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The Utility of Employee Flows as a Driver of Marketing Productivity

By

Gregory John Lee

A thesis submitted to the Faculty of Commerce Law and Management, University of the Witwatersrand, Johannesburg, in fulfilment of the Degree of Doctor of Philosophy.

Johannesburg, 2008

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ABSTRACT

The movement or flow of employees into, around and out of organisations ('employee flow') has long been a central issue in human resource management and industrial psychology. This is especially so for the specific element of employee turnover, but also applies to staffing and internal talent development. Employee flow is especially salient in a South African context characterised by scarce skills.

The voluminous literature on employee flow has tended to view each element such as recruitment or turnover separately, and has generally focused on internal outcomes (e.g. commitment or satisfaction). This thesis attempts to add two crucial features, namely EF as a whole system (i.e. inflows, intra-organisation flows and outflows of staff in conjunction), and customer-based outcomes. Something of a synthesis is thus sought between EF and ideas of marketing productivity.

Marketing productivity has been proposed as one of the most important foci of the marketing discipline (Rust, Ambler, Carpenter, Kumar, & Srivastava, 2004; Sheth & Sisodia, 2002). It refers to links between marketing and organisational performance or value. Models such as the 'service profit chain' (Heskett, Sasser & Schlesinger, 1997) identify the antecedents of marketing productivity to be internal organisation characteristics such as staff satisfaction or loyalty. This thesis seeks to expand such models in the context of a system of EFs. Advanced decision theoretic utility theories of EF (e.g. Boudreau & Berger, 1985) allow for the complete, integrated value of employee movements over time to be modelled. Such a model is constructed and links to marketing metrics, notably service perceptions, investigated. Organisational value arising via the outcomes for customers are further

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value of employee movements is proposed to , mediated by improved customer equity (e.g. Gelade & Young, 2005).

An empirical, survey-based study was conducted to assess the model. EF was assessed in business-to-business relationships from the perspective of the customer using conceptions of decision theoretic utility analysis, and both intermediate and outcome-based customer perceptions of service quality used as dependent variables. Moderation effects from frequency of interaction and integration of the customer into the supply chain were also tested, as well as controls for characteristics of the transaction, organisation and industry.

Results suggest that EF does significantly affect various stages of service quality provision, notably 'potential quality', which it appears mediates links to other aspects of service provision, especially final service outcomes. In addition, EF was also found to affect outcomes through the intermediate relational element of 'soft process quality', possibly highlighting the importance of relationship management and soft skills in B2B relationships. Employee outflows in particular showed evidence of relatively strong effects, possibly highlighting the ongoing salience of turnover, in particular effective identification and management of functional versus dysfunctional turnover instead of a sole focus on retention. Results were significantly stronger for service industries than others (presumably as service is the outcome), and when there were relatively few supplier contact staff (perhaps due to social networking, bonding, exchange or emotional contagion).

This thesis adds substantially to the methodologies underlying service profit chain models. It explicitly included new constructs (EF utility). Contextually, it was the first proper test of this model in South Africa. Theoretical

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inter-disciplinary syntheses of utility models, nd customer utilities to the organisation. Ultimately, practical significance may arise for managerial models, estimating and justifying human resource interventions.

Key words: Service-profit chain, marketing metrics, decision theoretic utility analysis, employee movement, employee flow, employee turnover, employee acquisition, employee separation, customer equity, customer satisfaction, customer retention, organisational performance, organisational value.

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Declaration

I hereby declare that this thesis is my own unaided work except where due recognition has been given. It is submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree in any other university.

Gregory John Lee

Johannesburg

23rd January 2008

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EDICATIONS

There are so many people who deserve blessings for their help and support.

To Jesus Christ, as always, my great love and unfailing Lord.

Andrew Thatcher for stepping in to supervise, with a dedication and thoroughness I would never have expected, thanks so much!

Xander of course for always being there with wry encouragements, necessary distractions for the end of the rope, proof reading and much tea.

To the church and related crowd – Andrew, Katalin, Dave and Tam, Paul, Russell, Wayne and Brigs, Deborah, Lynette, Nancy, Rilet, Stella, Alet etc. for great support through all the years. What will you ask me now if the question "So, how's the PhD?" goes away?

To Rob, Turtle, Dad, Mom, Paps and Eric.

My colleagues, who have never stopped believing in me and supporting me. The tearoom crowd, Robert Vivian, Christo Auret, Frank Liebeberg, Lyndal, Aylit, Prof Harry, Ryan, Albert, Giampaolo Garzarelli, Neil Rankin, Stephan Shirmer, Scott Hoenig, Roo. Anthony Lumby for unflinching support, a seriously necessary leave of absence, and unstinting financial and personal support.

To all of you at church not yet mentioned, especially my cell, your prayers and support were wonderful.

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LS AND ABBREVIATIONS

2SLS	***Two stage least squares, an alternative estimator for regression or SEM with problematic endogenous variables***
AIC	*Akaike's Information Criterion, a structural equation modelling fit statistic, see Table 7-3*
AICR	*Robust equivalent of Akaike's Information Criterion, a model fit and comparison statistic*
B	*Unstandardised regression/SR path coefficient*
β	*Standardised regression/SR path coefficient*
B2B	*Business-to-business*
BCG	*Brogden, Cronbach & Gleser models of utility analysis*
BEE	*Black economic empowerment*
BICR	*Robust equivalent of Schwarz Information Criterion, a model fit and comparison statistic*
BR	*The base rate*
CAIC	*Bozdogan's (1987) CAIC, a structural equation modelling fit statistic, see Table 7-3*
CE	*Customer equity*
CFA	*Confirmatory factor analysis*
CFI	*Bentler's Comparative Fit Index, a structural equation modelling fit statistic, see Table 7-3*
CLV	*Customer lifetime value*
DFBeta	*A measure of data point influence*
DFfit	*A measure of data point influence*
D_i^2	*Squared Mahalanobis distances, a measure of multivariate outliers*
EF	*Employee flow*
EFin	*Employee inflow quality*
EFout	*Employee outflow quality*
GFI	*Goodness of Fit Index, a structural equation modelling fit statistic, see Table 7-3*
GMM	*Generalised Method of Moments estimation procedure, in this case used for estimating models with adjustment of heteroscedasticity*
HET_1	*Pesaran and Taylor's (1999) heteroscedasticity test for two-stage least squares (2SLS) SEM models*
h_{ii}	*Hat score - a measure of multivariate outliers*
HPQ	*Hard process quality - sub-dimension of INDSERV referring to the quality of a supplier in providing good process service in 'hard' elements such as financial management and timing*
HPWS	*High performance work systems*
INDSERV	*Business-to-business service quality scale of Gounaris (2005)*
ISAP	*Index of South African Periodicals*
KSAs	*Knowledge, skills, and abilities*
LTS	*Least Trimmed Squares, a robust regression approach*
MAU	*Multiattribute utility analysis*
MCD	*Rousseeuw and Van Driessen's (1999) Minimum Covariance Determinant, an algorithm for drawing a covariances robust to outliers*
MM	*A robust regression approach*
MVE	*Rousseeuw's (1984) Minimum Volume Estimator, an algorithm for drawing a covariances robust to outliers*

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	ett's (1980) Non-normed Index, a structural equation
	tatistic, see Table 7-3
	Rate
OCB	*Organisational citizenship behaviours*
OLS	*Ordinary least squares, the predominant regression estimation procedure based on minimising the sum of squared residuals*
OQ	*Output quality - sub-dimension of INDSERV referring to the quality of a supplier in bringing about ultimate improvements in outcomes for the customer, such as image, sales or financial success.*
PQ	*Potential quality – sub-dimension of INDSERV referring to the potential of a supplier to provide good service*
R^2	*Squared multiple correlation*
RBN	*Raju, Burke & Normand utility analysis models*
RCT	*Referent cognitions theory*
RESET	*Pesaran and Talyor's (1999) specification error test for assessing fit of two-stage least squares (2SLS) SEM models*
RJP	*Realistic job preview*
RMR	*Root Mean Square Residual, a structural equation modelling fit statistic, see Table 7-3*
RMSEA	*Root mean square error approximation, a structural equation modelling fit statistic, see Table 7-3*
ROBCOV	*A SAS macro created by Friendly (2007) for creation of robust covariances based on the MCD or MVE*
ROI	*Return on investment*
RTR	*Replacement Turnover Rate*
RV	*Reference Value: word-of-mouth value of customers*
r_{xq}	*The correlational relationship between predictor and criterion*
r_{xy}	*Validity coefficient, i.e. the correlational relationship between predictor and outcome.*
S-estimation	*A robust regression approach*
SEM	*Structural equation modelling*
SHV	*Shareholder value*
SPQ	*Soft process quality - sub-dimension of INDSERV referring to the quality of a supplier in providing good process service in 'soft' relational elements such as communication*
SR	*Survival rate*
SR	*Structural regression – path analysis with latent variables*
SR	*Selection ratio = no. of hired candidates / no. of applicants*
TCE	*Transaction cost economics*
TTR	*True Turnover Rate*
UA	*Utility analysis, short for decision theoretic utility analysis*
VIF	*Variance Inflation Factor, a measure of multicollinearity*
WR	*Wastage rate*
ΔU	*Nett incremental utility from the selection procedure*
$\overline{Z}_{xs}$	*Average standardised selection score of selectees*
σ_y	*Standard deviation of service value*

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1. INTRODUCTION

The importance of staffing organisations with sufficiently qualified and talented employees of the required quantity and potential has consistently remained a core priority in both the business and academic arenas (Barney, 1991 & 1995; Cappelli & Crocker-Hefter, 1996; Mueller, 1996; Pfeffer, 1994; Ulrich, 1998). In juxtaposition to the many management and human resource management fads, the attraction, development and retention of talent in particular appears to remain a serious and abiding area of managerial interest and concern (Barney, 1995; Cappelli & Crocker-Hefter, 1996; Pfeffer, 1998). This is especially so in the South African economy, in which serious skills shortages continue to predominate (Department of Labour, 2005).

This thesis accordingly focuses on the issue of staffing. Specifically, it examines the issue of employee 'movement' or 'flow', seen as a whole system. In other words, although some employees may remain 'static' in their jobs, an organisation or business unit also experiences generally simultaneous inflows, outflows and internal movement of employees. Employee turnover may occur, sometimes draining the best talent from an organisation, other times leading to merciful release of underperforming staff (Hom & Griffeth, 1995). Exciting acquisitions of talented staff may turn an organisation around, or poor recruitment and selection let in sub-standard performers (Wright, Dunford and Snell, 2001). Internally, well-managed promotions or transfers may lead to variable job fit (Garibaldi, 2006).

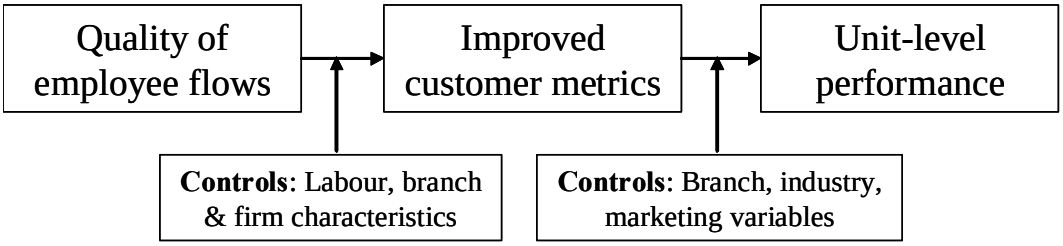
Employee flow (hereafter referred to as 'EF') is studied in this thesis within the broad context of organisational performance, conceived via a broad conception of the service profit chain (Heskett, Sasser & Schlesinger, 1997; Schlesinger & Heskett, 1991). In terms of such thinking, movement of personnel may have an appreciable effect on the workings of the organisation or unit and ultimately its performance and value. Often, effects of such

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s are supposed by researchers to impact r value via customers. In other words, because customers form much of the operating revenue of the organisation (see Chapter Five), it is likely that if employee-related issues such as EF are to impact on organisation performance and value then that impact probably needs to occur via improved service and products given to customers with concomitant improvement in customer affective and behavioural attachment to the organisation.

