	1918.5	980.0	369.5
degrees of freedom	210	189	184
	Model 0 — Model 1	Model 1 — Model 2	
χ^2	1918.5 — 980.0 = 938.5	980.0 — 369.5 = 610.5	
degrees of freedom	210 — 189 = 21	189 — 184 = 5	
Significance	$p < .001$	$p < .001$	

Table 10.9: ‘Nested’ Model χ^2 Difference Tests of Discriminant Validity

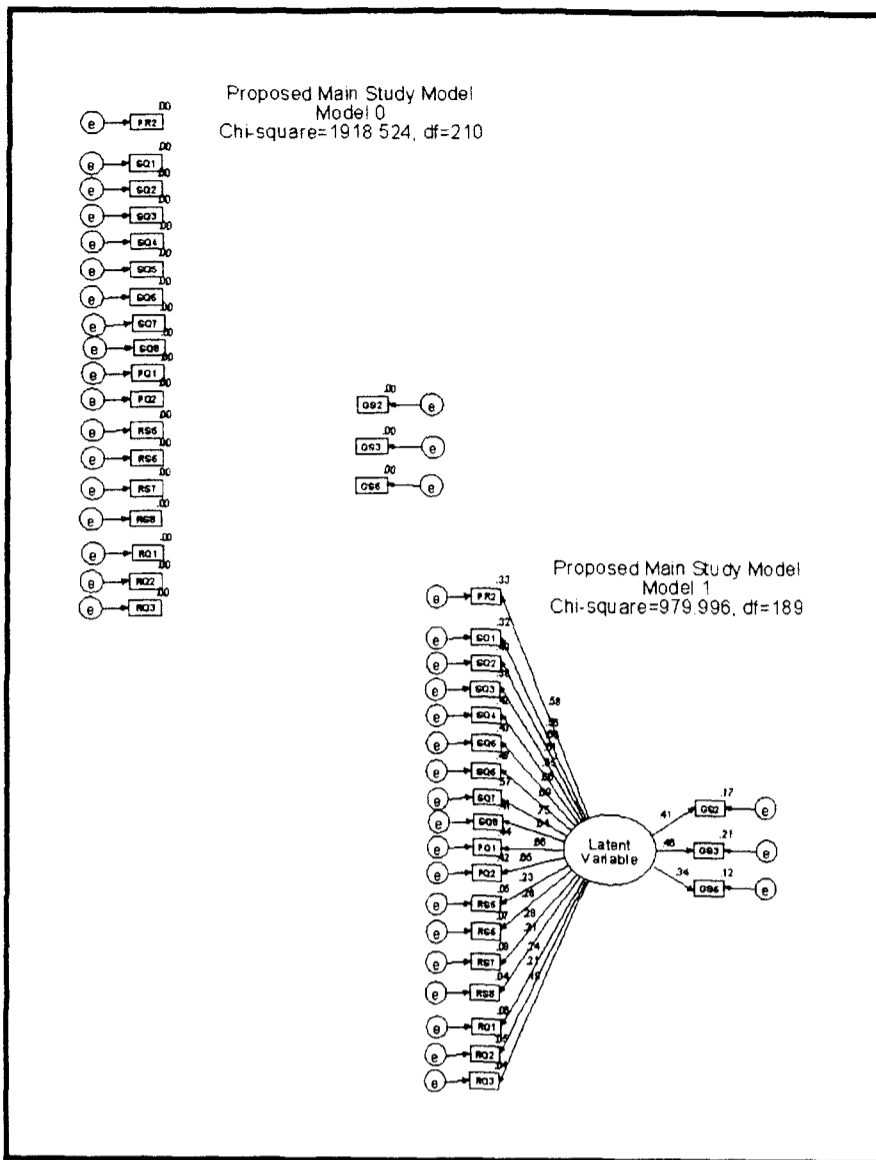


Figure 10.8: SEM Output for 'Nested' Model Test of Discriminant Validity

The measurement model for the proposed main study model, revised as discussed above, was found to contain constructs that are unidimensional and reliable, and that exhibit convergent and discriminant validity. All these assessments comprise the second stage of the Churchill et al. framework discussed in section 10.2. The revised path diagram shown in Figure 10.9 reflects the deletion of the PR construct and the eight manifest variables as discussed above. The next step in the SEM two-step process (Anderson and Gerbing 1988) is to assess the structural model.

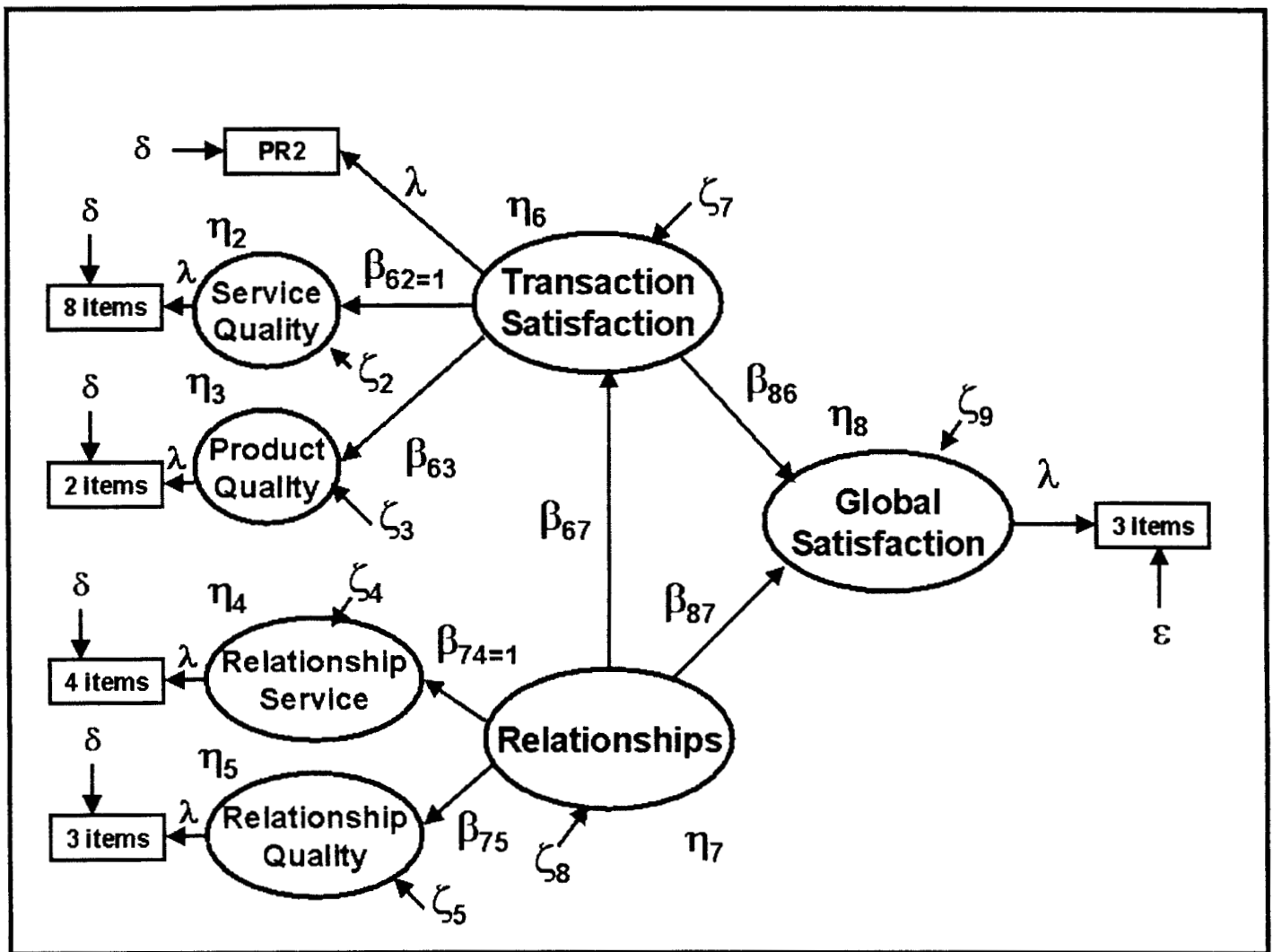


Figure 10.9: Revised Model for Main Study

10.6.4 Structural Model Analysis

After satisfactorily estimating the measurement model an analyst would assess how well the specified model accounted for the data with one or more goodness-of-fit indices that simultaneously assess the measurement and structural model (Anderson and Gerbing 1988). However, SEM has no single statistical test that best describes the strength of a model's prediction and there is no general agreement over a set of appropriate goodness of fit measures (Hair, Anderson, Tatham and Black 1995).

Hair, Anderson, Tatham and Black (1995) divided goodness of fit measures into the following three distinct classes:

1. Absolute measures of fit determine the degree to which the overall model (structural and measurement models) predicts the observed covariance or correlation matrix.
2. Incremental goodness-of-fit measures compare the proposed model to some baseline or null model.

3. Parsimonious goodness of fit tests assess parsimony by assessing the goodness-of-fit of the model to the number of estimated coefficients or conversely to the degrees of freedom.

Absolute fit measures include the likelihood-ratio χ^2 statistic, goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), and root mean square residual of approximation (RMSEA).

The likelihood-ratio χ^2 statistic is the only statistically-based measure of fit available to the researcher for evaluating SEM (Hair, Anderson, Tatham and Black 1995). A large χ^2 value relative to degrees of freedom shows that the observed sample matrix **S** differs significantly from the estimated matrix Σ , whilst a low χ^2 value indicates the two matrices are not significantly different (Hair, Anderson, Tatham and Black 1995).

The analysts thus looks for a non-significant χ^2 statistic to support the model at the .05 significance level or higher, i.e. a 'reverse-test' logic, but the χ^2 statistic should be viewed with caution and used as an indicator rather than a formal test of a hypothesis (Diamantopoulos 1994, Fornell 1983).

The statistical usefulness of the χ^2 statistic has been the subject of debate due to its sensitivity to sample size and the number of indicators, and their effect on its statistical power (Bentler 1980, Diamantopoulos 1994, Fornell and Larcker 1981, Hair, Anderson, Tatham and Black 1995). Accordingly a number of other measures have been developed to assist in assessing a model's goodness-of-fit. Hair, Anderson, Tatham and Black (1995) suggested that analysts should include one measure from each class in their evaluation of a structural model.

GFI is an indicator of the relative amount of variances and covariances jointly accounted for by the SEM (Diamantopoulos 1994). It is a non-statistical measure ranging from 0 (poor fit) to 1.0 (perfect fit) but is not adjusted for degrees of freedom (Hair, Anderson, Tatham and Black 1995). The AGFI is adjusted for degrees of freedom and also has similar values. No absolute thresholds for acceptability have

the AMOS[®] software cannot calculate either a GFI or AGFI value. However, all other goodness-of-fit indices are calculable and acceptable, except normed χ^2 that just exceeds the upper limit. All manifest variable and latent construct coefficients are positive, except RE→GS.

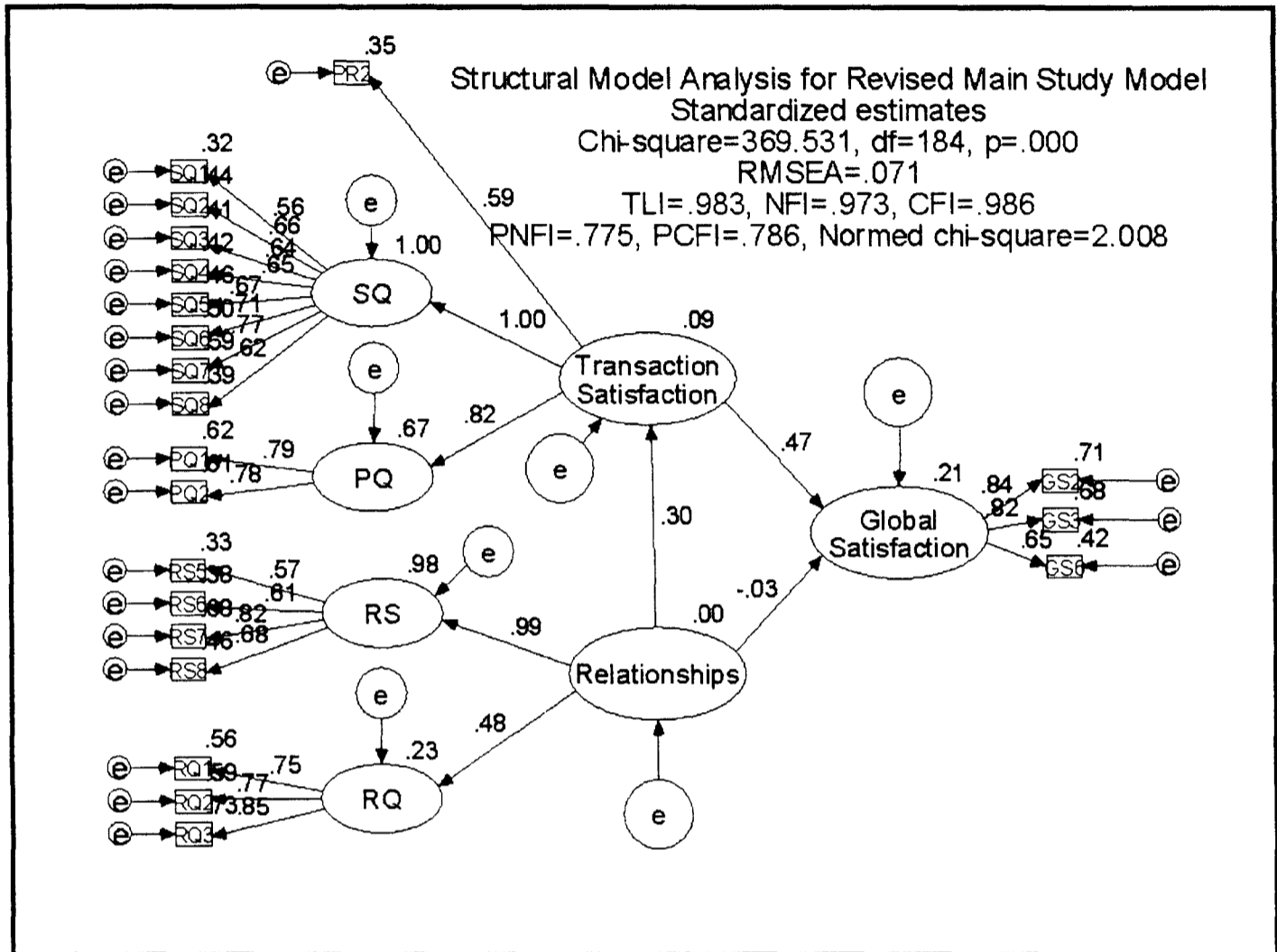


Figure 10.10: Standardised Estimates and Goodness-of-Fit Measures for Revised Main Study Model

Two error variances, for the latent constructs SQ and RS, were estimated to be negative on a first run of the model, i.e. a Heywood case, and the AMOS[®] software indicated an improper solution. Anderson and Gerbing (1988) argued sampling error is a likely cause in this situation, and respecifying the model with the problematic parameters fixed at zero or some arbitrarily small, positive number has no appreciable effect on the parameter estimates of other factors or on the overall goodness-of-fit indices. Accordingly, the two variances were fixed at .005 to allow model identification and analysis (Anderson and Gerbing 1988, Fornell 1983, Hair, Anderson, Tatham and Black 1995).

Whilst there are some goodness-of-fit issues, the model is nevertheless useful to consider patterns of relationships between constructs and the strength of manifest variable indicators to their respective constructs. It also provides a point of departure to develop a respecified model to provide a better statistical and theoretical fit.

10.6.5 Discussion of Findings and Model Respecification

Eight hypotheses pertaining to structural relationships were presented in section 10.3 and are rejected/not rejected as follows.

H₁: PR positively indicates TS, i.e. $\beta_{61} > 0$.

This hypothesis is rejected as the PR construct was deleted during measurement model assessment. The remaining variable PR2 does positively indicate TS on its own with a standardised positive coefficient of .59.

H₂: SQ positively indicates TS, i.e. $\beta_{62} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of 1.00. This coefficient was fixed to 1.0 for model specification and identification and has not changed due to the SQ error variances being fixed at a nominal amount for model identification.

H₃: PQ positively indicates TS, i.e. $\beta_{63} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .82.

H₄: TS positively affects GS, i.e. $\beta_{16} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .47.

H₅: RS positively indicates RE, i.e. $\beta_{74} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .99. This coefficient was fixed to 1.0 for model specification and identification and has not essentially changed due to the RS error variances being fixed at a nominal amount for model identification.

H₆: RQ positively indicates RE, i.e. $\beta_{75} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .48.

H₇: RE positively affects GS, i.e. $\beta_{87} > 0$.

This hypothesis is rejected with a standardised negative coefficient of -.03.

H₈: RE does not positively affect TS, i.e. $\beta_{67} \leq 0$.

This hypothesis is rejected with a standardised positive coefficient of .30.

The latter two hypotheses indicate that relationships do not directly affect global satisfaction but are mediated through transaction satisfaction. This suggests respondents assess relationship characteristics during each transaction event that manifest themselves in transaction satisfaction.

Using the various standardised coefficients, mathematical equations expressing relationships between latent constructs in the model would be:

$$GS = .47TS,$$

$$\text{where } TS = .59PR^2 + SQ + .82PQ + .30RE, \text{ and}$$

$$\text{where } RE = .99RS + .48RQ$$

In terms of all first order constructs a resultant equation would be:

$$GS = .47(.59PR^2 + SQ + .82PQ + .30(.99RS + .48RQ)), \text{ or}$$

$$GS = .28PR^2 + .47SQ + .39PQ + .14RS + .07RQ$$

Under this revised main study model more coefficient weight is attributed to PR, SQ and PQ construct variables than the RS and RQ construct variables. However the relationship items do affect transaction satisfaction. Global satisfaction is indicated by a supplier's overall quality and overall feelings of satisfaction towards them, and to a lesser extent their purchase intentions for the following year.

Can the model be respecified to improve the fit and meaning underlying the constructs and the discussions above? Respecification of indicators in the

measurement model is used to increase goodness-of-fit in the structural model when indicators “have not worked out as planned” (Anderson and Gerbing 1988 p.417). Anderson and Gerbing (1988) noted there are four ways to respecify indicators, however only two ways are preferred as they preserve the potential to have unidimensional measurement. The other two ways, relating the indicator to multiple constructs and using correlated error measurements, do not, and would thus obfuscate the meaning of the estimated underlying constructs.

The two preferred ways are relating the indicator to a different construct or deleting the indicator from the model. These ways are operationalised by assessing the pattern of standardised covariance residuals (Anderson and Gerbing 1988, Steenkamp and van Trijp 1991). Standardized covariance residuals are the residuals from the sample covariance matrix S and reproduced covariance matrix Σ divided by their asymptotic standard errors (Steenkamp and van Trijp 1991). Values indicating misspecification would be any value exceeding $|2.58|$ (Diamantopoulos 1994, Steenkamp and van Trijp 1991), although a more conservative value of $|2.00|$ has also been recommended (Anderson and Gerbing 1988).

The pattern of standardized covariance residuals is informative for respecification. When an indicator has large negative residuals (representing ‘overfitting’) with the other items pertaining to the same construct, and large positive residuals among other indicators in another construct (representing ‘underfitting’), the indicator could be moved to that construct. (Anderson and Gerbing 1988, Steenkamp and van Trijp 1991). When an item has many large residuals in absolute value but no clear pattern emerges, it appears best to delete the item (Steenkamp and van Trijp 1991). However, standardized covariance residuals should be used with caution and in an integrative way (Anderson and Gerbing 1988, Steenkamp and van Trijp 1991). They are calculated under the assumption of multivariate normality and will be biased when the data violate this assumption. Further, standardized covariance residuals could become significant with large samples, simply because of the power of the test (Steenkamp and van Trijp 1991).

A review of the AMOS[®] software output yielded only eight standardised covariance residuals with a value exceeding |2.00| out of 231 possible combinations (3.5%). The patterns were scattered across the five constructs and no associations or trends were evident. For example, PQ1 and PQ2 each had values of –2.29 with RS8 whilst RS6 had values of 2.70 and 2.27 with RQ2 and RQ3 respectively. Thus, no action was taken with any of the indicators.

Another technique in assessing the fit of a specified model is the use of modification indices, which are diagnostic indicators that can be helpful in deciding which additional paths from latent constructs to indicators might improve the fit of the model (Loehlin 1998). A modification index (MI) indicates an improvement in fit through a decrease in the χ^2 statistic caused by freeing a fixed i.e. nonestimated path present in the model (Diamantopoulos 1994, Loehlin 1998, Hair, Anderson, Tatham and Black 1995). An MI value of 3.84 or greater suggests a statistically significant χ^2 statistic reduction would result if the path was estimated. In the case of a typical CFA model the fixed paths are the zero paths between each construct and the indicators that are not supposed to load on it. Thus, “blindly freeing paths will reduce the χ^2 statistic but can also produce nonsensical models” (Loehlin 1998 p.198). An analyst should never make model changes based solely on assessment of MI as it is an “atheoretical approach totally contrary to the spirit of the technique and should be avoided in all instances” (Hair, Anderson, Tatham and Black 1995 p.644).

The AMOS[®] software output did not provide any modification indices for the model, possibly because it could not properly estimate MI or GFI and AGFI information from the χ^2 statistic. Accordingly, no assessment of MI parameters could be undertaken with this model. Diamantopoulos (1994) stressed that at this point of respecification an analysis is no longer confirmatory but becomes exploratory in nature. Deleting or adding parameters are the two basic ways to modify a model, but the specification search must be guided by theoretical considerations. As Loehlin wrote “changing a structural model is changing one’s theory, and should always be done with that in mind” (1998 p.199). However Diamantopolous, quoting Long, noted that “even if the model initially suggested by substantive theory is rejected,

there are generally some parameters that are definitely required on the basis of past research and some parameters that make no sense to include” (1994 p.124).

The proposed main study model in Figure 10.3 was predicated upon the 29 variables in Table 10.1 fitting hypothesised constructs derived from the PZB Model. Confirmatory factor analysis would have verified the appropriateness of the PZB Model and constructs within the measurement and structural models. However it may be that the PZB Model conceptualisation of transaction satisfaction being indicated by price and service and product quality does not fit the industry of study in this thesis. A reconceptualisation of the model and constructs through exploratory factor analysis of the 29 variables might provide better explanation and fit with the industry under review. The next section will discuss such a reconceptualisation and a subsequent SEM analysis.

10.7 RECONCEPTUALISED MAIN STUDY MODEL ANALYSIS

10.7.1 Exploratory Factor Analysis and Model

Reconceptualisation

Returning to the Churchill et al. framework, the recommended initial analysis of a domain of variables is with EFA. The 29 variables in Table 10.1 were derived from the pilot study that used EFA and were then assigned to relevant constructs in the PZB Model and the RE construct emerging from the pilot study. The PZB Model (PZB 1994, Parasuraman and Grewal 2000) is an attempt to consider variables of price as an indicator of transaction satisfaction together with service and product quality. It was developed as a response to methodological criticisms of the original SERVQUAL model (PZB 1985, 1988). The PZB Model has not been empirically tested and as a result its constructs have not received any rigorous investigation. The use of the PZB Model amended by the RE construct did not provide a robust fit under SEM analysis in section 10.6.

This is not to say the PZB Model lacks conceptual rigour. Rather, the direct application for this study of the amended PZB Model using established customer

service and relationship variables within the Churchill et al. framework has indicated conceptual difficulty. Thus, it is necessary to revisit the first stage of the Churchill et al. framework to consider a different conceptual model that may be more robust and provide better explanation for the main study.

An EFA of the 29 variables was conducted in a similar manner to the EFA conducted for the pilot study and discussed in section 9.3. The methods and techniques used were identical to the pilot study and thus details are not repeated here. The first step was to check whether this technique is appropriate for the data under consideration. There were 201 cases considered and this number of cases represented almost seven cases per variable. A Pearson correlation matrix for the 29 customer service variables yielded sufficient level and depth of inter-item correlation, i.e., substantial numbers of correlations greater than 0.30. Coefficient alpha for all variables in the correlation matrix was .86, which is considered highly reliable. ANOVA yielded an F value of 749.96 at $p < .000$, which indicates the means across all variables were reasonably equal (Hair, Anderson, Tatham and Black 1995). The Bartlett test of sphericity χ^2 for the 201 cases was 1768.7 with 210 degrees of freedom and is significant. The Kaiser Meyer Olkin (KMO) measure of sampling adequacy index for this data was .83 and is considered 'meritorious'. Based on the analysis of the Pearson correlation matrix and these various tests, factor analysis was considered appropriate for the 201 cases (ibid.).

The next step was to extract factors from the data and the method selected was again principal component analysis. The number of factors to extract was determined by examining the eigenvalues of factors and the percentage amount of variance that is explained by the factors. Six factors had eigenvalues over 1.00 and explained 64.9% of the variance. Seven factors were found after VARIMAX orthogonal rotation. However two factors, each with two variables, were deleted due to item-to-total correlations (ITC) of less than .50 and insignificant F scores. One factor contained GS4 and GS5 and its ITC was .37 with an F value of 1.25, $p < .26$. The other factor contained RS1 and RS2 and its ITC was .47 with an F value of 1.20, $p < .27$. Further, four variables, SQ8, RS3, RS4 and GS1 did not significantly load onto any factors

and were also deleted. The remaining five factors and 21 variables are shown in Table 10.10 at a .50 loading level. The five factors explained 63.6% of the variance so little explanation was lost from the deletion of the other two factors.

Variable	1	2	3	4	5	h²	ITC
PQ2	.80					.67	.66
SQ5	.74					.62	.67
SQ7	.74					.67	.72
PQ1	.73					.62	.63
SQ3	.70					.54	.63
PR2	.56					.50	.51
SQ2	.55					.54	.59
RS7		.82				.71	.68
RS8		.81				.66	.58
RS5		.70				.53	.50
RS6		.57				.57	.50
RQ3			.87			.78	.73
RQ1			.84			.73	.67
RQ2			.81			.72	.67
GS2				.86		.77	.72
GS3				.82		.74	.68
GS6				.79		.66	.58
SQ4					.72	.67	.65
SQ6					.70	.66	.60
PR1					.68	.52	.41
SQ1					.60	.50	.53
Eigenvalue	5.90	3.02	1.81	1.54	1.09		
Variance Explained	18.2%	11.8%	11.5%	11.1%	11.0%		
Cumulative Var Expl	18.2%	30.0%	41.5%	52.6%	63.6%		
Coefficient Alpha	.86	.76	.83	.81	.75		
F Statistics	9.2	31.6	22.1	2.4	7.0		
Probability	p<.001	p<.001	p<.001	p<.09	p<.001		
KMO Measure	.83						
Bartlett's χ^2	1768.7	210df	p<.001				

Table 10.10: EFA for Reconceptualised Main Study Model

The resulting variables utilised for SEM analysis are exactly the same as used in section 10.6, except for the addition of PR1 and the deletion of SQ8. Also, the second, third and fourth factors contain exactly the same variables as the RS, RQ and GS constructs assessed in section 10.6. The two new factors directly affect the PZB Model portion of the main study model. The first factor contains seven variables: PR2, SQ2, SQ3, SQ5, SQ7, PQ1 and PQ2. The fifth factor contains four variables: PR1, SQ1, SQ4 and SQ6. An examination of the variable names in each factor suggested that factor 1 is related to customer service and quality during the order transaction, i.e. on-time delivery, complete orders, products arrive to specification, etc. This factor was accordingly named order service and quality (OSQ). The examination also suggested that factor 5 is related to customer service activities that precede an order, i.e. price, availability, and consistent and appropriate order cycle times. This factor was accordingly named preorder (PRE).

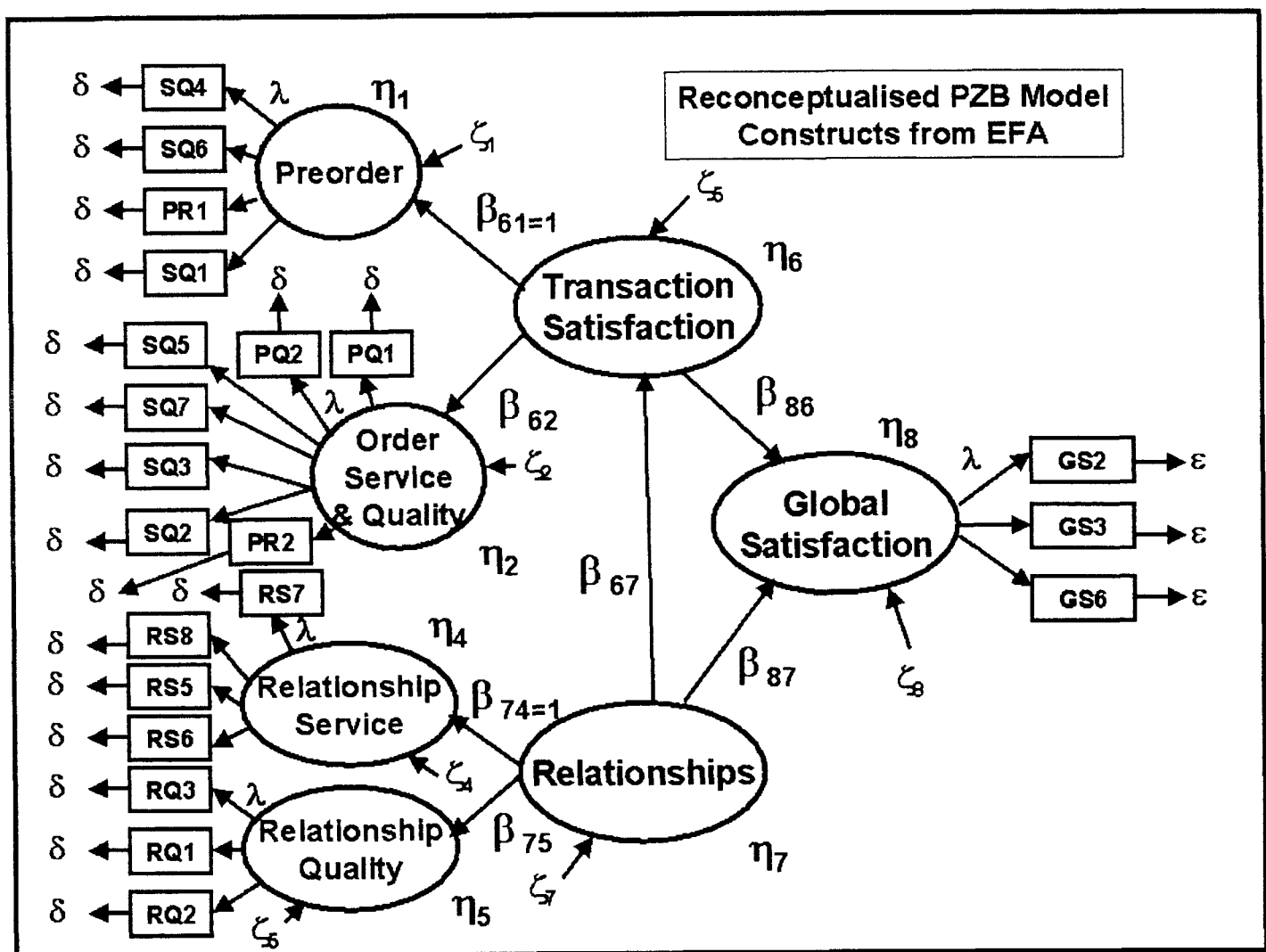


Figure 10.11: Reconceptualised Main Study Model

The reconceptualised main study model based on these two new constructs and the remaining five constructs used previously is shown in Figure 10.11. Construct

numbers were not amended for RS, RQ, TS, RE and GS. PRE was assigned η_1 and OSE was assigned η_2 . There is no construct assigned η_3 .

10.7.2 Amended Hypotheses for the Reconceptualised Main Study Model

New hypotheses about causal model relationships in Figure 10.11 were derived and are again denoted in Figure 10.11 by the symbol β for relationships between endogenous latent constructs (Diamantopoulos 1994). To avoid any confusion with the eight hypotheses in section 10.6 all hypotheses here have been renumbered commencing with **H₉**.

The new constructs of pre-order and order service and quality are posited to affect a customer's transaction satisfaction, in concert with the original PZB Model premiss. Similarly, transaction satisfaction is again posited to affect overall or global satisfaction with a firm's service quality. Thus, resultant hypotheses for the new constructs in Figure 10.12 are as follows:

- H₉**: PRE positively indicates TS, i.e. $\beta_{61} > 0$.
- H₁₀**: OQS positively indicates TS, i.e. $\beta_{62} > 0$.
- H₁₁**: TS positively affects GS, i.e. $\beta_{86} > 0$.

RS and RQ are again posited to affect RE however the finding that the effect of RE on GS is mediated through TS has led to a re-signing of the two relevant hypotheses. Thus, resultant hypotheses for these relationships are presented as follows:

- H₁₂**: RS positively indicates RE, i.e. $\beta_{74} > 0$.
- H₁₃**: RQ positively indicates RE, i.e. $\beta_{75} > 0$.
- H₁₄**: RE positively affects TS, i.e. $\beta_{67} > 0$.
- H₁₅**: RE does not positively affect GS, i.e. $\beta_{87} \leq 0$.

10.7.3 Measurement Model Confirmatory Factor Analysis

Table 10.11 shows the standardised loadings, R^2 , composite reliability and variance extracted for all 21 variables and five constructs indicated by the manifest variables. All critical ratios were significant and there were no negative error variances.

Values in Table 10.11 have all improved relative to values in Table 10.6, particularly some R^2 values, and almost all criteria meet their respective thresholds. However, PR1 did not meet its loading and R^2 thresholds and was deleted for further analysis.

Variable	Loading (>.50)	R^2 (>.25)	Coefficient Alpha (>.70)	Composite Reliability (>.70)	Variance Extracted (>.40)
PR1	.43	.19	.75	.76	.45
SQ1	.60	.36	-	-	-
SQ4	.78	.62	-	-	-
SQ6	.80	.64	-	-	-
PR2	.57	.32	.86	.86	.48
SQ2	.66	.43	-	-	-
SQ3	.62	.46	-	-	-
SQ5	.68	.51	-	-	-
SQ7	.79	.63	-	-	-
PQ1	.69	.48	-	-	-
PQ2	.71	.50	-	-	-
RS5	.57	.33	.76	.77	.46
RS6	.61	.38	-	-	-
RS7	.83	.68	-	-	-
RS8	.68	.47	-	-	-
RQ1	.75	.56	.83	.83	.62
RQ2	.77	.59	-	-	-
RQ3	.85	.72	-	-	-
GS2	.84	.71	.81	.82	.60
GS3	.82	.67	-	-	-
GS6	.65	.42	-	-	-

Table 10.11: Reconceptualised Measurement Model Assessment with CFA

Standardised loadings, R^2 , and measures of composite reliability and variance extracted were recalculated for all constructs indicated by manifest variables. The new values are shown in Table 10.12 and meet the assessment thresholds. Thus, the remaining 20 manifest variables and five constructs of PRE, PQ, RS, RQ and GS exhibit unidimensionality, reliability and convergent validity.

Construct	Variable	Loading (>.50)	R ² (>.25)	Composite Reliability (>.70)	Variance Extracted (>.40)
PRE	SQ1	.58	.33	.77	.54
	SQ4	.79	.62	-	-
	SQ6	.81	.66	-	-
OSQ	PR2	.57	.33	.86	.48
	SQ2	.66	.43		
	SQ3	.68	.46	-	-
	SQ5	.72	.51	-	-
	SQ7	.79	.63	-	-
	PQ1	.69	.47	-	-
	PQ2	.71	.50	-	-
RS	RS5	.57	.33	.77	.46
	RS6	.62	.38		
	RS7	.83	.68	-	-
	RS8	.68	.47	-	-
RQ	RQ1	.75	.56	.83	.63
	RQ2	.77	.59	-	-
	RQ3	.85	.72	-	-
GS	GS2	.84	.71	.82	.60
	GS3	.82	.67	-	-
	GS6	.65	.42	-	-

Table 10.12: Reconceptualised Measurement Model Assessment with CFA after Item Deletion

Discriminant validity was again assessed using pairwise and ‘nested’ model χ^2 difference tests and calculation are shown in Tables 10.13 and 10.14 respectively. Again, all tests were significant at the .05 level and discriminant validity is exhibited. The measurement model for the reconceptualised main study model, revised as discussed above, was found to contain constructs that are unidimensional and reliable, and that exhibit convergent and discriminant validity. All these assessments comprise the second stage of the Churchill et al. framework previously discussed.