Accordingly, the study will examine the issues of EF, customer metrics and equity, and the links to customer-related organisation performance, then test an empirical model seeking to establish some of these links. This set of relationships is represented in Figure 1-1, including the effects stemming from characteristics of the firm, industry or broad economy.

Figure 1-1: Broad model for empirical study



Before proceeding, it is necessary to 'paint the big picture'. That is, this thesis seeks to examine the impact of EF within the larger context of organisational performance. The specific organisational performance model to be examined is a broad conceptualisation of the service-profit chain. Therefore, a brief review of service-profit chain models is given below to set the stage for the specific discussions to follow.

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T CHAIN

The provision of service to customers and consumers has become a key focus for business today. The increase in service salience within economies (both first world and developing economies, Lovelock & Wright, 1999) has helped to accelerate this trend. Even within traditional retail and consumer product markets, service within supply chains has become a watchword (e.g. Dietz, Pugh, & Wiley, 2004; Gounaris, 2005; Gelade & Young, 2005).

This increasing focus has led researchers to attempt to map the overall systemic antecedents, processes and effects of service. The service profit chain represents such a move, and involves a set of models seeking to explain how interior employee-related constructs lead to improved customer metrics and therefore to improved organisational performance and ultimately value. The service profit chain will be examined as the primary context for the linkages proposed in this thesis between EF, customer and organisation/unit performance.

1.1.1 EARLY SERVICE PROFIT CHAIN THINKING

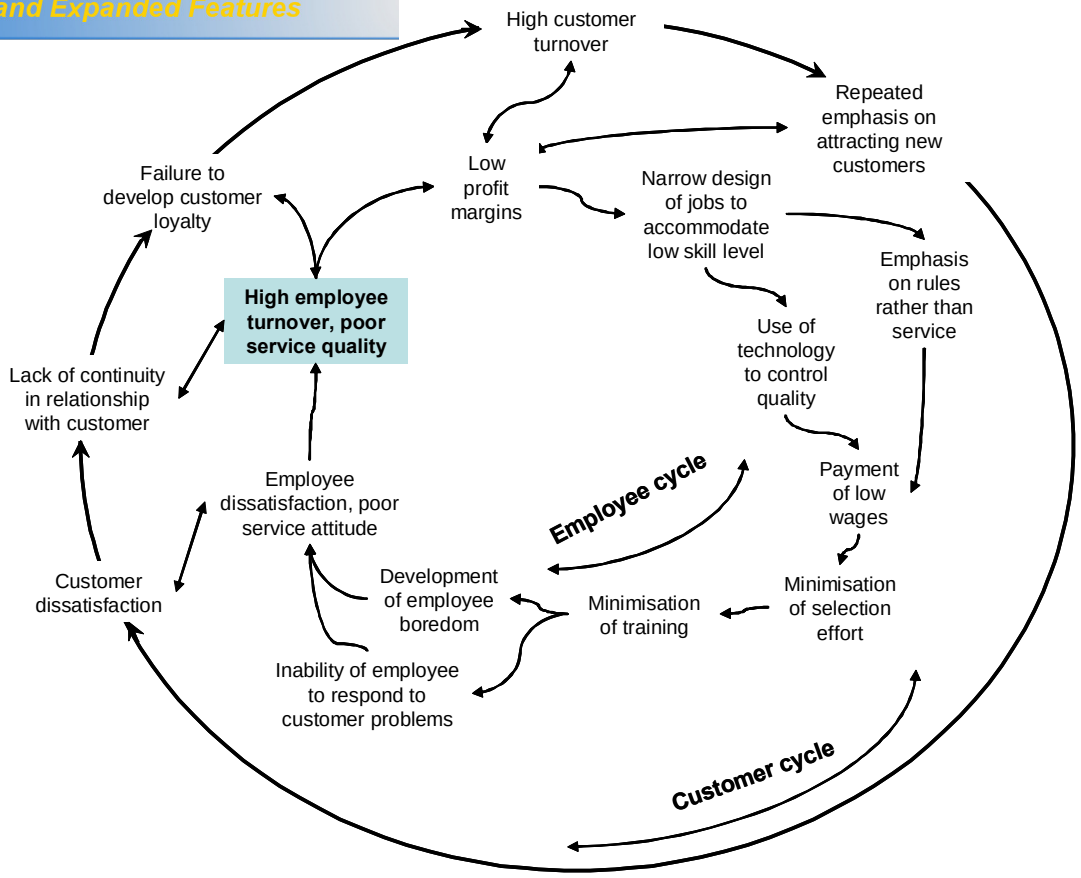
In initial work on the service-profit chain, Schlesinger and Heskett (1991) investigated the occurrence of poor and good service quality respectively, attempting to distil processes of each that could lead to generalisable models.

A. Cycles of Failure in Service quality

Schlesinger and Heskett (1991) presented the Cycle of Failure model presented in Figure 1-2, in which they suggested that poor service quality arises from poor customer contact staff, notably poorly paid and developed personnel leading to high staff turnover, employee dissatisfaction, customer dissatisfaction, and consequently reduced sales (Schlesinger & Heskett, 1991:17).

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991:18) cycle of failure model



These linkages were supported by some research findings at the time (Schlesinger & Heskett, 1991:18 cite Schneider & Bowen, 1985; Lawler, 1973; Parkington & Schneider, 1979; Bennis, 1970; Blau, 1974 and Johnson & Seymour, 1985). Evidence of these links, including more contemporary research, is given in Chapter Four and is not explicated here as this section is merely intended to provide an introduction of the models involved.

Schlesinger and Heskett (1991) suggested the following reasons for the perpetuation of cycles of failure: 1) Managers react to low employment and education levels by cutting staff development budgets rather than looking to the long term, 2) Managers overuse technology to service customers, denuding the 'core element' of personal contact that only employees can deliver; 3) Managers are generally cynical about broad economic trends such as inadequate skills in the labour market, and use these as justifications

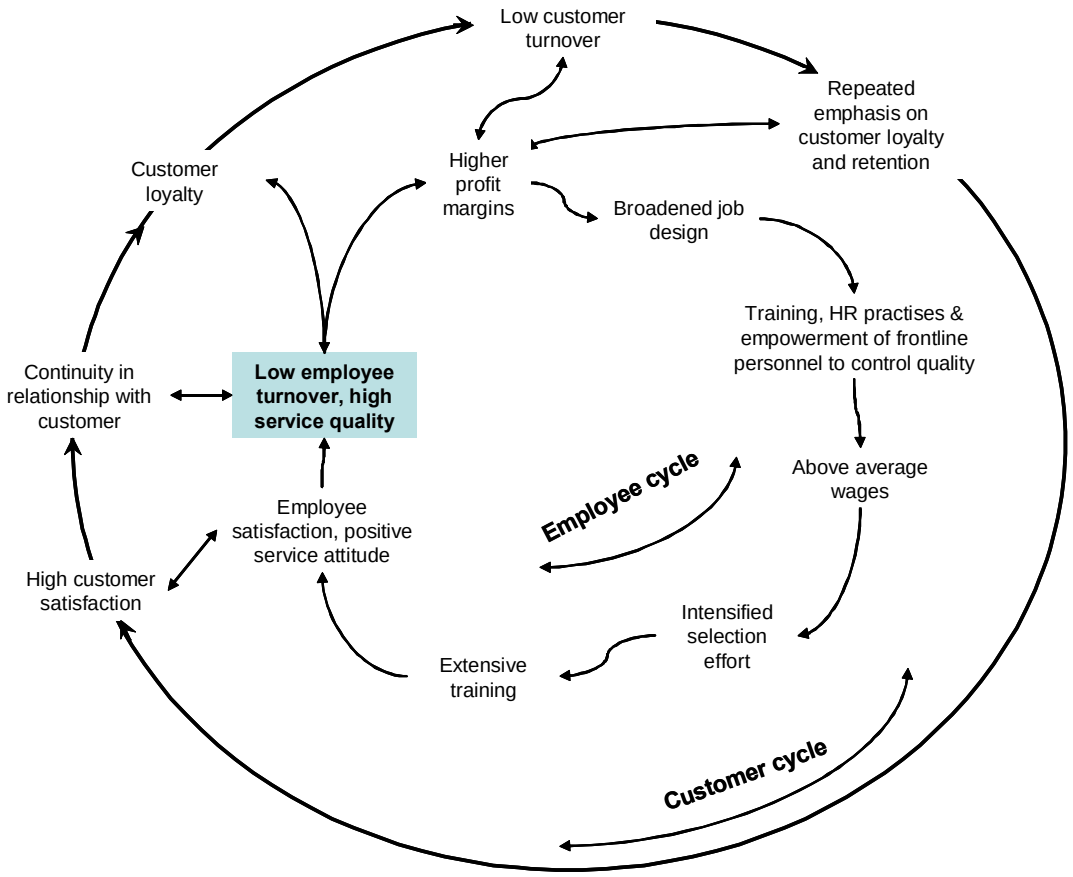
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work assignments that assume the worst in
hort-term performance leads to operational foci driving out longer term investments in human resources; 5) Lack of measurement of human resource interventions and customer value lead to uncertainty in managerial decision-making. The intermediate role of employee turnover – the specific element of flow included here – is highlighted in Figure 1-2.

B. The Cycle of Success

Schlesinger and Heskett (1991) furthermore observed from various case studies a possible 'cycle of success', seen in Figure 1-3.

Figure 1-3: Schlesinger and Heskett's (1991:19) cycle of success model



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posited to lead to high customer loyalty and ursors of this seemed to be good pay, empowerment of staff, and development and training.

Schlesinger and Heskett (1991) posited that a cycle of success existed for a variety of reasons: 1) Managers acceptance that although poor labour market conditions existed, they would remain rigorous in employee selection and development to ensure integrity of their staff pool, instead of using this condition to generate excuses for poor employee and customer satisfaction; 2) Technology facilitates face-to-face service quality rather than substituting for it - customer orientation attitude is deemed more valuable; 3) Short-term operational foci are important but not central, the organisation continues to focus on long term competitiveness through superior talent; 4) Employee and customer metrics are measured and utilised in strategy formulation.

The work presented above is largely atheoretical, but it did help to start the debate about systemic linkages between human resources, customer and financial systems of organisations.

Schlesinger and Heskett (1991:26-28) also suggested the following elements of strategy as found in organisations that display the cycle of success: 1) Careful selection 2) Realistic previews of the job and organisation; 3) Focus on early job experiences (good induction and socialisation of employees); 4) Employee empowerment and job decision latitude; 5) Communicating their role in customer satisfaction and economic success to employees; 6) Team work; 7) A focus on aggregate labour cost instead of individual wage levels (focus on the total cost of doing business); 8) Measurement of competitive goals and feedback into the service system; 9) Concentration on quality as the service core.

The elements of success defined above are also those defined in the area of the 'high performing work systems' literature, which over the same period has successfully investigated whether bundles of 'high performance' or 'high

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ces practises are predictive of organisational & Huselid, 1998; Becker & Gerhart, 1996; Clark, 1999; Delaney & Huselid, 1996; Dyer & Reeves, 1995; Guthrie, 2001; Harel & Tzafrir, 1999; Heffernan & Flood, 2000; Huselid, 1995; Ichniowski, Shaw & Prennushi, 1997; Kangis, & Williams, 2000; King, 1995; Lewis, 2002; MacDuffie, 1995; McCartney, 2004; Pfeffer, 1998; Ramsay, Scholarios & Harley, 2000; Terpstra & Rozell, 1993; Welbourne & Andrews, 1996). This literature provides much empirical and indeed theoretical backing to Schlesinger and Heskett's (1991) original case-study based observations.