Constructs	χ^2 Difference	Significance Level
PRE versus OSQ	74.5	.001
PRE versus RS	8.0	.01
PRE versus RQ	6.3	.05
OSQ versus RS	21.8	.001
OSQ versus RQ	12.5	.001
RS versus RQ	122.5	.001

Table 10.13: Latent Construct χ^2 Difference Tests of Discriminant Validity in Reconceptualised Model

	Model 0	Model 1	Model 2
χ^2	1783.4	963.3	283.1
degrees of freedom	190	170	163
	Model 0 — Model 1	Model 1 — Model 2	
χ^2	1783.4 — 963.3 = 820.1	963.3 — 283.1 = 680.2	
degrees of freedom	190 — 170 = 20	170 — 163 = 7	
Significance	p<.001	p<.001	

Table 10.14: ‘Nested’ Model χ^2 Difference Tests of Discriminant Validity in Reconceptualised Model

10.7.4 Structural Model Analysis

The standardised estimates and goodness-of-fit values for the revised, reconceptualised structural model are shown in Figure 10.12. The χ^2 statistic is again significant, however the AMOS[®] software could calculate GFI and AGFI values along with the other goodness-of-fit indices. All indices are calculable and acceptable according to recommended thresholds (Garver and Mentzer 1999, Hair, Anderson, Tatham and Black 1995). All manifest variable, error variances and latent construct coefficients are positive, except RE→GS, which was hypothesised. A review of the AMOS[®] software output yielded only three standardised covariance

residuals with a value exceeding |2.00| out of 210 possible combinations (1.4%). The residuals were RS6↔RQ2 at 2.71, PR2↔RS8 at -2.26 and GS3↔SQ2 at 2.61. No theoretically sound trends are evident thus no action was taken with any of the indicators.

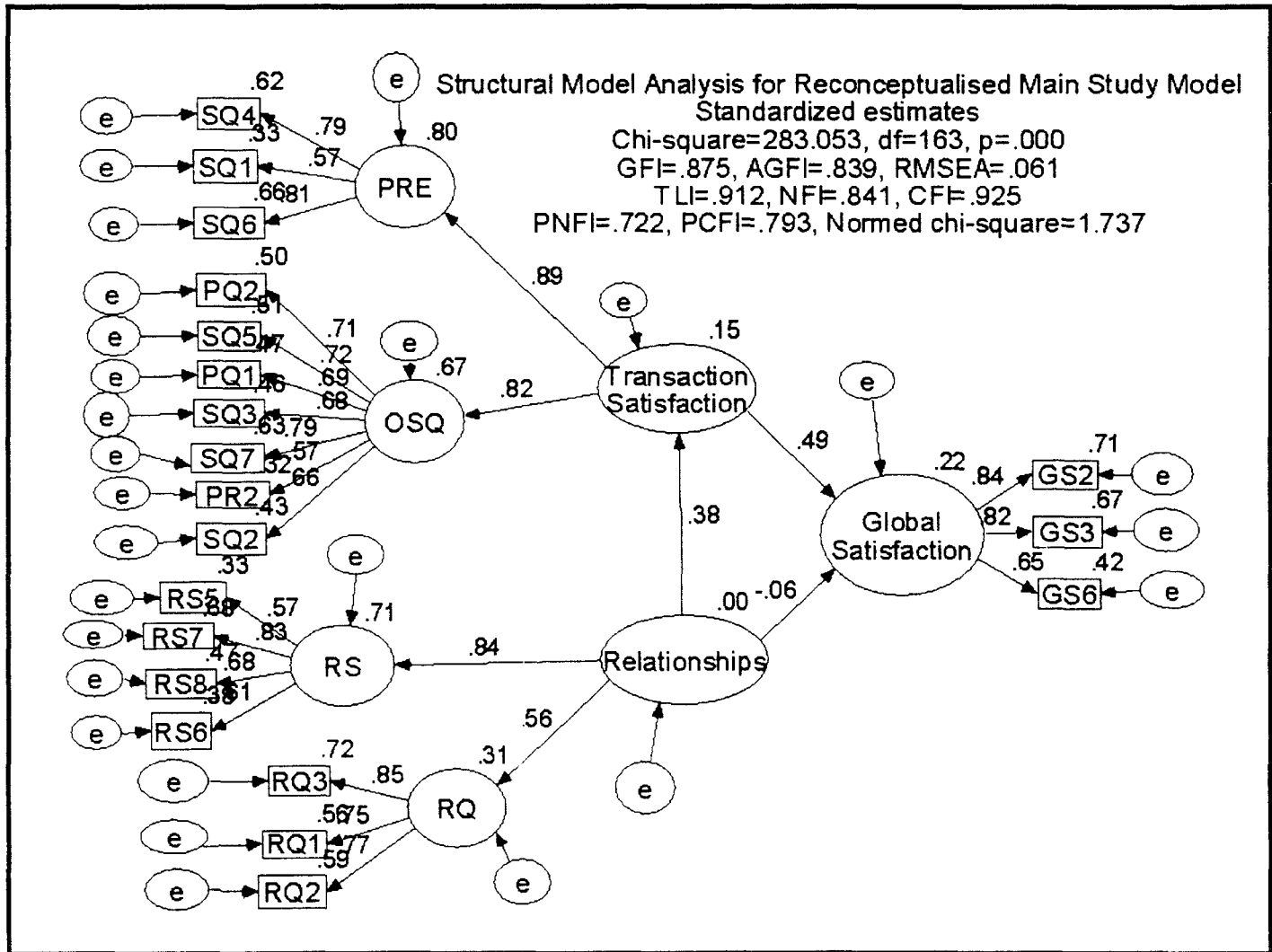


Figure 10.12: Standardised Estimates and Goodness-of-Fit Measures for Reconceptualised Main Study Model

A review of the modification indices in the AMOS[®] software output yielded only four instances where significant MI values related to a construct and a manifest variable. The other MI values in the outputs related to error variance↔error variance or manifest variable↔manifest variable. The four instances were RS6↔RQ, SQ2↔GS, PR2↔RE and PR2↔RS. Again, no theoretically sound trends are evident no action was therefore taken with any of the indicators.

Like the pilot study, transactional variables are also important to respondents of the main study, which comprised the selected sub-sectors of UK food processors. The weighting of the PRE and OSQ constructs as compared to the RS and RQ constructs

suggests relationships are also important but still lag behind the importance of basic issues for this group of quality, availability and service. The themes emerging here will be further discussed in the next chapter.

10.7.5 Discussion of Findings

Seven hypotheses pertaining to structural relationships in the reconceptualised main study model were presented in section 10.7.3 and are rejected/not rejected as follows.

H₉: PRE will positively indicate TS, i.e. $\beta_{61} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .89.

H₁₀: OQS will positively indicate TS, i.e. $\beta_{62} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .82.

H₁₁: TS will positively affect GS, i.e. $\beta_{86} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .49.

H₁₂: RS will positively indicate RE, i.e. $\beta_{74} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .84.

H₁₃: RQ will positively indicate RE, i.e. $\beta_{75} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .56.

H₁₄: RE will positively affect TS, i.e. $\beta_{67} > 0$.

This hypothesis is not rejected with a standardised positive coefficient of .38.

H₁₅: RE will not positively affect GS, i.e. $\beta_{87} \leq 0$.

This hypothesis is not rejected with a standardised negative coefficient of -.06.

Using the various standardised coefficients, mathematical equations expressing relationships between latent constructs in the model would be:

$$GS = .49TS,$$

$$\text{where } TS = .89PRE + .82OSQ + .38RE, \text{ and}$$

$$\text{where } RE = .84RS + .56RQ$$

A resultant equation from substitution in terms of all first order constructs would be:

$$GS = .49(.89PRE + .82OSQ + .38(.84RS + .56RQ)), \text{ or}$$

$$GS = .44PRE + .40OSQ + .32RS + .21RQ$$

Under this reconceptualised main study model more coefficient weight is attributed to variables in the RS and RQ constructs, which indicates more importance relative to PR and OSQ variables than for the revised main study model in section 10.6. GS is again indicated by the same manifest variables and coefficient weights for them are identical to the revised main study model.

10.8 CONCLUSION

This chapter discussed the main study conducted for this thesis, which represents the second stage of the Churchill et al. framework detailed in Chapter Eight. This stage assesses construct validity by testing 'purified' measures from the first stage with new data. Following on from the pilot study in Chapter Nine, 29 customer service and relationship variables were derived for investigation. The UK food processing sector was selected as an extension to the Scottish pilot study sample for surveying about the initial research issues of customer service and satisfaction, as well as relationship issues which emerged from the pilot study.

The model for study was amended from a model of transaction and global satisfaction developed by PZB (1994). Constructs of relationship service and quality were added to PZB's first-order constructs of price, service quality and product quality, and eight hypotheses were derived pertaining to the relationships between all constructs. The main study utilised a postal survey sent to 1,215 firms. Two hundred

and one usable responses or about a 17% response rate were obtained after a primary mailout and followup.

The most important customer service variables were products arriving undamaged and according to specification, consistent product quality, on-time delivery and complete orders. The most important relationship variables were trust, commitment, action on complaints, integrity and delivery time.

CFA and structural equation modelling SEM were applied using the Anderson and Gerbing two-step approach (1988) to assess the measurement and structural models of the main study model. The resulting measurement model possessed 21 variables and constructs that were unidimensional and reliable and exhibited convergent and discriminant validity. The χ^2 statistic and goodness-of-fit and adjusted goodness-of-fit indices could not be calculated however all other goodness-of-fit indices were acceptable. The hypothesis for price was rejected as the price construct was eliminated during measurement model assessment. The relationship construct did not directly affect global satisfaction but was mediated through transaction satisfaction and related hypotheses were also rejected. All other hypotheses were not rejected.

Respecification of the model was not attempted, instead the model was reconceptualised by revisiting the first stage of the Churchill et al. framework and undertaking an exploratory factor analysis of the 29 variables. The three PZB first order constructs were replaced by two constructs of pre-order and order service and quality, whilst all other constructs were returned with exactly the same variables. CFA and SEM were again applied using the two-step approach. The resulting measurement model possessed 20 variables and all constructs were again unidimensional and reliable and exhibited convergent and discriminant validity. The χ^2 statistic and all goodness-of-fit indices were calculated and all of the latter were acceptable. Seven amended hypotheses were derived for the new model pertaining to the relationships between the new and returned constructs. All seven were not rejected and the model was considered to exhibit construct validity.

These findings confirm the domain and validity of the amended constructs being investigated and the items generated for investigation, in accordance with the entire Churchill et al. framework. The findings thus provide a substantive and rigorous set of results. However, an interpretation of the reconceptualised model and a discussion of its predictive validity and relationship to existing theory are required. Chapter Eleven now provides such an interpretative discussion.

CHAPTER ELEVEN

INTERPRETATION OF FINDINGS AND MODEL EXTENSION

11.1 INTRODUCTION

Analysis of the proposed main study model necessitated a reconceptualisation and re-analysis of the model to develop a better model fit and ensure statistical validity and reliability. Reconceptualisation was based on an EFA of the tested variables and proposed two different constructs to those posited in the PZB Model initially used for the main study. An interpretation of this reconceptualised model and a discussion of its predictive validity and relationship to existing theory are provided in this chapter.

First, the important variables and resultant constructs from the pilot and main studies are discussed in terms of face and content validity. Secondly, the variables and constructs are compared and contrasted to those found in the service quality and logistics literature, including a comparison of SEM goodness-of-fit estimates among various studies to assess statistical validity and reliability across the studies. Finally, a hypothesised extension to the various models is proposed as a basis for future research, and will set the stage for thesis conclusions in Chapter Twelve.

11.2 IMPORTANT VARIABLES AND RESULTANT CONSTRUCTS

Constructs resulting from the reconceptualised model analysis are presented in Table 11.1 together with constituent variables and variable importance rankings. Rankings are combined for the Pre-Order (PRE) and Order Service and Quality (OSQ) constructs, as well as for the Relationship Service (RS) and Relationship Quality

(RQ) constructs. Constituent variables were the same for both the proposed and reconceptualised models except for PR1 and SQ8 being deleted from the latter through EFA and measurement model assessment.

Construct	Variable Code	Variable Name	Rank
Pre-Order (PRE)	SQ1	Availability	9
	SQ4	Appropriate OCT	11
	SQ6	Consistent OCT	10
Order Service and Quality (OSQ)	PR2	Accurate Invoices	5
	SQ2	On-Time Delivery	4
	SQ3	Complete Orders	5
	SQ5	Products Arrive Undamaged	1
	SQ7	Accurate Orders	7
	PQ1	Consistent Product Quality	3
	PQ2	Products Arrive to Specification	2
	Relationship Service (RS)	RS5	After Sales Support
RS6		Delivery Time	4
RS7		Helpful CSRs	8
RS8		Customised Services	11
Relationship Quality	RQ1	Trust	1
	RQ2	Commitment	2
	RQ3	Integrity	4

Table 11.1: Resultant Variables and Constructs from Main Study

All 14 variables in the PRE, OSQ and RS constructs from the main study also loaded onto the four factors in the pilot study. Figure 11.1 shows variable relationships between the pilot and main study factors. Factors 2 and 3 in the pilot study are similar to the OSQ and RS constructs in the main study, whilst factors 1 and 4 are similar to the PRE construct. This is further demonstrated by the pilot study factor names presented in Chapter Nine. Factor 1 was termed order cycle activities, Factor 2 was termed after-sales activities, Factor 3 was termed delivery activities, and Factor 4 was termed pre-order activities. These names are consistent with the main study constructs. Conceptually then, these variables and constructs provide content

validity for this industrial segment, i.e. there is empirical correspondence between theoretical constructs and the measures that tap them (Dunn, Seaker and Waller 1994, Mentzer and Flint 1997).

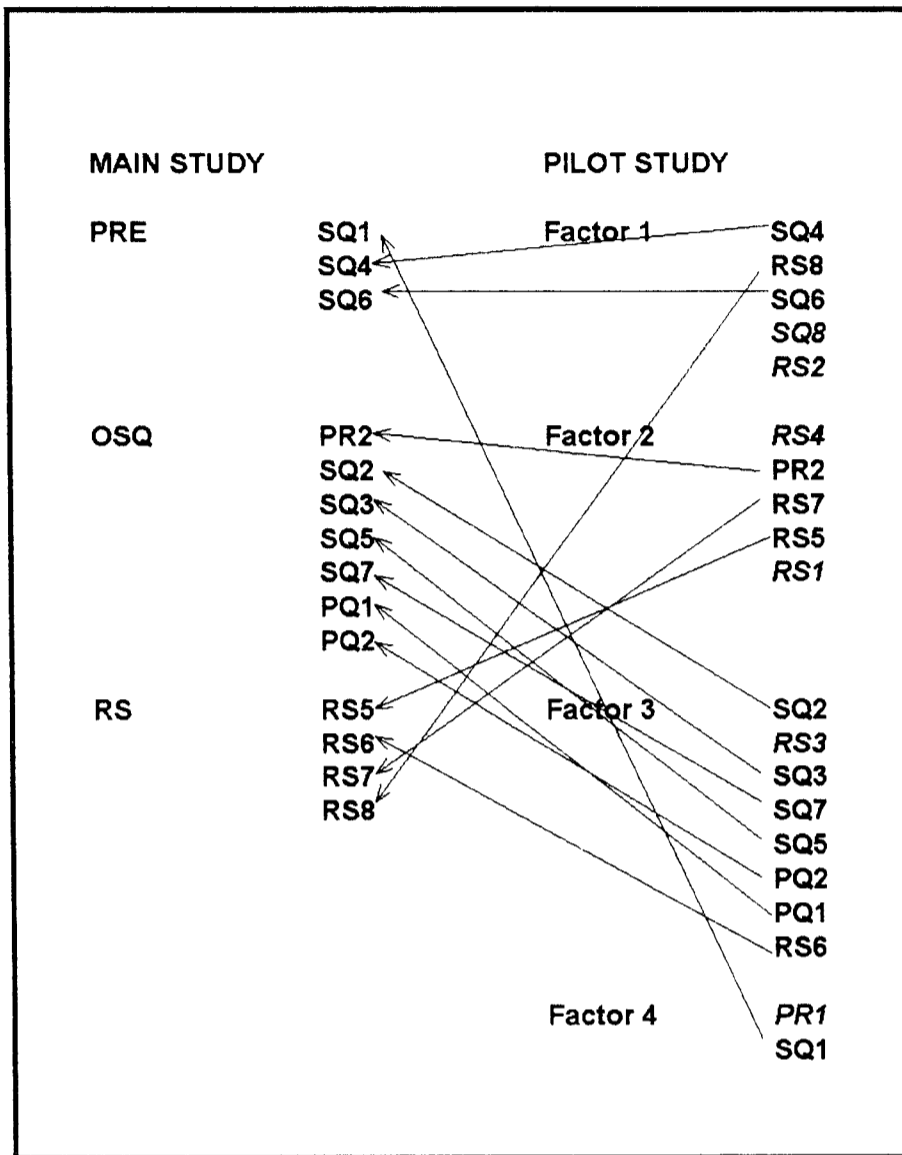


Figure 11.1: Comparison of Main and Pilot Study Factors

The three constructs hypothesised by PZB (1994) and Parasuraman and Grewal (2000) of price, service quality and product quality to indicate transaction satisfaction are falsified in this study's context (Popper 1999). The PRE and OSQ constructs that replace them in the main study have a better model fit and provide better meaning as regards the variables within them. However, this study is the first known empirical investigation of the PZB Model, and falsification does not mean the PZB Model has no validity. Further testing of the constructs and model are required to advance or further falsify its value as a conceptual argument.

Variables and constructs of price exhibited mixed findings. PR1 had a high importance ranking in the pilot study and was important to respondents in the post-

pilot study interviews, but had a low importance ranking in the main study. PR1 also only loaded onto the fourth factor in the pilot study and was deleted from the main study. PR2 had high importance rankings in both main and pilot studies and loaded onto the second pilot study factor, and loaded onto the OSQ construct in the main study. Thus, whilst price is of some importance to respondents, only accurate invoices featured in the reconceptualised model as a variable within another construct.

Further, variables of supplier importance, relationship power and the ability to switch suppliers were deleted from the 'right-hand side' construct of global satisfaction. Within the GS construct they were ranked first, fifth and sixth respectively among the six variables according to means. But supplier importance, with an overall mean of 4.2, was also the only variable where there was no significant difference of means between dissatisfied and satisfied respondents.

These findings suggest, as regards the sub-sectors of UK food processors surveyed, that availability and cycle time are important pre-order requirements whilst on-time delivery of accurate complete orders in good quality are important transaction requirements. These findings support various suppositions (Ennew, McDonald, Morgan and Strak 1995, Tansey and Worsley 1995, Browne and Allen 1997a) about the commoditisation of the food processing industry and an emphasis on primarily transactional and cost considerations. The important requirements of relationship service are also related to transactional issues of potential transaction failure, such as after-sales support, helpful customer service representatives and time of delivery.

However, there is a requirement for trust, commitment and integrity in relationship quality, suggesting issues of power and concentration of exogenous actors are also important to this respondent group. The measures of respondents as satisfied customers over many transactions will be identified by the customer's feelings towards their suppliers, their evaluation of their suppliers' quality and future purchase intentions. Thus, whilst transactional issues are important to these industry sub-sectors ongoing relationships are also important as posited by Mentzer (1993)

and Lambert, Emmelhainz and Gardner (1999). However, the dichotomy or duality of transactions versus relationships that emerged in the pilot study was also found in the main study.

Like the pilot study, these findings again suggest respondents may operate at two levels when evaluating logistics customer service. Actors at the supplier-customer interface may view functional or transactional variables in the reconceptualised model as distinct from price and supplier issues of importance, power and ability to switch. As discussed in Chapter Nine, respondents might operate at hierarchical levels regarding supplier customer service and several recent studies have discussed such multilevel and multidimensional service quality constructs (Brady and Cronin 2001, Dabholkar, Shepherd and Thorpe 2000, Rutner and Langley 2000).

Whilst the main study model was designed with first, second, and third order constructs, it did not tap variables at those levels. Accordingly, the model needs to be extended to consider how these variables might interact with it. The empirical studies examined in Chapter Seven did not exhibit any patterns related to important or non-important variables. Further, the studies were grouped in three different sets according to their prevalent constructs. A comparison of the main study model's characteristics with these studies is required to confirm nomological validity and provide a point of departure for a model extension.

11.3 MODEL AND GOODNESS-OF-FIT COMPARISONS

Chapter Seven presented 12 empirical studies in logistics customer service based on three sets of constructs developed by La Londe and Zinszer (1976), Sterling and Lambert (1987, 1989), and Mentzer, Gomes and Krapfel (1989).

La Londe and Zinszer (1976) considered customer service has three distinct constructs: pre-transaction, transaction and post-transaction. These three constructs introduce a time factor within a transaction that is important in a logistics context that has different and ongoing activities occurring over time for both suppliers and

customers.

Sterling and Lambert (1987, 1989) used La Londe and Zinszer as a starting point to develop constructs that represented a functional orientation, e.g. lead or cycle time, transportation services and so on. They considered resultant items transcended the three constructs proposed by La Londe and Zinszer, but did not consider the importance of time and different times in the transaction process.

Mentzer, Gomes and Krapfel (1989) introduced service quality and the SERVQUAL model of PZB (1985, 1988) to the logistics discipline. They suggested constructs of availability, timeliness and quality. The work of Mentzer and various colleagues, in that and subsequent publications, has contributed substantially to logistics methodology and rigour, and has advanced a line of research into logistics customer service based on these three constructs.

Bienstock, Mentzer and Bird (1997) developed SERVQUAL-type scales of physical distribution quality using Mentzer, Gomes and Krapfel's constructs of timeliness, availability and the condition of products as opposed to quality. They considered timeliness was the most important construct, and concluded that technical or outcome criteria were the most important determinants of service quality perceptions. Functional or process criteria were not found to be as important but were not discounted. Mentzer, Flint and Kent (1999) developed a customer-focussed quality scale for logistics that featured nine constructs: information quality, ordering procedures, ordering release quantities, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality. This delineation of constructs appears to be derived from the Mentzer, Gomes and Krapfel constructs if ordering or orders are substituted for availability. Mentzer, Flint and Hult (2001) extended the Mentzer, Flint and Kent (1999) study in considering logistics service quality as a process across order placement, order receipt and satisfaction. They used the same nine constructs and the same sample source but did not indicate whether the data used in both studies was the same. They did find support for process considerations in logistics service.

The latter three studies utilised CFA and SEM, which were proposed as appropriate for logistics theory development in an article on SEM characteristics (Garver and Mentzer 1999). Table 11.2 provides a comparison of the SEM goodness-of-fit values among the three Mentzer et al. studies and the reconceptualised main study model. The Bienstock, Mentzer and Bird (1997) study shows split sample results from the SERVQUAL performance measures, whilst missing values in the three literature studies were not reported. All four studies are statistically robust and have acceptable goodness-of-fit indices, although none of the χ^2 values are statistically 'insignificant' ($p > .05$). Thus, the four studies have confirmed construct validity of logistics customer service, notwithstanding there are different constructs among the four studies.

The goal of the Bienstock, Mentzer and Bird (1997) study was to develop an appropriate scale for physical distribution quality. Their confirmation of timeliness, availability and condition constructs was reflected in several responses "that 'ideal' physical distribution service was that which provided what they wanted, undamaged, when they wanted it" (1997 p.41). Bienstock, Mentzer and Bird also noted that future research should be undertaken across different industries to explore the relative importance of the criteria they found.

There are several criticisms of Mentzer, Flint and Hult's (2001) article. Firstly, the article is basically an extension of the Mentzer, Flint and Kent (1999) article, but no comment was made about whether the same data sets were used. The large sample of DLA respondents suggests Mentzer and Flint, along with the authors, may have developed this research as part of a funded project. Accordingly, comparison between both articles regarding overall research contributions and implications are lacking. Mentzer, Flint and Hult also noted they "could not find any articles in the logistics literature that offered a process conceptualization that included all the dimensions" tested in their study (2001 p.86). However, they did not discuss the customer service items and process dimensions of pre-transaction, transaction and post-transaction found by La Londe and Zinszer (1976). They only noted La Londe

and Zinszer’s three-part definition of customer service, and began their discussion of constructs at Mentzer, Gomes and Krapfel (1989).

	Reconcept. Model	Mentzer, Flint & Hult (2001)	Mentzer, Flint & Kent (1999)	Bienstock, Mentzer & Bird (1997)	
					1st data set 2nd data set
n	201	1,765	5,531	201	205
χ^2	283.1	1231.3	329.5	193.9	214.0
df	163	350	266	81	139
probability	.000000017	.000000000	.004843829	.000000000	.00004553
normed χ^2	1.74	3.52	1.24	2.39	1.54
GFI	.88	-	-	.88	.90
AGFI	.84	-	-	-	-
RMSEA	.06	-	.03	-	-
TLI	.91	-	-	-	-
NFI	.84	-	.89	.91	.93
CFI	.93	.98	.98	.95	.97
PNFI	.72	-	-	-	-
PCFI	.79	-	-	-	-

Table 11.2: SEM Comparison with Other Logistics Studies

Figure 11.2 presents Mentzer, Flint and Hult’s hypothesised model and their nine constructs to achieve satisfaction. They have suggested a process path, shown along the bottom of the diagram, of order placement, order receipt and satisfaction. The constructs in this path are considered analogous to constructs of pre-transaction, transaction and post-transaction. The nine constructs underlying their process do not represent a parsimonious model. Six constructs are substantially ordering functions and study results may be more focused on purchasing criteria than other important logistics customer service items. The industrial sectors surveyed are customers of a non-profit government focal organisation, the U.S. Defense Logistics Agency that may have very different views regarding customer service requirements than profit-driven firms. Finally, the two studies did not consider price as a variable of logistics service quality.

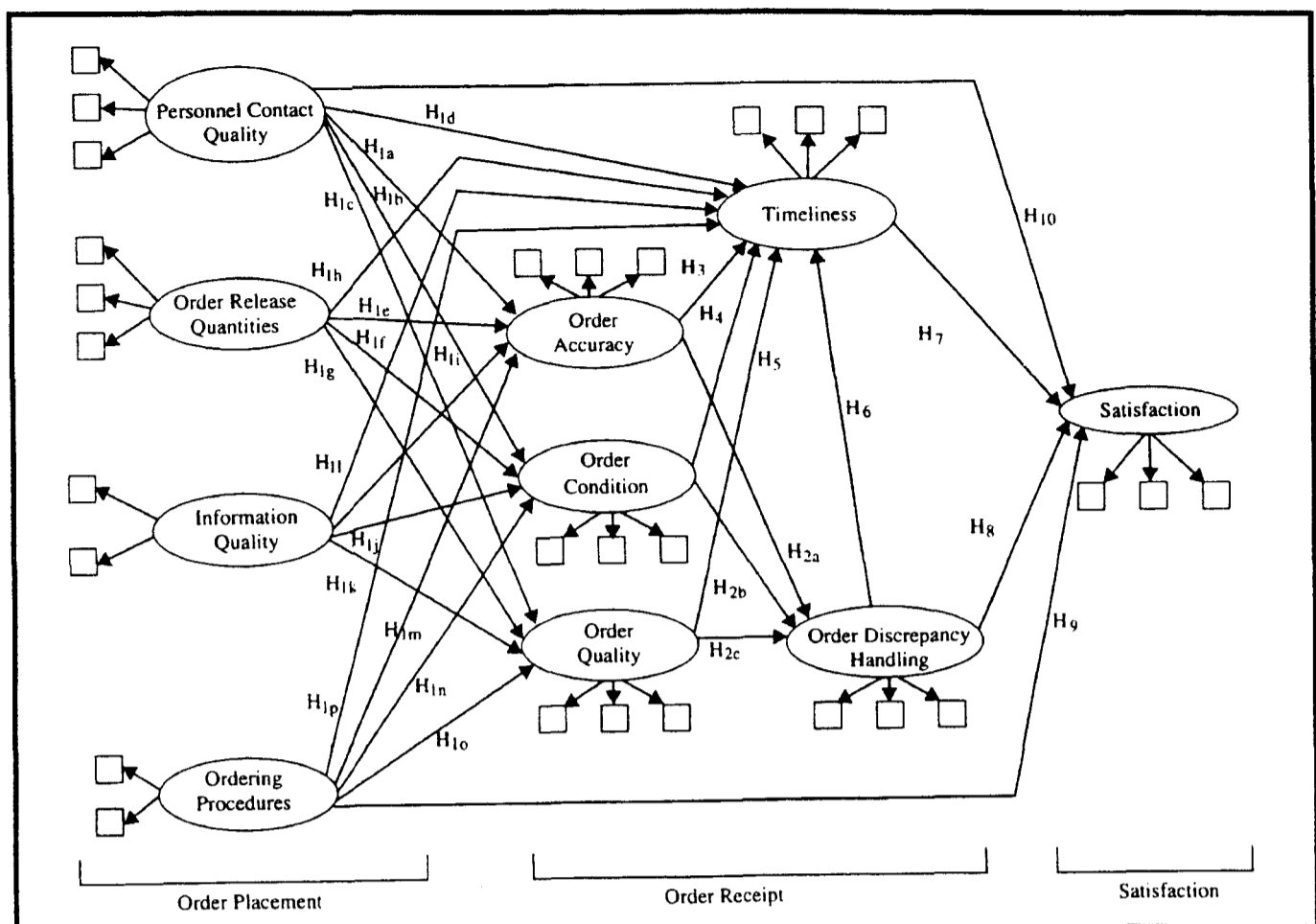


Figure 11.2: Hypothesised Model of Logistics Service Quality as a Process

(Source: Mentzer, Flint and Hult 2001 p.86)

The foregoing comparisons relate to diverse industrial sample groups between the US and UK. There may be different views between US and UK food processing sectors however there are no similar empirical studies to allow such comparison. However, a surrogate may be the number of small food processors in each market. U.S. firms dominate global food manufacturing concentration. In 1974 U.S. firms accounted for about 50% of all such firms whilst UK firms accounted for about 20%. By the late 1980s “out of the 110 largest food and drink companies in the world, 43 were American and 18 British” (Tansey and Worsley 1995 p.112). This difference suggests a higher percentage of small and independent UK food processors in the selected sub-sectors that may place more emphasis on transactional and cost issues that were found in both the pilot and main studies.

In summary, important constructs in logistics customer service appear to simply boil down to the original La Londe and Zinszer (1976) propositions of pre-transaction, transaction and post-transaction. Conceptually, this thesis and the three studies in the literature exhibit concurrent validity as criterion-related validity in terms of these

three constructs. Suggestions on model extension to tap other missing variables, such as price, are presented in the next section.

11.4 HYPOTHESISED MODEL EXTENSION

Hierarchical models of service quality were introduced in Chapters Six and Nine in the context of means-end value hierarchy model (MEVHM) research by Rutner and Langley (2000) and Brady and Cronin (2001). Brady and Cronin’s proposed hierarchical model of marketing service quality tested across four consumer service industries is shown in Figure 11.3 for illustrative purposes. Their service quality construct is affected by three quality sub-constructs, which in turn indicate first-order constructs in a similar manner to the main study model and Rutner and Langley’s MEVHM shown in Figures 6.11. The concept of a hierarchical model again lends itself to an extension of the main study model to include the deleted variables of price and supplier importance.

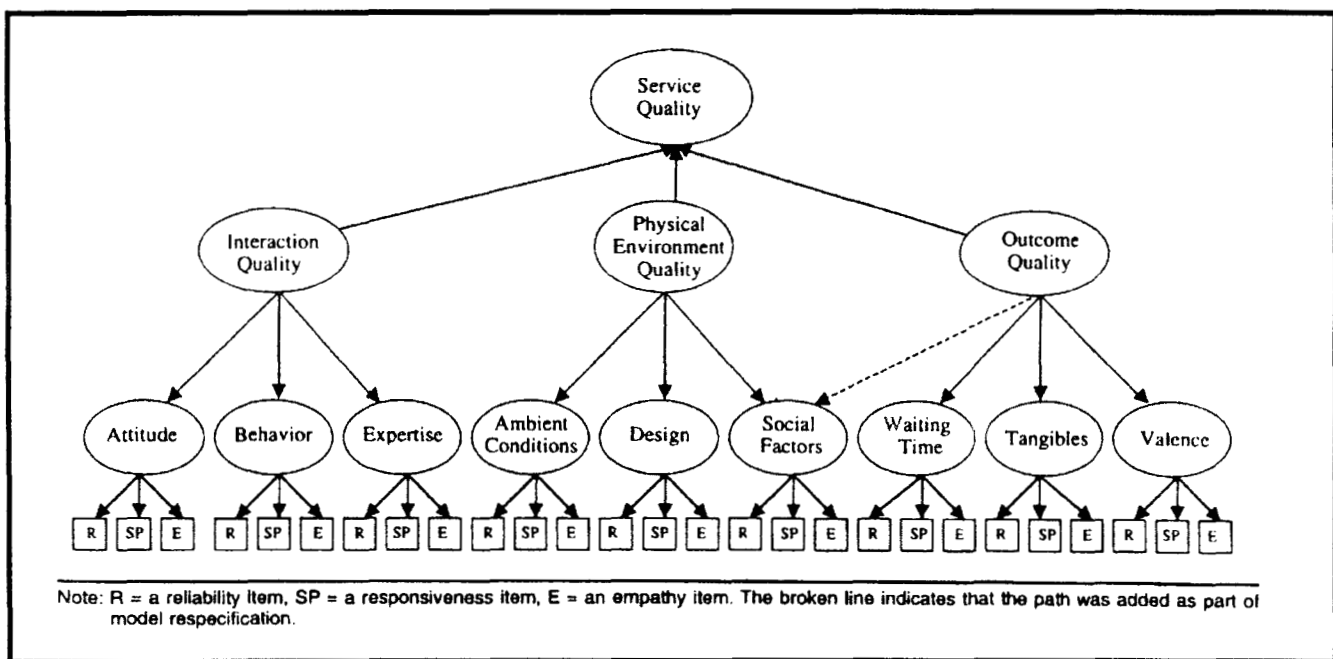


Figure 11.3: Proposed Hierarchical Model of Service Quality
 (Source: Brady and Cronin 2001 p.37)

Issues of supplier importance, which might influence relationship power and the ability or intention to switch, and price may be hygiene factors that must be in place for customers to evaluate other aspects of customer service, such as those proposed in the main study model. In other words, if an appropriate supplier and a reasonable price range are not initially available, customers will not proceed to the next stage of

customer service evaluation, i.e. conducting a transaction. Customers may deal with these issues by having suppliers bid to be on a favoured supplier list and also provide price quotes in advance. Alternatively, a supplier may be the only choice for a certain product or service, i.e. a sole-source situation and price may also be determined by what the market will bear.

A hypothesised model extension reflecting these propositions is shown in Figure 11.4 as a hierarchical model. Constructs of supplier and price are indicated by a construct termed supplier selection. These constructs are first level factors in this MEHVM, and represent the hygiene factors that must be in place before any transaction occurs. The main study model is shown in the shaded box within the diagram, replacing the PZB Model that was falsified in the study, and represents a second level factor. Global satisfaction is again the outcome of transaction satisfaction events summated over time, and represents a third level factor, or customer value. The constructs in the first level are hypothesised to be antecedent factors in determining whether a customer proceeds to the next level.

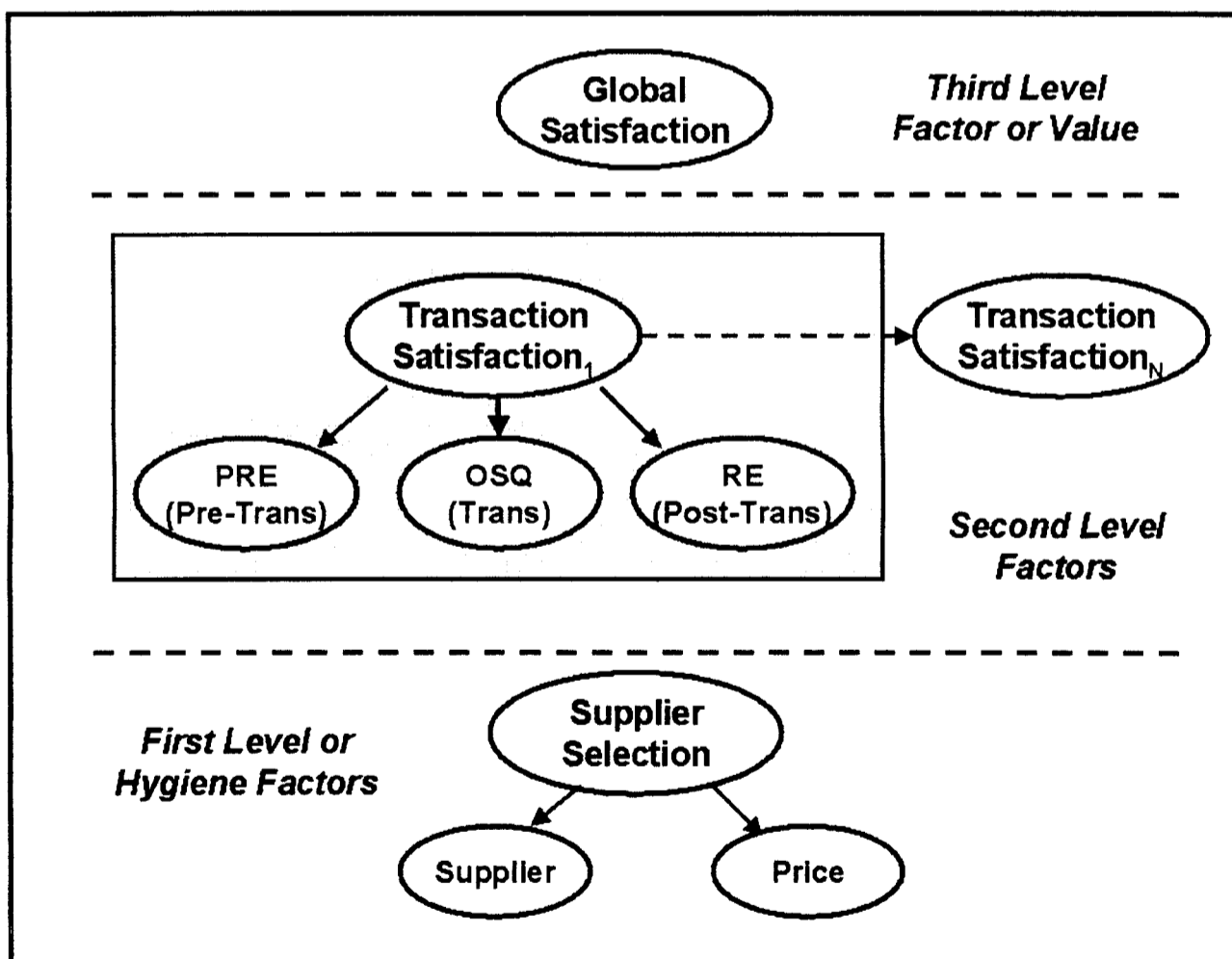


Figure 11.4: Hypothesised Model Extension

11.5 CONCLUSION

This chapter has considered theoretical interpretations of this study and its meaning for knowledge creation. Bagozzi (1984) presented two ways in which new knowledge is generated. One is when a given theory is refined through expansion of the number of nonobservational propositions between independent and independent variables and/or deepening of the rationale behind the propositions. The other is when an older theory is replaced with a new one. In both cases, new knowledge is not produced until the refined or new theory is found to provide a more general explanation and/or more accurate predictions.

This thesis has generated knowledge according to Bagozzi's first proposition. The research issues presented in Chapter Seven were investigated and explained through a rigorous study based on an extant theory of customer service, customer satisfaction and service quality. The findings were statistically robust compared to other robust studies in the literature indicating rigour was achieved in the study. Constructs found in the study reaffirmed La Londe and Zinszer's constructs developed over 25 years ago, and falsified constructs originally proposed by Parasuraman, Zeithaml and Berry. Comparison of the constructs with various studies by Mentzer et al. indicates the main constructs of customer service, customer satisfaction and service quality in logistics are related to pre-transaction, transaction and post-transaction activities.

A hypothesised hierarchical extension to the main study model is proposed according to Bagozzi's second proposition, and suggests constructs of price and supplier selection are considered before transactions occur and main study model constructs come into play. However, testing of this extension is beyond the scope of this study and requires future research. The next chapter briefly summarises this thesis and details its theoretical, methodological and managerial contributions, and discusses study limitations and other aspects for future research.

CHAPTER TWELVE

CONCLUSIONS AND IMPLICATIONS

12.1 THESIS SUMMARY

This thesis tested the importance and sufficiency of existing constructs of customer service, customer satisfaction and service quality in the logistics function of selected sectors in the UK food processing industry. This chapter concludes the thesis by first providing a summary, and then discussing its contribution and implications for management and future research.

This thesis defined logistics as a process for effecting time and place utility of customers, and comprising activities of transport, warehousing, inventory management, and information processing. Although originally part of marketing and distribution, logistics became a separate field of study in the 1950s and 1960s with the advent of the marketing concept. However, the outputs of logistics and marketing are the same: satisfying customer needs. Accordingly this thesis adopted the proposition that logistics research benefits from inter-disciplinary theories and techniques, and utilised frameworks and models from the marketing and services disciplines in this study.

Customer service is a factor in meeting customer needs and is therefore an important feature of the logistics process. This thesis focussed on a customer-supplier dyadic exchange in the context of determining and understanding customer needs and establishing customer service features to meet them. Actors on both sides of the dyadic exchange require information. Technology and computerised systems assist in gathering such information but have issues of effectiveness and dissemination to all

actors. The establishment of customer service features and issues of information are also driven by a trade-off between extra costs incurred and enhanced profits received.

Concepts of process and an outcome of providing customer benefits link customer service with customer satisfaction. The dominant customer satisfaction theory is the expectancy-disconfirmation paradigm, where customers develop expectations prior to a service event and afterwards confirm or disconfirm those expectations based on their perceptions of the event. However, a service event requires consideration of the service quality provided throughout it. The literature has provided frameworks and some evidence of a link from customer service through customer satisfaction and loyalty to better firm performance and profitability.

Relationship literature outlines various benefits for customers and suppliers. However, some relationship literature has identified important customer service variables as transactional in nature whilst other literature has indicated cost reductions may be more important to customers. Limited empirical evidence suggests that customers are not willing to embrace relationships as readily as suppliers are, and will thus revert to purchase behaviours related to key transactional concerns.

A review of 59 logistics references identified 41 different variables of customer service with 16 variables appearing frequently and thus considered dominant. But there has been little empirical work done, only 22 articles over 25 years. Over one-third of this research has focussed on the supplier's perspective, and there has also been little work done regarding customer satisfaction issues. Finally, some of the empirical work lacks theoretical development or analytical rigour, which is seen as a pressing requirement for logistics research.

Twelve studies were found to have contributed to the development of scales and constructs of customer service in logistics. Three streams of constructs emerged that focussed on transactions within the logistics process such as ordering and timeliness. There is a disparity regarding comparison among the different studies and construct streams, and thus external validity of constructs in each stream are unknown.

Analytical techniques in these twelve studies showed improved rigour over the years, moving from simple means and standard deviations of ordinal data to confirmatory factor analysis and structural equation modelling of interval data. However, the three construct streams and the 16 dominant variables are primarily transaction-based and do not relate well to relationship literature. Thus, there is a significant gap in the literature regarding important variables and constructs of customer service, customer satisfaction and service quality in logistics, and their association to relationship theory and practice.

This thesis investigated these issues and adopted conceptual models of customer service and customer satisfaction in logistics services from Mentzer, Gomes and Krapfel (1989) and PZB (1985, 1988). The investigation considered a dyadic exchange between a customer and its supplier, customer needs and customer service features to fulfil these needs, and was conducted from the customer's perspective. Three research questions were proposed for this study: which customer service variables were important to and expected by customers; whether customers achieved satisfaction from a single service delivery event as a result of these customer service variables; and whether any of these variables underlie constructs of logistics customer service. A framework from Churchill (1979) and Dunn, Seaker and Waller (1994) was used in this thesis as a rigorous approach for development of measurement scales and constructs and corresponding issues of reliability and validity.

A pilot study of the Scottish food processing industry represented the first stage of the selected framework. The five most important variables expected by respondents were on-time delivery, order short or damaged (OSD), complete and accurate orders, price and action on complaints. A large majority of respondents were marginally satisfied with the customer service provided by suppliers in an actual event. Two of the most important variables, price and action on complaints, were key discriminating variables for dissatisfied respondents. An examination of the expectations-perceptions difference scale suggested an importance weighted performance measure be used in the main study due to its better psychometric

properties. EFA found four significant factors utilising all 16 variables and was considered statistically robust. Since all variables were utilised, no 'purification' of variables was proposed for the main study however some variables were redefined in order to remove some confusion over meaning. The factors did not derive any constructs related to the other three sets found in the literature. Four of the five most important variables were contained in the third factor whilst the remaining most important variable was contained in the fourth factor.

This dichotomous finding and the finding that the five important variables are transaction-oriented whilst the four least important variables are relationship-oriented led to follow-up interviews being conducted with respondents to examine the importance of relationships. The interviews confirmed the importance of relationships to respondents as well as transaction-oriented variables, particularly price. Investigation of this dichotomy and its impact on future intentions was adopted for the main study. Issues of supplier honesty and integrity and the lack of technology, particularly electronic data interchange being used in this industrial sub-sector emerged from the interviews. Investigation of these issues was also adopted for the main study. The pilot study findings thus confirmed the domain of an overall customer service construct and the 16 variables generated for investigation, in accordance with the framework's first stage, and were considered a substantive and rigorous set of results with which to proceed to the second stage of the framework.

The main study of the thesis, representing the second stage of the framework assessed construct validity by testing 'purified' measures from the first stage with new data. Twenty-nine customer service, customer satisfaction and relationship variables were derived for investigation. The UK food processing sector was selected as an extension to the Scottish pilot study sample for surveying about the initial research issues of customer service and satisfaction, as well as relationship issues which emerged from the pilot study. The model for study was amended from a model of transaction and global satisfaction developed by PZB (1994). Constructs of relationship service and relationship quality were added to this model's first-order constructs of price, service quality and product quality, and eight hypotheses were

presented pertaining to the relationships between all constructs. The five most important customer service variables were products arriving undamaged, products arriving according to specification, consistent product quality, on-time delivery and complete orders. The five most important relationship variables were trust, commitment, action on complaints, integrity and delivery time.

CFA and SEM were used to assess the measurement and structural models of the main study model using a two-step approach from Anderson and Gerbing (1988). The resulting measurement model possessed 21 variables and constructs that were unidimensional, reliable and exhibited convergent and discriminant validity. The χ^2 goodness-of-fit index could not be calculated however all other goodness-of-fit indices were acceptable in the structural model. One hypothesis related to price as an indicator of transaction satisfaction and two hypotheses related to relationships directly affecting global satisfaction were rejected, but the other five hypotheses were not rejected.

Respecification of the model was not attempted, instead the model was reconceptualised by revisiting the first stage of the framework and undertaking an EFA of all 29 variables. The three first order constructs from the PZB (1994) model were replaced by two constructs of pre-order and order service and quality, whilst the relationship service and quality constructs were retained with exactly the same variables. CFA and SEM were used again and the resulting measurement model possessed 21 variables. All constructs were again unidimensional, reliable and exhibited convergent and discriminant validity, and a χ^2 goodness-of-fit index was calculated and considered acceptable along with other indices in the structural model. Seven amended hypotheses were derived for the new model pertaining to the relationships between the new and returned constructs. All seven were not rejected and the model therefore exhibited construct validity, especially when compared to a series of studies by Mentzer et al. These findings confirmed the domain, construct validity and reliability of the amended scales and constructs being investigated and the variables generated for investigation in accordance with the framework and thus provided a substantive and rigorous set of results.

12.2 CONCLUSIONS REGARDING THE RESEARCH QUESTIONS

Which customer service variables found in the literature do firms expect suppliers to provide, how important are these variables, and are there any other variables that are important?

The original 16 variables found dominant in the literature, and refined to 20 variables for the main study, were important to respondents in both the pilot and the main studies. Thus, customers in the UK food processing industry expect suppliers to provide a battery of customer service features that include these variables. The importance of these variables differed and several were deleted from models examining constructs however, all had some importance to respondents. No new customer service variables emerged from the research. These variables confirm previous study findings, and are proposed as a battery of important variables for the UK food processing industry regarding logistics customer and relationship service.

Three new variables related to relationships in logistics emerged from the research: integrity, trust and commitment. These variables confirm findings of Morgan and Hunt (1994), and are proposed as a battery of important variables for the UK food processing industry regarding logistics relationship quality.

Three new variables related to satisfaction emerged from the research: overall supplier quality, overall feelings of satisfaction and future purchase intentions. These variables are proposed as a battery of important variables for the UK food processing industry regarding global satisfaction. These variables confirm findings of Zeithaml, Berry and Parasuraman (1996) regarding important behavioural variables of service quality, and are proposed as a battery of important variables for the UK food processing industry regarding customer-supplier relations.

Did firms achieve satisfaction from a single service delivery event as a result of a supplier providing variables of customer service? If they did not achieve satisfaction were there any key discriminating variables?

The pilot study did not find expectations-perceptions difference scores related to a SERVQUAL-type instrument to be conceptually robust, even though they were statistically significant between satisfied and dissatisfied respondents. This finding failed to support a SERVQUAL expectations-perceptions difference measure in this context, and supported literature that has challenged the SERVQUAL instrument on this methodological issues (see Buttle 1996 and Smith 1995). The pilot study did suggest the use of a weighted service performance, or SERVPERF measure, supporting findings from Cronin and Taylor (1992, 1994). Over 80% of respondents were satisfied with their logistics service event, so no meaningful insights could be drawn from a small number of dissatisfied respondents. However, price and action on complaints, both ranked important to all respondents, were key discriminating variables between satisfied and dissatisfied respondents.

The main study used the SERVPERF measure, and confirmed four constructs that tapped a transaction satisfaction construct as hypothesised. Again, over 80% of respondents were satisfied with their logistics event so no meaningful insights could be drawn from a small number of dissatisfied respondents. The main study also found transaction satisfaction to directly affect global satisfaction as hypothesised, supporting propositions by PZB (1994). The use of a SERVPERF measure is proposed for the UK food processing industry to use to measure customer satisfaction, both on a transactional and a relational level.

Do any of these variables underlie constructs of logistics customer service for the selected industry sector that are different or similar to constructs found in the literature?

The research found four first-order constructs of pre-order, order service quality, relationship service and relationship quality indicated by a construct of transaction

satisfaction. Each construct contributed to transaction satisfaction. Calculated coefficients for each construct are: .44 for pre-order, .40 for order service quality, .32 for relationship service and .21 for relationship quality.

A comparison of these constructs with studies by Bienstock, Mentzer and Bird (1997), Mentzer, Flint and Kent (1999) and Mentzer, Flint and Hult (2001) found that primary constructs of customer service, customer satisfaction and service quality in logistics are related to pre-transaction, transaction and post-transaction processes. This finding reaffirmed La Londe and Zinszer's (1976) original constructs of transaction satisfaction.

The main study adopted a model by PZB (1994) that proposed constructs of price, service quality and product quality as indicators of transaction satisfaction. This research did not support these constructs in this study's context and thus falsified the proposed PZB Model.

12.3 CONTRIBUTION OF THE RESEARCH

In line with stated research aims and questions this thesis investigated customer service, customer satisfaction and service quality in the logistics function of the UK food processing industry. In doing so this thesis has made several contributions to research methodologies and previous research, logistics and marketing theory, and logistics practice.

From a methodological perspective, this thesis provided a rigorous study of issues in logistics as called for in the literature. It also confirmed the appropriateness of the two-stage framework for scale development proposed by Churchill (1979) and Dunn, Seaker and Waller (1994). The Churchill et al. framework was designed primarily for marketing research applications. However, this thesis satisfactorily used it in a logistics context, supporting other studies by Mentzer et al. Further, this thesis has used both stages of the framework to confirm construct validity whereas some other studies which have only used the first stage. Besides the Churchill et al. framework,

this thesis also incorporated models and methods from the marketing and services discipline and thus provides an inter-disciplinary study that has been called for in the literature (Bartels 1988, Stock 1997).

This thesis confirmed and extended the use of confirmatory factor analysis and structural equation modelling as appropriate methods to develop latent constructs of customer service, customer satisfaction and service quality in logistics. However the thesis also developed a model 'reconceptualisation' technique to be used as either an alternative or a complement to model respecification in the Churchill et al. framework. Model reconceptualisation consists of examining and reconfirming constructs from second stage data using exploratory factor analysis, before proceeding to confirmatory factor analysis.

In contrast to previous studies this thesis examined issues from the customer's perspective as opposed to the supplier's perspective. The output of logistics and marketing is meeting customer needs, and previous research in logistics and marketing has argued that firms must solicit the customer's view. Findings in this thesis therefore reflect the customer's view regarding importance of customer service variables and constructs they underlie.

This thesis also investigated one profit-driven industry sector, as opposed to previous studies that have examined primarily multiple industrial sectors or governmental agencies. The sample in this study can be considered representative of the selected sub-sectors of UK food processors. From a conceptual and theoretical perspective this thesis validated a battery of customer service and relationship variables important to these sub-sectors of the UK food processing industry. Accordingly, managerial recommendations for these sub-sectors regarding these variables and other issues should apply to all firms within them.

The research in this thesis was conducted entirely in the UK whereas previous empirical work has primarily been conducted in North America, particularly the U.S. The contrast between findings from the two areas, and the difficulties encountered in

applying North American models of logistics and service quality in this study suggest some important differences, which are further discussed below. This thesis thus provides a point of departure for further research in Europe generally and in this industrial sector specifically, to ensure different voices are heard on these issues.

From a theoretical perspective this thesis confirms earlier studies (Cronin and Taylor 1992, 1994) and extended the use of a weighted service performance measure, or SERVPERF, for service quality and customer satisfaction, due to its better psychometric properties. This thesis also validated constructs of pre-transaction, order service and quality and relationship service and quality in this industrial context, thus reaffirming and extending original constructs developed by La Londe and Zinszer (1976). After comparisons with more recent studies, this thesis confirms that logistics customer service pertains to a few temporal constructs across a transaction, and thus provides a parsimonious set of constructs for use by researchers and managers.

This thesis provided the first empirical study of a revised service quality model hypothesised by Parasuraman, Zeithaml and Berry (1994) and Parasuraman and Grewal (2000), termed the PZB Model. The thesis falsified the transaction satisfaction constructs of price, service quality and product quality hypothesised in the PZB Model, but supported the hypothesis that transaction satisfaction positively affects global satisfaction. This thesis also extended the PZB Model to include variables and constructs of relationships and validates their inclusion. Lastly, this thesis introduced and validated variables of purchase intentions and relationship power for the global satisfaction construct, and supports previous studies that hypothesise satisfied customers increase future purchases (Oliver 1997, Reichheld and Sasser 1990).

Taking the foregoing into account, the principal contribution of this thesis has been to highlight an important difference between European and North American views on customer service. Relationship constructs were added to transaction constructs in the North American models adapted for this study in order to generate robust and

meaningful findings. Relationship constructs and their underlying variables were thus important to respondents. In contrast, studies conducted in North America have primarily found only transaction constructs and supporting variables to be important. This divergence may be a result of the industry investigated in this thesis, the UK food processing industry, or as a result of a larger issue.

Whilst North American academics have discussed at length the importance of customer-supplier relationships as corollaries to customer service and satisfaction, most empirical research has focussed on transactional elements and efficiencies. However, most European research has discussed and tested relationships, particularly in marketing as a result of the Nordic and IMP relationship marketing schools. These different research agendas may reflect differences between European and North American management styles or cultures (Voss, Roth, Chase, Rosnzweig and Blackmon 1999). North American managers are interested in relationships but typically exhibit transactional behaviour (Spekman, Kamauff and Myhr 1998, Tate 1996). Conversely, European managers tend to engage more in relationship practice (Christopher, Payne and Ballantyne 1991, McIlraith 2000).

The findings of this thesis are applicable only to the industrial sector investigated. Further research across different industrial sectors in the UK, and various industrial sectors in Europe, is required before external validity can be established and these findings considered generalisable. However, if these findings are generalisable then there are important research and managerial implications for logistics customer service.

From a research perspective, variables and constructs of relationships should be taken into account in any empirical study conducted in Europe. To not do so would limit research effectiveness and rigour. Further, North American studies should also test variables and constructs of relationships to determine whether or not they are important to North American respondents. By doing so researchers will be able to test relationship theory and advance or refute its significance in the North American context. Managerial implications follow in the next section.

Upon reflection there are three areas where the research design of this thesis might have been enhanced. Firstly, a SERVPERF weighted measure might have been used to determine the specific delivery event's effect on relationship variable responses. The term 'relationship variables' suggests perceptions of more than one transaction event, however a weighted measure might have provided an indication of potential changes in relationship variable importance as a result of the specific transaction event in the main study.

Secondly, a deeper investigation regarding the use of technology by respondents might have been useful to understand why respondent firms are largely not up-to-date technologically. Potential reasons could be the primarily small size of respondent firms, the cost of hardware and software, or lack of opportunity to technically integrate with suppliers and customers.

Lastly, levels of satisfaction with the transaction event might have been measured on a Likert scale as opposed to a dichotomous yes-no response. The small number of dissatisfied respondents might have changed if respondents were given a scale for satisfaction-dissatisfaction, and some further insights might have appeared if different levels of satisfaction-dissatisfaction were recorded. These shortcomings do not detract from the thesis and its contribution, however the enhancements are recommended for consideration in future replications of this study.

12.4 MANAGERIAL IMPLICATIONS

As discussed above, this study should be replicated in other industrial sectors and European countries to determine the generalisability of the findings and the model. The findings are directly applicable to these sub-sectors of the UK food processing industry, however there are wider implications based on any generalisability of the study to other industrial and national contexts.

The academic and practitioner literature is replete with discussions about added-value benefits for suppliers from providing superior customer service. Customers who are satisfied when their needs are met develop loyalty to suppliers that translates into additional revenue and profit for the supplier. However, the cost of providing extra customer service features not desired by customers can outweigh the benefits received by suppliers. The findings of this thesis confirm suppliers should first determine which customer service features their customers require, and then provide only those customer service features. This process should enhance a firm's ability to satisfactorily manage cost trade-off risks.

The findings also confirm firms should categorise customer service features into constructs related to pre-transaction, transaction and post-transaction events when facilitating operations design and customer service planning. This categorisation would enable firms to determine critical events in their service and allow them to monitor and follow-up on service failures.

The findings confirm firms operating on a transactional basis should move towards relational exchanges with customers as respondents in this study consider relationships are important, and to achieve benefits of increased and loyal business. The importance to respondents of trust, integrity and commitment suggests other supply chain members beyond this study's context also should develop better relationships with UK food processors to alleviate issues of mistrust and concentration of power found in the literature.

The findings confirm firms should increase their use of technology to develop a differential competitive advantage. This is also important in the UK food processing industry where products are largely commoditised and services such as logistics provide such competitive advantage. Further, large food retailers increasingly require suppliers to adopt technological initiatives such as ECR so these retailers can meet evolving consumer needs in the marketplace. The responses indicating little use of technology suggest this industrial sector has a large task before it to do so.

The findings specifically provide a battery of variables that firms in UK food processing can use to develop their own customer service features. This battery is by no means exhaustive and firms might have to add or delete some features to service their own sectoral and local requirements. The battery of customer service variables was however developed from a diverse literature source, and thus should have some applicability in other industrial and national contexts.

Lastly, there are also implications for multi-national companies (MNCs) doing business in both Europe and North America. Respondents to this study were primarily SMEs and findings are based on their views. However, MNCs should be aware of the differences between both continents regarding relationships and customer service. MNCs will likely have to adapt customer service policies to meet different needs in these settings.

12.5 THESIS LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The delimitations of this thesis were set out in Chapter One but invariably limitations result from the research process that leave scope for future research. Specific to this thesis, several issues such as price, supplier importance and supplier switching were tested but did not feature in resultant constructs of the main study. These issues were discussed in terms of a hierarchical framework encompassing the validated constructs in the main study model in an extended model hypothesised in Chapter Eleven. Future research should empirically test the extended model firstly in this industrial sector to determine its effect on findings in this thesis and secondly across other industrial sectors to test external validity.

Although the research was derived from logistics studies across many contexts and the findings considered valid and reliable for this industry sector, their external validity or generalisability cannot be determined. Future research should replicate this study across other industry sectors and European countries as discussed above to confirm external validity and reliability of the scales and constructs. This cross-

validation will also provide validity of the nomological net that is the last step in the Churchill (1979) and Dunn, Seaker and Waller (1994) framework.

The thesis findings do provide concurrent validity, i.e. in the present, as a sub-set of criterion-related validity, however predictive validity, i.e. in the future, has not been demonstrated. Future research should replicate this study, subject to any external validity amendments, to determine the longitudinal stability of these variables and constructs in various contexts.

Finally, first-order constructs of transaction satisfaction in the PZB Model (PZB 1994) were falsified in this study. This is not to say the PZB Model is invalid or has no meaning, however future research should test the PZB Model's constructs in other settings to confirm or refute this study's findings.

There is a need to undertake logistics customer service research on an ongoing and deeper basis to keep pace with the importance academics and practitioners attach to it. Present research output levels of about one journal article and two PhD theses per year are not satisfactory to do so. It is recommended that a research centre for logistics customer service be established to conduct, co-ordinate and disseminate such research. There are research groups on the periphery, such as the IMP group for relationships and purchasing, the Lean Enterprise Research Centre at Cardiff Business School for manufacturing and the American Customer Satisfaction Index group for household consumer satisfaction. However there is no group specifically researching or monitoring logistics customer service. Various studies by Mentzer et al. represent the closest thing to such a group, however recent work regarding the DLA appear to be the result of a major funded consultancy as opposed to an ongoing research strategy.

The topic of logistics customer service, satisfaction and relationships is important and ongoing research is needed in today's dynamic marketplace. It is hoped this thesis has provided a useful study on this topic and a point of departure for increased future activity.

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Appendices

EUROPEAN SUPPLY CHAIN SUMMIT 2001

Proposed Academic Semi-Structured Interview Schedule

Interviewer: David Bruce Grant

I. Preamble:

Introduce myself;
 Welcome and thank interviewee;
 Inform interviewee the purpose is to examine the history, current state and future of UK/European logistics and SCM based on extant literature;
 Advise interviewee the objective is to solicit their views and opinions about these issues as guided by my questions;
 Ensure confidentiality and anonymity regarding any attributed comments
 Obtain verbal consent from interviewee on this basis and proceed.

II. Opening Gambit:

1. What is their specific interest in UK/Europe logistics and SCM?

III. Historical Development and Issues:

2. How do you think UK/Europe logistics and SCM has historically developed?
3. What are the advantages and disadvantages of that development?
4. What are the important topics and issues in UK/Europe logistics and SCM today?
5. What are the future challenges and opportunities for UK/Europe logistics and SCM?

Probe: Relationship with developments in North America; Technology and e-commerce; Partnerships; Globalisation; Interdisciplinary effects.

IV. Insights for Practice:

6. What are the important issues for practitioners?
7. What should they be doing to enhance their efficiency, effectiveness and relevance towards UK/Europe logistics and SCM?
8. How can academics help here?

Probe: Strategy; Partnerships; Customer Value; Operations.

V. Insights for Research:

9. What are the important issues for academics regarding UK/Europe logistics and SCM?
10. Where should academic research in UK/Europe logistics and SCM be headed during the next decade?
11. What research topics will you be following over the next decade?

Probe: Research Frameworks; Rigour versus Relevancy; Positivist versus Non-Positivist research; Theory Building; Definitions and Constructs.

VI. Summary and Conclusion:

12. Summary of questions 1. to 11.
13. Have I missed anything?


VII. Closure:

Thank interviewee again and help usher out of room.

Section 1 - Please circle the number beside each customer service feature that reflects your firm's view of the following statement. Please circle N/A if not applicable to your firm.

"Our firm expects this customer service feature from our suppliers."

Customer Service Feature		Strongly Disagree					Strongly Agree		Rank
1.	Competitive price quotes including discounts and payment terms.	N/A	1	2	3	4	5		
2.	Products and support parts available in stock.	N/A	1	2	3	4	5		
3.	On-time delivery on the date promised.	N/A	1	2	3	4	5		
4.	Easy product ordering.	N/A	1	2	3	4	5		
5.	Statement of the specific time for a delivery.	N/A	1	2	3	4	5		
6.	Complete and accurate orders.	N/A	1	2	3	4	5		
7.	The provision of customised services for products.	N/A	1	2	3	4	5		
8.	Appropriate order cycle time (lead time).	N/A	1	2	3	4	5		
9.	Consistent order cycle time (lead time).	N/A	1	2	3	4	5		
10.	The provision of ongoing information and status of a delivery.	N/A	1	2	3	4	5		
11.	Accurate invoices.	N/A	1	2	3	4	5		
12.	Helpful customer service representatives.	N/A	1	2	3	4	5		
13.	Products arrive undamaged and according to specification.	N/A	1	2	3	4	5		
14.	Immediate action on complaints.	N/A	1	2	3	4	5		
15.	Prompt and effective handling of returns.	N/A	1	2	3	4	5		
16.	Proper after-sales technical and other support.	N/A	1	2	3	4	5		

Section 2 - In the shaded column on the right in the above table, please rank in order the five customer service features that are most important to your firm. 

Section 3 - Please list any other customer service features you expect from your suppliers that are not included above. _____

The University of Edinburgh
Survey of Supplier Customer Service

Section 3 - Consider the **MOST RECENT DELIVERY** to your firm from one of your suppliers. Please circle the number beside each customer service feature that reflects your firm's view of the following statement. Please circle N/A if not applicable to your firm.

"Our firm received this customer service feature from the supplier."

Customer Service Feature	Strongly Disagree	1	2	3	4	Strongly Agree
17. Competitive price quotes including discounts and payment terms.	N/A	1	2	3	4	5
18. Products and support parts available in stock.	N/A	1	2	3	4	5
19. On-time delivery on the date promised.	N/A	1	2	3	4	5
20. Easy product ordering.	N/A	1	2	3	4	5
21. Statement of the specific time for a delivery.	N/A	1	2	3	4	5
22. Complete and accurate orders.	N/A	1	2	3	4	5
23. The provision of customised services for products.	N/A	1	2	3	4	5
24. Appropriate order cycle time (lead time).	N/A	1	2	3	4	5
25. Consistent order cycle time (lead time).	N/A	1	2	3	4	5
26. The provision of ongoing information and status of a delivery.	N/A	1	2	3	4	5
27. Accurate invoices.	N/A	1	2	3	4	5
28. Helpful customer service representatives.	N/A	1	2	3	4	5
29. Products arrive undamaged and according to specification.	N/A	1	2	3	4	5
30. Immediate action on complaints.	N/A	1	2	3	4	5
31. Prompt and effective handling of returns.	N/A	1	2	3	4	5
32. Proper after-sales technical and other support.	N/A	1	2	3	4	5

33. What was delivered to your firm? **Raw Materials/Supplies for Processing** _____
Packaging Materials _____ **Office Supplies** _____ **Other** _____

34. Was this a typical delivery from this supplier? **Yes** _____ **No** _____

35. How important is this supplier to your firm? **Not at all Important** **Very Important**
1 2 3 4 5

Supplier Customer Service And Relationships

Research Supported by
The University of Edinburgh



Supplier Customer Service and Relationships

Confidentiality:

Respondents are assured of **complete confidentiality**. No organisation or individual will be identified within the research output. Questionnaires are numbered for control purposes only for posting research findings, and so there is no unnecessary follow up with firms who have already responded.

Feedback:

Research findings will be circulated to all participants requesting it. The research findings will be circulated in early 2001.

Objectives of the Research:

This research complements previous studies to examine the impact of customer service on relationships between suppliers and customers in the UK food processing industry. Participants are being asked to provide responses about customer service features, supplier performance, customer satisfaction, and customer-supplier relationships as a result of customer service initiatives. The objectives of the research are as follows:

- Gather industry wide data by means of a questionnaire
- Analyse the data to investigate trends in supplier customer service and relationships
- Disseminate the findings to the academic and business community

Should you have any queries about any element of this research please do not hesitate to contact the research co-ordinator as detailed below:

Mr David Grant
Department of Business Studies
University of Edinburgh
William Robertson Building
50 George Square
Edinburgh EH8 9JY

Direct Telephone 0131 650 4605
E-mail David.Grant@ed.ac.uk

Section 1: Importance of Supplier Customer Service

The following set of statements relate to **your feelings about the importance of each customer service feature described** in your decision to purchase inputs for your operations from your suppliers. Please **circle the number shown on the scale below** that best indicates the **importance** of each customer service feature to you.

Customer Service Feature	Very Unimportant				Very Important
1. Competitive price quotes including discounts and payment terms.	1	2	3	4	5
2. Products and support parts available.	1	2	3	4	5
3. On-time delivery on the date promised.	1	2	3	4	5
4. Complete orders.	1	2	3	4	5
5. Appropriate order cycle or lead-time.	1	2	3	4	5
6. Accurate invoices.	1	2	3	4	5
7. Products arrive undamaged.	1	2	3	4	5
8. Consistent order cycle or lead-time.	1	2	3	4	5
9. Accurate orders.	1	2	3	4	5
10. Consistent product quality.	1	2	3	4	5
11. Ongoing information and status of a delivery.	1	2	3	4	5
12. Products arrive according to specification.	1	2	3	4	5

Please continue overleaf

Section 2: Performance of Supplier Customer Service

Please consider the **MOST RECENT DELIVERY** provided by **either** one of your existing suppliers **or** a third-party logistics service provider that was a typical delivery of supplies needed for your operations. Please **check the type of firm** you have chosen.

_____ **Supplier** _____ **Third-Party Logistics Service Provider**

The following set of statements relate to **your feelings about your supplier or the third-party logistics service provider**. Please **circle the number shown on the scale below** that indicates the extent to which you believe the firm chosen **performed** during the delivery to meet your expectations of the customer service features.

Customer Service Feature	Much Worse than I Expected				Much Better than I Expected
13. Competitive price quoted including discounts and payment terms.	1	2	3	4	5
14. Products and support parts were available when required.	1	2	3	4	5
15. On-time delivery on the date promised.	1	2	3	4	5
16. Order was complete.	1	2	3	4	5
17. Appropriate order cycle or lead-time.	1	2	3	4	5
18. Accurate invoices.	1	2	3	4	5
19. Products arrived undamaged.	1	2	3	4	5
20. Consistent order cycle or lead-time.	1	2	3	4	5
21. Order was accurate.	1	2	3	4	5
22. Consistent product or logistics service quality.	1	2	3	4	5
23. Ongoing information and status of the delivery.	1	2	3	4	5
24. Products arrived according to specification.	1	2	3	4	5

Section 3: Supplier and Delivery Information

The following set of questions relate to the **MOST RECENT DELIVERY** that you considered in Section 2. Please respond with an answer that best reflects your own perceptions of the delivery.

25. What type of supplies was delivered to your firm?

- Packaging Materials**
- Office Supplies**
- Other**
- Raw Materials/Supplies for Processing**

Briefly describe the product and supplier if you selected raw materials /supplies

26. How important is this supplier to your firm?

- | | | | | | |
|-------------------|----------|----------|----------|--|------------------|
| Not at all | | | | | Very |
| Important | | | | | Important |
| 1 | 2 | 3 | 4 | | |
| | | | | | 5 |

27. How frequently does this supplier deliver to you?

- | | |
|--|---|
| <input type="checkbox"/> 1 to 2-3x/Year | <input type="checkbox"/> 1 to 2-3x/Month |
| <input type="checkbox"/> 1 to 2-3x/Week | <input type="checkbox"/> Daily |

28. Overall, what is the percentage of the supplies you purchase annually from this supplier compared to the value of your total annual purchases?

- | | |
|---|---|
| <input type="checkbox"/> Less than 5% | <input type="checkbox"/> 5 to 10% |
| <input type="checkbox"/> 11 to 25% | <input type="checkbox"/> 26 to 50% |
| <input type="checkbox"/> More than 50% | |

29. Overall, were you satisfied this supplier met your needs for this delivery?

- Yes** **No**

The following set of statements relate to **your overall feelings about the supplier you considered in Section 2**. Please respond by **circling a number** which best reflects your own perceptions.

30. My feelings towards this supplier's services can best be described as

- | | | | | | |
|-------------------------|----------|----------|----------|--|-----------------------|
| Very Unsatisfied | | | | | Very Satisfied |
| 1 | 2 | 3 | 4 | | |
| | | | | | 5 |

Please continue overleaf

31. The overall quality of this supplier's customer service is

Very Poor **Excellent**
 1 2 3 4 5

32. Assuming all other business factors remain the same, in the next year my use of this supplier will be

Not At All **Very Frequent**
 1 2 3 4 5

Section 4: Supplier Relationship Information

Please consider your business relationships with your suppliers. The following set of statements relate to **your feelings about the importance of each relationship feature described with regards to all your suppliers**. Please **circle the number** shown on the scale below to indicate each relationship feature's importance to you.

Relationship Feature	Very Unimportant				Very Important
33. Easy product ordering.	1	2	3	4	5
34. Ongoing communication.	1	2	3	4	5
35. Immediate action on complaints.	1	2	3	4	5
36. Prompt and effective handling of returns.	1	2	3	4	5
37. Proper after-sales technical and other support.	1	2	3	4	5
38. Timely response to requests.	1	2	3	4	5
39. Trust at all times.	1	2	3	4	5
40. Commitment to the relationship.	1	2	3	4	5
41. Integrity at all times.	1	2	3	4	5
42. Helpful customer service representatives.	1	2	3	4	5
43. Provision of customised products or services.	1	2	3	4	5

44. Overall, what percentage of your suppliers do you feel that you have good relationships with?

_____ %

45. Overall, power in your relationships with your suppliers is

	Very Much In Their Favour		Very Much In Our Favour
1	2	3	4
1	2	3	4
1	2	3	4

46. Overall, your ability to switch suppliers is

	Very Difficult		Very Easy
1	2	3	4
1	2	3	4
1	2	3	4

Section 5: Respondent Information

The following set of questions relate to your firm. Please respond with an answer that best reflects your own perceptions.

47. Type of business? _____

48. Number of years in business? _____

49. Your firm's average number of employees?

_____ 1 to 9	_____ 10 to 49
_____ 50 to 249	_____ 250 or more

50. Are you the only person responsible for purchasing suppliers' products?

_____ Yes	_____ No
-----------	----------

51. Are you the only person responsible for arranging for the delivery of suppliers' products?

_____ Yes	_____ No
-----------	----------

52. Your firm's average number of suppliers? _____

53. Your firm's average number of deliveries per week? _____

54. What percentage of your deliveries is provided by?

_____ Supplier Delivery
_____ Own Firm Delivery
_____ Third-Party Delivery

55. Our firm uses computer technology such as EDI or the Internet for the purchase of our supplies

	Not At All		Very Frequently
1	2	3	4
1	2	3	4
1	2	3	4

Thank you for taking the time to complete this survey. Please return it using the envelope provided and mark an X on the line below if you wish to receive a copy of the research findings. They will be sent out in early 2001. _____

Telephone Script for Contacting Survey Respondents

- Hello, Mr [contact last name]. I'm David Grant from the University of Edinburgh Management School. May I have a few minutes of your time?
- I want to speak to the person in your company that looks after the ordering and delivery of supplies and materials. Is that you?