Having investigated these initial thoughts, these authors moved on to begin deriving more holistic and systematic processes of linkages between human resources, customer and organisational performance and/or value (Heskett, Jones, Loveman, Sasser, & Schlesinger, 1994; Heskett, Sasser, and Schlesinger, 1997). It is these later models, examined below, which describe the service-profit chain proper and which provide therefore the modelling basis for the investigations done in this thesis.

1.1.2 CONTEMPORARY SERVICE-PROFIT CHAIN THINKING

As stated above, based on their earlier work on cycles of success and failure in organisations, Heskett, Sasser and Schlesinger (1997) later developed their concepts into the service-profit chain models used here. They defined the service profit chain concept as follows:

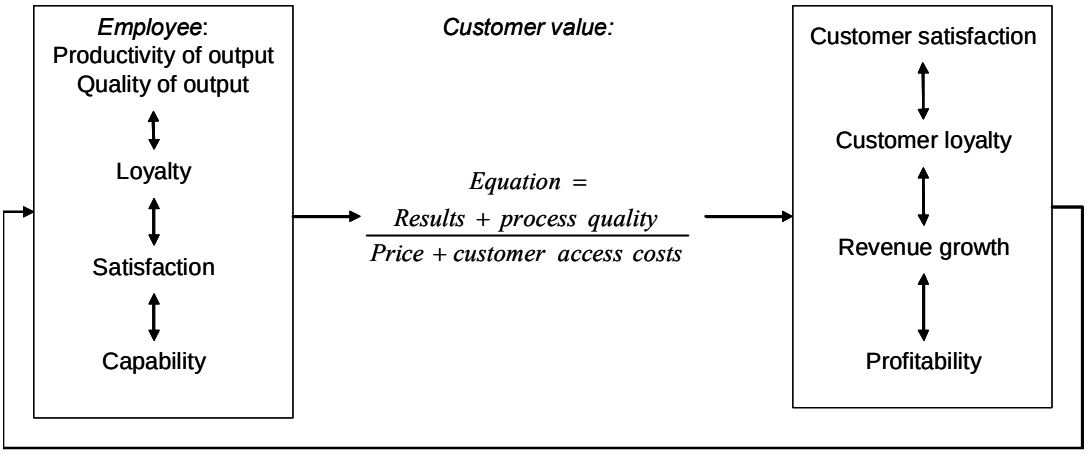
> **"Simply stated, service profit chain thinking maintains that there are direct and strong relationships between profit; growth; customer loyalty; customer satisfaction; the value of goods and services delivered to customers; and employee**

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, loyalty, and productivity" (Heskett *et*

They presented the broad model in Figure 1-4, in which it can be seen that various explicit relationships form their conceptualisation of service profit chain thinking. These include: 1) A positive relationship between profit and customer loyalty, 2) A positive relationship between employee loyalty and customer loyalty, 3) A positive relationship between employee satisfaction and customer satisfaction.

Figure 1-4: Elements of the service profit chain (Heskett et al., 1997: 12).



As also seen in Figure 1-4, Heskett *et al.* (1997) posit that the key central driver is 'customer value':

> **"the value of goods and services delivered to customers is equivalent to the results created for them as well as the quality of processes used to deliver the results, all in relation to the price of a service to the customer and other costs incurred by the customer in acquiring the service … the resulting leverage**

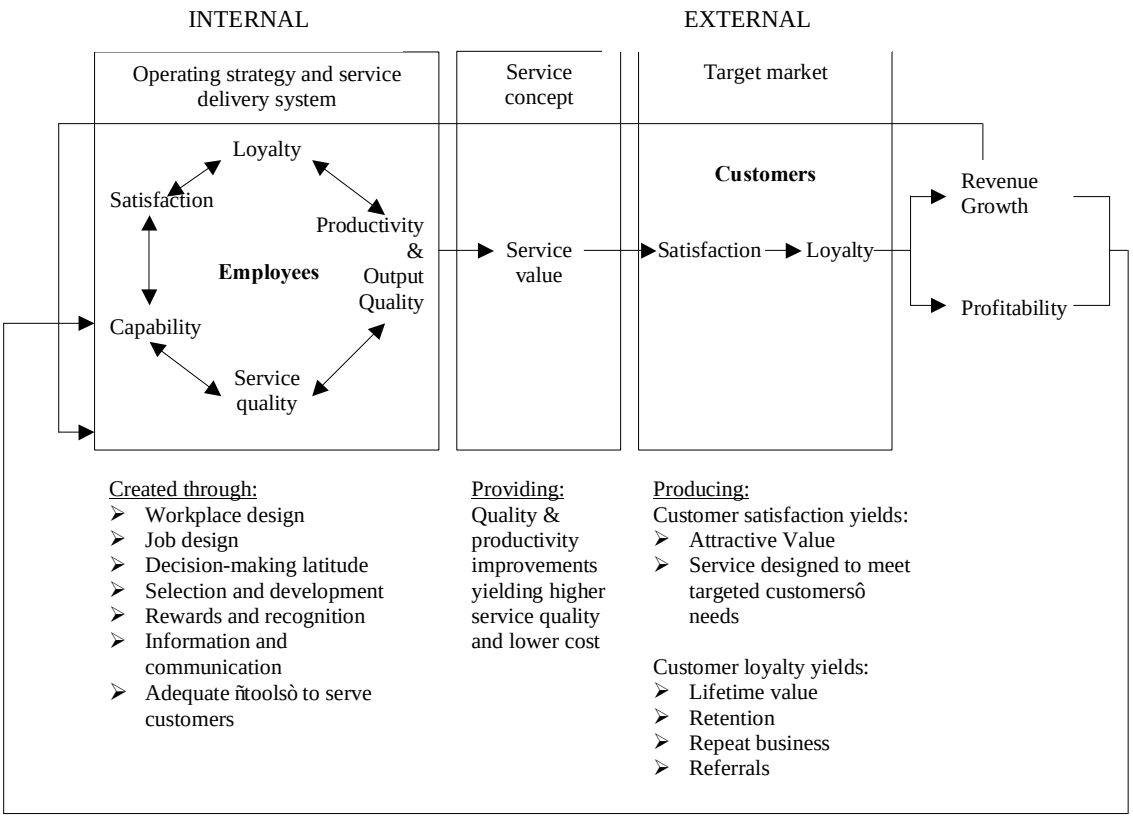
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over costs (to a service provider) creates

skett *et al.*, 1997: 12)."

Heskett *et al.* (1997) further suggested that the way in which this occurs can be represented as per Figure 1-5. Some of the main relationships proposed in the thesis can be seen in this figure, namely the creation of positive employee affect and behaviour (through a priori work environment and human resources activities and systems), leading to a) successful creation of value for customers, b) a positive match between customer affect and therefore sales-oriented behaviours, and c) ultimate profitability and value.

Figure 1-5: Activation of the service profit chain (Heskett et al., 1997:19)



With regard to the initial work systems involved, Heskett *et al.* (1997) described internal success as a function of what they refer to as a 'cycle of

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d internal operations – such as a strong and and sound human resource practices. Some EF sub-variables are included here, including issues such as recruitment and selection and turnover management, but EF is not presented as a whole system. It is precisely this omission that this thesis will seek to remedy, via both strong theoretical and empirical justification.

1.1.3 THE SATISFACTION MIRROR: NECESSARY OR NOT?

An important issue in the Heskett *et al.* (1997) model is their conception of a 'satisfaction mirror', in terms of which they hypothesise that customer satisfaction mirrors employee satisfaction (i.e. the two are essentially synchronous). They further suggest that satisfaction, when mirrored in the alternate party, leads to commensurate increases in employee and customer loyalty respectively.

With regard to employees, loyalty implies that the likelihood of employee turnover decreases, further strengthening relationships with customers, and, from the customer perspective, loyalty means repeat business and referrals improving revenue and profitability, as shown in Figure 1-5. According to this view, customer loyalty is dependent on customer satisfaction. Therefore, although Heskett *et al.* (1997) found that employee loyalty and customer loyalty are quite strongly positively related, the practical implication of this correlation can only be found where customer satisfaction mirrors employee satisfaction and this relationship is later mirrored in mutual loyalty.

The satisfaction mirror thesis also suggests that employee satisfaction and customer satisfaction reinforce each other over time, implying a stronger relationship between service personnel and customers in time that should yield increasing profitability and revenue growth. If this is correct, it is of primary importance that organisations implement measures to ensure

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action by empowering them to be active
pability within the context of a well functioning work environment, as this becomes the primary method of inducing customer satisfaction, loyalty, and ultimately higher profitability.

Chapter Four describes theory and evidence for links such as this between employee and customer constructs, therefore at this stage empirical and theoretical justification will be reserved. It is noteworthy that Heskett *et al.* (1997) place much emphasis on contagion of underlying affect rather than behaviour.

As will be seen in Chapter Four, notably in findings such as that of Gelade and Young (2005), who attempted to test a full mediation model rather than only bivariate linkages, it is possible that the core role of satisfaction is not necessarily the key one. From a theoretical basis too, influential theories such as Fishbein and Ajzen's (1975) Theory of Reasoned Action suggest that although affect is the beginning point of a behavioural process, it is linked only when intentions of behaviour and various other variables come into play.

With specific regard to this thesis, the key dependent variable of EF can certainly be linked in various ways to employee satisfaction – Heskett *et al.* (1997) themselves acknowledge so. Well recruited and selected personnel who have good fit with the job and organisation are probably likely to evidence higher satisfaction and indeed loyalty (Becker & Huselid, 1998; Guthrie, 2001; Huselid, 1995; Ichniowski, Shaw & Prennushi, 1997; MacDuffie, 1995). Turnover has been shown to lead to and be influenced itself by satisfaction (see Chapter Two). However as will be seen in Chapter Four, it is possible that other paths to customer and organisational success arising from EF can be discerned other than a satisfaction mirror: more behavioural hypotheses can also be made, such as the simple one that poor EF tends to denude absolute skill levels and therefore objective performance, regardless of

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could affect customer satisfaction but not isfaction). The reader is referred to the later discussions in the thesis on the linkages between employees and customers for more on this.

Notwithstanding the above, which provides a broad introductory framework, it is important to note that it is not the intention of this thesis to undertake a complete view of the elements of the service profit chain or of the satisfaction mirror. The role of EF will be examined in itself, with employee affect left unexplored, even if it is possible that employee affect is a consequence of flow variables. Given the service-profit chain model discussed above, these links are still considered to be a valid part of the model.

Therefore, as an interim conclusion, the broad conclusions of the service profit chain are embraced as a basis for this thesis, namely that internal employee policies, occurrences and affect may impact upon customers, which in turn affects organisational/unit performance and/or value. However with regard to EF, the thesis will not embrace the necessity for a satisfaction mirror overly closely: rather the possibility of direct links between EF and customer satisfaction is examined with the unmeasured possibility that internal employee satisfaction is involved left open for possibility.