[If Yes, continue. If No, ask them who that person is and ask to be transferred; start again.]

- I'm researching customer service of suppliers in the Scottish

[choose] *meat* *poultry & game* *seafood*

- industry. I think the results of this research will be of interest to you. Would you be kind enough to help me with it by completing a simple questionnaire?

[If Yes, continue. If No, probe "May I ask why?" to alleviate any concerns. If still No, then thank them and ring off.]

- Great! I will post the questionnaire by the middle of next week with complete instructions, and I will include a self-addressed, stamped envelope for your convenience.
- Thanks for your help. Good-bye.

June 18, 1999

«Title» «FirstName» «LastName»
«Company»
«Address1»
«City»
«PostalCode»

Dear «Title» «LastName»:

Thank you for talking with me on the phone about my research. I appreciate you allowing me to send you the enclosed Survey for you to complete. I'm sure you will be interested in this research and its implications for supplier customer service.

The Survey will take about 12-15 minutes to complete. I have included a self-addressed, stamped envelope for your convenience in returning it to me.

Would you please complete and return the Survey no later than June 30, 1999.

If you wish to receive a copy of the Survey results when they are published later this year, please complete the final section on page 3.

Individual firms responding to this Survey will not be identified. All questionnaire data will be treated with the strictest confidence and Survey results will only be presented in aggregate.

Thank you again for your assistance with my research.

Yours sincerely,

David Grant
Direct Telephone: (0131) 650 4605
E-mail: David.Grant@ed.ac.uk

July 14, 1999

«Title» «FirstName» «LastName»
«Company»
«Address1»
«City»
«PostalCode»

Dear «Title» «LastName»

I am writing regarding my telephone contact and subsequent letter of June 18 concerning research into supplier customer service.

I appreciate you have been unable to complete the Survey I sent with my letter. However, your views are important to make this research meaningful, and I again invite you to participate.

I have enclosed another Survey for you to complete. It should only take about 12-15 minutes to do so. I have also enclosed a self-addressed, stamped envelope for your convenience in returning it to me.

Would you please complete and return the Survey no later than July 30, 1999?

Again, if you wish to receive a copy of the Survey results when they are published later this year, please complete the final section on page 3.

Individual firms responding to this Survey will not be identified. All questionnaire data will be treated with the strictest confidence and Survey results will only be presented in aggregate.

Thank you again for your consideration.

Yours sincerely,

David Grant
Direct Telephone: (0131) 650 4605
E-mail: David.Grant@ed.ac.uk

Preamble

Thank participant and assure confidentiality and anonymity.
 Confirm recording for my purposes only instead of notes.
 Review research to date and findings from pilot study.
 Confirm nature of inquiry for this interview: discuss findings and probe CServ and CSat in more depth; and discuss supplier relationships.

Findings

How did you find the survey questionnaire? [**Show questionnaire, probe design, unclear concepts or questions**]
 Where you surprised by the findings sent to you? [**Show findings, probe similarities and differences with their responses**]
 Do they represent your firm's view?

Customer Service and Satisfaction

How do you define customer service? [**Probe for value added, activities, performance measures, corporate philosophy**]
 What factors are the most important for your firm when purchasing supplies? [**Probe for lowest level attributes as well as those in findings**]
 How often do your priorities about these factors change? [**Probe seasonal, different suppliers**]
 Do you consider price of supplies, product/product quality being supplied, and the customer service received from supplier as separate factors when selecting suppliers?
 Is each of these factors equally important?
 How do you define customer satisfaction? [**Probe for CSat as an output of CServ**]
 Can a supplier let you down once or twice and still provide satisfaction for you?
 How do you buy? [**Probe IT, webpage, number of people involved**]

Suppliers and Relationships

What are the most important qualities a supplier should possess? [**Probe honesty, ethics, dedication, and quality of service**]
 What benefits do you receive from your suppliers? [**Probe for higher level benefits**]
 How would you define a relationship with a supplier?
 Do you have relationships with any of your suppliers? [**Probe how many, length of time**]
 How did these "relationships" come about or develop? [**Probe who initiated**]
 What are the most important factors for a successful "relationship"? [**Probe mutual benefits, power, reduced costs, trust, commitment**]
 What are your company values? [**Probe for highest level values**]
 Do any of your suppliers share them? [**Probe for those with whom they have relationships**]

Closure

Have I missed anything, do they have any other comments?
 Thank participant and offer a copy of findings from the next phase.

APPENDIX EIGHT

24 May 2000

«Title» «FirstName» «LastName»
«Company»
«Address1»
«City»
«PostalCode»

Dear «Title» «LastName»,

I am co-ordinating a UK wide research survey investigating customer service and supplier-customer relationships in the logistics of the UK food processing industry. I believe this research will be of interest to you as a customer and supplier in the food supply chain.

I would value your views on these issues and therefore invite you to participate in this research. I would be most grateful if you would take the time to complete and return the enclosed Survey document. The Survey should take between 15-20 minutes to complete. A self-addressed, stamped envelope is enclosed for your convenience.

Whilst I acknowledge that demands on your time are considerable, I would appreciate you returning the Survey to me before **9th June 2000**.

If you feel someone else within your firm should complete this Survey, please forward it to the person who looks after logistics and deliveries of supplies.

If you would like to receive a copy of the Survey results when they are published, please indicate this in the final section on page 7 of the Survey document.

All questionnaire data will be treated with the strictest confidence. Individual firms responding to this Survey will not be identified and Survey results will only be presented in aggregate.

Thank you in advance for your assistance in this research.

Yours sincerely,

David Grant

Telephone: (0131) 650 4605
E-mail: David.Grant@ed.ac.uk

22 May 2000

«Company»
«Address1»
«City»
«PostalCode»

Dear Sirs,

I am writing to inform you that I am co-ordinating a UK wide research survey investigating customer service and supplier-customer relationships in logistics of the UK food processing industry.

I am surveying 1,300 firms that may include some of your association's members. Enclosed for your reference is a copy of the questionnaire being used in the survey. Surveying will take place from the 24th of May until mid-June 2000.

All questionnaire data will be treated with the strictest confidence. Individual firms responding to this survey will not be identified and survey results will only be presented in aggregate.

I believe the survey results will be of interest to you and your association's members as customers and suppliers in the food supply chain. I will forward a copy of the survey results to you when they are published.

Please do not hesitate to contact me if you require any further information regarding this research.

Yours sincerely,

David Grant

Telephone: (0131) 650 4605
E-mail: David.Grant@ed.ac.uk

7 April 2000

«Title» «First Name» «Last Name»
«Company»
«Address 1»
«City»
«Postal Code»

Dear «Title» «Last Name»,

Thank you for talking to me today and agreeing to assist with my new study of supplier customer service in logistics of the food industry.

As discussed, I have prepared a new questionnaire that I will be sending out to food processing firms in the UK. I appreciate your assistance in helping me ensure that the questionnaire has no obvious errors and is sound in content and meaning.

Would you please complete the questionnaire as though you were a survey participant, and then comment on the questionnaire design and content as shown on the back page?

Enclosed is a self-addressed, stamped envelope for your convenience in returning it to me. I would appreciate you returning it by Tuesday 18 April.

Thank you again for your assistance with this new study. I look forward to seeing your comments in due course.

Yours sincerely,

David Grant

Direct Telephone: (0131) 650 4605
e-mail: David.Grant@ed.ac.uk



“Supplier Customer Service And Relationships”

We have not yet received your response to the above questionnaire recently sent to you. Your opinions and views are important for our research, and I again invite you to complete the questionnaire and post it in the self-addressed, stamped envelope. If you have misplaced your questionnaire please call us at 0131 650 4305 and we will send a replacement. Thank you for your consideration, we look forward to hearing from you soon.

*David Grant
Research Coordinator*

Addendum - Published Papers

INDEX – PUBLISHED PAPERS

This addendum contains copies of the following peer-reviewed, published papers from this thesis, in accordance with the University of Edinburgh's *Postgraduate Study Programme* regulation 3.9.11 Regulatory Standards for Format and Binding, 2001/02, page K-30.

1. "A Proposed Course of Postgraduate Study in Business Logistics to be Undertaken at the University of Edinburgh" In T. Skjøtt-Larsen (Ed.) *Proceedings of the European Logistics Association Doctorate Workshop 1999*, June 1999, Monchy St. Eloi France: AFT·IFTIM, pp.48-58, ISBN 3-9804583-8-5.
2. "A Literature Review of Customer Service and Satisfaction in Business Logistics" In A. McAuley and L. Sparks (Eds.) *Proceedings of the 1999 Academy of Marketing Annual Conference*, July 1999, Stirling UK: University of Stirling, pp.848-867, ISBN 1-85769-115-6.
3. "A Study of Customer Service and Satisfaction in Logistics of the Scottish Food Sector" In *Proceedings of the 4th Annual Logistics Research Network Conference*, September 1999, Morpeth UK: Newcastle Business School, pp.29-35.
4. "Customer Service in Logistics: What about the Dichotomy between Transactions and Relationships?" In *Proceedings of the 5th Annual Logistics Research Network Conference*, September 2000, Cardiff UK: Cardiff Business School, pp.211-220, ISBN 0-9537982-1-6.
5. "Supplier Customer Service in Scotland: Findings from an Exploratory Research Study" In *Proceedings of the British Academy of Management 2000 Conference*, September 2000, Edinburgh UK: University of Edinburgh, Paper bam396.
6. "The Pursuit of Rigour in Logistics Research: An Empirical Example," In G. Stefansson and B. Tilanus (Eds.) *Collaboration in Logistics: Connecting Islands using Information Technology – Proceedings of the XIII NOFOMA Conference*, June 2001, Reykjavik Iceland: University of Iceland, Paper 14, ISBN 91-631-1112-8.
7. "How do I love thee? Let me count the ways: availability, on-time delivery, and the right price!" In O. Solem (Ed.) *Promoting Logistics Competence in Industry and Research – Proceedings of the XIV NOFOMA Conference*, June 2002, Trondheim Norway: Norwegian University of Science and Technology, pp.439-453, ISBN 82-471-5150-2.

**A Proposed Course Of Postgraduate Study In Business Logistics To Be Undertaken At The
University Of Edinburgh**

David Bruce Grant

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The University of Edinburgh

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A Proposed Course Of Postgraduate Study In Business Logistics To Be Undertaken At The University Of Edinburgh

David Bruce Grant

The University of Edinburgh

Introduction

This paper discusses my proposed course of postgraduate study in business logistics to be undertaken at the University of Edinburgh, and was prepared for the *European Logistics Association Doctorate Workshop 1999*.¹ The proposed course of study has two stages. The first stage is an MSc by Research degree that will consider certain aspects of the proposed course of study, and will conclude with the submission of a dissertation in September 1999. The second stage is a PhD degree that will build on the MSc degree and examine other research issues contained within the proposed course of study.

This paper is comprised of five sections. The first will discuss the literature review that has shaped my research. The second will describe the purpose of my research and my research questions. The third will briefly discuss the work being undertaken for the MSc dissertation that will attempt to provide answers for some of my research questions. The fourth will present my proposed research plan for the PhD. Finally, the fifth will present some questions to generate discussions about my proposed course of study at the Workshop and conclude with comments emanating from those discussions.

Discussion of Preliminary Literature Review

A preliminary review of the literature provided a good background for the proposed course of study. The discipline of business logistics and the transportation element within it both face a number of challenges in the new millennium. Customer sophistication due to socio-economic factors, development of technology and new channels through information technology, and the role of third-party contractors (or “contracting out”) of logistics services are significantly affecting the environment in which logistics suppliers operate (Younger, 1997; Quarrie and

¹ This paper was presented and discussed at the *European Logistics Association Doctorate Workshop 1999* in Monchy Saint-Eloi, France. This version of the paper has been amended to include my reflections on the comments and questions that resulted from the Workshop discussions.

Hobbs, 1997; and Lamey, 1996). The physical separation between customers and suppliers containing location-centric concepts such as retail gravitation, sales and distribution channels, and media-driven advertising and promotion may alter dramatically due to the Internet and electronic commerce (Sheth and Sisodia, 1999). These challenges will undoubtedly affect logistics suppliers' views of customers and their requirements, and the product and service offerings they provide. Thus, a fresh approach to understanding customer service and satisfaction and supplier selection criteria is warranted in light of these challenges.

The Council of Logistics Management defines business logistics management as “the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirements” (Lambert and Stock, 1993). The latter part of this definition includes a customer service component, which can be considered as providing time and place utility to the customer (*ibid.*). Moreover, since the primary activities of logistics (transportation, warehousing, inventorying and order processing) do not physically transform the products, they tend towards the definition of a service (i.e., the benefits received by the customer from these logistical activities are delivered by way of a service rather than a good). Zeithaml, Parasuraman and Berry (1985) consider there are four important characteristics that distinguish services from tangible goods:

1. Intangibility as services cannot be seen, smelt, felt, tasted or otherwise sensed similar to goods.
2. Inseparability of production and consumption as most services involve the customer in the production function.
3. Heterogeneity or inconsistency of the service from the perspective of the service delivery and customer experience.
4. Perishability of the service if it is not consumed at the moment in time it takes place (*i.e.*, the service cannot be inventoried).

These characteristics are manifested in the Servuction System Model adapted by Hoffman and Bateson (1997). The model relates those aspects of the service experience which affect the customer's perception of the actual service delivered, such as the environment, contact personnel, and other customers. The model is also a point of departure for the Service Quality Model (SERVQUAL) developed by Parasuraman, Zeithaml and Berry (1988) which explores the

customer satisfaction gap. This is the difference between the customer's expectations and perceptions of a service. Essentially, if a customer's *ex post* perceptions of an actual service delivered exceed their *a priori* service expectations, then the customer will be satisfied with the service. Dissatisfaction will occur if the reverse is true, thus customer satisfaction appears as a function of customer service.

Customer satisfaction as a result of exceptional customer service will yield customer loyalty and increased sales, which should see, increased profitability and market share (Daugherty, Stank and Ellinger, 1998; Emerson and Grimm, 1998). Suppliers may have to provide value-added services and be customer-responsiveness in order to differentiate themselves in the market and obtain such loyalty and profitability (Daugherty, Sabath and Rogers, 1992). However, adding services will cost the firm some of that profitability. Lambert and Stock (1993) consider that logistics services require several cost trade-offs to meet the cost effectiveness and customer service elements of the logistics definition. Their cost trade-offs model shows relationships between various logistics activities and basic marketing mix variables. In order to satisfy customers' needs, in accordance with the basic marketing concept and SERVQUAL, companies must carefully consider and choose the various cost trade-offs.

This would appear to be a simple procedure. However, some research suggests otherwise. Markham and Aurik's survey (1993) revealed that about one-third of European logistics suppliers determine their customers' requirements by analysing complaints. Another one-third does so based on competitors' service objectives. Their conclusion is that various suppliers do not understand their customers' needs, and that suppliers must provide added value based on customers' criteria in order to meet such needs. Byrne (1992) considers that quality in logistics means meeting agreed-to customer requirements and expectations. He argues suppliers will have to develop and deliver services offerings more quickly in light of the many changes to distribution that have emerged in the last few years (such as technology, EDI, JIT, etc.). If they are not doing so, then they are not meeting such needs. Blanding (1992) also considers that there is little evidence that logisticians and suppliers have attracted interest in logistics activities, and thus have not properly determined customers' needs.

Christopher and Yallop (1992) believe a first step is to audit customer service quality within the firm. Such a tool may enable suppliers to get at the root of their customers' needs and their ability to deliver to those needs. Manrodt and Davis (1992) consider relationships with

customers, effective logistics structures and appropriate information systems are the three primary components of an effective logistics customer service strategy. The foregoing indicates that a customer's supplier selection criteria for logistics likely extends beyond usual criteria and includes a number of intangible factors as the customer seeks added value to the service provided. Being able to recognise and respond to important customer needs would allow a supplier to differentiate itself from the competition.

But what is customer service and what do we understand about it from a logistics perspective? The literature is ambiguous about a definition (Donaldson and Fletcher, 1994). A clear definition is needed and when studying customer service in logistics the attributes of customer service should be limited to those most important in the industry of study (Innis and La Londe, 1994). As regards previous research into customer service, there has been little programmatic study and much research has overlapped (*ibid.*). From a logistics perspective, previous research has focused on service attributes while little attention has been given to the environment under which logistics suppliers operate (Emerson and Grimm, 1998). Further, little empirical research has been conducted on logistics effects in the service sector, including logistics services themselves (Dresner and Xu, 1995).

This preliminary trawl of the literature established a direction for further readings in these areas and helped focus the research questions above. To date, over one hundred references have been identified in the literature including the selected references for this paper. Almost sixty will be examined for the MSc dissertation. Future literature sources will be incorporated as found over the course of the PhD study.

Purpose of the Research

My research interests are in the transportation area of business logistics and customer service. These interests have been developed and fostered over my business and academic career. The research questions I wish to address include:

1. What customer service criteria pertaining to logistics do firms use when selecting suppliers of transportation? The presence and importance of such criteria should lead to certain customer expectations regarding the choice of suppliers.
2. What are points of comparison between those criteria found in the current literature and those criteria that emerge from survey research? Customers may seek unique

value-added enhancements in addition to usual services provided by transportation suppliers. Thus, how important would such enhancements be to the customers and what are the implications for the suppliers?

3. What are important supplier perceptions regarding customer criteria and expectations of transportation as examined in questions 1. and 2.? What are the comparisons and differences between these perceptions and expectations? What are the implications for both customers and suppliers? Significant differences here may lead to customer dissatisfaction and continual supplier evaluation/selection rather than repeat purchase and loyalty.
4. Can a model of transportation supplier selection be developed based on the various dimensions, perceptions, and expectations developed in questions 1. to 3.? What are the unique and distinct aspects of such a model versus existing models? Can this model be generalised in empirical tests?
5. What comparisons and differences exist by industrial sector? What unique sector dimensions change the behaviour of customers and suppliers regarding the provision of transportation services? Preliminary dimensions considered include perishability, liability due to hazardous products, and seasonality of demand.
6. What comparisons and differences exist between UK and Polish customers and suppliers regarding transportation and logistics services? The UK is an industrialised western nation and has an extensively developed transportation system and logistics network. It offers its own unique perceptions and makes an excellent point of reference since it is the country of choice for my study. Poland is interesting as it is a transitional economy emerging from a centrally planned environment and has an ageing and neglected transportation infrastructure. It is undergoing rapid transformation of its base of customers and suppliers in both a logistics and transportation context.

The MSc Dissertation

The MSc dissertation will examine the importance of certain dimensions of customer service (“CSERV”) and try to relate them to customer satisfaction (“CSAT”) for customers in a logistics context. Thus, the research here will attempt to provide answers and/or further

information for part of my first two research questions. A review of the literature concerning CSERV and CSAT found that CSERV needs to be considered across three purchase-process elements in logistics: Pre-Transaction, Transaction, and Post-Transaction (La Londe and Zinszer, 1976). Mentzer, Gomes and Krapfel, Jr. (1989) developed a model that compared CSAT dimensions of customers to CSERV dimensions of suppliers. They argued that logistics activities only form a subset of a firm's entire CSERV process as the firm's other marketing activities form the rest of the CSERV process dimensions. They agreed with the SERVQUAL model and proposed that CSAT in a logistics context is the outcome of a comparison between a customer's perceptions of CSERV and their *a priori* expectations of the total CSERV performance.

Thirteen dimensions of CSERV appeared more frequently than other dimensions in the literature, either as part of general discussions or as a result of hypothesis testing. They include, *inter alia*, the convenience and ease of ordering, the availability of products and inventory, timely delivery as regards date, complete and accurate orders, and prompt action as regards complaints and/or returns. These dimensions may be dominant in a logistics context. While they have been tested or discussed as part of overall CSERV issues, they have not been tested or examined in isolation to determine their dominance or importance.

These dimensions will be tested in a postal survey of firms within the meat, poultry & game, and seafood industry in Scotland. The participating firms will be asked:

1. whether they expect their suppliers to meet the thirteen dimensions of CSERV discussed above;
2. what other dimensions they expect their suppliers to meet;
3. whether a supplier provided these thirteen dimensions relative to an actual and recent delivery of supplies; and
4. whether they were satisfied overall with the delivery and transaction.

The two different scales of the CSERV dimensions will be analysed to determine whether the thirteen dimensions are dominant for the firms in this sector, and whether the dimensions can be reduced to the three elements of pre-transaction, transaction and post-transaction. Further, the dimensions will be regressed to determine if a linear relationship exists with CSAT as the dependant variable and the resultant equation tested against the actual delivery rankings for fit.

The MSc study is intended to develop a better understanding about important CSERV dimensions but its focus is exploratory. Its limitations include considering a single transaction,

isolating CSERV dimensions in a single industrial and geographic setting, and deriving a CSAT relationship within this context. It is however considered a pilot study and good first stage for the PhD study.

The PhD Study

Areas of the PhD study are still being developed but there have been some preliminary ideas considered. Certain details may be affected by results from the MSc study however the general research design will likely be unaffected. The PhD study will expand upon the MSc by considering the nature of long-term relationships in the customer-supplier exchange, the effects of such relationships on CSERV dimensions and supplier selection, and the contexts of three industrial sectors and two different geographic regions. The study will also consider a supplier selection model. If customers do not consider their needs are being met while suppliers consider they are meeting customers' needs, there may be a problem with the translation of these needs into operational strategies of CSERV and CSAT. The SERVQUAL model may not be complete in its approach to developing a proper response to these issues in a transportation logistics context. The model may need to be adapted for a logistics and transportation setting, or a new model developed to take these factors into account. The conceptual customer service/satisfaction model developed by Mentzer, Gomes and Krapfel, Jr. (1989) may be useful here.

Major empirical research will then be undertaken with a survey of transportation suppliers and customers in the UK and Poland developed from industrial and/or commercial directories and databases. The resultant data will be analysed for similarities and differences using conventional quantitative techniques, possibly including factor analysis, regression, conjoint analysis and/or structural equation modelling. The findings will be disseminated through my PhD dissertation, publications and presentations. Summary results will also be available to those survey respondents requesting them.

A contribution to knowledge will come from examining CSERV and CSAT components of the supplier selection model as compared to existing theory and the SERVQUAL model, examining whether the model is affected by long term relationships or other yet unidentified factors, and examining the model within different industrial and geographic contexts. Research in these specific areas has not been previously undertaken to my knowledge. Managerial implications for European customers and suppliers should include a better understanding of

customer needs regarding transportation services and suppliers, unique CSERV dimensions that may affect certain industries, and differences among geographic regions. Further research could replicate the study across other industry sectors and European countries to reinforce external validity.

Questions for Workshop Discussion

The following questions were presented to the participants of the Workshop for consideration and discussion.

1. Are the theoretical constructs for CSERV, CSAT and the proposed model sound and sensible?
2. What questions are there with respect to the external and internal validity of the research design?
3. Will the resultant model be reliable?
4. Can the research be better focused?

The discussions and other feedback provided at the Workshop primarily dealt with the MSc study. The general themes of these discussions and my comments are presented in this section for completeness. Participants at the Workshop were only able to see a five-page abstract of this paper, and thus some comments that follow may be repeated from other sections above.

The firms being surveyed in the MSc study are intermediaries and are not final consumers. About fifty percent are being surveyed without prior contact, while the remaining firms are being contacted by telephone in an attempt to raise response rates. The effect of this procedure will also be tested.

The survey questionnaire is being pre-tested in order to ensure respondents can answer it without difficulty. An attempt is being made to determine the appropriate person to answer the questionnaire either in the cover letter or via telephone. As a result of a suggestion at the Workshop, survey respondents are now being asked to rank their five most important dimensions of CSERV in the initial set provided.

The thirteen dominant dimensions were distilled from forty-five dimensions found in the literature on the basis of frequency and significance in any empirical testing. They may not be exhaustive but an important first step is to test them in isolation. The study is considered exploratory and there are no hypotheses being tested.

Respondents are not being asked how they measure the CSERV dimensions. The dimensions are given simply as statements and respondents are asked to agree or disagree as to whether they expect their suppliers to provide them. They are also being asked to provide other dimensions they expect that have not been provided in the initial set.

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David Bruce Grant
Edinburgh, June 18, 1999

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This list of references, only a part of the author's bibliography, was selected for space and content considerations in this paper. Please contact the author for further information.

A Literature Review of Customer Service and Satisfaction in Business Logistics

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A Literature Review of Customer Service and Satisfaction in Business Logistics

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This paper is a literature review concerning customer service and satisfaction in business logistics, and was considered timely in light of the increasing importance customer service in the logistics literature. The objective of the review was to determine if there is a consistency in application of the terms and meanings of customer service and satisfaction by both academics and practitioners. Fifty-eight references were examined and categorised and important issues in customer service and customer satisfaction and their impact on firm performance and the business logistics debate were discussed. Dimensions or variables of customer service found in the literature were allocated to pre-transaction, transaction, and post-transaction elements of logistics and other marketing mix components. Thirteen such dimensions were found to be dominant in logistics versus other dimensions. Relationships between dimensions of customer service and satisfaction were developed and discussed, and an existing model of customer service and satisfaction was adapted to include these relationships. Questions concerning these relationships were developed and presented for future research.

Introduction

Logistics faces a number of important and relevant challenges in the new millennium. The author shares the view that customer service and customer satisfaction will be one of those challenges. A focus on customer service in logistics has increasingly developed since the early 1970's and is seen as a key part of future research in the logistics discipline (Kent, Jr. & Flint, 1997). While customer service in logistics has not been identified as a core issue in previous literature, it continues to retain a high emphasis (McGinnis, Boltic & Kochunny, 1994). Moreover, more recent work has shifted the focus of the customer service definition from a supplier's viewpoint to a customer perspective (Christopher, 1986; Sterling & Lambert, 1989). Such a focus mirrors work undertaken beginning in the early 1960's regarding end-users or final consumers. Both the idea of understanding and satisfying consumer needs (Levitt, 1960) and the implementation of a marketing concept as opposed to a production or sales orientation (Kotler, Armstrong, Saunders & Wong, 1996) have led academics and managers in adopting this service and satisfaction viewpoint.

Mentzer & Kahn (1995) argue that much of logistics literature and research lacks a rigorous orientation towards theory development, testing, and application, and they present a framework for future logistics research. They propose such research should follow the scientific method and list appropriate criteria for evaluating the research. Their framework is not unique or profound as it follows a basic idea generation, literature review, hypothesis formulation, data collection and analysis, and conclusion format proposed by many others in research. Sterling & Lambert (1987) consider that empirical customer service research discussed in the literature suffers from small sample sizes and low response rates which affect the ability to perform meaningful statistical analyses. These articles are important as they identify shortcomings in current logistics research and reinforce

the positivist and scientific paradigms of the discipline.

Customers have become more sophisticated and demanding during the last thirty years, and their expectations regarding suppliers' abilities to meet their needs have subsequently increased (Daugherty, Sabath & Rogers, 1992; Manrodt & Davis, Jr., 1993). This has also been found to be the case for end-consumers regarding retailers and service organisations (Sparks, 1990/91; Hummel & Savitt, 1988; NatWest Streamline, 1994). Underlying factors modifying these expectations in a UK and European setting include changes in socio-economic conditions and technology-driven response systems by suppliers and retailers (Boitout, 1997; Younger, 1997). Continued technical innovation in society may radically change widely held concepts about the nature of logistics and alter how customers purchase goods and services (Sheth & Sisodia, 1999). Many suppliers, retailers and service organisations have striven to improve customer service processes in their logistics functions in order to establish or maintain a competitive advantage in light of these challenges. Desired outcomes of such efforts are, in precedential order, satisfied customers, increased customer loyalty, repeat and increased purchases, and improved corporate financial performance (Daugherty, Stank & Ellinger, 1998; Emerson & Grimm, 1998; Manrodt & Davis, Jr., 1993).

But are we satisfied with what customer service and customer satisfaction (hereinafter termed CSERV and CSAT, respectively) really mean to both suppliers and customers alike? Is there a consistency in the application of these terms and their meanings in logistics processes by academics and practitioners alike? Do we possess satisfactory definitions that might work across all functional logistics areas, market sectors and marketplaces? What are the important dimensions of customer service and satisfaction, and how are they measured? While much research has been undertaken here, some authors believe there are still significant gaps in our knowledge (Donaldson & Fletcher, 1994; Innis & La Londe, 1994; Morris & Davis, 1992) and application (Byrne, 1992; Markham & Aurik, 1993) of these issues. This article will consider the foregoing questions, critique the literature, and develop additional questions for further research.

Literature Review Methodology

Since a focus on customer service only developed in the early 1970's, searches for CSERV and CSAT issues in business logistics were undertaken in relevant academic journals and association and practitioner publications from that time onwards. Internet search engines were used with appropriate keywords to locate relevant sites, and related articles and books. Various Scottish libraries, business publication, and UK theses databases were searched through the University of Edinburgh library system again to locate relevant sources of material. References were checked to determine which articles and authors were cross-cited. From this trawl, the 58 references contained herein were selected and examined for their importance and relevancy to the CSERV and CSAT debate in logistics. This literature review forms part of the author's PhD study and work will naturally continue on its development. Nevertheless, the author considers most of the major themes, authors

and references are contained in this review and provide sufficient scope for the following discussions.

Statistical Discussion of the Literature

The 58 references are summarised in Table One. The first column contains the author(s) and year and a frequency of citations within the other references. La Londe & Zinszer (1976) and Sterling & Lambert (1987) are cited 15 times each in the other references; Lambert & Stock (1993) nine times; Lambert & Harrington (1989) seven times; and Gilmour (1982), Parasuraman, Berry & Zeithaml (1988), Pisharodi & Langley, Jr. (1990), and Sabath (1978) six times each. These frequencies suggest that these references are important to the debate and cover significant theoretical or empirical ground. The nature of each reference is contained in column two according to the following categories. These categories were selected on the basis of the three distinct aspects of logistics, CSERV and CSAT. The frequency of references in each category is shown at the end in parentheses.

1. General background and/or comments on logistics (28);
2. Discussion and/or development of model(s) for logistics (4);
3. Research and hypothesis testing in logistics (13);
4. General background and/or comments on CSERV (43);
5. Discussion and/or development of model(s) for CSERV (11);
6. Research and hypothesis testing in CSERV (15);
7. General background and/or comments on CSAT (25);
8. Discussion and/or development of model(s) for CSAT (9); and
9. Research and hypothesis testing in CSAT (11).

Most of the references have multiple categories. This is certainly as a result of the search goals, types of searches undertaken and keywords used. However, the intent of categorisation here is to determine to what degree the categories have been discussed singly and together. For example, only Lambert & Stock (1993), Langley, Jr. & Holcomb (1992), and Mentzer, Gomes & Krapfel, Jr. (1989) undertook discussions and/or development of models primarily for logistics, and always in conjunction with CSERV and CSAT issues. There are a total of 39 research and hypothesis testing studies across the three categories. Eleven concerning logistics are in conjunction with CSERV testing (8), CSAT testing (2), or with both CSERV and CSAT testing (1). Only the Jackson, Lewis, Williams & Cannon (1991) study of Bayesian estimations and the Mentzer & Kahn (1995) logistics framework are considered logistics-only pieces of research. There are 43 discussions about CSERV issues and 25 about CSAT issues, including 14 where CSERV and CSAT issues appear together. Discussions and/or development of CSERV models appear 13 times. There are nine appearances of CSAT models, but four of them are included with CSERV models. Thus, it appears there has been much done on issues in CSERV. However, there has been little work done on CSAT particularly independent study. Further, there hasn't been a significant amount of work with either done in a logistics context. The third column describes the content and main points of each reference. Columns four and five note whether or not the reference discussed CSERV and CSAT issues, respectively. There are 45 references concerned with CSERV, 25 with CSAT, and 13 with both. Columns six to eleven note

whether each reference discussed and/or tested certain dimensions of CSERV and CSAT in the three elements of Pre-Transaction, Transaction and Post-Transaction proposed by La Londe & Zinszer (1976). Table Two is a list of the dimensions corresponding to the respective elements in Table One. It also lists the frequency of the dimension in Table One and my categorisation with respect to being a logistics and/or other marketing mix component. The inclusion of a dimension was based on its importance in the reference as determined by the author (*i.e.*, statistical significance or high factor analysis loadings). There are 26 references that did discuss CSERV and CSAT in terms of the three elements, and 32 that did not. The dominant dimensions in each element will be discussed in another section below.

Customer Service (CSERV)

La Londe & Zinszer (1976), in analysing responses of corporate executives, proposed that CSERV consists of three distinct elements: Pre-Transaction, Transaction and Post-Transaction. Their dimensions within these elements were oriented towards process for the supplier (*i.e.*, preparing a written CSERV policy or analysing stockout levels) as opposed to responding to specific customer requirements. However, customer requirements and resultant CSAT dimensions may be inferred from the variables contained in these elements. The three elements introduce a time factor for a transaction, which is important in a logistics context. The purchase behaviour of logistics services in an organisational setting differs from that of an end-consumer. Thus, these three elements likely play a large role in purchase decisions by actors in such a setting. Gilmour (1982) tested some of these elements and dimensions in several market segments for scientific equipment and found differences among the segments as to which elements and dimensions were required and important. Pisharodi & Langley, Jr. (1991) used these elements to find an association between CSERV and market response (*i.e.*, customers will respond and buy because of CSERV).

Sterling & Lambert (1987) used La Londe & Zinszer (1976) as a starting point to develop a methodology for testing CSERV variables in an industrial setting. They used the office systems and furniture industry for their study. Their factor analysis of variables proposed CSERV dimensions that represented a function orientation (*e.g.*, lead cycle time, transportation services, etc.). They also considered that the resultant variables transcended the three elements proposed by La Londe and Zinszer (1976) so did not consider the importance of time and different times in the transaction process. Lambert & Harrington (1989) replicated the Sterling & Lambert (1987) study in the plastics industry and found a consistency in the use of the original methodology, although they discovered some differences in the importance and ranking of CSERV dimensions between the two industries.

Sterling & Lambert (1987) recognised that CSERV among channel intermediaries requires an integrative approach with the other marketing mix components. Rinehart, Cooper & Wagenheim (1989) conceptualised this aspect further and developed a table of marketing mix variables and logistics variables according to function such as facility or inventory management. Their contribution

was to reassign CSERV variables to their appropriate marketing or logistics interface and recognise a purchase transaction and logistical performance of the firm as the joint output of marketing and logistics activities. Their marketing variables included a place category, which included only channel structure type and ownership but not any logistics variables, as they argued logistics activities affect all marketing mix components and thus require their own categorisation.

Customer Satisfaction (CSAT)

The studies discussed above were essentially focused on CSERV from the suppliers' perspective and did not consider much in the way of CSAT. Mentzer, Gomes & Krapfel, Jr. (1989) developed a model that compared CSAT dimensions of customers to CSERV dimensions of suppliers. They also argued that logistics activities only form a subset of a firm's entire CSERV process. The firm's other marketing activities form the rest of the CSERV process dimensions. They proposed that CSAT is the outcome of a comparison between a customer's perceptions (hereinafter termed CPERC) of CSERV and their *a priori* expectations (hereinafter termed CEXP) of the total CSERV performance. Maltz & Maltz (1998) also found support for logistics channel perceptions and responses being functions of CSERV performance. The Mentzer, Gomes & Krapfel, Jr. model (1989) has been adapted to include other considerations in the references and this essay, and is presented as Figure One. These latter arguments are comparable to the SERVQUAL model developed by Parasuraman, Berry & Zeithaml (1988). SERVQUAL considers the shortfalls or "gaps" in service performance and concludes that if perceptions of an actual performance are greater than the *a priori* expectations (*i.e.*, there is a "gap" between them, or $CPERC > CEXP$), then the customer is satisfied. Sabath (1978) also discussed the concepts of CSERV and CSAT in terms of perceptions and expectations, while Nagel & Cilliers (1990) developed a methodology for CSAT in logistics based on SERVQUAL. This comparison is iterative with each performance and thus a "cybernetic" or feedback loop is developed. Pisharodi & Langley, Jr. (1990) also discussed using a feedback loop in the CSERV process in order to evaluate and validate customer behaviour. Since most functions in logistics consist of services such as transportation, inventory management, warehousing, and information services, consideration of logistics issues in a service context is appropriate. Hoffman & Bateson (1997) and Zeithaml, Parasuraman & Berry (1985) have discussed the distinct issues concerning services versus products, particularly with respect to marketing. This theme of logistics being a part of a firm's marketing activities has been supported by Mentzer, Gomes & Krapfel, Jr. (1989), Rinehart, Cooper & Wagenheim (1989), Tucker (1983), Stank, Daugherty & Ellinger (1998), Sterling & Lambert (1987) and (1989), and Lambert & Stock in their text (1993). Oliver (1980) tested and found support for CSAT as a function of CEXP and as a predictor of Post-Transaction attitudes and buying intentions. Oliver & Swan (1989) found support for CSAT as a function of interpersonal equity in consumer behaviour. Anderson & Sullivan (1993) investigated the antecedents and behavioural aspects of CSAT. They determined that firms producing high quality and reliable

products (including services) should have a more satisfied customer base and that a firm's future profitability depends on CSAT today (including handling of customer complaints) via appropriate CSERV policies.

Consequences of CSERV and CSAT on Firm Performance

Firms attempt to meet various shareholder (or stakeholder) requirements in the ordinary course of their business. Profitability is one of those requirements. Without profits being generated from a firm's ongoing economic activity, shareholder capital and retained profits will erode and the result may well be bankruptcy. Thus firms need customers to buy products and those customers that are satisfied should continue to buy from the firm. Market share developed from repeat purchases and customer loyalty has been researched and considered a surrogate of profitability and CSAT (Blanding, 1992; Dresner & Xu, 1995; Daugherty, Stank & Ellinger, 1998). Profitability is affected by both revenues (as a function of pricing) and costs, and a cost-trade-off model developed by Lambert & Stock (1993) considers the cost of CSERV as part of the firm's resources for the marketing mix. Hill (1994) and Holcomb (1994) have examined logistics costs in an effort to develop cost minimisation techniques.

The literature also includes strategic considerations. Adding value to customers with CSERV was discussed by Donaldson (1995), Daugherty, Sabath & Rogers (1998), Christopher & Yallop (1992); and Morash, Dröge & Vickery (1996). Perkins (1993) compared a supplier's CSAT capabilities against competitors. Anderson, Fornell & Lehmann (1994) consider profitability will only be developed from the long-term strategic use of CSAT and quality. Key customers of a firm will demonstrate more long-term loyalty based on CSAT (Daugherty, Ellinger & Plair, 1997). Schary (1992) developed a feedback or "cybernetic" loop for long-term strategic planning purposes. The benefits from long-term loyalty and relationships will stem from strategic partnerships where CSAT is experienced by all parties (Sharma, Grewal & Levy, 1995; Walton, 1996). Finally, a competitive advantage might be realised by using logistics CSERV as a strategic differentiation factor for CSAT was proposed by Müller (1991) and Lambert & Stock in their text (1993).

Important Dimensions of CSERV

Certain dimensions of CSERV appeared frequently in the references either as discussions or as a result of hypothesis testing. Those with frequencies of 5 or greater in Table Two are presented under their respective element below together with their marketing mix categorisation.

Pre-Transaction

1. Convenience and ease of ordering (logistics)
2. Availability of products and inventory (product/logistics)
3. Ability of firm to provide customisation and special services within order (logistics)
4. Pricing including discounts and payment terms (price)

Transaction

1. Delivery is timely as regards date and being on-time, otherwise firm should provide sufficient information (logistics)
2. Order cycle time is short and consistent (logistics)
3. Orders are complete and accurate
4. Orders may be expedited if required (logistics)
5. Invoices are accurate (price/logistics)
6. CSERV representatives are helpful, knowledgeable and provide information (promotion)

Post-Transaction

1. Orders arrive in good quality and undamaged (product/logistics)
2. Complaints and/or returns receive action (promotion/logistics)
3. There is good technical, sales and other after sales support (product)

These thirteen dimensions of CSERV are considered dominant within the literature. While they have been tested or discussed as part of overall CSERV issues, they have not been tested or examined in isolation to determine their importance.

Relationships Between CSERV Dimensions and CSAT

There are several relationships that may be drawn from this literature review. They are presented as mathematical functions below and are incorporated graphically in the Mentzer, Gomes & Krapfel, Jr. (1989) model adapted in Figure One. First, it appears that CSERV in logistics needs to be considered across the three elements of Pre-Transaction, Transaction, and Post-Transaction. Each element appears to have its own important dimensions as noted above.

$$\text{CSERV (Logistics)} \rightarrow f(\text{Pre-Transaction} + \text{Transaction} + \text{Post-Transaction}) \tag{1}$$

Second, following on the SERVQUAL model (Parasuraman, Berry & Zeithaml, 1988), CSAT will likely be a function of CPERC and CEXP.

$$\text{CSAT} \rightarrow f(\text{CPERC} > \text{CEXP}) \tag{2}$$

Third, CSAT (and thus CPERC and CEXP) will likely also be a function of CSERV provided by both the logistics and the other marketing components of a firm.

$$\text{CSAT} \rightarrow f(\text{CSERV Logistics} + \text{CSERV Other Marketing Components}) \tag{3}$$

Fourth and fifth, a "cybernetic" or feedback loop appears to be a necessary feature of both the CPERC and CEXP and the CSERV and CSAT relationships.

$$\text{CPERC} \rightarrow \text{CEXP} \rightarrow \text{CPERC} \rightarrow \text{CEXP} \rightarrow \dots \tag{4}$$

$$\text{CSERV} \rightarrow \text{CSAT} \rightarrow \text{CSERV} \rightarrow \text{CSAT} \rightarrow \dots \tag{5}$$

Sixth, a firm's profitability (denoted by the symbol π) and long-term existence will be a function of

several factors, one of which is customers "enjoying" CSAT, developing loyalty towards the firm, and re-purchasing from them.

$$\pi \rightarrow f\{\text{Loyalty and repeat purchases} \rightarrow f(\text{CSAT})\} + f\{\text{Other Factors}\} \quad (6)$$

A linear relationship derived from the above relationships is presented below. This relationship considers CSAT as a dependant variable of the three CSERV elements of logistics and other marketing components. Coefficients for the independent variables are presented as metrics. While not suggesting the relationship is linear or mathematical, it is useful to do so in order to develop questions that should be considered in future research.

$$\text{CSAT} = \beta_1(\text{CSERV Logistics \{Pre-Transaction Dimensions } \chi_1 + \chi_2 + \dots + \chi_n\}) + \beta_2(\text{CSERV Logistics \{Transaction Dimensions } \gamma_1 + \gamma_2 + \dots + \gamma_n\}) + \beta_3(\text{CSERV Logistics \{Post-Transaction Dimensions } \alpha_1 + \alpha_2 + \dots + \alpha_n\}) + \beta_4(\text{CSERV Other Marketing Components})$$

Questions Concerning the Relationships

The questions below have been developed from the above relationships. It is my view that they have not been completely answered or considered at all in the literature reviewed for this essay. While extensive, they may not be exhaustive of the issues in CSERV and CSAT.

1. Is this relationship true (*i.e.*, is CSAT a function of these variables as proposed)?
2. Does it essentially hold for different market or industry sectors (*i.e.*, can comparisons be made between them)?
3. What independent variables are important in the logistics dimensions and other marketing components (*i.e.*, can we confirm or accept the dominant dimensions noted above are the most important to customers)?
4. What are the coefficients of the independent variables (*i.e.*, what drivers are there for these variables)?
5. Although the coefficients are presented as metrics, are they in fact metrics (*i.e.*, is there a quantifiable relationship between the dependant and independent variables)?
6. How different (if at all) are the coefficients across different market or industry sectors (*i.e.*, are the magnitudes different among different sectors)?
7. Does firm size affect the magnitude of the coefficients (*i.e.*, is there more or less importance attached to certain variables)?
8. Are the coefficients different in size between customers and suppliers (*i.e.*, are there actual or perceptual differences)?
9. How does channel power affect the coefficients (*i.e.*, does channel power affect the size of or negate some variables)?
10. What are the differences in magnitude between the logistics and other marketing components coefficients (*i.e.*, are the other marketing components significant or not in the relationship)?
11. Are the coefficients of the logistic variables without value (*i.e.*, if all firms provide the same variables, then a customer may not ascribe any value to these variables)?
12. If they are without value, then what other variables (if any) replace them in the relationship (*i.e.*, what are secondary or tertiary considerations by customers)?

These questions should form the basis for further research to establish a better model of CSERV

relating to CSAT in a logistics context and try to close the gaps outstanding in the literature.

Conclusions

This paper has reviewed the literature concerning CSERV and CSAT issues in business logistics. Meanings and definitions, and the consistency in their application, appear to be satisfactory among the 58 references. Some authors have provided studies and models as the basis for future research in CSERV. Their contributions include the temporal elements of the logistics purchase process, and the need to integrate and consider logistics in a firm's marketing mix and its entire channel of distribution. Other authors have investigated CSAT as a comparison between customers' expectations and perceptions with attendant feedback loops, and have demonstrated the linkage and importance of satisfied customers to a firm's performance in the market. While much work has been done in the area of CSERV, there is less work in the area of CSAT and the integration of both concepts in logistics contexts. The references were categorised according to those elements and dimensions that figure prominently in the CSERV and CSAT debate. Thirteen dimensions appear to be dominant and this has implications for both academics and managers. Academics should test the possible dominance of these dimensions and examine other dimensions for their importance and relevance. Managers might need to consider their CSERV strategies in light of any dominant dimensions in order to effectively and efficiently utilise limited marketing mix resources. An existing model of CSERV and CSAT was adapted to incorporate new findings in the literature, further develop some key relationships, and suggest questions for future research into these relationships. The pursuit of these suggested questions will help close the current gaps in our knowledge of CSERV, CSAT and their relationships to business logistics.

Figure One - Conceptual CSERV/CSAT Model
 (adapted from Mentzer, Gomes & Krapfel, Jr., 1989)

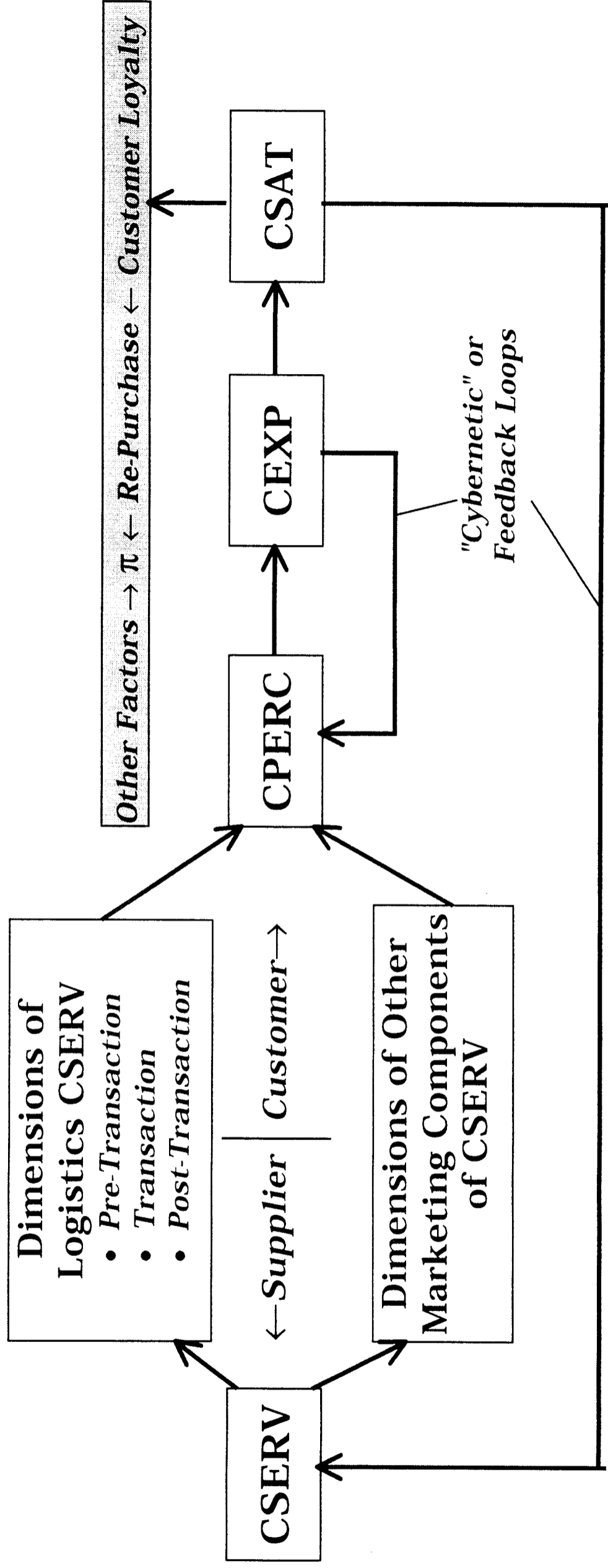


Table One: Summary of Literature Review

Author (Year) [# of Cross Citations]	Category	Content and Main Points of Reference	CSERV Issues	CSAT Issues	Pre-Trans	Dim #	Trans	Dim #	Post-Trans	Dim #
Anderson, Fornell & Lehmann (1994) [4]	7, 8, 9	Developed and tested model examining firm profitability as $f(\text{CSAT and Quality})$. Found strong support for their model but noted it has a long term perspective.	No	Yes	No		No		No	
Anderson & Sullivan (1993) [3]	7, 8, 9	Discussed and tested CSAT in terms of antecedents and behavioural consequences.	No	Yes	No		No		No	
Blanding (1992) [1]	1, 4	Discussed relationship between CSERV and loyalty and noted how CSERV can be quantified.	Yes	No	No		No		No	
Boitout (1997)	1, 7	Discussed partnership processes of supply chain management and efficient consumer response as related to CSAT	No	Yes	No		No		No	
Byrne (1992)	1, 4	Proposed certain CSERV requirements necessary for quality in logistics.	Yes	No	Yes	20	Yes	4, 9, 10, 18	Yes	2, 7
Christopher (1986)	1, 4, 5	Textbook on managerial issues of logistics which includes chapter on CSERV issues.	Yes	No	Yes	7, 20	Yes	1, 5, 6, 9, 10, 15	Yes	2, 3
Christopher & Yallop (1992) [1]	1	Discussed use of CSERV to augment core product of firms and presented methodology to implement CSERV programme in a firm.	Yes	No	Yes	7, 20	Yes	1, 4, 5, 6, 8, 9, 10, 15	No	
Daugherty, Ellinger & Plair (1997)	7, 8, 9	Tested differences of CSAT and loyalty between 'key' accounts and other types of accounts. The former indicated higher levels of both as compared to the latter.	No	Yes	No		No		No	
Daugherty, Sabath & Rogers (1992) [1]	3, 4, 6	Tested whether integrated firms might gain competitive advantage by providing value-added, customised services across 4 special request dimensions, limited support found.	Yes	Yes	Yes	1	Yes	1, 2	No	
Daugherty, Stank & Ellinger (1998)	3, 7, 9	Tested CSAT as $f(\text{logistics})$, customer loyalty as $f(\text{CSAT})$, and market share as $f(\text{customer loyalty})$. Support found for two former relationships, but no support for latter.	No	Yes	Yes	2	Yes	3-12	No	
Donaldson (1995) [1]	4, 6, 7	Tested 4 propositions about CSERV in manufacturing firms	Yes	No	No		Yes	1, 4, 9,	Yes	2, 6, 7

Donaldson & Fletcher (1994)	4, 6	and support found for 3 propositions. Tested manufacturing firms' activities in making operational changes for CSERV. Found little evidence of such changes.	Yes	No	No	13, 15	No
Dresner & Xu (1995)	4, 5, 6, 7, 8, 9	Tested 3 CSERV variables in service sector (airlines) and their effect on profitability. Found strong support.	Yes	Yes	3	13, 14	No
Emerson & Grimm (1998)	3, 4, 6, 7, 9	Tested 6 environmental variables against the importance of CSERV and CSAT. Found support for indirect channels, firm size, and supplier flexibility.	Yes	Yes	2, 4, 5	3, 4, 5, 9, 15	Yes
Gilmour (1982) [6]	4, 6	Tested CSERV elements between suppliers of scientific equipment and their market segments of hospitals, private firms, institutions, schools, etc. Found differences of importance among segments.	Yes	No	7, 8	1, 5, 7, 15	Yes
Hill (1994)	1	Considers the cost of CSERV in a logistics context.	Yes	Yes	7	1, 5, 6, 7, 8	No
Hoffman & Bateson (1997)	1, 4, 5, 7, 8	Textbook on services marketing which includes chapters on CSERV and CSAT issues and models.	Yes	Yes	No	No	No
Holcomb (1994)	3, 4, 5, 6	Considered and tested comprehensive method for designing, assessing and improving CSERV from quality and cost perspectives using Taguchi parameters.	Yes	No	4	4, 6, 9, 10, 12, 13, 14	No
Hummel & Savitt (1988)	4, 5	Discussed integrated CSERV strategy for customers by retailers in managing their suppliers on basis of availability, convenience, information and support.	Yes	Yes	No	No	No
Innis & La Londe (1994) [4]	4, 5, 6, 7, 9	Tested 32 CSERV attributes to determine CSAT, purchase/repurchase intentions and attitudes as $f(\text{CSERV})$. Support found for two former variables.	Yes	Yes	2, 4, 5, 6, 7, 8, 9, 10, 11, 12	1, 3, 7, 10, 11, 13, 15	Yes
Jackson, Lewis, Williams & Cannon (1991)	3	Discussed the use of empirical Bayes estimation in model for performance control with small sample data.	Yes	No	No	No	No
Kent, Jr. & Flint (1997)	1, 4	Considered evolution of logistics thought and CSERV within it.	Yes	No	No	No	No
Kotler, Armstrong,	4, 7	Discussed idea of marketing concept and CSERV and	Yes	Yes	No	No	No

Saunders & Wong (1996)	4, 5, 6	CSAT as part of a firm's marketing strategy.	Yes	No	Yes	2, 13, 20	Yes	4, 5, 6, 17	Yes	1, 3, 5, 7
La Londe & Zinszer (1976) [15]	3, 4, 6	Developed concepts and variables of CSERV from study of corporate executives	Yes	No	Yes	2, 13, 20	Yes	4, 5, 6, 17	Yes	1, 3, 5, 7
Lambert & Harrington (1989) [7]	1, 2, 4, 7	Replicated Sterling & Lambert (1987) methodology to test CSERV in plastics industry. Found support for methodology and common important CSERV variables.	Yes	No	Yes	4, 7, 16	Yes	9, 15	Yes	2, 7
Lambert & Stock (1993) [9]	1, 2, 4, 7	Textbook on logistics which includes chapter on CSERV, its relationship to marketing, and some comments on CSAT.	Yes	Yes	Yes	7, 20	Yes	1, 7, 15	Yes	6, 7
Langley, Jr. & Holcomb (1992) [3]	1, 2, 4, 5	Discussed CSERV and logistics in creating value for the firm's customers.	Yes	No	No		No		No	
Levitt (1960) [1]	4, 7	Discussed the concepts of understanding customer needs and the nature of the firm's business in meeting those needs.	Yes	Yes	No		No		No	
McGinnis, Boltic & Kochunny (1994)	1, 4	Considered trends in logistics thought and CSERV within it.	Yes	No	No		No		No	
Maltz & Maltz (1998)	1, 3, 4, 6	Tested CSERV performance as $f(\text{manufacturer \& distributor activities})$ using objective service performance and perceptual channel responsiveness data. Found some support for their hypotheses.	Yes	No	Yes	2, 5, 7	No		Yes	2
Manrodt & Davis (1993)	1, 4	Traced development of CSERV within logistics discipline from 1960's and strategic implications.	Yes	No	No		No		No	
Markham & Aurik (1993)	1, 4	Discussed firm differentiation using CSERV to add value by reducing customers' costs and increasing customers' revenues.	Yes	No	No		No		No	
Mentzer, Gomes & Krapfel, Jr. (1989) [4]	1, 2, 4, 5, 7, 8	Developed constructs of Physical Distribution Service as availability, timeliness, and quality. Evaluated literature to date to ensure validity of the constructs and proposed CSERV & CSAT model.	Yes	Yes	Yes	7	Yes	1, 4, 5, 6, 7, 13	Yes	2
Mentzer & Kahn (1995)	1, 2, 3	Discussed a framework for future logistics research in the positivist tradition.	No	No	No		No		No	
Morash, Dröge & Vickery (1996)	1, 3, 4, 6	Tested demand and supply "value disciplines" as strategic capabilities and related them to performance. Demand led supply capabilities in both importance and implementation.	Yes	No	Yes	4, 13, 14, 15	Yes	1, 15	Yes	4

Morris & Davis (1992) [1]	1, 3, 4, 6	and against performance. Investigated and tested the CSERV function in industrial firms. Three descriptors emerged: definitional, management and measurement, with the latter being found the weakest.	Yes	No	Yes	16, 17, 18, 19	Yes	4, 9, 10, 16, 17	Yes	1, 5, 6
Müller (1991)	7	Discussed importance of CSAT on firm's profitability	No	Yes	No		No		No	
Nagel & Cilliers (1990) [1]	1, 4, 7, 8	Developed a conceptual model for CSAT using SERVQUAL as basis.	No	Yes	No		No		No	
Oliver (1980) [5]	7, 9	Tested CSAT as $f(\text{expectations}) \rightarrow \text{postattitude} \rightarrow \text{postintention}$. Support found for this relationship.	No	Yes	No		No		No	
Oliver & Swan (1989) [5]	7, 9	Tested CSAT as $f(\text{interpersonal equity})$ and found support within a consumer purchasing situation.	No	Yes	No		No		No	
Parasuraman, Berry & Zeithaml (1988) [6]	4, 5, 7, 8	Developed SERVQUAL model to relate CSAT as output of CSERV which is determined by the firm.	Yes	Yes	No		No		No	
Perkins (1993)	3, 7, 9	Tested perceptions about one supplier's capabilities in providing CSAT against its competitors amongst its buyers, salesforce, and distributors.	No	Yes	Yes	4, 5, 6, 7	Yes	1, 15	Yes	2, 7
Pisharodi & Langley, Jr. (1990) [6]	4, 5	Developed a model of CSERV based on cybernetic principles to incorporate feedback loops to accommodate multi-dimensional aspects of customer and firm perceptions.	Yes	No	No		No		No	
Pisharodi & Langley, Jr. (1991) [2]	4, 6	Tested CSERV variables proposed by La Londe and Zinszer (1976) to find interset association between CSERV and market response. Found support for customer behaviour however there was little support for suppliers' perceptions of customer needs.	Yes	No	Yes	2, 13, 20	Yes	4, 5, 6, 17	Yes	1, 3, 5, 7
NatWest Streamline (1994)	4	Considered attitude and operations are two most important attributes of CSERV and must permeate firm's culture for success.	Yes	No	No		No		No	
Rinehart, Cooper & Wagenheim (1989) [1]	1, 4	Discussed integration of logistics and marketing to effect CSERV, and variables of CSERV on functional basis.	Yes	No	No		No		No	
Sabath (1978) [6]	4	Discussed concept of CSERV from perspective of customer and cost trade-offs to effect good CSERV.	Yes	No	No		No		No	
Schary (1992)	1, 4	Developed concept of CSERV based on cybernetic principles to incorporate long-term and pro-active strategy	Yes	No	No		No		No	

Sharma, Grewal & Levy (1995)	1, 7, 8	considerations. Presented conceptual framework of logistics behaviour and policy relating to CSAT and profitability through customer and supplier expectations. Satisfied customers can lead to strategic partnerships and increased profits.	No	Yes	Yes	7	Yes	1, 9, 18	Yes	1
Sheth & Sisodia (1999)	1, 4, 7	Suggested context of marketing is changing and thus established lawlike generalisations will need to be challenged, including logistics.	Yes	No	No		No		No	
Sparks (1990/91)	4, 7	Considered retailer differentiation via CSERV along certain dimensions of customer care and a total CSERV approach.	Yes	No	Yes	7, 12, 13	Yes	15	Yes	1, 3
Stank, Daugherty & Ellinger (1998)	1, 4	Discussed how marketers should exploit logistics to increase CSERV and CSAT.	Yes	Yes	Yes	4	Yes	1, 4, 9, 11, 13, 15	Yes	1, 7
Sterling & Lambert (1987) [15]	1, 3, 4, 6	Developed and tested methodology to examine CSERV from logistics and marketing in furniture industry. Found several important CSERV variables.	Yes	No	Yes	2, 4, 7, 16	Yes	4, 9, 12, 15, 17	Yes	1, 7
Sterling & Lambert (1989) [5]	1, 3, 4, 6	Reviewed development of CSERV and its research and presented methodology for integrating CSERV and marketing. Methodology was tested in furniture industry and highlighted importance of CSERV variables in firm's marketing mix.	Yes	No	Yes	4, 5	Yes	1, 4, 5, 11, 13, 15, 17	Yes	1, 2, 3
Tucker (1983) [3]	1, 4	Discussed 'traditional physical distribution' and 'marketing' approaches to CSERV, and research related thereto.	Yes	No	No		No		No	
Walton (1996)	7, 9	Considered and tested CSAT of supply chain partnerships and determined that planning is correlated to CSAT of managers.	No	Yes	No		No		No	
Younger (1997)	1, 4, 7	Presented challenges in trends of European consumer goods for logistics suppliers and retailers.	Yes	Yes	No		No		No	
Zeithaml, Parasuraman & Berry (1985) [3]	4	Discussed the problems of marketing services and their differences relative to goods: intangibility, inventory, perishability and inconsistency.	Yes	No	No		No		No	

Table Two: Important Dimensions of CSERV in the Literature

Dimension or Variable	Element	Freq Cited	Mktg Mix
1. Labelling & packaging	Pre-Trans	1	Promo
2. Willing to customise	Pre-Trans	7	Log
3. Overbooking of service	Pre-Trans	1	Log
4. Pricing including discounts	Pre-Trans	9	Price
5. Payment terms	Pre-Trans	5	Price
6. Breadth of product line	Pre-Trans	2	Pdt
7. Availability of new/old products & support parts	Pre-Trans	13	Pdt/Log
8. Telemarketing	Pre-Trans	2	Promo
9. Co-operative advertising	Pre-Trans	1	Promo
10. Supplier integrity	Pre-Trans	1	Promo
11. Supplier knowledge	Pre-Trans	1	Promo
12. Manufacturer advertising	Pre-Trans	2	Promo
13. General "CSERV"	Pre-Trans	4	Log
14. Widespread coverage	Pre-Trans	1	Log
15. Selective coverage	Pre-Trans	1	Log
16. Lead times	Pre-Trans	3	Log
17. Production scheduling	Pre-Trans	1	Pdt
18. Inventory control	Pre-Trans	1	Log
19. Order forecast accuracy	Pre-Trans	1	Log
20. Ease of ordering	Pre-Trans	6	Log
1. Delivery timing	Transaction	14	Log
2. Special promotion kits	Transaction	1	Promo
3. Order fill rate]	Transaction	3	Log
4. Complete orders	Transaction	13	Log
5. Order cycle time consistency	Transaction	10	Log
6. Order cycle time length	Transaction	8	Log
7. Deliveries on due date	Transaction	6	Log
8. Frequency of deliveries	Transaction	3	Log
9. Communication about deliveries	Transaction	12	Log
10. Invoice accuracy	Transaction	7	Price/Log
11. Advance shipping notices	Transaction	4	Log
12. Uses preferred carriers	Transaction	3	Log
13. On-time performance	Transaction	7	Log
14. Mishandling of goods	Transaction	2	Log
15. Customer service reps	Transaction	14	Promo/Log
16. Physical appearances	Transaction	1	Promo
17. Order expediting	Transaction	5	Log
18. Efficient and accurate paperwork	Transaction	2	Log
1. Action on complaints	Post-Trans	9	Promo/Log
2. Product quality	Post-Trans	10	Pdt
3. Handling of returns	Post-Trans	6	Promo/Log
4. General "CSERV"	Post-Trans	1	Log
5. Product installation	Post-Trans	3	Pdt
6. Product training	Post-Trans	4	Pdt
7. Technical, sales and other support	Post-Trans	10	Pdt

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A Study of Customer Service and Satisfaction in Logistics of the Scottish Food Sector

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Abstract

This paper discusses a research study-in-progress of dimensions of customer service and customer satisfaction in a logistics context. A review of the literature found that customer service should be considered across three purchase-process elements in logistics: pre-transaction, transaction, and post-transaction, and that thirteen dimensions of customer service in logistics appear more frequently in the literature than other dimensions. The literature review also found that satisfied customers should behave more positively towards their suppliers by purchasing again, developing increased customer loyalty, and establishing long term relationships. Resultant benefits for suppliers should include improved profitability due to increased sales and lower costs from familiarisation efficiencies. The research study tests these thirteen dimensions among suppliers and customers of one industry sector in Scotland at one interface in the logistics process. The research methodology and anticipated findings are discussed. This study is important as it may yield further knowledge of how customers process and evaluate dimensions of customer service as they relate to their satisfaction. It is also interesting to suppliers for their consideration and development of appropriate customer service initiatives that positively influence customer satisfaction. Lastly, it investigates customer service dimensions of logistics and other marketing components, not previously studied in isolation, to determine their independent importance and relevance to customer service for both customers and suppliers.

Keywords: customer service; customer satisfaction; food; logistics; marketing; Scotland.

Introduction

This paper discusses a research study-in-progress during the summer of 1999 on customer service (CSERV) and customer satisfaction (CSAT) in the Scottish food sector of meat, poultry, game and seafood. This paper is written for the *Logistics Research Network Annual Conference* in September 1999 and thus only considers the literature review and methodology behind the research. Preliminary findings will be presented at the *Conference* as a follow-up to this paper.

The purpose of the research study is to examine certain dimensions of CSERV and CSAT in logistics in the Scottish food sector. Specifically, they are investigated at one interface as they pertain to a customer's *a priori* expectations of CSERV and *ex post* perceptions of an actual delivery from a supplier. The importance of these dimensions and whether Scottish customers achieve CSAT from their suppliers is the focus of this research study.

These initiatives parallel current thought and work in other aspects of marketing, such as relationship marketing and quality in services and consumer behaviour, and should be of interest to researchers and practitioners in those areas and in logistics.

Literature Review

The Council of Logistics Management defines business logistics management as "the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirements" (Lambert and Stock 1993). The latter part of this definition includes a customer service component, which can be considered as providing time and place utility to the customer (*ibid.*).

Since the primary activities of logistics (transportation, warehousing, inventorying and order processing) usually do not physically transform the products, they lean towards the definition of a service (*i.e.*, the benefits received by the customer from these logistical activities are delivered by way of a service rather than a good). Zeithaml, Parasuraman and Berry (1985) consider there are four important characteristics that distinguish services from tangible goods:

1. Intangibility as services cannot be seen, smelt, felt, tasted or otherwise sensed similar to goods.
2. Inseparability of production and consumption as most services involve the customer in the production function.
3. Heterogeneity or inconsistency of the service from the perspective of the service delivery and customer experience.
4. Perishability of the service if it is not consumed at the moment in time it takes place (*i.e.*, the service cannot be inventoried).

These characteristics provide a point of departure for the Service Quality Model (SERVQUAL) developed by Parasuraman, Zeithaml and Berry (1988) which explores the customer satisfaction gap. This is the difference between the customer's expectations and perceptions of a service. Essentially, if a customer's *ex post* perceptions of an actual service delivered meet or exceed their *a priori* service expectations, then the customer will be satisfied with the service. Dissatisfaction will occur if the reverse is true. Thus, CSAT becomes a function of CSERV.

SERVQUAL has been criticised since its inception on conceptual, methodological and interpretative grounds (Smith 1995), however its primary postulate of CSAT being the outcome of perceptions exceeding expectations is important as a starting point. Most researchers have modified SERVQUAL to reflect theoretical or industrial conditions particular to their situation (*ibid.*).

Customer satisfaction as a result of exceptional customer service has been shown to yield customer loyalty and increased sales, which should see increased profitability and market share (Daugherty, Stank and Ellinger 1998; Emerson and Grimm 1998). Suppliers may have to provide value-added services and be customer-responsiveness in order to differentiate themselves in the market and obtain such loyalty and profitability (Daugherty, Sabath and Rogers 1992).

However, adding services will cost suppliers part of that profitability. Should they do so? How many additional services should they offer? Lambert and Stock (1993) consider that logistics services require several cost trade-offs to meet the cost effectiveness and CSERV elements of the logistics definition. Their cost trade-offs model shows relationships between various logistics activities and basic marketing mix variables. In order to satisfy customers' needs, in accordance with the basic marketing concept and any SERVQUAL-style analysis, suppliers must carefully consider and choose the various cost trade-offs.

This would appear to be a simple procedure but some research suggests otherwise. Markham and Aurik's survey (1993) revealed that about one-third of European logistics suppliers determine their customers' requirements by analysing complaints. Another one-third does so based on competitors' service objectives. Their conclusion is that various suppliers do not understand their customers' needs, and that suppliers must provide added value based on customers' criteria in order to meet such needs. Byrne (1992) considers that quality in logistics means meeting agreed-to customer requirements and expectations. He argues suppliers will have to develop and deliver services offerings more quickly in light of the many changes to distribution that have emerged in the last few years (such as technology, EDI, JIT, etc.). If they are not doing so, then they are not meeting such needs. Blanding (1992) also considers that there is little evidence that logisticians and suppliers have attracted interest from customers in logistics activities and thus have not properly determined their needs.

The foregoing indicates that a customer's supplier selection criteria for logistics likely extends beyond usual criteria and includes a number of intangible factors as the customer seeks added value to the service provided. Being able to recognise and respond to important customer needs would allow a supplier to differentiate itself from the competition.

But what is customer service and what do we understand about it from a logistics perspective? The literature is ambiguous about a definition (Donaldson and Fletcher 1994). A clear definition is needed and when studying customer service in logistics the attributes of customer service should be limited to those most important in the industry of study (Innis and La Londe 1994). As regards previous research

into customer service, there has been little programmatic study and much research has overlapped (*ibid.*). From a logistics perspective, previous research has focused on service attributes while little attention has been given to the environment under which logistics suppliers operate (Emerson and Grimm 1998). Further, little empirical research has been conducted on logistics effects in the service sector, including logistics services themselves (Dresner and Xu 1995).

Grant (1999) undertook a literature review of CSERV and CSAT in logistics to examine the state of theoretical and empirical research in this area. A focus on CSERV in logistics has increasingly developed since the early 1970's (Sterling and Lambert 1989) and is seen as a key part of future research in the logistics discipline (Kent and Flint 1997). While CSERV has not been identified as a core issue in previous logistics literature, it continues to retain a high emphasis (McGinnis, Boltic and Kochunny 1994).

Grant (1999) agreed with La Londe and Zinszer (1976) that CSERV needs to be considered across three purchase-process elements in logistics: Pre-Transaction, Transaction, and Post-Transaction. The three elements introduce a time factor for a transaction that is important in a logistics context and relates to a customer's time utility. The purchase behaviour of logistics services in an organisational setting differs from that of an end-consumer. Thus, these three elements likely play a large role in purchase decisions by actors in such a setting. Gilmour (1982) tested some of these elements and dimensions in several market segments for scientific equipment and found differences among the segments as to which elements and dimensions were required and important.

Mentzer, Gomes and Krapfel (1989) proposed a logistics model similar to SERVQUAL where a customer will enjoy a state of CSAT if their perceptions are greater than their expectations. They also argued that CSERV in logistics is only one part of a supplier's total CSERV, and that the entire CSERV experience also depends upon other dimensions in the supplier's marketing components.

Grant (1999) found that certain dimensions of CSERV appeared frequently in the literature either within general discussions or as a result of hypothesis testing. They are presented below under their respective purchase-process element together with their marketing mix categorisation. These thirteen dimensions of CSERV may be considered dominant, but have not previously been tested or examined in isolation to determine their importance.

Pre-Transaction

1. Convenience and ease of ordering (logistics).
2. Availability of products and inventory (product/logistics).
3. Ability of firm to provide customisation and special services within order (logistics).
4. Pricing including discounts and payment terms (price).

Transaction

1. Delivery is timely as regards date and being on time, otherwise firm should provide sufficient information (logistics).
2. Order cycle time is short and consistent (logistics).
3. Orders are complete and accurate (logistics).
4. Orders may be expedited if required (logistics).
5. Invoices are accurate (price/logistics).
6. CSERV representatives are helpful, knowledgeable and provide information (promotion).

Post-Transaction

1. Orders arrive in good quality and undamaged (product/logistics).
2. Complaints and/or returns receive action (promotion/logistics).
3. There is good technical, sales and other after sales support (product).

From his literature review Grant (1999) raised several questions concerning these dimensions as the basis for future research. They include, *inter alia*,

1. Are they the only important or dominant dimensions in a logistics context? If so, then should suppliers intuitively focus on them in order to effectively and efficiently meet customer needs?
2. Are there other important dimensions that have not yet been considered? If so, what are they? Do they displace any of the above dimensions?
3. What are the important CSERV dimensions related to other marketing efforts? How much support

- and what level of limited CSERV resources should suppliers dedicate to all dimensions?
4. Are there differences in the importance of these dimensions among industrial sectors or even groups within a particular sector?

The research study-in-progress here investigates these thirteen dimensions in order to ascertain their importance and addresses some of the fundamental issues discussed above.

Research Methodology

This research is designed around the thirteen dimensions found in the literature review and considered by the author to be dominant in previous work. However there are other research issues being examined in this study.

Some authors have recently called for a more rigorous research orientation towards theory development, testing, and application in logistics (Mentzer and Kahn 1995). Issues regarding internal and external validity have been discussed as a feature of this new rigour (Mentzer and Flint 1997). This research study has been designed to ensure it fits with this new research order and to test some of the current suggestions regarding surveying and analysis.

Central to this new orientation in a CSERV context are two research design tenets. First is the proper development of latent (or unobserved) variables that feature in customer service research (Dunn, Seaker and Waller 1994). The use of survey research to determine peoples' perceptions of object reality is considered appropriate in any positivist or empiricist paradigm (*ibid.*). This research makes use of mail surveys as the operative research instrument.

Second is the proper development of quality scales in logistics (Mentzer, Flint and Kent 1999). This likely necessitates a perspective focussed on the customer as opposed to the supplier (*ibid.*). This research makes use of the SERVQUAL premise of expectations versus perceptions and the subsequent measure of satisfaction or dissatisfaction.