1.2. MORE ON THE THESIS APPROACH TO EF

EF literature suffers from two weaknesses. First, statistical studies predominantly limit EF to singular sub-components, such as employee turnover or aspects of inflows like recruitment. However, EF logically involves a system of inflows, internal movement, outflows and feedback effects (Boudreau and Berger, 1985). As stated, an example is that employee turnover and internal transfers in one period have a feedback effect on recruitment and selection in later periods, both quantitatively (how many

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; in) and qualitatively (the type and caliber of
, inflows dictate outflows to some extent, for instance where poor recruitment jeopardizes job fit, leading to higher turnover (Hom and Griffeth, 1995). Therefore, studies of EF should treat the variable as an integrated, systems construct. One area that has achieved an integrated systems-wide view of EF is that of decision theoretic utility analysis (Boudreau and Berger, 1985). However, this area was developed and utilized exclusively for ex ante valuation rather than for use in exploratory statistical studies as is the case here.

A second weakness of EF studies is their general reliance on exclusively quantitative measures. Measures of turnover are usually quantitative (mostly simple ratios). Recruitment research often uses simple categories of recruitment source, or selection focuses on issues such as selection ratios. Yet quantities may be deceptive. For instance, desirable functional turnover exists and can make up a considerable proportion of turnover (Dalton, Krackhardt and Porter, 1981; Hollenbeck and Williams, 1986), with a possible curvilinear relationship existing between employee performance and quitting behaviors (Jackofsky, 1984). Quantity may therefore mean almost anything qualitatively. Similarly, large quantities may be inefficient in recruitment and selection. EF should therefore include both quantitative and qualitative aspects, preferably combining the two. This approach is not the usual one.

This thesis seeks to remedy these issues by treating EF as an integrated system that assesses inflows, intraflows and outflows both quantitatively and qualitatively and allows balance - that is, attenuation or accentuation - each other. This approach reflects the reality of EF in organizations.

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O-BUSINESS SERVICE QUALITY

The specific customer service relationship examined in the thesis involves business-to-business relationships. Notwithstanding burgeoning interest in the role of employees and EF in customer service, the focus remains on relationships with individual consumers (Bendapudi and Leone, 2002). However, this study focuses on B2B relationships, for several reasons. First, deeper relationships are possible between front-line supplier and customer employees in B2B relationships than might be the case with individual final consumers. Second, the impact of the employee-customer interface is more salient in B2B relationships, where large contracts and buying capacity are at stake. Third, there has been a dearth of studies on B2B rather than on individual relationships (Bendapudi and Leone, 2002; Homburg and Stock, 2004). Fourth, different measurement scales ave been found to apply in B2B measurement, but there is less surety about their dimensionality. This affords an opportunity for research advances. Finally, different but lesser studied interaction variables might apply in the case of B2B relationships, again offering research opportunities.

Given these issues and development options, the general research question for the thesis is as follows:

> ***Overarching research question*: Does EF seen as an integrated and qualitative variable add significant value in explaining relationships between and within multi-dimensional customer service outcomes in B2B settings, dependent on characteristics of the relationship and organisations involved?**

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In order to examine the issues as discussed above, the following chapters will be presented in the thesis.

Chapter Two examines the sub-constructs of EF, notably employee acquisition (especially retention and selection), employee turnover, and internal movement (transfers and promotions). The aim of this chapter is to present each element of employee movement in its own right, in order that variations in the overall system might be understood in individual context.

Chapter Three examines models of EF as a whole system which ties all flow constructs together in one valuation model. This chapter is necessary because EF sub-constructs as reported in Chapter Two are not stand-alone variables: for example, employee turnover is affected by the quality and fit of the people being acquired in the first place, acquisition is driven by turnover, internal movement is naturally linked to both, and so forth. Notably, the area of decision theoretic utility analysis has been employed to build such a holistic EF system, and accordingly forms the methodological basis to this chapter.

Chapter Four examines the link between EF (including related constructs) and customers. This chapter presents basic theoretical material and empirical findings showing why employees may impact upon customers, and notably why EF might do so. The customer variables involved are presented in this chapter as the three-fold 'metrics' used in much of the marketing literature, namely customer perceptions of the organisation, satisfaction and retention.

Chapter Five examines the second link in the broad service profit chain, namely the link between customers and organisation/unit performance or value. Notably, because it is customers we are dealing with and because of the recent attention in the literature, customer equity is presented as the methodological and theoretical foundation to this link. The chapter briefly therefore presents models of customer lifetime value and equity as well as tie-

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ructs. Although the empirical models do not use ariable, but rather its constituent parts (because of difficulty with data collection), this chapter is given to provide the conceptual final link.

Chapter Six will discuss the collated research directions and conclusions arising out of the literature review and critiques, and suggest research questions and propositions.

Chapter Seven discusses the method for the empirical study, describing research questions and hypotheses, populations and samples, instruments and data collection mechanisms, statistical methods and empirical limitations. Generally speaking, the methodological approach taken is empirical positivism, with statistical testing in the hypothetico-deductive tradition the key methodologial philosophy (GGG).

Chapter Eight presents the results of the empirical study, a survey of 170 business-to-business (B2B) customer organisations which report perceptions of EF within a supplier organisation and report extensive sub-dimensions of perceived service levels. The extension of study to the B2B arena is important, as this context can differ from that of individual consumers.

Chapter Nine gives discussions, recommendations for both managers and researchers, and conclusions arising out of the empirical study findings and the thesis as a whole.

1.5. CONTRIBUTION OF THE THESIS

The contribution of the empirical studies will be discussed at the end of the thesis. Here it is sufficient to state that the following are proposed to be the contributions of this work to the literature:

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as not only an *integrated* construct – including internal flows and turnover – but also as a *qualitative* variable. The treatment of such a complete model of EF as an input into organisational theories and models has rarely been tested. This focus may enhance the explanatory ability of EF as a construct and provide further benefits for theory and practise;

- The aforementioned approach to EF is inspired by the decision theoretic utility approach to EF (Boudreau & Berger, 1985). To the researcher's knowledge (backed up by personal communications from the progenitor of the field, Professor John Boudreau), this is the first time that the decision theoretic utility model of EF has been examined extensively within a broader context. The model has seemingly only been utilised before in an *ex post* valuation manner, not as an *ex ante* explanatory variable within a statistical study. The implications for human resource management are significant: the testing of a whole system of EF is a potentially important addition to the literature;
- Service profit chain type models have almost exclusively been tested with constructs such as employee affect (satisfaction or loyalty) or human resources policies (e.g. training) as independent variables. EF as an entire system, and especially the utility of EF, has not before been studied in the context of the service profit chain. This study therefore adds significant and new complexity to the service profit chain and related literature;
- Tests of the service profit chain, especially utilising EF, have rarely been conducted in the context of business-to-business (B2B) environments. This thesis addresses this environment, providing new knowledge, potential comparisons with other environments, and possibly targeted managerial applications for this particular type of service profit relationship;

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rcher's knowledge this is the first full service-
th Africa, more on this point is discussed in the final chapter;

- Finally, new managerial models for the estimation and justification of management interventions might be amenable to development from the findings, which is a significant practical addition in this field of study.

Therefore it is believed that this thesis adds significant unique value to the fields under review.

1.6. BROAD LIMITATIONS

As stated previously, specific limitation of the empirical findings will be discussed later in the thesis. For now, there are the broad limitations of the overall thesis:

- The sheer magnitude and complexity of organisational performance models such as those discussed above are not amenable to strong empirical findings. The researcher is caught in a logical vice: either great numbers of variables must be gathered, which complicates analysis and jeopardises data gathering ability, or the researcher must limit the models to a few choice operationalisations. In this case, 'only' EF is used as a predictor variable (although it is a complex variable in itself). Intermediate customer metrics are limited to customer 'satisfaction with' and 'perceptions of' the supplier's service, which is not a complete reflection of customer metrics. Customer equity models, which in this case would require evaluations not only of the organisation itself but also competing brands, were considered too difficult to measure in its entirety. Finally, organisation performance and value are also measured by limited

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chapter). Although limited operationalisation is ical study, it is expected that this will limit the effect sizes to be found in statistical results. For example, EF will not entirely predict customer satisfaction or retention – other variables such as overall service and product features or even brand inertia may yield far greater effects. Customer satisfaction may not be a strong intermediate variable (e.g. Gelade & Young, 2005), for example the customer may have large barriers to exit that may restrict their ability to act on dissatisfaction.

- The broad research designs to be utilised have known limitations. The empirical study is done on only 170 organisations from the Gauteng region, which limits generalisability and may restrict statistical findings. The study involves the use of self-report surveys, which have the known limitations (see the method chapter for specific limitations in this regard). Also, being a B2B study, the findings may not extrapolate to consumer-type settings such as retail or service organisations. More on these limitations is discussed again in the method chapter;

Ultimately, despite these limitations, it is believed that the contribution of this thesis could be an important addition to the literatures of both the human resource management and marketing disciplines for the reasons stated above.

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LOYEE FLOWS AND WORK PERFORMANCE

In this chapter the individual constructs making up the overall concept of employee movement or flow (EF) will be introduced, defined and broadly discussed.

As introduced in the first chapter, the main independent variable of the model in the present study is employee flow/movement, or more specifically the 'utility' of such movement. What is defined as 'utility' in this context will be discussed extensively in Chapter Three, here the aim is merely to introduce the major concepts without going into great detail on any one construct, as space would not permit a thorough investigation of each.

Also broadly discussed in this chapter is the ways in which the constituent variables of flow (and the construct as a whole) affect work and possibly organisation performance.

2.1. INTRODUCTION TO EFS

Employee 'flows' refer broadly to three distinct but linked constructs (Boudreau, & Berger, 1985b & 1988:1-142), namely:

1. *Inflows of staff* (employee acquisition);
2. *Intra-organisational movements* (transfers, promotions and demotions); and
3. *Outflows of staff* (employee turnover).

Much of the discipline of human resource management is concerned with optimising the effects of EF – for example, the fields of human resource planning, recruitment, selection, pay elements for retention, retention

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commitment programmes, dismissal and entirely concerned with EF.

These constructs are fundamentally linked. For example, staff coming in at one time period are those moving around in later periods and ultimately leaving. Therefore the quality, quantity and method of acquisitions impacts later flow variables. For example, less attention to recruiting may lead to increased turnover as staff leave due to low performance and job-fit (Batt, 2002; Boudreau & Berger, 1985; Saks, 2005). Similarly, it is outflows that partially stimulate inflows as employees are replaced. Increased turnover leads to greater need for acquisitions, potentially increasing the selection ratio and decreasing average levels of experience (Cawsey & Wedley, 1979; Hom & Griffeth, 1995; Jeswald, 1974).

The above three categories of movement are therefore discussed next.

2.2. INFLOWS OF STAFF: EMPLOYEE ACQUISITION

Employee acquisition largely concerns recruitment and selection. Although it also involves socialisation and orientation of staff, this section will largely cover the former two constructs as they affect the empirical model later, while socialisation and orientation are not, per se, flow constructs and will accordingly not be discussed.

These acquisition activities have long been recognised to contribute to the value of human resources, largely via the differential performance which might be achieved by the acquisition of above average individuals, or the performance effects of individuals' initial experiences in the organisation (e.g. Breagh, 1992; Cronbach & Gleser, 1965; Cascio, 1999). This literature will also be reviewed briefly in this section.