The sample for the research was drawn from a Scottish Enterprise public listing of meat, poultry, game, and seafood producers (Scottish Enterprise 1998). This industry sector is of interest as it is considered one of the key groups in the Scottish economy (Scottish Enterprise 1999). This group's annual turnover of £7.3 billion represents over 13% of Scotland's £56.2 billion Gross Domestic Product (Scottish Trade International 1999). This group employs over 50,000 people in about 2,000 units throughout the supply chain and represents over 17% of Scotland's manufacturing segment (*ibid.*).

The public listing of 422 firms is not the entire population of this Scottish industry sector, as it does not include all firms or farmers and fishermen. However it is comprehensive and represents over 25% of the units in this industry supply chain. After deleting duplicate listings a sample frame of 397 firms was selected for surveying.

In an attempt to increase response rates according to suggestions in the literature (Diamantopoulos and Schlegelmilch 1996), it was decided to personally contact about half the frame prior to sending out a survey package. All firms that were surveyed received a personalised covering letter together with a three-page questionnaire and self-addressed stamped envelope (*ibid.*). A systematic random sample was selected within the 397 firms and 193 firms were contacted. The remaining 204 firms received an unsolicited survey package. Two contact attempts were made to each of the 193 firms. No contact was established with 60 firms. Contact with the other 116 firms ranged from direct conversation to messages left with the secretary or on an answering machine. There were nine bad or obsolete listings and eight firms refused to participate in the study. This reduced the total number of firms surveyed to 380.

The questionnaire listed sixteen different CSERV variable statements in the first section derived from the thirteen dimensions in order to ensure they were not confusing to respondents. Respondents were asked to indicate on a five-point Likert scale whether they agreed or disagreed with each statement as they pertained to their firm's expectations of their suppliers. They were also asked whether there were other CSERV variables they considered important in their firm that were not within the sixteen provided. Lastly, respondents were asked to rank the top five variables in order of importance.

In the second section respondents were asked to consider their most recent delivery of supplies and

again indicate whether they agreed or disagreed with the statement that their supplier provided CSERV according to the sixteen variables. The type of supplies and typicality of the delivery and supplier were also asked. The third section asked respondents whether or not they were satisfied overall with the supply delivery. The last section asked demographic information about the firms and respondents.

Analysis of the data will be conducted in SPSS and will include means tests of the variables, the members in the industry group, and early versus late respondents to examine bias (Lambert and Harrington 1990). Factor analysis will be performed on the sixteen variables to determine whether there are any interesting relationships as regards the three elements in the purchase process or the marketing mix variables, and to possibly purify the data to achieve parsimony. Logit regression may be attempted with CSAT considered dependent on the sixteen CSERV variables in order to determine whether a useful *a priori* regression equation can be developed. Such an equation would be checked against responses in section two and three of the questionnaire for an *ex post* fit.

Anticipated Findings

Based on the techniques suggested by Diamantopoulos and Schlegelmilch (1996) a significant response rate is anticipated in order to perform the proposed quantitative techniques. Hair, Anderson, Tatham and Black (1995) consider that at least 100 responses would be required given the number of variables and tests considered. This represents a response rate greater than 25%.

At the date of writing this paper in mid July 1999, over 90 responses have been received in the two weeks since the questionnaire was mailed. The response deadline has just passed and follow-up to non-respondents will now commence.

It is anticipated that respondents who score their statements of delivery higher than their statements of expectations should be satisfied overall in accordance with SERVQUAL. Due to the perishable nature of products within this industry sector, it is also anticipated that variables relating to timely delivery and order cycle time should score higher and be more important.

Preliminary findings will be available in September 1999 to present to the *Logistics Research Network Annual Conference* and disseminate to a wider audience afterwards by publication.

This study is considered important as it may yield further knowledge of how customers process and evaluate dimensions of customer service as they relate to their satisfaction and possibly give new meaning to the SERVQUAL model. It is also interesting for suppliers to consider and develop appropriate customer service initiatives that positively influence customer satisfaction. Lastly, it investigates customer service dimensions of logistics and other marketing components, not previously studied in isolation, to determine their independent importance and relevance to customer service for both customers and suppliers.

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Customer Service in Logistics: What about the Dichotomy between Transactions and Relationships?

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Abstract

Customer service is a well-established research area in the disciplines of logistics and marketing. One topic receiving plenty of recent attention concerns supplier and customer relationships. Within the literature on logistics strategy firms are being encouraged to develop customer service policies that satisfy customer needs and promote long term and profitable relationships. This literature has also demonstrated the benefits for firms that do so. However, many empirical studies in customer service have revealed a different situation. Transaction-oriented constructs, such as timeliness, availability, product condition, and price, are considered to be more important than relationship constructs. This paper discusses the literature surrounding this dichotomy between what customers appear to be looking for and what suppliers are being asked to provide. The paper also considers the implications of this dichotomy for both suppliers and customers and provides directions for future research to try and bring convergence to the debate.

Keywords: customer service, logistics, marketing, transactions, relationships

Introduction

Firms face a number of important challenges in the new millennium with respect to business logistics (Christopher 1999, Hale 1999, Younger 1997). Focusing on customer service and managing supplier-customer relations are two of these challenges (Mentzer 1993, Sheth and Sisodia 1999).

Firms attempt to meet various objectives in the ordinary course of their business. One objective is profit, calculated as sales revenue or turnover minus expenses. Both revenue, as a function of unit pricing and volume, and expenses, as a function of unit costs and overall operations, affect levels of profit. Shareholder capital and retained earnings will erode without profits being generated from a firm's ongoing economic activity, and the result might well be economic failure.

Firms therefore need to acquire and retain customers who buy their products and in turn generate sales revenue and profits. Customers who are satisfied with a firm's products and customer service should develop increased customer loyalty, repeat and increased purchases, and a propensity towards establishing long-term relationships. This customer behaviour has been shown to improve a firm's financial performance (Christopher 1997, Daugherty, Stank and Ellinger 1998; Emerson and Grimm 1998).

Firms are thus encouraged to provide value-added customer service and be customer-responsive in order to differentiate themselves in the market and enhance a customer's purchase. They are also encouraged to stimulate the development of long-term relationships or partnerships with suppliers and customers. By doing both they enhance the likelihood of increased business and profits, thus meeting one of their necessary corporate objectives.

However, recent literature suggests there might be difficulties with the linkage between customer service and relationship development in logistics. Empirical studies have shown different behaviours by customers or buyers whereby they focus on transactional issues in customer service while recognising the value and importance of establishing relationships.

This paper discusses the current state of customer service and relationships in logistics, the dichotomy between transaction and relationship elements, and proposes frameworks of research that might assist understanding of customer service and behaviour towards transactions and relationships in logistics.

Customer Service in Logistics

A focus on customer service in logistics has developed increasingly since the early 1970s (Kent and Flint 1997). While it has not been identified as a core issue in previous literature, customer service in logistics does retain a high emphasis in current work (McGinnis, Boltic and Kochunny 1994). Previous customer service research has had little programmatic study and much research has overlapped (Innis and La Londe 1994). The focus has usually been on customer service attributes rather than the environment under which suppliers operate (Emerson and Grimm 1998), and from a supplier's viewpoint rather than a customer's perspective (Christopher 1986, Sterling and Lambert 1989, Innis and La Londe 1994).

La Londe and Zinszer (1976) considered customer service in logistics could add value to customers through three components: as an activity that has to be managed, as performance measures to ensure customer satisfaction, and as an element of a firm's corporate philosophy. Lambert and Stock used these components to provide a definition of customer service in logistics as a "process for providing significant value-added benefits to the supply chain in a cost effective way" (1993 p.112).

Grant (1999a) reviewed the literature review on customer service in logistics and documented 45 different dimensions or variables of customer service. Sixteen variables appeared very frequently either within general discussions or as a result of empirical testing. He considered these variables might be dominant in terms of importance to customers of logistics services. He also examined five empirical studies that have contributed to the development of scales and constructs of customer service in logistics.

The seminal study by La Londe and Zinszer (1976) proposed customer service has three distinct elements or constructs: pre-transaction, transaction and post-transaction. They developed customer service variables within these constructs that were transaction or process-oriented towards the supplier as opposed to being responsive to specific customer requirements.

Mentzer, Gomes and Krapfel (1989) presented a conceptual model for customer service in logistics whereby a customer will enjoy a state of satisfaction if perceptions of a logistics service event meet or exceed expectations. This model incorporates elements of the service quality or SERVQUAL model proposed by Parasuraman, Berry and Zeithaml (1988). Mentzer, Gomes and Krapfel (1989) argued that customer service provided by logistics, *i.e.*, time and place utility, is only one part of a supplier's total customer service offering and their two proposed constructs were marketing and logistics.

Rinehart, Cooper and Wagenheim (1989) went further than Mentzer, Gomes and Krapfel and proposed distinct constructs of customer service within the marketing and logistics categories. Their constructs under marketing were product management, price management, promotion management and place or channel management. The constructs under logistics were facility management, order processing and information management, inventory management and transportation. Place or channel management constructs under marketing differed from logistics constructs by being strategic in nature.

Bienstock, Mentzer and Bird (1997) proposed scales of physical distribution quality using customer service constructs of timeliness, availability and condition of products. They considered timeliness was the most important and concluded that technical or outcome criteria were the most important determinants of service quality perceptions. Functional or process criteria were not found to be as important but were not discounted.

Mentzer, Flint and Kent (1999) proposed a customer-focussed quality scale for logistics that featured nine constructs: information quality, ordering procedures, ordering release quantities, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality. Their constructs substantially relate to ordering functions and purchasing criteria. However this may be a result of their sample frame of departments in a non-profit government agency that might have very different views of customer service requirements than a profit-driven firm.

The 16 dominant variables of customer service proposed by Grant (1999a) are listed in Table One together with his categorisation of them within respective constructs of the five different empirical studies. There are differences among the constructs and variables found in this literature, however they all tend to be of a transactional or process-oriented nature.

Table One - Categorisation of Logistics Customer Service Variables to Five Empirical Studies

Customer Service Variables from Grant (1999a)	La Londe and Zinzser (1976)	Mentzer, Gomes and Krapfel (1989)	Rinehart, Cooper and Wagenheim (1989)	Bienstock, Mentzer and Bird (1997)	Mentzer, Flint and Kent (1999)
Competitive price quotes, discounts, payment terms	Pre-Transaction	Price	Price Management	N/A	N/A
Products and support parts available in stock	Pre-Transaction	Product; Logistics	Inventory Management	Availability	N/A
On-time delivery on the date promised	Transaction	Logistics	N/A	Timeliness	Timeliness
Easy product ordering	Pre-Transaction	Logistics	Order Processing and Information Management	Timeliness	Ordering Procedures
Statement of the specific time for a delivery	Transaction	Logistics	N/A	Timeliness	Timeliness
Complete and accurate orders	Transaction	Logistics	Order Processing and Information Management	Condition	Order Accuracy
The provision of customised services for products	Pre-Transaction	Logistics	N/A	Timeliness	N/A
Appropriate order cycle time (lead time)	Transaction	Logistics	Order Processing and Information Management	Timeliness	Timeliness
Consistent order cycle time (lead time)	Transaction	Logistics	Order Processing and Information Management	Timeliness	N/A
The provision of ongoing information and status of a delivery	Transaction	Logistics	Order Processing and Information Management	Availability	N/A
Accurate invoices	Transaction	Price; Logistics	N/A	Availability	N/A
Helpful customer service representatives	Transaction	Promotion	Promotion Management	N/A	Personnel Contact Quality
Products arrive undamaged and according to specification	Post-Transaction	Product; Logistics	N/A	Condition	Order Condition
Immediate action on complaints	Post-Transaction	Promotion; Logistics	Product Management; Transportation Management	N/A	Order Discrepancy Handling
Prompt and effective handling of returns	Post-Transaction	Promotion; Logistics	Product Management; Transportation Management	N/A	Order Discrepancy Handling
Proper after-sales technical and other support	Post-Transaction	Product	Promotion Management	Condition	Personnel Contact Quality

Customer service in logistics continues to be an important part of the marketing concept that promotes understanding and satisfying customer needs through the integrated application of the traditional marketing-mix variables of price, product, place and promotion (Levitt 1960, Kotler 2000).

Relationships and Partnerships in Logistics

Logistics literature began to call for the development of long-term relationships or partnerships early in the last decade. Relationships or partnerships are described as natural extensions or outcomes of customer satisfaction derived from customer service and efforts to integrate logistics and supply chain activities have been encouraged for all firms in the supply chain (Bowersox 1988, Gardner and Cooper 1988, Anderson and Narus 1990, Christopher, Payne and Ballantyne 1991, Mentzer 1993, McGinnis, Boltic and Kochunny 1994, Christopher 1997).

Relationships or partnerships are deemed necessary to provide a better means of firm differentiation due to rapidly changing environmental factors such as increased competition, more sophisticated and fragmented customers, advancing technology, and the commoditization of products (Christopher, Payne and Ballantyne 1991, Christopher 1997, Pels, Coviello and Brodie 1999). This call in logistics mirrored similar discussions in the marketing literature concerning relationship marketing.

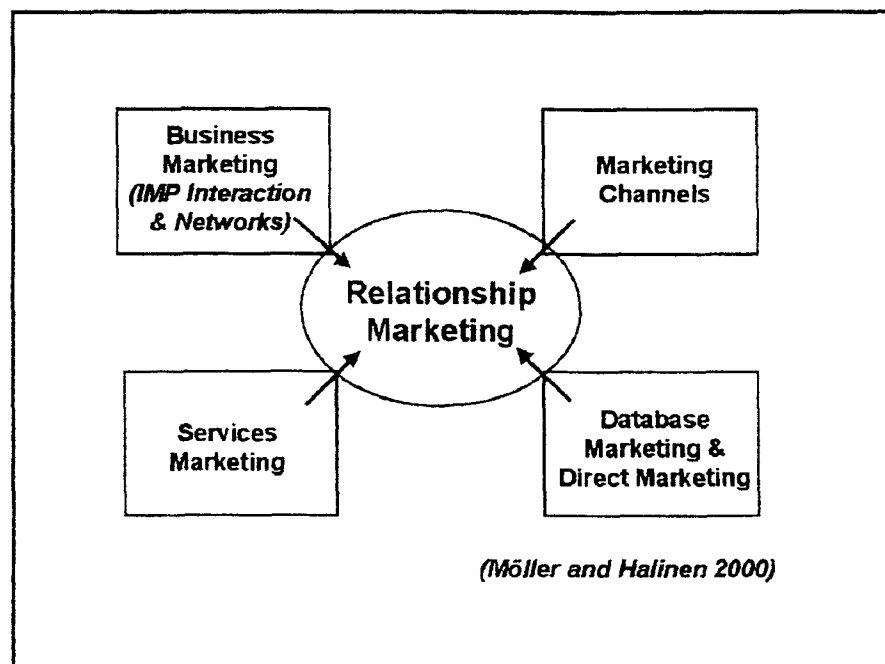


Figure One – Disciplinary Roots of Relationship Marketing

Möller and Halinen (2000) provide an analysis of relationship marketing that encapsulates the marketing literature from the 1990s. They note that relationship marketing has derived from four root sources. These sources, shown in Figure One, are the disciplines of services marketing, business marketing or interaction and networks approach associated with the Industrial Marketing and Purchasing (IMP) Group, marketing channels, and database marketing and direct marketing.

Each discipline has its own unique perspective towards relationship marketing, but all have the underlying premise that the traditional marketing-mix approach of transactional exchange is insufficient to allow managers to cope with their rapidly-changing environments (Möller and Halinen 2000). Appropriate conditions for establishing relationships or partnerships include an asymmetry in power or influence by one firm, a desire for business stability, the requirement to establish legitimacy, the necessity due to regulation, the usefulness of reciprocity, and the ability to achieve efficiencies (Blois 1996).

Relationships or partnerships in logistics and supply chain management are built upon trust and commitment from shared values and information, mutual dependence, communication and relationship benefits (Morgan and Hunt 1994, Spekman, Kamauff and Myhr 1998, Tate 1996). Relationship benefits that should accrue to both supplier and customer include cost reductions, risk sharing, shared creativity, understanding of customer defections and the potential for new business (Bowersox 1988, Christopher 1997).

A continuum between transactional and relational anchors has been developed and used by various scholars as a means to focus the debate on this subject. Figure Two shows three different frameworks for this continuum derived from different examinations about relationship or partnership transition

requirements for firms (Spekman, Kamauff and Myhr 1998), the degree of supplier integration desired (Lambert, Emmelhainz and Gardner 1999), and basic buyer-seller exchange considerations (Pels 1999).

Some authors (Grönroos 1994, Brodie, Coviello, Brookes and Little 1997) have postulated that a move along the continuum from transactional to relationship marketing might provide further explanation of this phenomena, and might therefore represent a paradigm shift in accordance with Thomas Kuhn's (1970) definition of same.

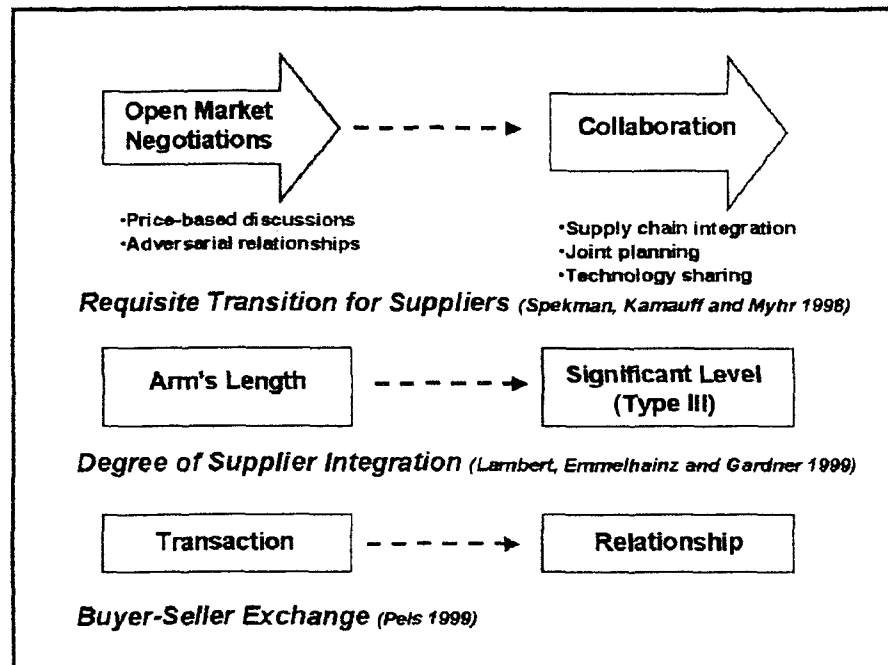


Figure Two – Three Frameworks of the Transactional - Relational Continuum

There have been several strategies proposed to effect the transition from transactional to relational business interfaces. Two examples are presented here to illustrate this point. Möller and Halinen (2000) propose two main managerial modes of relationship marketing: a market-based mode that manages a firm's customer base and a network-based mode that manages interdependencies between business actors. They argued managers have to master and utilise both modes in conjunction with traditional marketing management techniques.

Christopher (1997) proposes firms develop multiple points of connection between various functional areas of suppliers and customers in order to strengthen bonds. These connections would see suppliers becoming preferred for customers and barriers being erected against competitor entry and customer switching. Pels (1999) notes academics have a responsibility to assist practitioners and managers to understand this shift from transactional to relational exchanges in order to help them avoid market myopia.

Relationships or partnerships are thus thought to be important to the logistics and marketing disciplines. They are the source of competitive advantage for firms to determine their future with their customer and suppliers in an increasingly complex world (Lambert, Emmelhainz and Gardner 1999, Saren and Tzokas 1999).

The Dichotomy between Relationships and Transactions in Logistics

However, evidence from several empirical studies of business to business interfaces suggest buyers or customers in exchange situations might be of two minds and not ready or able to fully embrace relationship or relationship marketing concepts. Assuming relationship theory pre-empts practice as opposed to reflecting it, transition from a transaction to a relationship focus has been problematic in practice and there remains a dichotomy between transactional and relational exchanges.

A key feature to the establishment of permanent relationships are a supplier's and a customer's understanding of and willingness to sacrifice short-term advantages for long-term gains (Earp, Harrison and Hunter, 1999). However, definitions about relationship marketing are often ambiguous

and non-specific (Blois 1996, Blois 1998, Earp, Harrison and Hunter, 1999, Pressey and Mathews 2000). Relationship marketing also promises added value beyond a transactional exchange but does not show how this value is produced (Tzokas and Saren 1997).

Thus, firms and managers judged against competition on short-term performance measures, such as quarterly or annual profitability, might lack the ability or desire to embrace relationships if their purpose is not clear (Ackerman 1996). Managers might also engage in selfish and individualistic behaviour that has significant economic benefits over co-operative relationships but is not conducive to relationship building (Palmer 1999). Such behaviour contradicts a humanist interpretation of relationship marketing that considers individuals to be stable, identifiable and autonomous, and moral due to encompassing wholesome and beneficial values shared by everyone (Smith and Higgins 2000). But it does not contradict arguments (Pels 1999, Smith and Higgins 2000) that transaction and relationship exchanges are based on different paradigms.

Empirical studies have produced evidence supporting the confusion surrounding transactions and relationships, and subsequent behavioural issues of suppliers and customers. These studies also suggest it is primarily buyers or customers in an exchange that are less willing to indulge in relationships while acknowledging the importance and need for them. Other evidence is provided by several failures or dissolution of much publicised logistics partnerships including Laura Ashley and Federal Express and a *Fortune 500* company and its third-party logistics provider (Ackerman 1996, Lambert, Emmelhainz and Gardner 1999).

Campbell (1997) studied firms in the European flexible packaging industry in four partnership categories: customer-centred, political control, personal loyalty and mutual investment. The latter two categories correspond to usual relationships described above. Sellers or suppliers had higher percentage responses compared to buyers or customers regarding choice in these two categories, while the converse was recorded in the two former categories. She concluded that buyers and sellers do not always agree on the sentiments or behaviours that occur in relationships, and that there was a wide diversity between buyers and sellers about what a partnership entails.

Spekman, Kamauff and Myhr (1998) studied supply chains across five different industry groupings and found buyers tend to focus on cost-reduction through price, reliability of supply and reduced lead times as key drivers. They also found buyers less likely to view their own customers and suppliers as irreplaceable and essential to future business. However, they concluded that buyers on one level seem to understand the importance of relationships in supply chains but that on another level are uncomfortable with the rhetoric and practice of relationships and easily revert to cost-driven behaviours.

Grant (1999b) studied a sector of the Scottish food processing industry and found the most important variables of logistics customer service for respondents were transactional and related to the actual delivery of supplies: on-time delivery, products arriving undamaged and according to specification, orders being complete and accurate, and price. Price was the discriminating factor between dissatisfied and satisfied customers, in favour of the latter. Exploratory factor analysis yielded two significant factors comprised of solely relationship variables, thus customer attitudes in this grouping appeared to be operating at two different levels also.

The foregoing suggests academics and practitioners in logistics need to seek better understanding of buyer or customer attitudes towards relationships or partnerships. Rather than a Kuhnian paradigm shift, this evidence might indicate a falsification of theory underlying relationships or partnerships as discussed by Sir Karl Popper (1999). How then can logisticians and marketers go forward to obtain such understanding or explanation? There are three possible suggestions and frameworks in the literature that could provide the basis for further research into this phenomenon. The three frameworks are shown in Figure Three.

Tzokas and Saren (1997) developed a customer value chain (CVC) that incorporates relationships, technology and the total consumption process as drivers to produce value. Akin to Porter's (1985) firm value chain (FVC), the CVC's primary activities include the components of the total consumption process that relate to the purchase needs, evaluation criteria and process. The secondary activities are relationships and the technology. They anticipated the CVC would link to the FVC and would thus illustrate a holistic view of both the firm and its customers and their relationships. They presented their

CVC in a strategic and theoretical context and did not operationalise the linkages between the various components in the CVC and FVC. Research using this model of a customer's primary and secondary activities might provide an explanation of the differences between a customer's attitudes and behaviours towards relationships and transactions.

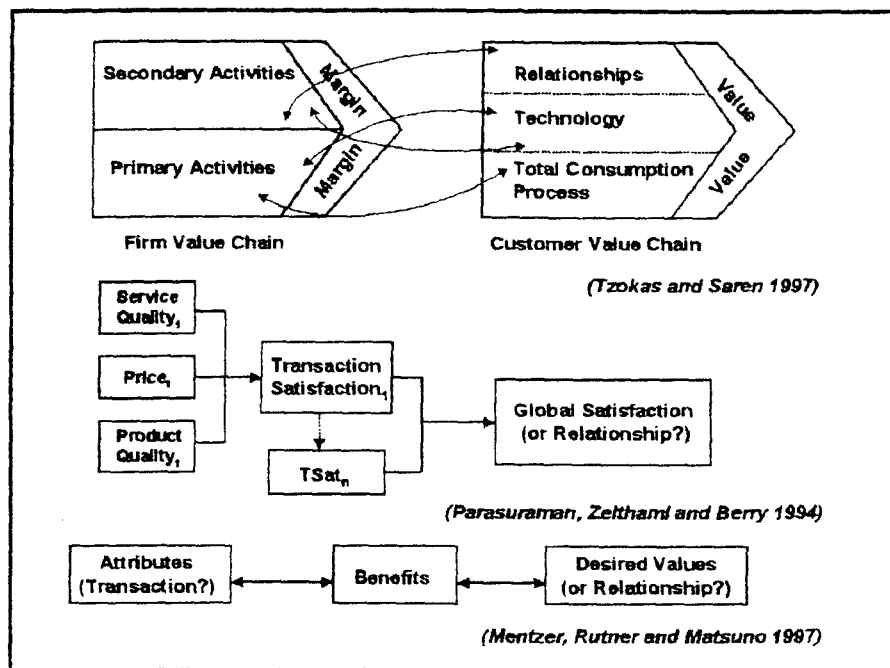


Figure Three – Possible Frameworks for Researching Customers and Relationships

Parasuraman, Zeithaml and Berry (1994), in a response to criticism of their SERVQUAL model, developed a transaction-specific model that attempts to describe a customer's global satisfaction in terms of the sum of a number of specific transactions. Research using this construct of global customer satisfaction might find it analogous to long-term relationship behaviour that reflects ongoing satisfaction with discrete transactions, predicated upon the evaluation of components of service quality, price and product quality.

Mentzer, Rutner and Matsuno (1997) introduced the means-end value hierarchy model (MEHVM) to logistics research as a methodology for understanding both the needs and values of customers in the supply chain. The MEHVM is an interrelated network that considers customer motivation in terms of their values that result from product/service benefits provided by specific product/service attributes. The model is hierarchical as a customer's overarching values determine the benefits sought that in turn determine what attributes are required to realise these benefits. Research using this methodology might explain the different levels of customer behaviour regarding transactions and relationships.

These frameworks are proposed as possible methods to investigate the phenomenon regarding transactions and relationships in logistics.

Conclusions

Customer service in logistics continues to be an important research and practical topic. Evidence from the literature suggests that variables important to logistics customers are transactional in nature. Further, cost reduction, as regards product price or associated service costs, is seen as a key variable for customers.

Literature on relationships or partnerships outlines potential benefits available to customers or buyers and suppliers or sellers entering into such arrangements. These include the important benefit of providing increased long-term profits that is fundamental to a firm's long-run success and health. However, customers or buyers do not appear willing to embrace relationships as readily as suppliers or sellers and appear to revert to purchase behaviours related to their key transactional concerns over costs and price. Such behaviour is not easily explained within existing theoretical concepts of relationships or relationship marketing.

This paper has discussed this dichotomy between customer service transactions and relationships in logistics. It has also suggested three alternative theoretical frameworks as a basis for further research to help develop a better understanding of this phenomenon. The author does not reject either side of the dichotomy, nor does he prefer one side to the other. This author simply seeks to present this issue to promote ongoing discussion and debate.

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SUPPLIER CUSTOMER SERVICE IN SCOTLAND: FINDINGS FROM AN EXPLORATORY RESEARCH STUDY

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This paper discusses an exploratory study of supplier customer service in logistics of the Scottish food processing industry. A review of the logistics literature found customer service is necessary to meet customer needs and ensure customer satisfaction. Satisfied customers will develop increased loyalty, establish long-term relationships and improve profitability for suppliers. Certain customer service variables appeared more frequently in the literature than others, but have not been tested in isolation. There were also five empirical studies that developed different constructs of customer service in logistics. This study tested these recurring variables to determine their importance to the industry, their impact on satisfaction in an actual logistics service experience, and whether they underlie other or similar constructs of customer service. The study found four variables important to the industry: on-time delivery, orders arriving undamaged and according to specification, complete and accurate orders, and price. Price was also the key discriminating variable impacting satisfaction for this industry. Four factors were found to underlie constructs of customer service: order cycle activities, non-ordering activities, ordering activities and delivery activities.

INTRODUCTION

The discipline of business logistics faces a number of important challenges in the new millennium (Christopher 1999, Hale 1999, Younger 1997). Focusing on customers and managing supplier–customer relations are two of these challenges (Mentzer 1993, Sheth and Sisodia 1999). Customer service (CServ) and customer satisfaction (CSat) are therefore becoming more important for both academic researchers and practitioners (McGinnis, Boltic and Kochunny 1994, Kent and Flint 1997). Customers who achieve CSat due to a firm's CServ initiatives will develop loyalty and become more profitable to suppliers (Daugherty, Stank and Ellinger 1998, Emerson and Grimm 1998).

However, concepts of CServ and CSat in logistics and important variables and constructs of CServ are not well understood, and research in these areas has not usually considered

the customer's perspective (Christopher 1986, Sterling and Lambert 1989, Innis and La Londe 1994). Further, logistics activities, as services have not seen a great deal of research (Grant 1999).

This paper addresses these issues and discusses an exploratory research study (Study) of CServ and CSat in supplier logistics of the meat, poultry and game and seafood sub-group in the Scottish food processing industry. The purpose of the Study was to test variables of logistics CServ to determine their importance to this industrial sector, their impact on CSat in an actual logistics service experience, and investigate whether these variables underlie other or similar constructs of CServ found in the literature.

LITERATURE REVIEW

A focus on CServ in logistics has increasingly developed since the early 1970's and is seen as a key part of future research in the logistics discipline (Kent and Flint 1997). And while it has not been identified as a core issue in previous literature, CServ in logistics does retain a high emphasis in current work (McGinnis, Boltic and Kochunny 1994).

But what exactly is customer service? The literature is ambiguous about definitions of CServ (Lambert and Stock 1993, Donaldson and Fletcher 1994). Innis and La Londe (1994) argue that clear definitions are needed, and attributes of CServ should be limited to those that are the most important, in any industry of study. This necessitates an understanding of CServ and CSat dimensions that are important to customers in the context of an industry and its logistics experiences.

An early discussion of CServ in logistics described it as adding value through three components: an activity that has to be managed, performance measures to ensure CSat, and an element of a firm's corporate philosophy (La Londe and Zinszer 1976). Lambert and Stock enhanced these components to provide a definition of CServ as a

"process for providing significant value-added benefits to the supply chain (or channel of distribution) in a cost effective way" (1993 p.112).

This definition suits logistics activities that provide intangible benefits to customers and do not physically transform goods. It will be the operative definition of CServ for this Study.

Hoffman and Bateson (1997), and Zeithaml, Parasuraman and Berry (1985) discussed the distinct issues concerning the marketing of services versus goods in the marketing mix category of product. Hoffman and Bateson described the following four important characteristics that distinguish services from goods:

"intangibility as services cannot be seen, smelt, felt, tasted or otherwise sensed similar to goods;

inseparability of production and consumption as most services involve the customer in the production function;

heterogeneity or inconsistency of the service from the perspective of the service delivery and customer experience; and

perishability of the service if it is not consumed at the moment in time it takes place, i.e., the service cannot be inventoried" (1993 p.43).

The primary activities of logistics involve transportation, warehousing, inventory and order

processing and usually do not physically transform goods. Thus they encompass the above characteristics and classifications of a service, *i.e.*, the benefits received by the customer are delivered by way of a service rather than a good. Logistics activities therefore may be considered services and subject to evaluation and analysis resident in the services/services marketing disciplines.

CSat has been defined as a

"postpurchase evaluation of product quality given prepurchase expectations" (Anderson and Sullivan 1993 p.126) and as *"cumulative over time... postpurchase evaluation[s] of... specific purchase occasion[s]"* (Anderson, Fornell and Lehmann 1994 p.54).

Both of these definitions are derived from an expectancy-disconfirmation paradigm. This paradigm posits satisfaction judgements as a function of two constructs: preliminary or baseline expectations and the addition of perceived positive or negative disconfirmations of those expectations (Oliver 1980).

Based on this paradigm, Parasuraman, Zeithaml and Berry developed a model of service quality (1985) and a scale to measure it (1988) entitled SERVQUAL. SERVQUAL measures the customer's shortfalls or "gaps" in perceptions (CPerc) of an actual service performance compared to *a priori* expectations (CExp). A positive gap (*i.e.*, CPerc is greater than CExp) indicates a customer is satisfied with the service while a negative gap (*i.e.*, CExp is greater than CPerc) indicates dissatisfaction. Thus, CSat becomes a function of CServ and the perceptions-expectations "gap" provides a measure of service quality.

SERVQUAL has been much criticised since its inception on conceptual, methodological and interpretative grounds, and most researchers have modified the SERVQUAL instrument to reflect theoretical or industrial conditions particular to their situation (Carman 1990, Babakus and Boller 1992, Cronin and Taylor 1992 and 1994, Brown, Churchill and Peter 1993, Teas 1993 and 1994, Buttle 1995, Smith 1995).

Other authors have argued that CSat and service quality are distinct constructs with different antecedents, and that predictive expectations are not the only antecedent of CSat (Oliver 1993, Spreng and Mackoy 1996). Managers should not believe that meeting or exceeding expectations alone will satisfy customers, and that managing expectations by lowering them to produce higher CSat likely ignores any positive effects of expectations in the service experience (Spreng and Mackoy 1996).

Notwithstanding these issues and reservations surrounding SERVQUAL, expectations and perceptions, the premise that CSat is the outcome of CPerc meeting or exceeding CExp provides a point of departure for understanding what customers may need and how they may react to certain CServ initiatives. The definition of CSat given above will be the operative definition of CSat for this Study.

Firms attempt to meet various shareholder or stakeholder requirements in the ordinary course of their business. Profitability, which is calculated as sales revenue or turnover minus expenses, is one of those requirements. Revenue as a function of unit pricing and volume, and expenses as a function of unit costs and overall operations both affect profit levels. Profitability is by no means assured for those firms who do not consider both factors carefully. Without profits being generated from a firm's ongoing economic activity, shareholder capital and retained profits will erode and the result might well be bankruptcy.

Firms need customers to buy products to generate sales revenue and profits. Customers who are satisfied with a firm's products as a result of exceptional customer service efforts will manifest, in precedential order, increased customer loyalty, repeat and increased

purchases, and improved corporate financial performance (Daugherty, Stank and Ellinger 1998; Emerson and Grimm 1998, Manrodt and Davis 1993).

Market share developed from repeat purchases and customer loyalty may be considered a surrogate of profitability and CSat (Daugherty, Stank and Ellinger 1998, Dresner and Xu 1995, Innis and La Londe 1994). Firms are thus encouraged to provide value-added services and be customer-responsive in order to differentiate themselves in the market to enhance the customer's purchase. As a result, the firm should see increased customer loyalty, profitability and market share (Daugherty, Sabath and Rogers 1992).

A first step in this process is to understand a customer's requirements. This could be determined by auditing existing CServ policies (Christopher and Yallop 1992, Lambert and Stock 1993). However, Markham and Aurik (1993) argued that about one-third of European logistics suppliers determine customer requirements by analysing complaints and another one-third does so based on competitor service objectives. No mention is made of the remaining one-third so presumably they do nothing.

Previous research of CServ has had little programmatic study and much research has overlapped (Innis and La Londe 1994). The focus has been on service attributes rather than the environment under which suppliers operate (Emerson and Grimm 1998), and from a supplier's viewpoint rather than a customer's perspective (Christopher 1986, Sterling and Lambert 1989, Innis and La Londe 1994). Further, little empirical research has been conducted on logistics effects in the service sector, including logistics services themselves (Dresner and Xu 1995).

Grant (1999) undertook a literature review of logistics, CServ and CSat to examine the current state of theoretical and empirical research in these areas. From this trawl, over 60 references were examined and categorised according to the three La Londe and Zinszer (1976) purchase elements of pre-transaction, transaction and post-transaction, whether the reference related to CServ, CSat, logistics or a combination, and whether variables of CServ/CSat were discussed or tested within the reference.

Grant (1999) documented 45 different dimensions or variables of CServ in the references. Sixteen variables appeared very frequently either within general discussions or as a result of significant hypothesis testing. These variables are presented in Table One in no particular order. Grant considered these variables might be dominant among customers of logistics services. Further, he noted they have not been tested independently or in isolation from other CServ variables.

Variable	Description
1	Competitive price quotes including discounts and payment terms.
2	Products and support parts available in stock.
3	On-time delivery on the date promised.
4	Easy product ordering.

5	Statement of the specific time for a delivery.
6	Complete and accurate orders.
7	The provision of customised services for products.
8	Appropriate order cycle time (lead time).
9	Consistent order cycle time (lead time).
10	The provision of ongoing information and status of a delivery.
11	Accurate invoices.
12	Helpful customer service representatives.
13	Products arrive undamaged and according to specification.
14	Immediate action on complaints.
15	Prompt and effective handling of returns.
16	Proper after-sales technical and other support.

Table One: Sixteen Recurring Variables of CServ from the Literature

Grant (1999) also found five empirical studies that have contributed to the development of scales and constructs of CServ in logistics. La Londe and Zinszer (1976) argued that CServ has three distinct elements or constructs: pre-transaction, transaction and post-transaction. They discussed CServ variables within these constructs that were process-oriented towards the supplier as opposed to being responsive to specific customer requirements. Examples of such variables included preparing a written CServ policy or analysing stockout levels.

These three constructs introduce the time factor of a transaction that is important for a service like logistics that provides time and place utility. Besides supplier selection, the actual purchase behaviour of logistics services in an organisational setting also differs from that of an end-consumer. Thus, CServ features within these three constructs likely play a large role in purchase decisions by actors in a business-to-business role.

Mentzer, Gomes and Krapfel (1989) presented a conceptual model for CServ in logistics. It is similar to Parasuraman, Zeithaml and Berry's model (1985) whereby a customer will

enjoy a state of CSat if CPerc of a logistics service event meet or exceed CExp. They argued that CServ in logistics is only one part of a supplier's total CServ, and their two constructs were logistics and marketing as they considered the entire CServ experience also depends upon other variables in the marketing components.

Rinehart, Cooper and Wagenheim (1989) went further than Mentzer, Gomes and Krapfel and developed distinct constructs of CServ within the marketing and logistics categories. Their marketing constructs were product management, price management, promotion management and place or channel management. The logistics constructs were facility management, order processing and information management, inventory management and transportation. Place or channel management differed from the logistics constructs by being strategic in nature.

Bienstock, Mentzer and Bird (1997) developed scales of physical distribution quality using CServ constructs of timeliness, availability and condition of products. They considered timeliness was the most important and concluded that technical or outcome criteria were the most important determinants of service quality perceptions. Functional or process criteria were not found to be as important but were not discounted.

Mentzer, Flint and Kent (1999) developed a customer-focussed quality scale for logistics that featured nine constructs: information quality, ordering procedures, ordering release quantities, timeliness, order accuracy, order quality, order condition, order discrepancy handling, and personnel contact quality. Their scale constructs substantially relate to ordering functions and purchasing criteria however this may be a result of their sample frame of departments in a non-profit government agency that may have very different views of CServ requirements than a profit-driven firm.

Grant concluded that there has been much done on issues in CServ however the research has often focussed on the supplier's perspective. He also found little work done on CSat, particularly research studies that are independent of CServ and not a significant amount of work done with either CServ or CSat in a logistics context.

Grant proposed a model shown in Figure One, and adapted from the Mentzer, Gomes and Krapfel (1989) and the Parasuraman, Zeithaml and Berry (1985) models, that could be used to conduct exploratory research relative to his findings. It is the operative model for this Study.

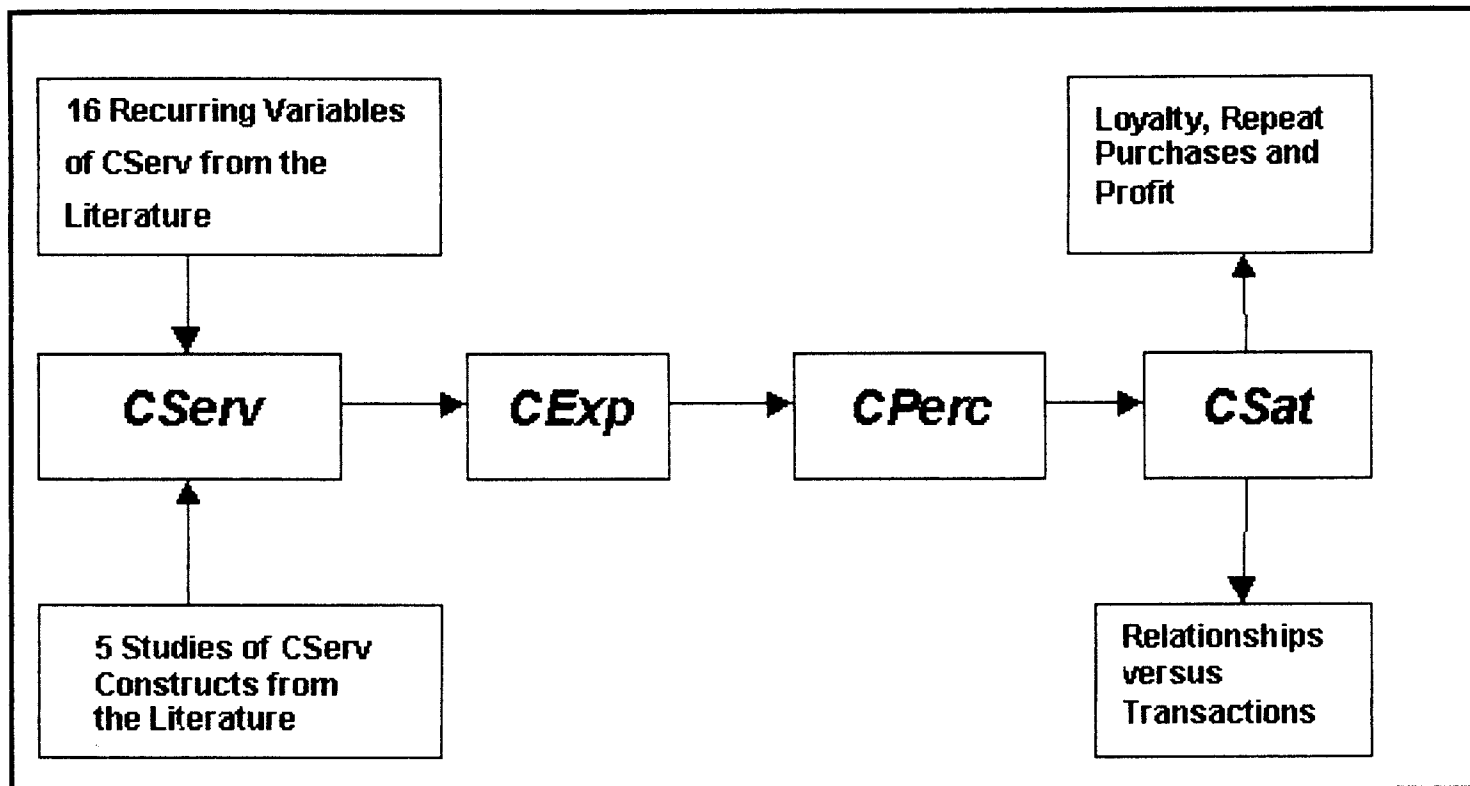


Figure One: A Conceptual Model of CServ and CSat in Logistics

Adapted from Mentzer, Gomes and Krapfel (1989) and Parasurman, Zeithaml and Berry (1985)

METHODOLOGY

The following three research issues were derived for this Study. They are not hypotheses as the enquiry was exploratory to expand on Grant's findings (1999) as regards the importance of CServ and CSat. The nature of relationships as outputs of CSat was not included in this Study.

Research Issue 1

How important to a selected industry sector are the 16 CServ variables developed by Grant (1999)? Are there are other variables that are important to the selected sector?

Research Issue 2

Did respondents in the selected sector achieve CSat from a particular service delivery experience as a result of a supplier providing these variables of CServ? If they did not achieve CSat were there any key discriminating variables?

Research Issue 3

Do any of the 16 variables underlie constructs of CServ in logistics? How do these constructs compare to those proposed in the five studies in the literature?

The research methodology for this Study followed the first stage of a two-stage methodology proposed by Churchill (1979) and Dunn, Seaker and Waller (1994). This entailed developing of the variables for enquiry from the literature review, collecting data in a pilot survey, and analysing the data with a view to explaining CServ and CSat in logistics in the context of the research issues. This was followed by exploratory factor analysis in an attempt to purify or simplify the variables for further empirical study in the second stage of the proposed methodology.

The survey instrument was a self-administered postal questionnaire sent to a

representative sample of the selected industry. The questionnaire used Likert interval scaling questions for CExp and CPerc of the CServ variables, and nominal or ordinal questions for control data about the respondents. Descriptive statistics and exploratory factor analysis were derived from the data using SPSS statistical techniques.

The industry selected for the Study was the meat, poultry and game, and seafood sub-sector of the Scottish food processing industry. The total Scottish food industry is considered one of the keys in the Scottish economy (Scottish Enterprise 1999). Its annual turnover of £7.3 billion represents over 13% of Scotland's £56.2 billion Gross Domestic Product. It employs over 50,000 people in about 2,000 units throughout the food sector supply chain and represents over 17% of Scotland's manufacturing segment (Scottish Trade International 1999). This industrial sector is also undergoing changes in its supply chains or channels of distribution due to socio-economic and technological developments (Boitout 1997, van der Vorst and Beulens 1999).

This sample did not include farmers and fishermen or butchers, fishmongers and retailers, although some of the firms do sell to final or end-consumers. After deleting duplicate listings from a public listing of firms in this group, a sample frame of 397 firms was selected for surveying. The sub-group breakdown was 100 meat (25%), 24 poultry and game (6%), and 273 seafood (69%).

The questionnaire was pre-tested by administering it to five staff members of the Scotch Quality Beef & Lamb Association Limited, an industry association representing almost 10,000 members in the beef and lamb supply chain.

About one-half of the sampling frame was selected for personal telephone contact or solicitation prior to sending out a survey package in order to test the effect of pre-notification and enhance response rates (Earp and Hunter 1999). This was done systematically with every other firm being selected from a random start point in each sub-group and 193 firms were selected for contact.

Two contact attempts were made per firm. No contact was made with 60 firms, there were 9 obsolete telephone listings, and only 8 firms declined to participate. The 60 solicited no contact firms and the other unsolicited 204 firms in the sampling frame not selected were sent personalised survey packages.

Successful contact with the remaining 116 firms took one of three forms: direct contact with the respondent, contact with and subsequent referral from someone other than the respondent, or a message left on an answering machine. These firms were also sent personalised survey packages for a total sample size of 380 firms.

RESULTS

The initial mail-out yielded 93 responses (25%) from the 380 questionnaires posted and included 37 responses (18%) from the unsolicited group of 204, 12 responses (20%) from the solicited, no contact group of 60, and 44 responses (38%) from the solicited, contact group of 116. In an attempt to increase the number of responses for factor analysis, the 72 firms in the solicited, contact group who did not respond to the initial mail-out were sent a follow-up letter and second questionnaire that again invited them to participate.

The unsolicited and solicited, no contact groups were not used for follow-up as they were unlikely to provide large numbers of responses for the effort and expense involved. The second mail-out yielded only 15 additional responses (21%) that was similar to the response rates for the other two groups. There were 105 usable questionnaires reflecting an overall response rate of 28%.

There were 66 responses (63%) from seafood producers, 36 (34%) from meat producers and 3 (3%) from poultry and game producers. Respondent firms were asked about their number of employees according to categories for small and medium-sized enterprises established by the European Community. Almost 67% had less than 50 employees and fell within the Community's small to medium enterprise (SME) category. Respondents were asked whether they were the only individual in the firm responsible for purchasing and arranging the delivery of a supplier's products and over 75% were not.

Respondents were asked about the number of suppliers dealt with and the number of deliveries received per week. The mean number of suppliers was about 70 with a median of 33 and a mode of 50. The mean number of deliveries per week was about 47 with a both median and mode of 20. The mean percentages for respondents regarding method of delivery were 43% for supplier delivery, 18% for their own firm, and 39% for third-party delivery.

The data were examined for normality and survey bias. Normal probability plots were generated and examined for the 16 variables. The data were considered normal for statistical analysis and not transformed. Respondents were split into first (early) and last (late) quartiles according to when their responses were received to compare differences in responses and test non-response bias based on a technique discussed by Lambert and Harrington (1990). The last quartile of respondents contained all of the second mailout respondents as well as initial mailout respondents who responded after the initial mailout due date.

Differences in means were calculated for the 16 CServ variables and a paired two-group t-test performed for first and last quartile responses. There were no statistically significant differences in means for the 16 CServ variables at the 5% significance level. Responses from early and late respondents were therefore considered the same and non-response bias non-existent.

Respondents were first asked about their expectations of CServ from their suppliers with regards to the 16 variables found in the literature. The questionnaire provided the statement "Our firm expects this customer service feature from our suppliers" and respondents were asked to select a point on a 5 point Likert scale ranging from strongly disagree as anchor point 1 to strongly agree as anchor point 5. These responses provided measures of a respondent's CExp.

Respondents were also asked to rank the five most important variables to their firm from the 16 provided in the survey. Table Two shows the rankings from the mean scores of the Likert responses, respondent importance scores, and an overall average of the two rankings. The four most important variables were on-time delivery on the date promised, products arriving undamaged and according to specification (OSD), complete and accurate orders, and competitive price quotes including discounts and payment terms. There were no significant "other important variables" listed by respondents on the questionnaire.

Respondents were then asked to consider the most recent delivery they received from a supplier and again select a point on a similar 5 point Likert scale according to the statement "Our firm received this customer service feature from the supplier." These responses provided measures of a respondent's CPerc from an actual service experience.

Variable	Description	Means Ranking* (Mean)	Importance Ranking* (Weighted Score)	Overall Ranking**
1	Price	7 (4.28)	2 (259)	4
2	Availability	10 (4.12)	5 (89)	7
3	On-Time Delivery	2 (4.67)	1 (286)	1
4	Easy Ordering	11 (4.09)	11 (23)	11
5	Delivery Time	12 (3.76)	10 (32)	11
6	Complete Orders	4 (4.59)	4 (190)	3
7	Customised Services	15 (3.59)	14 (8)	14
8	Appropriate OCT	14 (3.61)	15 (7)	14
9	Consistent OCT	13 (3.69)	12 (14)	13
10	Ongoing Information	16 (3.44)	16 (6)	16
11	Accurate Invoices	5 (4.57)	6 (86)	6
12	Helpful CSRs	6 (4.29)	9 (41)	7
13	OSD	1 (4.81)	3 (215)	2
14	Action on Complaints	3 (4.61)	7 (78)	5
15	Return Policy	8 (4.16)	12 (14)	10
16	After Sales Support	9 (4.13)	8 (47)	9
* Spearman Coefficient		.840		
** Average				

Table Two: Rankings of CServ Variables

The deliveries received were primarily raw materials (55%) and packaging materials (20%) used in production processes. The deliveries were typical of those provided by the supplier (95%) and almost 60% of respondents received deliveries from the supplier more frequently than once a week. Almost 50% of respondents rated the supplier as very important to them.

Lastly, respondents were asked with a dichotomous yes-no question whether they were satisfied overall that CServ delivery needs were met by the supplier on that occasion. Eighty-four per cent of respondents were satisfied while 16% were dissatisfied. This response provided a measure of a respondent's CSat for the event.

Overall CExp and CPerc for both satisfied and dissatisfied respondents were derived from the sum of means of the two sets of 16 variables and then compared. This analysis is similar to the SERVQUAL measure developed by Parasuraman, Zeithaml and Berry (1988). The CPerc sum of means of 69.6 marginally exceeded the CExp sum of means of 66.7 for satisfied respondents as shown in Table Three. The CPerc sum of means of 55.8 was less than the CExp sum of means of 66.3 for dissatisfied respondents as shown in Table Four.

Variable	CExp Mean	Std Dev	CPerc Mean	Std Dev	t-test	Sig (2 tail)
Price	4.29	.823	4.29	.930	-0.469	0.640
Availability	4.15	.920	3.90	.918	3.223	0.002
On-Time Delivery	4.73	.693	4.28	.941	4.427	0.000
Easy Ordering	4.10	.869	4.17	.838	-0.609	0.545
Delivery Time	3.76	1.007	3.78	1.066	0.288	0.774
Complete Orders	4.59	.742	4.35	.880	3.339	0.001
Customised Services	3.61	.943	3.58	1.078	0.704	0.484
Appropriate OCT	3.60	.954	4.48	1.557	-2.697	0.009
Consistent OCT	3.63	.997	4.54	1.459	-3.105	0.003
Ongoing Information	3.46	.997	4.05	1.707	-1.829	0.071
Accurate Invoices	4.55	.777	4.58	.901	-0.324	0.747
Helpful CSRs	4.31	.831	4.33	1.196	0.000	1.000
OSD	4.81	.588	4.42	.833	4.631	0.000
Action on Complaints	4.66	.591	5.26	4.437	-1.239	0.219
Return Policy	4.19	.781	4.90	1.928	-3.146	0.002
After Sales Support	4.27	.848	4.68	1.586	-1.217	0.228
Sum of Means	66.7		69.6			

Table Three: CExp and CPerc of Satisfied Respondents

Variable	CExp Mean	Std Dev	CPerc Mean	Std Dev	t-test	Sig (2 tail)
Price	4.188	1.223	3.400	1.183	2.956	0.010
Availability	4.000	1.265	2.667	1.397	2.942	0.011
On-Time Delivery	4.471	1.068	2.647	1.412	4.980	0.000
Easy Ordering	4.118	1.054	3.824	1.015	0.893	0.385
Delivery Time	3.882	.993	3.188	1.328	1.660	0.118
Complete Orders	4.647	.702	3.529	1.231	3.271	0.005
Customised Services	3.571	1.089	3.455	1.695	0.361	0.726
Appropriate OCT	3.800	1.014	3.824	2.099	0.642	0.531
Consistent OCT	4.133	.834	4.177	2.038	0.572	0.576
Ongoing Information	3.529	1.328	2.706	1.572	1.912	0.074
Accurate Invoices	4.647	.493	4.235	.903	1.692	0.110
Helpful CSRs	4.352	.606	3.941	.899	1.514	0.150
OSD	4.824	.393	3.177	1.468	4.197	0.001
Action on Complaints	4.470	.800	3.177	1.074	3.484	0.003
Return Policy	4.118	.858	4.059	2.135	0.094	0.926
After Sales Support	3.588	1.372	3.765	1.641	-0.469	0.645
Sum of Means	66.3		55.8			

Table Four: Mean CExp and CPerc of Dissatisfied Respondents

A paired group t-test of CExp and CPerc means and standard deviations for each variable was calculated and are also listed in the respective tables. Analysis of demographic data for dissatisfied respondents did not yield any significant differences from the entire sample.

Seven variables for the satisfied group had absolute t-test values greater than 1.96 that indicated significant differences between means. Four variables, availability, on-time delivery, complete and accurate orders and OSD, had positive t-test values. The positive sign indicates that CPerc was less than CExp for these variables and respondents were dissatisfied. The other three variables with negative t-test values were appropriate order cycle time (OCT), consistent OCT and return policy. The negative sign indicates CPerc exceeded CExp for these variables and respondents were satisfied.

Six variables for the dissatisfied group had absolute t-test values greater than 1.96 that indicated significant differences between means. These variables were price, availability, on-time delivery, complete and accurate orders, OSD, and action on complaints. All six variables had positive t-test values, thus CExp was less than CPerC for these variables and respondents were unsatisfied.

Satisfied respondents reported CPerC exceeded CExp for price, however on average they reported CExp was less than CPerC for the other three most important variables. Dissatisfied respondents reported CExp was less than CPerC for all four of the most important variables.

Overall, respondents recorded CSat when CPerC exceeded CExp for only one of the four most important variables, price. Conversely, respondents recorded no CSat when CExp was less than CPerC for all four most important variables.

Variable (Ranking of Importance)	Factor 1 - Order Cycle Activities	Factor 2 – Non-Ordering Activities	Factor 3 – Ordering Activities	Factor 4 – Delivery Activities
Appropriate OCT (15)	.953			
Consistent OCT (13)	.752			
Customised Services (14)	.727			
Ongoing Information (15)	.461			
Return Policy (10)		.736		
Easy Ordering (11)		.541		
After Sales Support (9)		.540		
Helpful CServ Reps (7)		.520		
Accurate Invoices (6)		.496		
Price (4)			.785	
Availability (7)			.549	
OSD (2)			.457	
On-Time Delivery (1)				.848
Action on Complaints (5)				.538
Complete Orders (3)				.460

Initial Eigenvalues	6.186	1.988	1.348	1.141
Variance Explained	18.6%	14.8%	12.2%	11.0%
Cumulative	18.6%	33.4%	45.6%	56.6%
Cronbach's Alpha	.84	.79	.70	.81
Chi-Square (c²)	600.583			
Degrees of Freedom	120			
Significance	.000			

Table Five: Factors and Loadings at the .45 Level

Exploratory factor analysis was used to determine if any of the 16 variables were underlying constructs of CServ for this industry sub-group. Factor analysis is a data reduction technique for analysing the structure of inter-correlations among large number of variables by defining a set of common underlying dimensions or factors.

Four factors were found using principal axis extraction and VARIMAX orthogonal rotation and are shown in Table Five at a .45 loading level. All factors had initial eigenvalues greater than 1.0 and comprise 15 of the 16 variables. The four rotated factors explain about 57% of the variance which is low but expected as rotation will derive greater independence between factors stemming from less mathematical correlation. However, Cronbach's alpha was .70 or greater for each factor which is an acceptable measure of the internal reliability of the variables in the factors. The Chi-square value for the correlation matrix of all 16 variables was statistically significant.

The four most important variables of on-time delivery, OSD, complete and accurate orders and price loaded onto the third and fourth factors. The only variable not to load onto any factors at the .45 level was delivery time. The factors were named according to the activities addressed by the majority of the variables in them.

DISCUSSION

The most important variables of CServ for respondents were transaction-oriented and related to the delivery of supplies: on-time delivery, OSD, complete and accurate orders, and price. These four variables were ranked strongly in terms of weighted importance and means as compared to the other 12 variables. This suggests that firms in this industrial sub-group are very conscious and concerned about factors surrounding a transaction or event.

More relationship-oriented variables such as helpful customer service representatives, after sales support and return policy were ranked in the middle of the variable list, while other transaction-oriented variables such as appropriate and consistent order cycle time were ranked near the end of the variable list. No clear discrimination was found between transaction-oriented and relationship-oriented variables.

Overall CSat from an actual logistics delivery service experience was numerically calculated as the difference between CPerc and CExp and compared to the respondent's view. CSat was marginally achieved for satisfied respondents but not achieved for dissatisfied respondents. These findings support the postulate of Parasuraman, Zeithaml and Berry's service quality model (1985) that differences in expectations and perceptions can be used as a measure of satisfaction and service quality.

Price was the key discriminating variable regarding CSat between satisfied and dissatisfied respondents. This finding suggests this industrial sub-group is price-conscious and possibly price-sensitive. The majority of respondents were SMEs and intermediaries in the food supply chain. The supplies they obtain for processing may be considered commodities and thus price becomes the key factor. This aspect was not tested in the Study.

Exploratory factor analysis yielded four factors that were statistically sound but interesting in that the four important CServ variables loaded onto the third and fourth factors. The four CServ variables that loaded onto the first factor were the lowest ranked variables of importance: appropriate and consistent order cycle time (OCT), customised services and ongoing information. The latter two variables are relationship-oriented.

Similarly, the four CServ variables in the second factor are all relationship-oriented. This finding suggests that respondents might operate at two different or hierarchical levels as regards customer service from suppliers. They might focus on transaction factors during independent events but maintain a sense of relationship overall on an ongoing basis.

The four factors of order cycle activities, non-ordering activities, ordering activities and delivery activities represent constructs of CServ in logistics that are particular to this industrial sub-sector. These constructs relate primarily to the ordering and purchasing process. The constructs of logistics service quality developed by Mentzer, Flint and Kent (1999) substantially relate to ordering and purchasing. Thus, there appears to be some support for the appropriateness of these constructs in logistics, particularly this industrial sector, and further research to confirm their validity is warranted.

The first stage of the Churchill (1979) and Dunn, Seaker and Waller (1994) methodology includes the purification or reduction of the variables to ensure model parsimony. This was not undertaken with this data due to 15 out of 16 variables loading onto the four factors.

From a research methods perspective, telephone pre-notification of respondents more than doubled the response rate of unsolicited mailouts from 18% to 38%. This finding supports existing literature on the increase of response rates using different notification techniques and professional survey packages.

CONCLUSIONS

This Study examined 16 variables of CServ from the literature in the Scottish food processing industry for their impact on CSat and whether underlying constructs could be derived. The enquiry here is new and relevant in four ways.

First, the 16 recurring variables of CServ found in the literature have not been investigated in isolation from other CServ variables. Second, this industry has not been surveyed empirically on the research issues proposed for the Study. Third, these variables have not been analysed independently to develop constructs of CServ. And finally, constructs from these variables have not been compared to other constructs of CServ contained in the five different studies in the literature discussed above.

This Study also parallels current thought and work in the marketing discipline, such as relationship marketing, quality of services and consumer behaviour, and should be of interest to researchers and practitioners in those areas as well as those in logistics.

The results of the Study provided answers to the research issues addressed above and the Study is therefore useful as exploratory research. The second stage in the methodology of Churchill (1979) and Dunn, Seaker and Waller (1994) is to test any purified or reduced number of measures in a larger empirical study and assess all factors of validity.

Further research towards this second stage could follow-up this Study to ensure the validity of the measures, purify or reduce the number of measures as required, and proceed to the next empirical study. Analysis techniques for the next empirical study could include confirmatory factor analysis or structural equation modelling.

The issues of customer loyalty, repeat purchases and profitability as a result of CSat have been the subjects of much research and discussion in the literature. Further research here could consider the impact of logistics CServ cost trade-offs on logistics profitability.

The issue of transactions versus relationships has not been researched extensively in logistics particularly at the supplier-customer interface. Further research here could consider the significance of relationships in logistics, whether customers act at different levels when evaluating suppliers from a transactional or relational perspective, and how transactional versus relational issues differ across different actors in a customer's purchase process.

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THE PURSUIT OF RIGOUR IN LOGISTICS RESEARCH: AN EMPIRICAL EXAMPLE

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ABSTRACT

Although logistics is an applied discipline with a positivist and quantitative research heritage, logistics researchers have been encouraged to increase methodological and analytical rigour in order to develop more reliable and valid instruments and models. However the pursuit of such rigour presents challenges as well as benefits, for example selection of a non-response bias measurement technique is difficult but its use will confirm or refute non-response bias. This paper considers such “rigorous pursuit” in the context of an empirical pilot survey that was part of a two-stage research design. Research objectives were the development of important variables and underlying constructs of logistics customer service that could be confirmed in the second stage. The survey used a postal questionnaire and the sample comprised intermediaries in the food processing industry. The challenges and benefits found in the survey and the methodological and analytical issues surrounding them, such as pre-notification of respondents and usable cases for multivariate techniques, are presented and discussed.

Key Words: Logistics, Research Methodologies, Customer Service and Satisfaction

1. INTRODUCTION

Mentzer and Kahn (1995) posited that logistics research was founded in the positivist paradigm and that future research should follow the scientific method inherent in it. Other authors have argued that logistics research should also consider more non-positive and qualitative research (Näslund 1999, Stock 1997), however Mentzer and Kahn's argument is appropriate if descriptive or causal research is undertaken. It is also consistent with the nature of positivist and quantitative enquiry that consists of idea generation; literature review; hypothesis formulation; data collection and analysis; and discussion (Remenyi, Williams, Money and Swartz 1998, Robson 1993).

Mentzer and Kahn (1995) were also concerned that logistics research has lacked a rigorous orientation towards theory development, testing and application. Other authors have echoed this call for increased rigour that requires careful consideration and discussion by researchers of the concepts of construct, internal and external validity (Churchill 1979, Dunn, Seaker and Waller 1994, Garver and Mentzer 1999, Mentzer and Flint 1997).

This paper discusses these concerns in the context of an empirical pilot survey (the Study) and presents several issues and research implications found during its implementation. The Study utilised a quantitative survey for data collection from respondents within a selected industrial sector. The research design encompassed attributes of the quantitative paradigm and was consistent with positivist enquiry. The phenomena investigated in the Study were variables and constructs of customer service and satisfaction in logistics. Due to space limitations for this paper, detailed discussions surrounding the Study will only be provided as they pertain to issues of this paper's topic. However, the author will gratefully provide further details of the Study upon written request.

2. RESEARCH DESIGN

Churchill (1979) and Dunn *et al.* (1994) respectively provided similar frameworks for the development and validation of variables and constructs in marketing and logistics. Both proposed two-stage methodologies that are shown in Table 2.1. Pilot surveys are used at the end of the first stage to determine and 'purify' any latent variables prior to conducting major empirical research. Latent variables are unobservable, and measurement of them and subsequent construct development requires stronger methodological approaches within the logistics discipline (Dunn *et al.* 1994).

The Study was the first-stage of these coincident methodologies, or steps 1-4 in Table 2.1, and culminated in the design, data collection and analysis of a pilot survey. Although it did not test hypotheses this Study was consistent with positivist enquiry. The phenomena investigated in this

Study were manifest (directly observable) and latent variables and subsequent constructs of customer service and satisfaction in logistics. The Study was therefore a descriptive enquiry designed to present a more accurate profile of the actors involved, their attitudes towards the phenomena, and the events that might help shape such attitudes (Robson 1993).

Table 2.1 Proposed Methodologies for Variable and Construct Development

Steps	Churchill 1979	Dunn, Seaker and Waller 1994
1	Specify domain of construct (Literature search)	Define constructs
2	Generate sample of items (Literature search, Experience survey, Insight stimulating examples, Critical Incidents, Focus Groups)	Develop potential items, Check content validity, Confirm substantive validity
3	Collect data	Pilot survey
4	Purify measure (Coefficient alpha, Factor analysis)	Exploratory factor analysis, Item to total correlation
5	Collect data, Assess reliability (Coefficient alpha, Split-half reliability), Assess validity (Multitrait-multimethod matrix), Develop norms (Average and other statistics summarizing distribution of scores)	Test theory, Confirmatory factor analysis, Reliability, Convergent validity, Discriminant validity, criterion related validity (predictive and concurrent), Nomological validity

The research design of the Study followed the first four steps in Table 2.1. First, the domain of the constructs was specified or defined (step 1) as customer service and satisfaction in a logistics context. This domain was predicated upon existing theoretical work in customer service, satisfaction and service quality developed by Mentzer, Gomes and Krapfel (1989) and Parasuraman, Zeithaml and Berry (1985). Second, the items or variables related to the constructs and scale measures were generated (step 2). Findings from an extensive literature review (Grant 1999) identified 16 important variables for investigation, which are presented in alphabetical order in Table 2.2.

Table 2.2 Sixteen Variables of Logistics Customer Service

Accurate Invoices	Delivery Time
Action on Complaints	Easy Ordering
After Sales Support	Helpful Customer Service Representatives (CSRs)
Appropriate Order Cycle Time (OCT)	Ongoing Information
Availability	On-Time Delivery
Complete Orders	Order Short or Damaged (OSD)
Consistent Order Cycle Time (OCT)	Price
Customised Services	Return Policy

Dunn *et al.* (1994) and Garver and Mentzer (1999) argued that content and substantive validity, as sub-dimensions of construct validity, are an important part of these first two steps. Content validity is defined as the correlation that items or variables as a group have with a construct or any latent variables. Substantive validity is defined as the theoretical linkage between a construct or latent variable and its items. Thus, substantive validity is necessary for content validity.

The Study considered both of these forms of construct validity. Substantive validity was established through the literature review (Grant 1999), while content validity was intuitively developed and confirmed within the data analysis. A pilot survey (step 3) was undertaken and measures were examined using exploratory factor analysis in an attempt to 'purify' them (step 4).

The three research objectives of the Study were:

1. Do firms expect suppliers to provide the 16 customer service variables in Table 2.2? How important are the 16 variables and are there are other important variables?
2. Did firms achieve satisfaction from a specific service delivery experience as a result of a supplier providing these 16 customer service variables? If they did not achieve satisfaction were there any key discriminating variables?
3. Do any of the 16 variables underlie constructs of logistics customer service for the selected industry sector?

The second stage (step 5) comprises collecting new data and performing confirmatory factor analysis to test the remaining sub-dimensions of construct validity, as well as determining internal and external validity (Churchill 1979, Dunn *et al.* 1994, Mentzer and Flint 1997). The remaining sub-dimensions are unidimensionality, reliability, convergent validity, discriminant validity and predictive validity and are tested from a statistical perspective. This stage will form the basis of future research from the Study's results.

3. DATA COLLECTION

3.1. Research Instrument

The research instrument selected was a self-administered postal questionnaire that enabled collection of data from a large sample with wide geographic coverage at relatively low cost. It also provided a relatively simple and straightforward approach to the study of attitudes, beliefs and motives, and solicited data from the sample with high amounts of standardisation. Potential disadvantages of such instruments include low response rates, undetectable ambiguities and misunderstandings in the survey questions, and the possibility of social responsibility response and non-response bias (Remenyi *et al.* 1998, Robson 1993). Using other instruments, such as personal interviews and telephone surveys can mitigate these disadvantages, however they were not selected for the Study due to time and cost constraints. While the author does not believe these disadvantages were substantial and impacted the Study, the issue does highlight the difficulty of performing research under 'real world' constraints (Robson 1993).

Questions were designed to be specific and closed for data standardisation and non-ambiguous interpretation (Oppenheim 1992). Measurement about demographic and 'yes-no' questions was made at the nominal level for frequency and cross tabulation analysis. Measurement about expectations and perceptions questions for customer service and satisfaction was made at the interval level using a 5 point Likert scale for multivariate quantitative analysis. These latter questions were used for attitude measurement. There is some debate whether these questions are interval or ordinal as the intervals or difference between each number in the scale do not necessarily have the same meaning. There is also some debate over how many points should be used in a Likert scale, either 5, 7 or 9. Five points provide ease of respondent choice (Mentzer, Flint and Kent 1999, Robson 1993) and research has indicated there is no difference in reliability between 5 and 7 points (Lissitz and Green 1975). The measurement of these questions as interval and the use of a 5 point Likert scale were selected based on these findings in the literature and on 'common practice' prevalent in marketing research (Remenyi *et al.* 1998).

Pre-testing questionnaires is recommended to detect deficiencies in design, administration and question wording (Oppenheim 1992, Remenyi *et al.* 1998, Robson 1993). This Study's instrument was pre-tested by administering it to five staff members of a trade association in the industry selected (see section 3.2). Results of the pre-test led to minor wording changes in the questionnaire and an increase in possible completion times advised to respondents. Space limitations prevent the three-page questionnaire being appended to this paper however a description of the major sections and question types follows.

Section 1 asked respondents about expectations of supplier customer service for each of the 16 variables by the statement 'Our firm expects this customer service feature from our suppliers.' A Likert scale was used with anchors of 'strongly disagree' and 'strongly agree.' Section 4 asked respondents to consider the most recent delivery received from a supplier and used the Likert scale according to the statement 'Our firm received this customer service feature from the supplier.' There were no labels for the three intermediate points and respondents were also able to select 'not applicable.' These sections respectively provided data about the firm's expectations and perceptions of their suppliers.

Section 4 also asked respondents whether they were satisfied overall with the actual delivery. This was a 'yes-no' dichotomous question and provided an overall measure of the service experience that could be related to the difference between expectations and perceptions (Mentzer, Gomes and Krapfel 1989, Parasuraman *et al.* 1985). The section further queried the type of supplies, typicality and frequency of delivery and importance of the supplier. This provided data about the nature of the actual delivery and its impact on the firm's ongoing operations.

Section 2 asked respondents to rank the top five variables in order of importance to their firm. This was asked to determine how important the variables are to firms in addition to whether they are important. Section 3 asked whether there were other customer service variables considered important that were not among the 16 provided. This was to ensure variables important to respondents were not overlooked and confirm the substantive validity of the 16 variables found in the literature. Section 5 asked for control information about the firm and respondent. This was to determine whether firm size and the number of suppliers and deliveries affected the firm's

expectations and perceptions about the customer service variables. Respondents were provided with an opportunity to receive a copy of the survey results as an incentive to participate.

3.2. Survey Sample

The industry selected for study was a sub-sector of the Scottish food processing industry consisting of meat, poultry and game, and seafood producers. It is one of the keys in the Scottish economy with annual turnover of £7.3 billion, representing 13% of Scotland's gross domestic product, and over 50,000 employees in 2,000 units throughout the food supply chain (Scottish Trade International 1999). These industry sub-sector intermediaries have not been studied extensively with respect to the research issues discussed in section 2 and were therefore worthy of investigation.

The sample for the Study was drawn from a Scottish Enterprise public listing of meat, poultry and game, and seafood producers in the food producers industry sector. The 1,000 plus firms in this listing represented more than 50% of total Scottish food producers (Scottish Trade International 1999). There were a total of 422 firms listed in the meat, poultry, game, and seafood groups. This sample was a convenience sample and readily available to survey (Remenyi *et al.* 1998). This was not the entire population of such firms in Scotland, but was considered comprehensive and representative of these segments.

The sample also did not include farmers and fishermen or butchers, fishmongers and retailers that form the anchors of the food supply chain in line with research objectives, although some of the firms surveyed do sell to final or end-consumers. After deleting duplicate listings a sample frame of 397 firms (100%) was selected with a breakdown of 100 meat (25%), 24 poultry and game (6%), and 273 seafood (69%) firms.