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Recruitment has been defined in the following terms:

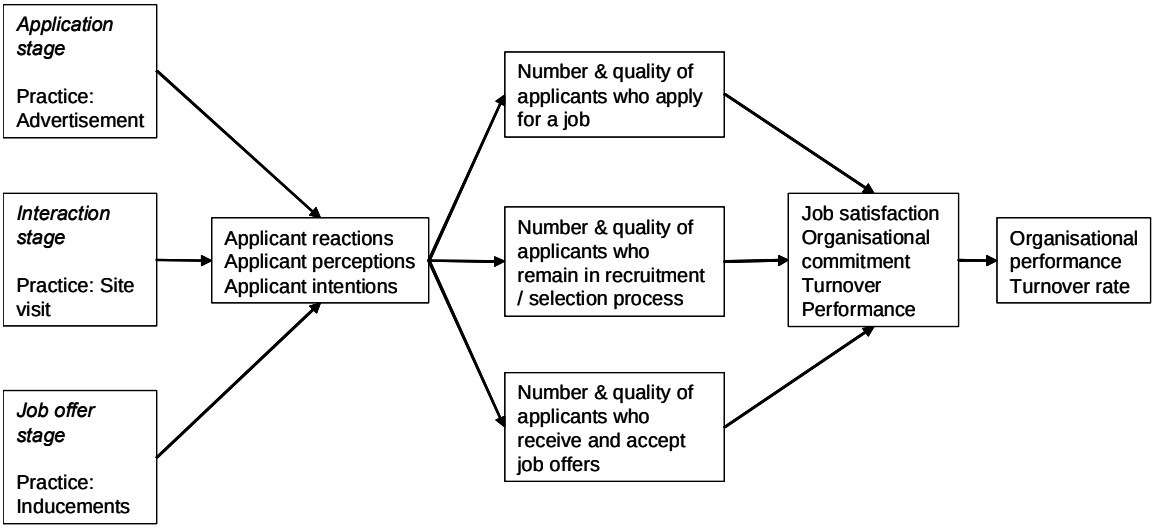
> **Employee recruitment involves those organizational activities that (1) influence the number and/or types of applicants who apply for a position and/or (2) affect whether a job offer is accepted (Breaugh, 1992: 4)**

Rynes (1991) similarly suggested that recruitment be defined as:

> **... all organizational practices and decisions that affect either the number, or types, of individuals who are willing to apply for, or accept, a given vacancy (Rynes, 1991: 429)**

Based on a review of prior recruitment models (e.g. Breagh & Starke, 2000; Rynes, 1991; Rynes & Barber, 1990), Saks (2005) suggests the simple model of the recruitment process suggested in Figure 2-1:

Figure 2-1: Multi-level model of the recruitment process and outcomes (Saks, 2005)



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literature has focused on three specific topics
rt of model: realism in recruitment, recruitment sources, and recruiter traits and behaviours. These three topics are briefly outlined below.

A. Sources of Recruitment

Recruitment source has particular salience to the analysis of EF because it defines the source of that flow. Broadly speaking, for our purposes recruitment sources can be divided into two types, namely internal and external. Internal sources denote employees who are sourced within the organisation, while external sources provide employees who come from the outside (Saks, 2005: 52).

Having said this, another important distinction is that between informal and formal sources (Taylor, 2005). The latter require formal market intermediaries such as media sources for adverts or employment agencies for placements, the former includes internal sources and others such as referrals where formal market intermediaries are not used. However for EF purposes the internal/external distinction is taken as a more physical key. Most notably, this broad distinction between internal and external recruitment impacts on whether new hires or transfers and promotions are to be the predominant method of inflow, an issue that has the ability to impact thereafter on all subsequent flow as well as key organisational variables. This is taken into account in the empirical research later, in that differential impacts from variegated recruitment sources are measured.

Theories of recruitment source effects suggest that employees differ in quality depending on the source from which they were recruited. Recruitment source is also often hypothesised to affect variables such as turnover, job fit,

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th, Hom, Fink & Cohen, 1997; Taylor, 1993;

Specific recruitment sources are well known and researched. External sources include candidates sourced through advertisements in various media, public or private employment agencies, campus recruiting, internet applications, walk-ins[1] and head-hunted candidates. Internal sources include promotions or demotions (vertical moves), internal job posting (horizontal moves) and referrals (Breaugh, 1992).

Generally speaking, internal/informal candidates are very often hypothesised to provide better organisational outcomes than external/formal candidates (Fitz-Enz & Davison, 2002; Griffeth *et al.*, 1997: 25; Menchen & Winfield, 1998; Taylor, 1993; Taylor & Schmidt, 1993), although findings are variable. In the case of turnover, it has long been proposed that internal candidates are less likely to leave (or will stay for longer) than externally recruited employees. This effect is, of course, stronger for some specific sources than for others. Referrals, especially, are often found to be effective (e.g. Taylor, 1993 for review), although findings are not unequivocal.

Such differential work outcomes, if they exist, do not of course arise from the recruitment source *per se*. Instead, it is generally held that recruitment sources lead to varied outcomes either (1) through the type of people that they reach, or (2) through the way in which they communicate job information. The former rationale is termed the 'individual difference' hypothesis, and the latter the 'realism' hypothesis. Although research has not always been successful in confirming these mediators (Griffeth *et al.*, 1997),

[1] Walk-ins are applicants who, without prompting from a specific job advertisement or other source mentioned above, approached the organisation for a job. This source has at times been proposed to be an internal source. However generally it is seen as external, and will be treated so here.

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s the leading explanations and will therefore be

are explained as follows:

i. The Individual Difference Hypothesis and Job-Fit

This hypothesis holds that the various recruitment sources have differential outcomes because they reach disparate groups of people (Taylor & Schmidt, 1983; Schwab, 1982). The different groups of job candidates reached by each source may differ significantly on fundamental facets such as education, ability, personality and motivation. For instance, campus recruitment, on average, is fairly guaranteed to lead to higher-educated but less-experienced applicants than a newspaper advertising campaign.

Individual differences across recruitment sources have often been tested directly in research (e.g. Griffeth *et al.*, 1997: 25 who constructed a 'quality index' for the nurses in their study, based on experience, education, attitude, job interest, appearance, communication skills and overall job qualifications). However a more general underlying construct is 'person-job fit', the extent to which the individual is suited in all aspects to the tasks and environment (Breaugh, 1992). Job-fit can be conceptualised from two perspectives. Firstly, the employee should fit the demands of the job tasks in terms of qualifications, skills or potential. Secondly, the employee needs to some extent to be congruent with the job and organisation in terms of his / her personality, ethics and values.

It has been suggested that certain recruitment sources will prove superior in their ability to provide employees who will fit the job. Internal sources are often proposed as best because internal candidates are both known by the organisation and will have had more chance to assess for themselves whether or not they will fit the position. The individual difference hypothesis may be

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rent recruitment sources may reach groups of age abilities to fit the job.

ii. Realism and Recruitment Sources

Realism focuses on whether applicants gain an accurate picture of the job (both good and bad aspects). Realism may be acquired by applicants in various ways, only one of which is as a consequence of recruitment sources as discussed in this section. Other means of providing realism are discussed in the following section. Also discussed in the following section is the benefits of realism.

Recruitment sources may affect the realism contained within the information held by the applicant. Specifically, certain recruitment sources such as referrals – and especially internal and informal sources - have been theorised to lead to more realistic impressions of the job, and thus more favourable work outcomes (Wanous, 1992).

Some recruitment sources may be inherently more conducive to realism due to differential access to information. For example, internal candidates may have more information about the job merely by having had the opportunity to observe other individuals performing it, or by information disseminated in internal social networks. Likewise informal sources, even if they are external, are more likely to receive more (and more accurate) information because they generally have access not only to formal organisation communications such as adverts and websites but also informal social networks. Conversely, external and especially formal-source candidates also can acquire a certain level of realism through formal communications of the organisation, including the aforementioned formal communications as well as via recruiters or in discussions initiated in the selection process, but

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y to be tainted by unrealistic 'selling' of the job
er, 1998: 84).

Realism is not only affected by recruitment sources. It has been extensively researched in various contexts, as discussed next.

B. Realism in Recruitment

A major area of realism research has been that surrounding the realistic job preview (RJP, Wanous, 1973), which describes organisational initiatives to present a realistic picture of the job to job candidates (both good and bad aspects), instead of 'selling' the job by painting the best possible picture (Barber, 1998).

Realistic impressions are proposed to lead to better outcomes for four reasons (Taylor, 1993). Firstly, applicants are better able to deal with the negative aspects of the job in a mental sense. The formation of realistic expectations means that dissonance and the resultant dissatisfaction are not experienced. Secondly, candidates will have had time to formulate actual strategies for dealing with negative aspects of the job. Thirdly, the honesty inherent in revealing the less-desirable aspects of the job may improve trust between employee and employer, leading to greater loyalty and better outcomes. Finally, an element of realism enables candidates to decide for themselves whether the job meets their needs and requirements. Thus it leads to self-selection of unsuitable candidates out of the recruitment system, probably reducing costs due to issues such as early exit or dismissal.

RJPs have been shown to have modest impacts on turnover, performance and lowering of expectations (see Saks 2005: 52 for a review of the voluminous literature), although their relative inexpensiveness may render their utility higher than more expensive and later ways of accomplishing this in the employment process (such as satisfaction, loyalty and retention

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y considered desirable to inject a certain level of

rocess.

This literature has a certain amount of salience to this thesis because, as discussed above, differential levels of realism may stem from different recruitment sources. Therefore the direction and source of EF may impact on this variable which may therefore impact on important outcomes.

C. Recruiter Traits and Behaviours

In terms of economic theory, recruiters are theoretically seen as signals to applicants of organisational realities (Rynes, Bretz and Gerhart, 1991). Several decades of research into recruiter behaviours has essentially found that 'warmth' (showing an interest in being personable towards applicants) and 'informativeness' (knowledge of specific job content and conditions) are the key characteristics of recruiter behaviours that may affect outcomes (see Barber, 1998: 55-60). However Saks (2005: 53) reports accumulated evidence suggesting that this effect weakens over the recruitment process, and is not significant when placed alongside vacancy characteristics. More general research on recruiter traits has been weak and inconclusive. This literature is not as important to this thesis as it is not as strongly linked to EF itself.

D. Other Areas of Importance in Recruitment

Other areas of recruitment have increasingly also been shown to be potentially important, including 1) employment inducements such as flexibility, prime pay or development opportunities, 2) Recruitment activities, such as variety of recruiting media and locations to increase brand awareness, site visits and efficiency in the process, 3) good recruitment advertising and 4) organisational image, reputation and symbolic characteristics (see Saks, 2005 for literature reviews underlying all these areas).

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not discussed further as they have limited erall, the realism and individual difference hypotheses are the main features of recruitment that do apply to the thesis, especially as achieved by recruitment source (which is an EF issue). Accordingly, recruitment source is explicitly built into the empirical method.

E. Measurement of Recruitment Outcomes

Given the nature of the models explored in the next chapter, in which operationalised measures of each flow variable are necessary, it is necessary to discuss the measurement of each variable.

Recruitment perhaps has the greatest relative paucity of measures, being typically assessed via the selection ratio (SR) and yield ratios. The SR is the proportion of the total pool of applicants whom the organisation will need to hire, i.e.

Selection ratio = no. of hired candidates / no. of applicants

In addition, yield ratios express the percentage of applicants who have progressed from one stage of recruitment (e.g. initial submission of CVs) to the next (e.g. shortlisting for initial interview). The yield if only 50 people are chosen for initial interviews from 500 initial CVs submitted is therefore 10%. Further yield ratios and cumulative yield ratios for any steps of a recruitment process can be calculated, and ultimately compared to costs involved at each stage to estimate a per-applicant cost.

Fitz-Enz and Davison (2002: 62-78) additionally provide a number of recruitment ratios such as cost-per-hire and source analysis.

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ruitment Research

Various critiques of the dominant streams of recruitment research have been made. The overly dominant focus on the '3 Rs' of realism, recruitment sources and recruiter behaviours has been critiqued by many (Saks, 2005), notably Barber (1998), with calls for an increasing focus on alternative issues such as those covered in Section 2.2.1D above. However these alternative issues are not as relevant to this thesis as the mainstream topics, and as such as not pursued further.