3.3. Survey Administration

Techniques to increase response rates from postal surveys include obtaining survey sponsorship, using personalised cover letters, professional stationary, and self-addressed stamped envelopes (SASE), assuring confidentiality, pre-notifying respondents and providing various incentives (Schlegelmilch and Diamantopoulos 1991, Diamantopoulos and Schlegelmilch 1996, Earp and Hunter 1999). All suggestions except obtaining survey sponsorship were utilised in this Study.

About one-half of the sample frame was selected for personal telephone contact or solicitation prior to sending out a survey package in order to test the effect of pre-notification. A systematic sample of every other firm was utilised from a random start point in each group. A total of 193 firms were selected for contact while the remaining 204 firms in the sampling frame were sent survey packages on an unsolicited basis.

Two contact attempts were made per firm but despite this effort no contact was made with 60 firms. Contact with 116 firms took one of three forms: direct contact with the respondent, contact with and subsequent referral from someone other than the respondent, or a message left on an answering machine. There were nine obsolete telephone listings and eight firms refused to participate in the research that reduced the total sample frame to 380. A script was used for the contact to ensure consistency and reduce interviewer bias.

All firms received a professional, personal and tailored covering letter facilitated by a mail merge feature of the word processing package used. The format of the letter sent to unsolicited firms was designed to establish the author's credibility, discuss the research and its benefits to respondents, discuss mechanics of the questionnaire, note the deadline for responses, and assure confidentiality for respondents. The letter sent to solicited firms was simplified by eliminating the paragraphs about the author's credibility and the research, and adding a paragraph regarding the reason for writing as a result of the relative contact or non-contact. All letters offered respondents a copy of the survey results when published as a tangible incentive.

The survey packages were mailed ten days before the deadline date by second-class post. The mailout yielded 93 responses from 380 questionnaires posted (24%). The majority of responses were postmarked within the ten days before the deadline, however the last response received was postmarked 39 days after the mailout date. Five respondents per variable, or 80 responses for the 16 Study variables, are sufficient to undertake exploratory factor analysis, however ten respondents per variable, or 160 responses, is becoming the norm (Dunn *et al.* 1994, Hair, Anderson, Tatham and Black 1995). Seventy-two firms in the contacted group of 116 firms did not respond to the initial mailout. In an attempt to increase responses for factor analysis these firms were sent a follow-up letter together with another questionnaire and SASE that again invited them to participate. The other group was not solicited with this mailout as they were unlikely to provide large numbers of responses for the effort and expense involved. This omission raises the issues of social responsibility response bias due to the former group's desire to participate, as well as any non-response bias of the 272 total non-respondents.

The second mailout was posted 24 days after the initial mailout date and had a deadline date of 15 days after the second mailout date. The last response was postmarked 21 days after the second mailout date thus total survey response time was 45 days. The second mailout only yielded 15 additional responses from the follow-up group of 72 (21%) for a final total of 108 responses or an overall response rate of 28% from both mailouts. There were 105 usable questionnaires from the 108 total responses received. The group response rates and patterns of response suggest that postal survey respondents will either respond quickly or likely not at all, notwithstanding any follow-up efforts. These response results also support pre-notification of respondents as a doubling of the response rate versus no pre-notification was achieved in this Study.

4. DATA ANALYSIS

4.1. Descriptive Statistics

The majority of the 105 usable respondents were seafood producers (63%). Although seafood producers were the largest percentage group overall, more meat producers responded on a proportional basis (38%) than seafood producers (25%). Table 4.1 shows the frequencies and percentage totals for the industry sub-sector groups. The distribution percentages of respondents' postal codes corresponded closely to the distribution percentages of the mailout. The Aberdeen, Inverness and Paisley postal code zones comprised almost 50% of responses which corresponded closely to the industry sub-sector group responses, as these three areas are very active in seafood production.

Over 50% of deliveries received from suppliers were raw materials or supplies. Over 95% of deliveries were a typical delivery from the supplier. Respondents were asked how important the supplier was to the firm on a 5 point Likert scale ranging from 'not at all important' to 'very important.' The mean value was 4.2 with over 48% of respondents rating the supplier as 'very important.' Over 67% of respondents had less than 50 employees and thus fell within the European Community's category of small and medium-sized enterprises. Finally, 59% of respondents received deliveries at least weekly and almost 13% received daily deliveries. These frequencies confirm the importance of the item, delivery and supplier in the recent event to respondents as well as the consistent demographic nature of respondents compared to the sample frame surveyed.

Table 4.1 Responses by Industry Sector Group

	Responses	Response Percent	Mailout	Mailout Percent	Proportionate Percent
Meat	36	34.3	96	25.3	37.5
Poultry and Game	3	2.9	22	5.8	13.6
Seafood	66	62.9	262	68.9	25.1
Total	105	100.0	380	100.0	

Various cross tabulations were undertaken to examine any interesting relationships among the descriptive data but were discarded. More than 20% of cells in the cross tabulations contained expected frequencies of less than 5 and therefore any corresponding chi-square tests were statistically meaningless (Robson 1993). This suggests that a larger response set was needed to critically examine such relationships.

4.2. Survey Bias

Lambert and Harrington (1990) discussed three techniques for checking response and non-response bias particularly in postal surveys. The first technique examines demographic, sociological and geographic compositions of both respondents and non-respondents. The absence of non-response bias is inferred if there are no significant differences. This technique was not selected due to insufficient demographic data collected in the Study. The second technique involves sampling non-respondents after planned survey waves are completed. The survey instrument is condensed to include key variables derived from analysis and it is sent to a sample of non-respondents. This technique was not selected due to there being only one real response wave and time and resource constraints associated with this Study. Also, this technique does not address whether non-respondents would consider a reduced instrument the same as the primary instrument.

The third technique compares different waves and infers non-response bias is non-existent if there are no significant differences between survey variables. The weakness with this approach is the difficulty in assessing direction and magnitude of significant non-response bias. Further, temporal issues may affect large-scale surveys, such as changes in a respondent's environment. Notwithstanding its limitations, a modification of this technique was selected as being the most practicable for this Study. Respondents were split according to when their responses were received to examine differences in responses between the first (early) and last (late) quartile, which were considered to be different waves. The last quartile of respondents contained all of the second mailout respondents as well as initial mailout respondents who responded after the initial mailout due date.

Differences in means were calculated for the 16 customer service variables and a paired two-group t-test was performed for first and last quartile responses. The t-test proposed the null hypothesis that a difference in means is zero for a normal distribution and cannot be rejected if the

magnitude of the t-test value does not exceed 1.96 at a 95% confidence interval (Mentzer, Flint and Kent 1999, Robson 1993). Absolute t-test values were less than 1.96 for all 16 variables and thus there were no statistically significant differences in means for the 16 customer service variables in this Study. It was therefore inferred that responses from first quartile (early) and last quartile (late) respondents were the same and non-response bias was likely non-existent. This technique could not however address the issue of social responsibility response bias towards the survey by follow-up respondents.

4.3. Expectations Versus Perceptions

The data for was first checked for normality by generating probability plots in *SPSS*[®] for all variables related to expectations and perceptions. Normality was indicated as response plots were clustered around the straight line in all probability plots. Thus data collected were close to normal for statistical analysis and were not transformed (Norušis 1993).

Most of the 16 customer service variables appeared important as visual exploration of the data frequencies revealed numerous responses of '4's and '5's on the Likert scale. Ranking the variables based on statistical means was a further discriminatory measure of importance. Variables whose means were in the upper quartile, *i.e.*, means greater than 3.75, could be considered the most important. Respondents were also asked to rank the five variables that were most important to their firm. Ninety-three respondents did so and Table 4.2 shows for all 16 variables a mean response on the Likert scale, a raw ranking score based on a sum of frequencies and a weighted ranking score. The weighting was based on a rank frequency of 1 being multiplied by 5, a rank frequency of 2 being multiplied by 4, and so on. There were four variables that stood out as having high mean and ranking importance. These variables were on-time delivery, price, whether an order arrived short, undamaged and according to specification (OSD), and whether a complete order arrived. Thus, these variables were considered to be the most important logistics customer service variables for this sample.

Respondents were also asked to indicate whether they were 'satisfied' or 'dissatisfied' overall that customer service needs were met by the actual delivery. There were 86 respondents who indicated they were satisfied, 17 respondents who indicated they were dissatisfied and two non-respondents to the question. The means and standard deviations of each variable were calculated for respondents' expectations and perceptions. A paired group t-test of expectation and perceptions mean was calculated for each variable and variable means were summed for both expectations and perceptions. Examination of demographic data for dissatisfied respondents did not yield any significant differences from the whole sample.

Table 4.2 Importance Rankings of Customer Service Variables

Variable	Overall Mean	Raw Ranking Scores	Weighted Ranking Score
On-Time Delivery	4.68	77	286
Price	4.28	65	259
Order Short or Damaged (OSD)	4.81	66	215
Complete Orders	4.59	62	190
Availability	4.12	32	89
Accurate Invoices	4.57	39	86
Action on Complaints	4.61	35	78
After Sales Support	4.13	25	47
Helpful Customer Service Representatives (CSRs)	4.29	19	41
Delivery Time	3.76	13	32
Easy Ordering	4.09	11	23
Consistent Order Cycle Time (OCT)	3.69	5	14
Return Policy	4.16	8	14
Ongoing Information	3.44	2	6
Customised Services	3.59	3	8
Appropriate Order Cycle Time (OCT)	3.61	3	7

The satisfied group of respondents had summed variable mean values of 66.7 for expectations and 69.6 for perceptions; thus perceptions exceeded expectations. The difference of +2.9 indicates satisfaction was achieved for these respondents according to the service quality model (Mentzer, Gomes and Krapfel 1989, Parasuraman *et al.* 1985). Seven variables had absolute t-test values greater than 1.96 that indicated significant differences between means. Four variables had positive t-test values: availability, on-time delivery, complete and accurate orders, and orders arriving undamaged and according to specification (OSD). The positive sign indicates that expectations exceeded perceptions for these variables and respondents were dissatisfied according to the service quality model. Three variables had negative t-test values: appropriate order cycle time (OCT), consistent OCT and return policy. The negative sign indicates perceptions exceeded expectations for these variables and respondents were satisfied according to the service quality model.

The dissatisfied group of respondents had summed means variable values of 66.3 for expectations and 55.8 for perceptions; thus expectations exceeded perceptions. The difference of -10.5 indicates that satisfaction was not achieved for these respondents according to the service quality model (Mentzer, Gomes and Krapfel 1989, Parasuraman *et al.* 1985). Six variables had positive t-test values greater than 1.96 that indicated significant differences between means: price, availability, on-time delivery, complete and accurate orders, OSD, and action on complaints.

Since all six variables had positive t-test values, expectations exceeded perceptions for these variables and respondents were dissatisfied according to the service quality criteria.

Table 4.3 t-test Comparison of Satisfied and Dissatisfied Respondents

Variable	Satisfied Respondents	Dissatisfied Respondents	Direction
	t-test	t-test	
Availability	3.223	2.942	Similar
On-Time Delivery	4.427	4.980	Similar
Complete Orders	3.339	3.271	Similar
OSD	4.631	4.197	Similar
Appropriate OCT	-2.697	0.642	Dissimilar
Return Policy	-3.146	0.094	Dissimilar
Consistent OCT	-3.105	0.572	Dissimilar
Price	-0.469	2.956	Dissimilar
Action on Complaints	-1.239	3.484	Dissimilar

A comparison of the significant t-test values between the satisfied and dissatisfied groups is shown in Table 4.3. Nine variables out of 16 had significant t-test values. Four variables had similar values in terms of magnitude and direction between both groups: availability, on-time delivery, complete and accurate orders and OSD. The direction of these variables indicated respondents were dissatisfied with these variables. Three variables, appropriate and consistent OCT and return policy, were dissimilar but the direction indicated that respondents were satisfied with these variables. Only two variables, price and action on complaints, has significant differences between satisfied and dissatisfied respondents where only the latter were dissatisfied with the variables. Thus, price and action on complaints were considered to be key discriminating variables between satisfaction and dissatisfaction for this sample. However this finding must be viewed with caution due to the small number of dissatisfied respondents.

4.4. FACTOR ANALYSIS

Exploratory factor analysis was used to assess whether any of the 16 variables were items underlying constructs of customer service. Factor analysis is a data reduction technique for analysing the structure of inter-item or inter-variable correlations among large numbers of variables by defining a set of common underlying dimensions or factors (Hair *et al.* 1995, Robson 1993). It has three main purposes: the identification of groups of variables that relate to each other, the development of model parsimony by simplifying the number of variables to these new groups, and the construction of indices which explain the bulk of variation in the data (Hair *et al.* 1995). It is also useful for assessing the reliability of multiple-item measures (Carmines and Zeller 1979).

The first step was to check whether factor analysis was appropriate for the data under consideration. There were 75 cases considered as the other 30 cases had variables that were ‘not applicable’ and non-response or missing data. This number of cases represented almost five cases per variables but as noted in section 3.3 was at the minimum level suggested in the literature. However, the factor correlation matrix for the 16 variables yielded sufficient level and depth of inter-item correlation, *i.e.*, substantial numbers of correlations greater than 0.30. Two other tests were also applied. The Bartlett test of sphericity provides a chi-square statistical probability that the correlation matrix has significant correlations among the variables. The chi-square for the 75 cases was 601 with 120 degrees of freedom. The Kaiser Meyer Olkin measure of sampling adequacy provides an index from zero to one, reaching one when each variable is perfectly predicted without error by the other variables. This index was 0.80 and is considered ‘meritorious’ (Hair *et al.* 1995). Based on the analysis of the correlation matrix and these two tests, factor analysis was considered appropriate for the 75 available cases.

Table 4.4 Total Variance Explained

Factor	Initial Eigenvalues	Initial Solution	Cumulative %	Rotated Solution	Cumulative %
		% of Variance		% of Variance	
1	6.186	38.664	38.664	18.589	18.589
2	1.988	12.428	51.092	14.797	33.387
3	1.348	8.425	59.517	12.257	45.644
4	1.141	7.131	66.648	10.947	56.590

The next step was to extract factors from the data. One extraction method is principal axis analysis and is appropriate to use when there is a desire to reveal latent dimensions of the original variables and there is little knowledge about the specific and error variances. It was selected as the Study was concerned with latent variables underlying constructs of customer service, and variances specific to individual variables or derived from errors in data-collection, measurement error or random components was not available (Hair *et al.* 1995).

The number of factors to extract was the third step. Two methods are useful for this process (Hair *et al.* 1995, Remenyi *et al.* 1998). The first examines the latent roots or eigenvalues of factors. Factors with eigenvalues less than 1.00 are considered insignificant and should be disregarded. The second method considers the percentage amount of variance that is explained by the factors. Table 4.4 shows the initial eigenvalues and variance explained for four factors in the initial principal axis solution. There were four factors with eigenvalues greater than 1.0 that explained two-thirds (67%) of the variance. Factor 1 had 13 of the 16 variables and explained almost 40% of the variance but was a meaningless factor that suggested no important groups of variables of significance.

The factor solution was ‘rotated’ mathematically until the reference axes of variance reached another position that better explained the factors and the factor loadings, *i.e.* correlations of each variable with the factor. Orthogonal rotation maintains the axes at 90 degrees and thus each

variable's loading on each factor is independent of its loading on another factor. Oblique rotation is not orthogonal and factors therefore do not remain completely unrelated as independence is lost (Hair *et al.* 1995). The analysis of orthogonal factors and the maintenance of independence were important for this Study to ensure robust findings and useful information underlying constructs of customer service, thus orthogonal rotation was selected.

Table 4.5 Coefficient Alpha Scores for Factors

	Factor Loadings	Coefficient Alpha	Inter-Item Correlation
Factor 1		.873	
Appropriate Order Cycle Time (OCT)	.953		
Consistent Order Cycle Time (OCT)	.752		
Customised Services	.727		
Factor 2		.811	
Return Policy	.736		
Easy Ordering	.541		
After Sales Support	.540		
Helpful Customer Service Representatives (CSRs)	.520		
Factor 3		N/A	.518 *
Price	.785		
Availability	.549		
Factor 4		N/A	.303 *
On-Time Delivery	.848		
Action on Complaints	.538		

* *Inter-item correlation for two item factors*

The factor loadings are correlation coefficients for each variable indicating the weight assigned to the factor. Mathematically, squaring the factor loading yields the amount of a variable's variance accounted for by the factor (Hair *et al.* 1995). For example, the variable easy ordering in Factor 2 has a loading of 0.541 (see Table 4.5). Factor 2 therefore accounts for 29.3% (0.541^2) of this variable's variance. Loadings greater than .50 are considered significant as they explain at least 25% of a variable's variance by the factor (Hair *et al.* 1995, Remenyi *et al.* 1998).

Four distinct factors emerged from the rotation (see Table 4.5). Factor 1 contains three variables: appropriate and consistent OCT and customised services. Factor 2 contains four variables: return policy, easy ordering, after sales support and helpful customer service representatives (CSRs). Factors 3 and 4 each contain two variables: price and availability, and on-time delivery and action on complaints respectively. The four factors in the orthogonal rotation solution explained 57% of the variance (see Table 4.4). This decrease in variance explained was expected, as rotation will

derive greater independence between factors stemming from less mathematical correlation but is nonetheless significant.

The internal reliability of the variables and four factors was examined next using coefficient or Cronbach's alpha. Internal reliability refers to the degree to which indicator variables are internally consistent and measure the same unobserved constructs. Coefficient alpha is calculated using the inter-item correlations contained in the correlation matrix. Values will thus be between the range of zero and 1.0. Coefficient alpha scores exceeding a threshold of 0.7 are considered to be reliable (Carmines and Zeller 1979, Dunn *et al.* 1994, Hair *et al.* 1995). Coefficient alpha scores and inter-item correlations for the four factors are also presented in Table 4.5. Scores for factors 1 and 2 were 0.873 and 0.811 respectively. Since they greatly exceed 0.70 they were considered internally reliable. Factors 3 and 4 do not have alpha scores. Coefficient alpha's purpose is to compare each item or variable to the remaining items as a group and it is therefore meaningless for two item factors (Carmines and Zeller 1979, Mentzer, Flint and Kent 1999). The inter-item correlations for factors 3 and 4 were 0.518 and 0.303 respectively. These correlations are not strong, particularly factor 4, and thus no inferences could be made about their internal reliability. Thus, factors 1 and 2 were considered to underlie constructs of logistics customer service for this sample. However, they did not contain any of the four important variables noted in section 4.3 nor the two discriminating variables noted in section 4.4.

5. CONCLUSIONS

The data analysis for this Study provided findings that met the research objectives outlined in section 2. Intermediaries in this sub-sector of the food processing industry expect suppliers to provide variables of logistics customer service. The four most important variables sought are on-time delivery, price, whether an order arrived OSD, and whether a complete order arrived. A majority of respondents were satisfied with the customer service provided in an actual event, but of those who were dissatisfied, price and action on complaints are key discriminating variables. Two significant factors were found to underlie constructs of logistics customer service. Variables in the first factor are appropriate and consistent OCT and customised services. Variables in the second factor are return policy, easy ordering, after sales support and helpful CSRs.

These findings provide a base of results with which to proceed to the second stage (step 5) of the Churchill (1979) and Dunn *et al.* (1994) research frameworks. The research methodology undertaken was designed to have the rigorous orientation called for by many authors. Both the literature review and the data analysis of the 16 variables confirmed sub-dimensions of substantive validity and content validity contained in construct validity. Survey and questionnaire quality, measures of important variables of logistics customer service, customer satisfaction as a result of perceptions compared to expectations, and the reliability of variables underlying constructs of logistics customer service were found to be significant and relevant.

However despite the rigour undertaken in this Study's research design two methodological issues did arise: would other data collection techniques have helped understanding of the phenomena under investigation and would a larger response have enabled more robust data analysis? Suggestions to address these issues are first, use other survey instruments such as personal interviews, time and budget permitting to provide triangulation of the phenomena, mitigate social responsibility response bias and confirm the findings from the questionnaire survey. Second, use a larger sample frame for the second stage or pre-notify the sample frame to enhance responses to allow more substantial data analysis, such as cross tabulations, and to confirm statistical robustness of the various analytical techniques used in this Study. Ideally, time and budget permitting, both a larger sample frame and pre-notification could be used in conjunction to maximise responses.

These suggestions do not mean that Study results presented in this paper are not meaningful, significant or robust. However addressing these two issues in future research provides an opportunity to enhance the Study as well as pursue the methodological rigour called for in the literature that is necessary to advance the logistics discipline.

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“HOW DO I LOVE THEE? LET ME COUNT THE WAYS: AVAILABILITY, ON-TIME DELIVERY, AND THE RIGHT PRICE!”

{The dichotomy between transactional and relational exchange in logistics customer service}

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ABSTRACT

The customer-supplier dyadic exchange and relationship marketing are well-established research areas in the marketing discipline. Supplier and customer relationships, or partnerships in logistics has also received considerable attention amongst academics since the late 1980s. The literature has encouraged firms to develop customer service policies to satisfy customer needs and promote long term and profitable relationships, and has documented the benefits for firms that do so. However, empirical studies in logistics customer service have revealed a different situation. Transaction-oriented dimensions such as availability, timeliness and price appear to be more important to customers than relationship dimensions of trust, integrity and commitment. This paper briefly discusses the importance of customer service to relationships and then considers the nature of relationships in logistics. Then, the dichotomy between customer attitudes and behaviour regarding transactions and relationships is explored on conceptual and empirical levels from studies in the extant literature.

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Next, three methodologies are presented as potential frameworks to address dichotomous attitudes and behaviour of customers. Finally, the paper concludes with suggestions for future research.

1. WHITHER CUSTOMER SERVICE?

Firms face a number of important challenges in the new millennium with respect to logistics and supply chains. Focusing on customer service and managing supplier–customer relations are seen as two of these challenges (Bowersox, Closs and Stank 2000, Skjøtt-Larsen 2000).

Firms need to acquire and retain customers to buy their products and generate sales revenue and profits. Customers who are satisfied with a firm's products and customer service should develop increased customer loyalty, repeat and increased purchases, and a propensity towards establishing long-term relationships. Thus, relationship development may be considered a natural outcome of customer satisfaction derived from customer service.

Firms are therefore encouraged to provide value-added customer service and be customer-responsive in order to differentiate themselves in the market and enhance a customer's purchase. Such customer behaviour has been proposed to enhance a firm's financial performance (Christopher 1997, Daugherty, Stank and Ellinger 1998; Emerson and Grimm 1998).

Customer service strategies should lead a firm's customers to adopt the behaviours noted above and develop long-term relationships or partnerships with them. Thus, customer service is posited as an antecedent for relationship development.

2. LOGISTICS RELATIONSHIPS

The logistics literature has called on firms to develop long-term relationships or partnerships since the late 1980s (Bowersox 1988, Gardner and Cooper 1988, Anderson and Narus 1990). Relationships are deemed necessary to provide firm differentiation in a rapidly changing business environment of increased competition, more sophisticated and fragmented customers, advancing technology, and the 'commoditization' of products (Christopher, Payne and Ballantyne 1991, Christopher 1997). This call in the logistics discipline has mirrored discussions in the marketing discipline concerning relationship marketing.

The earliest relationship marketing conception developed as an extension to Bagozzi's (1975) dyadic social exchange paradigm that characterises the marketing concept and includes consumer satisfaction elements. Bagozzi's paradigm has been incorporated into the American Marketing Association's definition of marketing (Li and Nicholls 2000).

However other conceptions have since appeared including the interaction and networks approach from Håkansson and the Industrial Marketing and Purchasing Group (IMP) and the 'Nordic School' of services marketing approach of Grönroos and Gummesson (Pels 1999).

Möller and Halinen (2000) provided a good review of these newer conceptual sources and other issues in relationship marketing. They noted each source has its own unique perspective towards relationship marketing, but all contain an underlying premise that the traditional marketing-mix approach of transactional exchange of Bagozzi is insufficient to allow managers to cope in their rapidly-changing environments.

Relationships in marketing and logistics are built upon trust and commitment from shared values and information, mutual dependence, communication and relationship benefits (Morgan and Hunt 1994, Spekman, Kamauff and Myhr 1998, Tate 1996).

Relationship benefits accruing to logistics suppliers and customers include cost reductions, risk sharing, shared creativity, understanding of customer defections and the potential for new business (Bowersox 1988, Christopher 1997). Appropriate conditions for establishing logistics relationships include asymmetry in power or influence by one firm, desire for business stability, a requirement to establish legitimacy, regulatory necessity, usefulness of reciprocity, and an ability to achieve efficiencies (Blois 1996).

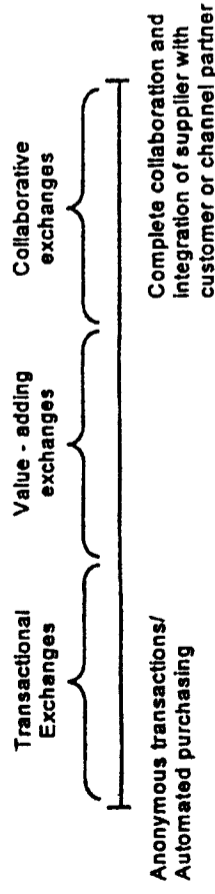


Figure 1: Transaction - Relationship Continuum (Day 2000)

But what about those firms that pursue transactional or one-off exchanges only à la Bagozzi? Continuums with transactional and relational anchors have been proposed as a means for both types of exchanges to co-exist. Figure 1 shows one such continuum from Day (2000). However a consensus is that relationships or partnerships are desirable, and firms have been encouraged to move towards that end of a continuum. There have

also been strategies proposed to effect a transition from transactional to relational exchanges, two examples are presented here.

Möller and Halinen (2000) proposed two managerial modes for relationship marketing: a market-based mode that manages a firm's customer base and a network-based mode that manages interdependencies between business actors. They argued managers have to utilise both modes in conjunction with traditional marketing management techniques.

Christopher (1997) proposed firms develop multiple points of connection between various functional areas of suppliers and customers in order to strengthen bonds. These connections would see suppliers becoming 'preferred' for customers and thus barriers being erected against competitor entry and customer switching.

A disadvantage of both proposed strategies is that they add levels of complexity to firms. The first strategy suggests firms may have to work at bimodal levels with their customer base. The second strategy requires extra effort by firms to establish and manage multi-level customer contacts. Thus, firms that utilise such strategies for relationship development may find it difficult to achieve 'promised' efficiencies and profitability.

3. THE RELATIONSHIP-TRANSACTION DICHOTOMY¹

Some authors have considered the notion of relationships represents a new 'paradigm' particularly in marketing (Grönroos 1994, Brodie, Coviello, Brookes and Little 1997). And yet, there are some conceptual difficulties with linkages between customer service and relationship development and a 'gap' between normative theory postulated by academics and everyday

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practice of marketers in firms (Fournier, Dobscha and Mick 1998, Li and Nichols 2000).

Empirical studies have shown different behaviours by customers whereby they focus on transactional issues in customer service whilst promoting the value and importance of relationships. The concept of supplier –customer relationships is still relatively new in Western business settings and old habits of using supplier competition to maintain low prices and releasing those suppliers who do not do so are slow to change (Krause and Ellram 1997). Buyers or customers in exchange situations might therefore be of ‘two minds’ and not ready or able to fully embrace relationship or relationship marketing concepts.

A key feature to establishing relationships is a supplier’s and a customer’s understanding of, and willingness to sacrifice short-term advantages for long-term gains (Earp, Harrison and Hunter, 1999). However, definitions about relationships are often ambiguous and non-specific (Blois 1996, Blois 1998, Earp, Harrison and Hunter, 1999, Pressey and Mathews 2000).

Moreover, whilst current relationship theories promise added value beyond a transactional exchange they do not show how this value is produced (Tzokas and Saren 1997). Thus, firms and managers who are evaluated on short-term performance measures, such as quarterly or annual profitability, might lack the ability or desire to embrace relationships if the purpose of doing so is not clear (Ackerman 1996).

Managers might also engage in selfish and individualistic behaviour that has significant economic benefits over co-operative relationships but is not

conducive to relationship building (Palmer 1999). Such behaviour contradicts a ‘humanist’ interpretation of relationship building that considers individuals to be stable, identifiable and autonomous, and moral due to encompassing wholesome and beneficial values shared by everyone (Smith and Higgins 2000).

Evidence from empirical studies reinforces this confusion surrounding transactions and relationships and the subsequent behaviour of suppliers and customers. These studies also suggest it is primarily buyers or customers in an exchange that are less willing to indulge in relationships while acknowledging the importance and need for them.

Other evidence has been the failure or dissolution of much publicised logistics relationships or partnerships, including Laura Ashley and Federal Express and a *Fortune 500* company and its third-party logistics provider (Ackerman 1996, Lambert, Emmelhainz and Gardner 1999).

Campbell (1997) studied firms in the European flexible packaging industry in four partnership categories: customer-centred, political control, personal loyalty and mutual investment. The latter two categories correspond to usual relationship characteristics described above. Sellers or suppliers had higher percentage positive responses regarding choice in these two categories compared to buyers or customers, whilst the converse was recorded in the two former categories. Campbell concluded that buyers and sellers do not always agree on the sentiments or behaviours that occur in relationships, and that there is a wide diversity between buyers and sellers about what a relationship or partnership entails.

Spekman, Kamauff and Myhr (1998) investigated supply chains across five different industry groupings in the U.S. They found buyers tend to focus on cost-reduction through price, reliability of supply and reduced lead times, and are less likely to view their own customers and suppliers as irreplaceable and essential to future business. They concluded that buyers on one level seem to understand the importance of relationships in supply chains, but on another level are uncomfortable with the rhetoric and practice of relationships and easily revert to cost-driven behaviours.

Grant (2001) surveyed customers in the Scottish food processing industry and found the most important logistics customer service variables were transactional: on-time delivery, products arriving undamaged and according to specification, orders being complete and accurate, and price. Price was the discriminating factor between dissatisfied and satisfied customers, in favour of the latter. Yet factor analysis yielded two prime factors comprised solely of relationship variables, thus customer attitudes in this group also appear to operate at two different levels.

Thus, transition from a transaction to a relationship focus has been problematic in practice and a dichotomy may exist in firms regarding transactional and relational exchanges. This dichotomy suggests academics and practitioners in logistics need to acquire a better understanding of customer attitudes and behaviour towards relationships or partnerships in order to achieve effectiveness. But how might logisticians obtain such understanding? There are three methodologies in the literature that could provide the basis for further research into this phenomenon.

4. PROPOSED METHODOLOGIES

Two proposed linear methodologies are shown in Figure 2. One is from Tzokas and Saren (1997), who developed a customer value chain (CVC) that incorporates relationships, technology and the total consumption process as drivers of value. Akin to Porter's firm value chain (FVC), the CVC's primary activities include the components of the total consumption process that relate to the purchase needs, evaluation criteria and process. The secondary activities are relationships and technology. Tzokas and Saren anticipated the CVC would link to the FVC and thus provide a holistic view of the firm, its customers and their relationships.

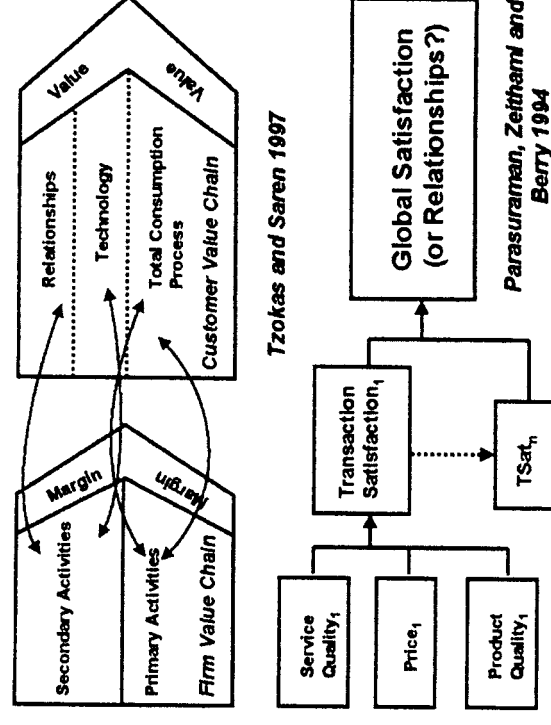


Figure 2: Two Proposed Linear Methodologies

The other is from Parasuraman, Zeithaml and Berry (1994), who developed a transaction-specific methodology that attempts to describe a customer's global satisfaction in terms of the sum of a number of specific transactions. Research using this construct of global customer satisfaction might find it analogous to long-term relationship behaviour that reflects

ongoing satisfaction with discrete transactions, predicated upon the evaluation of components of service quality, price and product quality.

Mentzer, Rutner and Matsuno (1997) and Rutner and Langley (2001) discussed the use of the means-end value hierarchy model (MEHVM) as a methodology for understanding the needs and values of customers in the supply chain. The MEHVM has its roots in the psychology and marketing disciplines and is an interrelated cognitive network that considers customer motivation in terms of their values resulting from product/service benefits or consequences provided by specific product/service attributes. The model is hierarchical as a customer's overarching values determine the benefits or consequences sought that in turn determine what attributes are required to realise these benefits or consequences.

Firms have used the MEHVM in business to consumer (B2C) contexts to understand consumers and the value they place on product or service offerings. However the MEHVM also has application in a business to business (B2B) and logistics context as it is just as important to understand the needs and values of customers within a supply chain (Mentzer, Rutner and Matsuno 1997). Moreover, arguments by some that B2C and B2B exchanges are fundamentally different have not been empirically proven in several studies (Coviello and Brodie 2001).

Rutner and Langley's devised the MEHVM shown in Figure 3 based on previous modelling by other authors and from their own empirical survey of approximately 100 companies using open-ended questions related to logistics value. It proposes a number of customer service variables as attributes; customer service, quality, SCM, profitability and relationship

building as the benefits or consequences; and logistics value as the overarching customer value. Rutner and Langley used this model to delineate definitions of logistics value and logistics value-added.

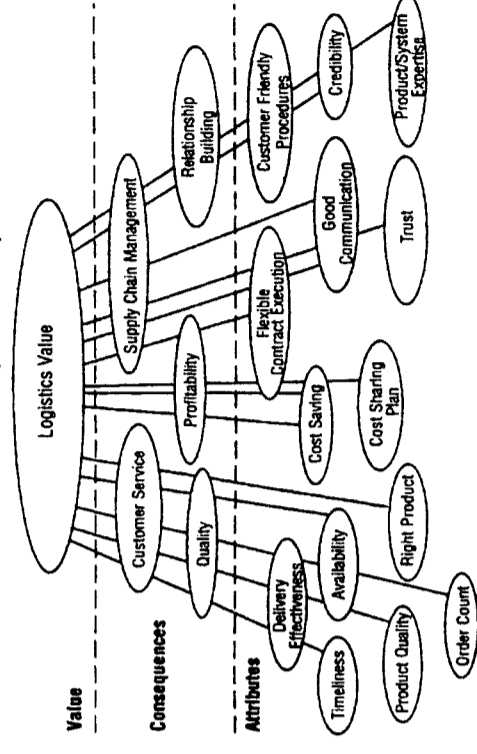


Figure 3: Means-End Value Hierarchy Model (Rutner and Langley 2001)

All three methodologies above have only been presented in strategic and theoretical contexts and have not been empirically tested. Empirical research using these methodologies might help explain the different levels of customer behaviour regarding transactions and relationships.

6. CONCLUSIONS

Customer service and relationship or partnerships in logistics continue to be important research and practitioner topics. Literature on relationships or partnerships outlines potential benefits available to customers and suppliers entering into such arrangements. These include increased long-term profits that are fundamental to a firm's corporate success and health.

However, empirical evidence from the literature suggests that important customer service variables tend to be transactional in nature. Customers do not appear willing to embrace relationships as readily as their suppliers do, and revert to historical behaviours related to transactional concerns of availability, delivery time and price. This behaviour is not easily explained within existing relationship and relationship marketing theories.

Three different methodologies may be alternative bases for further research to help develop a better understanding of the dichotomy between customer service transactions and relationships in logistics. All three have different constructs and dimensions related thereto and accordingly require different research designs. Some brief suggestions for the utilisation of these methodologies follow.

A study of Tzokas and Saren's CVC could consider customer value dependent upon constructs of total consumption, relationships and technology. Areas of interest might be correlations amongst these constructs and their coefficient weights in determining customer value.

A study of the Parasuraman, Zeithaml and Berry model could consider global satisfaction over time, as a surrogate for relationships, dependent upon the transaction satisfaction construct and its dimensions of price and service and product quality. Areas of interest might be correlations amongst these dimensions, their weights in determining both transaction and global satisfaction, and whether relationship intentions or activities are equivalent to the latter.

A study of Rutner and Langley's MEHVM could consider relationship value overarching benefits of customer service and other constructs, based on transactional variables as attributes. Areas of interest might be whether this hierarchical model is more robust and predictive compared to the linear models, and how customers operate at different hierarchical levels.

The author does not accept or reject either side of the transaction-relationship dichotomy, nor favour one methodology over the others. The purpose of this paper has been to present these issues for discussion to promote ongoing logistics competence in industry and research.

¹At the conference presentation Professor Olav Solem asked if a duality exists as opposed to a dichotomy, consistent with the continuum shown in Figure 1. There is no reason why not however the limited evidence found so far indicates primarily dichotomous positions. It is a good point for future consideration and the author acknowledges and thanks Professor Solem for this contribution.

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