In addition, inter-linkages between these areas have generally not been studied, resulting in a disjointed research area (Breaugh & Starke, 2000; Rynes, 1991).

Regarding prior statistical findings, although much recruitment research has been conducted on the mechanisms underlying the 3R's, the statistical effect sizes that have been discovered remain modest (Saks, 2005).

A further stream of critique regards levels of analysis: most research had been done at the level of the individual rather than the firm. Consequently calls have been made for more organisation- and multi-level research (Rynes & Cable, 2003; Taylor & Collins, 2000).

Perhaps most importantly, mainstream recruitment research has led to little practical guidance for managers (Barber, 1998; Rynes, 1991; Taylor & Collins; 2000), perhaps partly because of the excessive focus on the individual.

It is believed that the questions addressed by this thesis will to some measure address many of these problems, as discussed further in Chapter Seven. Dealing with different dimensions of EF as a single model may help to address the lack of integration. The empirical study of the thesis addresses organisation-level issues as called for, and is more likely to lead to practical guidance for managers as issues of EF lend themselves to direct interventions such as retention policies. However it is also noted that the focus of this thesis

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will by necessity obscure the finer recruitment cussed above. However this literature review and discussion is useful in potentially providing explanations to any effects of EF.

2.2.2 SELECTION

The field of employee selection - the process by which job applicants are assessed and accepted for actual hiring, and choose to accept - has long been one of the most studied areas in industrial and organisational psychology, and therefore by extension human resource management (Evers, Anderson & Voskuijl, 2005).

The traditional psychometric perspective of selection is encapsulated as follows:

> **Traditionally, selection and assessment has been viewed from a psychometric perspective. It is treated as representing a measurement problem. There are clearly individual differences (both physical and psychological), which mean that certain people will be more suited to some jobs than others. From a psychometric perspective then, selection and assessment is concerned with finding methods to measure these individual differences more accurately so that individuals and jobs can be appropriately matched.**
> **(Newell & Shackleton, 2001: 24).**

Schmitt and Chan (1998: 1-3) point out that the whole selection research process broadly tends to be framed in terms of the following steps:

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...he tasks and responsibilities to be fulfilled;

...g the knowledge, skills, and abilities (KSAs) required to successfully complete those tasks are determined;

3. Determination of the preceding leads to development of measures of both predictor variables (e.g. aptitude or strength) and subsequent job performance;
4. Measures of predictor variables and job performance are used to evaluate ability-performance hypotheses;
5. If ability-performance relationships are confirmed, the selection procedure being tested is implemented and evaluated (notably its return on investment).

Most of the above steps cannot be explicated here, as they are beyond the scope of this thesis and space does not permit (the interested reader is referred to Chapters 1-4 of Schmitt & Chan, 1998). The steps that do most concern the models of EF presented later are those to do with estimation of the predictor-performance link, specifically the estimation of selection reliability and validity.

Prior to discussing these concepts, however, a brief section on the performance definition issues (as encapsulated in steps 1-2 above) are perhaps necessary as these have direct relevance to the link between EF and subsequent outcomes.

A. Performance Definition in the Selection Research Process

Schmitt and Chan (1998: 4) suggest that the definition and operationalisation of performance, especially multi-dimensional performance, has not been a large part of selection research in the past, mainly because

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to utilise the archival performance scores given

Therefore *a priori* definition and measurement of performance may be more important than historical usage has allowed for. Notwithstanding this fact, scant attention is paid to this issue in this thesis, because EF models generally present a uniform construction of employee performance, and also because the empirical studies presented later do not have the ability to first define performance within a single-job or one-organisation context.

i. Broad Models of Job Performance

Leading models of individual job performance are those of Campbell and colleagues and Motowidlo and colleagues. The model of Campbell, McCloy, Oppler and Sager (1993) presented the following as sub-determinants of general job performance: (1) job-specific task proficiency (2) task proficiency of a non-job-specific nature (generic skills that are shared across jobs, such as computer skills), (3) written and oral communication tasks, (4) demonstrated effort, (5) personal discipline, (6) facilitation of peer and team performance (7) supervisory/leadership behaviour (8) management and administrative tasks.

More recently, Motowidlo and colleagues (Borman & Motowidlo, 1993; Motowidlo, Borman, & Schmit, 1997; Motowidlo & Van Scotter, 1994; Van Scotter & Motowidlo, 1996) have suggested that job performance is composed of at least two interrelated but distinct underlying performance dimensions, namely core 'task performance' (more technical skills) and 'context performance' (which "maintains the broader organizational, social and psychological environment in which the technical core operates", Motowidlo, Borman, & Schmit, 1997: 72). Also see Viswesvaran and Ones (2005) for further theory and research.

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do highlight the possibility that issues such as re reasons than just the technical performance impacts. Issues such as context stability – e.g. where relationships with clients may be as important as task fulfilment – may also come into the picture. This perspective is indeed pursued in the outcome variables of the empirical study later in the thesis, where 'soft process quality' is explicitly used as a stand-alone dimension.

ii. Measuring Job Performance

Also potentially important are the variegated methods of *measuring* performance. Schmitt and Chan (1998: 73-86) suggest that performance in the context of selection may be measured with regard to any of the following:

1. *Performance ratings*: Referring to performance appraisals most commonly measured on standard rating scales and administered to supervisors, and sometimes colleagues, peers, the appraisee and/or customers (the 360 degree appraisal process, Redman, 2001). The many pros and cons of performance appraisals, and alternative methods, have been well covered elsewhere (e.g. Armstrong & Baron, 1998; Bowles & Coates, 1993; Coates, 1994; Fletcher, 1993; Grint, 1993) and will not be discussed here, except to mention that various different forms or methods of administrating performance ratings may affect the reliability of the measures. Schmitt and Chan (1998: 78) note, for example, that correlation between raters has been found to have an asymptote at about 0.6, but that factors such as multiple raters from different hierarchical levels decrease this;
2. *Performance outcomes or results*: Utilising objective performance criteria such as sales or production is a popular method of assessing performance, but open to difficulties. Employees may have differential access to make

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in fact the commonly expressed problem is that ctors may have more impact on such outcomes than any given employee, eroding any links (e.g. Cascio, 2003: 336-337);

3. *Customer satisfaction and other perceptions*: As seen earlier in the context of the service profit chain and dealt with extensively in this thesis, customer affect and reactions are seen as crucial outcomes of employee behaviour (and movement, as hypothesised in this research) and as the antecedents of organisation profitability. Accordingly, customer outcomes are potentially important for the analysis of the efficacy of employee inflows. This focus on customer outcomes is discussed extensively in subsequent parts of the thesis and explicitly measured in the empirical study.
4. *Withdrawal behaviours*: Employee responses such as employee turnover or other withdrawal behaviours (e.g. absenteeism, psychological withdrawal or neglect) are not end-result outcomes, but are frequently shown to be intermediate issues in cost or profitability, and are treated as such in organisations (Lee, 2002). Therefore these variables are often treated as crucial outcomes of good selection, although here it is noted that withdrawal is treated within the whole employee movement chain as part of a focal predictor construct – see Chapter Three.

B. Selection Reliability

Reliability in selection refers to the ability of an assessment of an applicant to be consistent. Consistency can occur across different contexts, time and raters (i.e. across different selectors who are assessing an applicant). Generally, reliability is assessed via fairly simple correlation coefficients of various types across tests over time or context or across raters (for more see Schmitt & Chan, 1998). Reliability, although a central concept in selection, is

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ent research and therefore not pursued further

C. Selection Validity

Perhaps the traditional heartland of employee selection literature (e.g. Newell & Shackleton, 2001), the concept of validity essentially refers to whether an assessment of an applicant is capable of measuring what it purports to. Generally, selection procedures are assumed to be aiming to assess the ability of applicants to perform well on the job, i.e. performance is seen to be the issue at hand (Messick, 1995; Schmitt & Landy, 1993). The section above on what constitutes performance is therefore crucial in this regard.

Selection validity is generally agreed to come in three forms (Messick, 1995; Schmitt & Landy, 1993, Cascio, 2003: 242 cites Society of Industrial and Organizational Psychology, 1987; National Council for Measurement in Education, 1999; and the report *Uniform Guidelines on Employee Selection Procedures*, 1978: the discussion below applies). These are 'face', 'criterion' and 'construct' validity as follows:

1. *Face validity* is concerned with whether the content of a selection procedure, for instance the questions asked in an interview, does in fact concern itself with the actual job tasks and context that a prospective employee must face.
2. *Criterion-validity* refers to direct statistical checks of the efficacy of a procedure in selecting higher performing employees. It can be assessed via two methodologies (Messick, 1995; Schmitt & Landy, 1993; Cascio, 2003):
    a. *Predictive Validity*: In this procedure, applicants are assessed on the focal selection procedure, but then hired on another basis. Once

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…ance on the job is assessed, and a correlation …ormance on the selection procedure and the job respectively;

b. *Concurrent Validity*: In this procedure, which is seen to be less efficacious for reasons discussed below but quicker, the selection procedure is applied to job incumbents for whom job performance data already exists. A correlation is then easily drawn.

   A problem arises in the use of concurrent validity, namely that of range restriction. The range restriction issue arises because job incumbents (because they were presumably assessed on the basis of performance and have since been at least somewhat 'weeded out' on the basis of subsequent performance) have a smaller range of performance than would be the case among applicants. Therefore a range restriction adjustment to the normal correlation should be applied (Schmitt & Chan, 1998: 127).

3. *Construct validity* addresses the perhaps more academic question of whether certain constructs purported to be assessed are in fact what is being measured.

Relevant critiques of selection validity and applications of validity for the purposes of this thesis are discussed in Section F below.

D. Generalisability, Legality and Other 'Soft' Issues

There are a large number of other selection issues, including generalisability (whether selection reliability and validity applies across contexts), legality and several more (see Evers *et al.*, 2005) that may be important in a broader analysis. The scope of this study dictates that most of

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ere, however some comments about legality are

Legality refers to legislative imperatives affecting selection by government, industry bodies or other outside bodies to whom the firm is legally bound. It is obviously a crucial issue in the context of selection in South Africa, due to a predominance of legislation controlling areas such as affirmative action and employment equity, restrictions on uses of medical and psychometric testing and black economic empowerment. The reader is referred to Bendix (2006) for specific legislative provisions. In summary, following Bendix (2006), the following issues affecting EFs and the service profit chain – and therefore impacting directly on the context of this thesis - apply:

- In terms of inflows of staff, both employment equity and black economic empowerment (BEE) pressures generally require organisations to move towards greater acquisition, promotion and retention of black and female staff. This affects all aspects of EF, and may impact on relationships with customers in a variety of ways positive or negative. One purely economic consideration is that black economic empowerment frameworks generally require business to business purchasing of goods and services to be from BEE-accredited suppliers. Therefore the racial composition of an organisation's EF – and by extension the workforce over time - can affect the business they get and the ratings of customers (Broad Based Black Economic Act 53 of 2003).
- The Labour Relations Act 66 of 1995 applies substantial boundaries to the discipline, dismissal and retrenchment of staff. This is presumed primarily to affect the outflows of staff, but also may lead to firms applying different acquisition strategies to avoid potential legislative pressures and costs later (e.g. outsourcing instead of hiring internally). This is likely to directly

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ain, possibly by affecting service provision, and otential for relationships to be built between organisation and customer agents (e.g. Kakabadse & Kakabadse, 2003).

Notwithstanding the potential importance of these issues, it generally requires very specific research designs to build individual demography into EF models, and this thesis will retain a broader focus on more global views of the quality of flow. Accordingly, the discussion on legislation is not expanded in the context of the thesis.

One final - and in the context of the empirical study important - issue to be introduced is that of utility.

E. Selection Utility

A final component of successful selection is that dealt with in the larger context of this thesis, namely utility. Here we refer to the impact of the selection procedure on the broader aims and imperatives of the organisation, generally conceived to be profitability, monetary worth and ultimately organisational value (employee wellbeing as an aspect of this is also relevant and is discussed further below). Selection utility is not dealt with any further here, as it is extensively covered in Chapter Three.

F. Critiques of Selection Literature and Relevance to the Thesis

The two major critiques of the selection issues discussed are to do with performance measures and validity. Utility is also relevant to this thesis but is discussed in detail in Chapter Three.

With regard to the performance foci of selection methods, a major critique for the purposes of this study involves the general dominance of an internal-focus, in other words the performance focus is usually restricted to employee

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rnal task and process productivity (Evers, *et al.*, rrisome is that the decision process has been found to be made on very broad impressions of mostly internal elements, with selectors too often overweighting negative data and assigning categories and weightings of performance to justify decisions rather than to make them (Newell & Shackleton, 2001: 32).

Obversely, a customer-focus has generally not been brought extensively into selection research, even though it has entered increasingly into performance appraisal, although there are some exceptions such as the use of assessment centres for selection (Lievens & Thornton, 2005; Newell & Shakleton, 2001). Also not as common are organisation- and multi-level studies of selection with a customer focus (Ployhart & Schneider, 2005), even though once again unit-level performance appraisals via 'balanced scorecards' explicitly include customer metrics.

There are several critiques that can be brought against the validity literature. Perhaps the most trenchant is that few organisations seem to systematically undertake true validation processes, and when they do there appears to be low validity for traditional forms of selection (Newell & Shackleton, 2003), although some forms of selection such as general mental ability tests and others have shown very consistent levels of validity (Evers, *et al.*, 2005). In addition, there seems to be some disconnect between scientific findings and practice (Anderson, 2005).

The concept of validity, in this case notably predictive validity of a specific kind, is relevant to this research for two reasons: 1) Firstly, in the empirical research the quantity of employee inflows is assessed in conjunction with global assessments of quality of flow, therefore implicitly the validity of the organisation's acquisition processes is being assessed, b) Secondly, employee inflows will later be assessed as precursors of customer perceptions of both service quality in processes as well as outcomes flowing from service,

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of criterion validity. The focus on customer B2B service quality especially which constitutes an organisational-level analysis – overcomes some of these critiques. However again, the nature of the thesis and study is that selection will not be finely analysed at all, but forms only a facet of the inputs into and possible explanations for the EF variables dealt with here.

2.3. INTRA-ORGANISATION EMPLOYEE MOVEMENTS

While at an organisation, employees may be involved in intra-organisation movements, notably transfers and promotions (e.g. Dalton & Todor, 1993). Demotion is also possible but relatively rare in South Africa where it is considered as effective dismissal.

These activities, too, have potentially important productivity implications. Much of the reason is related to the concept of job 'matching', i.e. placing the employee in a job that accords with his/her knowledge, skills, abilities, and possibly temperament too, or even his/her growth potential (Cascio, 2003). This is sometimes more easily achieved after the employee has had a period within the organisation so that his/her talents can be assessed and more adequately allocated (Garibaldi, 2006; Lazear, 1995).

Internal movements do not necessarily need extensive discussion because in the context of customer service they often have much of the same effects as inter-organisational inflows (which were discussed in the previous section) and inter-organisational turnovers (discussed in the next section). This is because when intra-organisational movement happens, an employee is leaving one part of the organisation (localised turnover) and joining another (localised inflow). Especially in the case of service employees who deal with customers, transfers can therefore be identical in impact to inter-

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e an employee leaving or entering customer he customer's perspective).

Accordingly, much of the discussion relevant to transfers and promotions has already been dealt with in the context of recruitment sources above: because both of these are internal recruitment sources, the prior theories and discussion apply.

Further considerations regarding internal flows as inflows to one part of the organisation from another include the following. Promotions may increase motivation of individuals due to the ability of higher rank and pay to simultaneously fulfil needs for status, consumption, security and growth (Cascio, 2003: 392). Research suggests that being passed over for promotion decreases commitment and increases absenteeism, while promoted individuals increase commitment (Schwartzwald, Koslowsky & Shalit, 1992). On the negative side, a colloquial theory holds that it is possible for individuals to be promoted to their level of incompetence (the 'Peter Principle', see Lazear, 2004 for formal modelling). Research by Pinder and Schroeder (1987) may bear this out: time to proficiency following promotions (dependent on support and similarity of old and new positions) was estimated at nine months, at the least this highlights potential costs. Therefore the impact of promotions would seem to depend on the efficacy of procedures (e.g. see Morris, 2000; Stumpf & London, 1981) rather than being a *fait accompli*.

When considering transfers as localised turnovers (possibly including job rotations, which can have the same effect as transfers, depending on the length of movement out of the incumbent job), as with promotions the intended effect to achieve efficacious job-fit may not be achieved due to balancing factors. For example, Pinder and Schroeder (1987) found that time to proficiency (as rated by supervisors and regarded as the employee performing to potential) following job transfers was 7.8 months, again

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ssible turnover effects are discussed extensively

In total therefore, transfers are relevant to the thesis as they can have similar impacts to acquisition and outflows. Therefore the research design employed later allows for explicit estimations of the impact of such internal flows to be made.

Finally, the last broad category of employee movement was outflows of staff, as discussed below.

2.4. OUTFLOWS OF STAFF

The outflows of staff involve employee turnover. Before discussing the effect of turnover on organisation performance, some discussion and delineation of the term will be given as this strongly affects conclusions as to the links between outflows and customers on organisational performance.

2.4.1 DEFINING EMPLOYEE TURNOVER

Employee turnover, in the context used for this thesis, must be defined carefully (Price, 1977: 4). There are various dimensions and types of turnover, some of which have differing effects on performance and different processes.

General usage defines 'employee turnover' as limited to *voluntary* movement *out of the boundaries of the organisation* by a *paid* employee (Mobley, 1982a: 10). However this thesis differs in that it will deal rather with the following definition of turnover: *voluntary or involuntary* movement *out of the boundaries* of the organisation or department by a *paid* employee. Each of the elements in italics above will be discussed briefly below, and critiques dealt with at the end of the section.

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ary Turnover

Voluntary turnover is that which is initiated by the employee (Price, 1977: 9). *Involuntary turnover* is not instigated by the employee and includes dismissal, retrenchment and mandatory retirement. The key difference is whether the employee was internally *motivated* to leave the organisation on his/her own account (Hom & Griffeth, 1995: 5). Normally in academic studies, the type of turnover is limited to voluntary turnover only – this is discussed further in Section 2.4.4.

Despite the apparent ease of this distinction, there is no shortage of 'grey' areas. Leaving due to pregnancy, for instance, is sometimes treated as voluntary (Marsh & Mannari, 1977) and sometimes as involuntary turnover (Mirvis & Lawler, 1977). Retirement could be mandatory or voluntary (Hanisch & Hulin, 1990). Pressure from a spouse to leave the job might be seen as voluntary, but Price (1977: 9) saw it as involuntary. As can be seen, it is hardly easy to categorise all forms of turnover. Generally speaking, however, the majority of cases can fairly easily be separated.

The difficulty with categorising types of turnover also spills over into the area of actually recording turnover causes in organisations (Hom & Griffeth, 1995: 5). When behaviour is measured, personnel records are often used. However often these may not include much detail on reasons for leaving. Even if such information exists, it may often be falsified or biased. Turnover may be classified as voluntary when actually the turnover was employer-initiated (e.g. to help the employee avoid a bad record). Alternatively it may be classified involuntary when in fact it was voluntary. This has been observed in cases when employers attempt to ease an employee's claim to unemployment insurance. Self-reports by employees are often no better, as

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h as self-preservation[2], post hoc justification ity[4] (among others) (Hom & Griffeth, 1995: 5).

B. Movement Across Which Boundaries?

The second limiting criterion is that turnover normally entails separation out of the boundaries of the organisation (Price, 1977: 7). However as discussed in the previous section on internal organisational movement, there are other types of organisational movement, including intra-organisation movements where the individual leaves his/her job or role, but does not leave the boundaries of the organisation. Therefore the definition utilised in this thesis acknowledges that, at a department level, outflows may include transfers or promotions out of the unit but still within the organisation. This is important to that unit – even if another unit is receiving a boost from the incoming employee, the department losing the member may suffer. Therefore in isolation they have experienced costly turnover. This is discussed further in Section 2.4.4 below.

C. Paid Employees

The final element of the traditional definition involves the element of remuneration. The turnover studied here is limited to paid employees (Mobley, 1982a: 10). This is important for the purposes of generalisability. A common standard is necessary, and paid employees differ in many respects to unpaid employees.

---

[2] Occurs when employees attempt to project more positive reasons for their actions than are otherwise the case, in order not to form negative relationships or appear unemployable to outside firms.

[3] Justifying the leaving decision after the fact with reasons that were not the real rationales for leaving.

[4] A cultural pressure perceived by employees consisting of a social stigma attached to non-voluntary turnover (especially dismissal), thus providing pressure to make one's leaving appear voluntary.

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oluntary workers (as might be found in not-for-
n some profit-making organisations). There are several reasons why volunteers cannot be considered. The primary consideration, of course, is that it must be assumed that in the absence of pay their motivations for working must be somewhat different from conventional workers. Analogously their reasons for leaving and turnover processes will differ too (e.g. Farmer & Fedor, 1999).

2.4.2 AVOIDABLE VS. UNAVOIDABLE TURNOVER

From the organisation's perspective, certain types of turnover are more avoidable than others. Avoidability infers that interventions might have been implemented to retain the employee(s). Some types of turnover are however not open to intervention by the organisation, and are accordingly unavoidable (Dalton, Krackhardt & Porter, 1981). Employee attitudes, behaviours and ultimately turnover processes may differ depending on which is the case. Most importantly, the avoidability of turnover affects its impact and informs subsequent management responses.

Abelson (1987), following Dalton *et al.* (1981), described four types of turnover. These differed on two dimensions, namely whether the turnover is voluntary / involuntary and whether it is organisationally avoidable / unavoidable. Figure 2-2 illustrates his breakdown.

As can be seen, certain forms of turnover are avoidable. These include employees leaving for other organisations due to better conditions (generally or in specific areas). Dismissal, layoffs and forced retirements are also avoidable. Unavoidable turnover includes voluntary reasons such as spouse-initiated moves (the organisation probably cannot affect the spouse unless he or she also is an employee) or career changes. Finally, death and serious medical disabilities are generally uncontrollable by either party (although

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ncrease the health levels of their employees, e.g.

ttempting to control these phenomena to some extent).

Figure 2-2: Abelson's (1987) expanded avoidability taxonomy of employee turnover

Organisation control	Employee control: Yes / voluntary	Employee control: No / involuntary
Yes / avoidable	Å Better pay elsewhere. Å Better working conditions elsewhere. Å Problem with leadership / administration. Å Better organisation to work for elsewhere.	Å Dismissal. Å Layoff. Å Forced retirement
No / unavoidable	Å Move to another location, spouse imposed. Å Mid-career change. Å Stay home to care for spouse / children. Å Pregnancy, did not return after limited period of time	Å Severe medical. Å Death

The question to be asked is whether employees falling into the different groups will evidence divergent attitudes and behaviours, and whether we can conclude that their turnover processes and consequences might differ. Abelson (1987) tested for such differences. He found that, employees who stayed and 'unavoidable leavers' did not differ significantly on any variable measured, however that both these groups differed significantly from 'avoidable leavers'. Specifically, avoidable leavers showed significantly lower satisfaction, less commitment and higher job tension than stayers or unavoidable leavers, and also showed higher incidences of withdrawal cognitions (as would be expected).

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that studies of turnover processes and y attention to the organisational avoidability of the turnover. If this is not done, empirical findings might be understated (for instance, relationships between satisfaction and turnover will be lower than otherwise if they include unavoidable turnovers). Of course, this is easier said than done due to the possible bias of self-reports.

Avoidability of turnover, although potentially important, is implicitly contained within the empirical method used in the thesis due to the consideration of quality of EFs. It is not, however, explicitly considered, as the customer does not generally know the reason for turnover.

The next section looks at the area of the consequences of turnover, which is concomitant with the focus of this thesis and which draws on the preceding material.

2.4.3 COSTS AND BENEFITS OF EMPLOYEE TURNOVER

Increasing research has been conducted into the costs and benefits of employee turnover for both the organisation and the individual (Boudreau & Berger, 1985; Dalton, Krackhardt & Porter, 1981; Mobley, 1982a&b; Staw, 1980, Macy & Mirvis, 1983).

It is immediately apparent that the consequences of turnover for the organisation bear directly upon this thesis's field of study. This is both because the measure of outflows used in the empirical study takes the potential implications into account, and because the links made in the thesis are partly between the effects of employee outflows and the customers who generate revenue for the organisation.

The consequences of employee turnover for the individual employee are perhaps of less obvious relevance to the process of individual turnover.

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with the basic breakdown between functional which naturally precedes an analysis of organisational consequences.

A. Functional vs. Dysfunctional Turnover

The organisational consequences of turnover have been one of the most contentious areas of study in turnover research. Traditionally, it has been assumed that turnover is an expensive phenomenon that drains money and key talent from an organisation, weakening it substantially (e.g. Blakeslee, Suntrup & Kernaghan, 1985; Cawsey & Wedley, 1979).

Others however have posited that turnover may, under certain circumstances, be a necessary boon that saves money and stimulates competitive advantage (Dalton & Todor, 1979 & 1982; Staw, 1980). If predominantly poor performers leave, for instance, then turnover could provide an opportunity to replace them with better employees and improve productivity. It is precisely this thinking that underlines the utility of EF that is discussed in Chapter Three.

With these assertions in mind, models have been introduced categorising the phenomenon into either functional or dysfunctional turnover (Dalton, Todor & Krackhardt, 1982; Dalton, Krackhardt & Porter, 1981). In the simplest terms, functional turnover occurs when the performance levels of those leaving is lower in general than those staying and/or joining. Dysfunctional turnover, then, occurs when it is the predominantly better performers who are leaving.

Dalton *et al.* (1982) introduced an expanded model of employee turnover (specifically voluntary turnover, referred to as quits), as seen in Figure 2-3. The model assumes that replacements are at least average performers.

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dt's (1982) expanded functional turnover taxonomy

Organisation's evaluation of the employee

Employee evaluation of organisation	Good employee	Poor employee
No voluntary turnover	Employee remains	Employee is terminated
Voluntary turnover	Employee quits (**dysfunctional turnover**)	Employee quits (**functional turnover**)

Thus strong performers who leave are likely to be replaced by (inferior) average performers, leading to dysfunctional turnover. Poor performers, however, will not be missed in the long term as even the average replacement provides higher productivity. Of course, some inferior employees will remain, and this must be classified as dysfunctional turnover. Likewise, good performers who stay can be classified as functional turnover.

Tests conducted on the functional / dysfunctional concept have generally confirmed the importance of the distinction. Dalton *et al.* (1981), for instance, estimated that in one organisation with thirty-two percent turnover, forty-two percent of the quits were low quality employees. Seventy-one percent of quits were furthermore internally reported as easy to replace. Additionally, some 45% (by quality) and 52% (by replaceability) of the dysfunctional turnover was estimated to be unavoidable. Hollenbeck and Williams (1986) estimated in another study that 53% of turnover found was functional. Meta-analyses of the performance-turnover link, although open to difficulties of interpretation,

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ationship. Considerably more discussion on the given in Section 2.4.3B.

This indicates that poor performers may be more likely to quit on average than good performers (i.e. indicating a measure of potentially functional turnover, Hom & Griffeth, 1995: 49; McEvoy & Cascio, 1987; Williams & Livingstone, 1994). Finally, Park, Ofori-Dankwa and Bishop (1994) found that determinants of turnover types differ by functionality. They found that dysfunctional turnover was positively related to the presence of group incentives and negatively related to unionism. Functional turnover was furthermore negatively related to levels of pay and unemployment and positively associated with availability of individual incentive programmes.

Mathematically, some simple indices of the functionality of turnover have been developed. One of these is:

$$T_{funct} = T_{frequ} * \text{Performance}$$

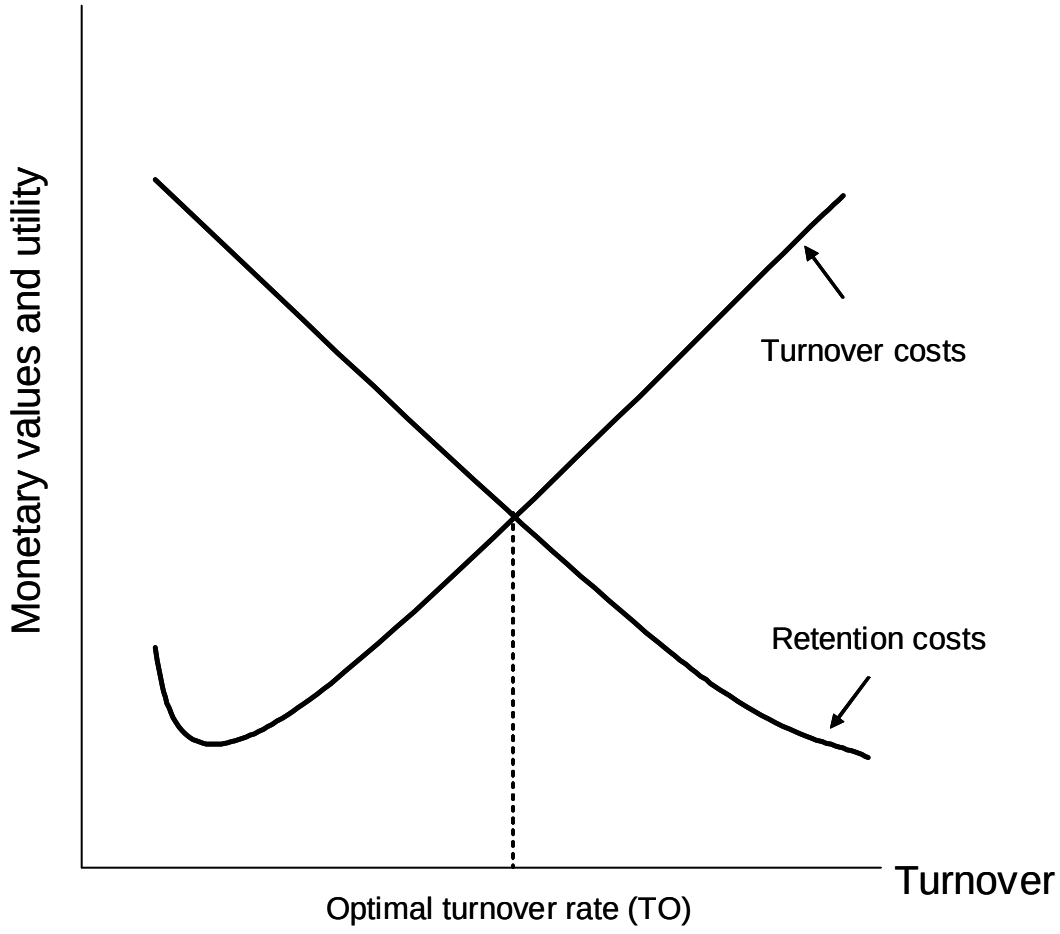
where T_{funct} = the dependent functionality of turnover, T_{frequ} = a dichotomous variable of whether the employee is a stayer or a quit, and 'Performance' is a standardised performance measure (Hollenbeck & Williams, 1986). However Hom and Griffeth (1995: 7) point out that this index fails to distinguish between a high performing stayer and a poor performing leaver, despite likely differences in attitudes and behaviours. It also fails to measure the broader spectrum of work performances (e.g. organisational citizenship behaviours).

The concept of functional (and avoidable) turnover suggests that an optimal level of turnover may exist. Economic models can be adapted, based upon the principle of scarcity. In this case, the rising costs of turnover (as more people leave and replacements have to be acquired and trained) are assumed to be offset against the falling costs of retaining employees as a

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ed. This produces a function of the broad type s X_1 increases (turnover costs), so X_2 (retention costs) must decrease (Baysinger & Mobley, 1983: 287). An optimal turnover level is found at the intersection of these two constructs (turnover and retention costs), as seen in Figure 2-4:

Figure 2-4: Optimal employee turnover (Baysinger & Mobley, 1983; Abelson & Baysinger, 1984)



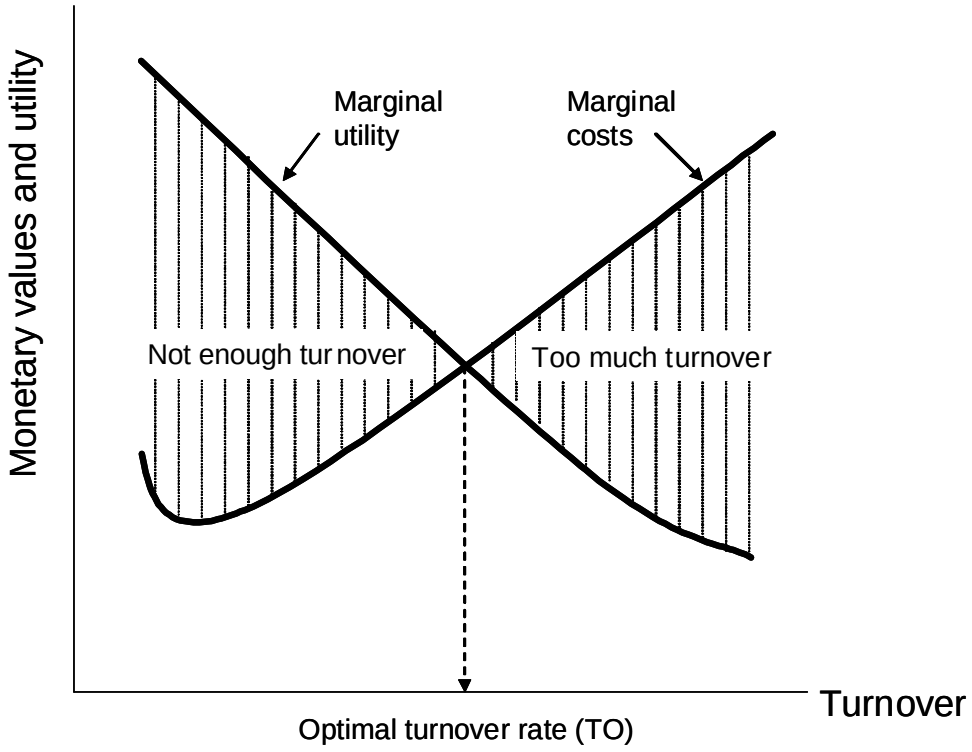
The first diagram, Figure 2-4, shows the raw turnover and retention costs. As can be seen, the costs of turnover are offset against the costs of retention. If one sums the two costs, the total cost of organisational turnover (and thus retention) is achieved. The optimal turnover rate (TO) is the lowest point on the total turnover cost curve (which is also the intersection of the turnover

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A rate lower than TO suggests that turnover
versa for a rate higher than TO (Baysinger & Mobley, 1983: 288-289).

Also relevant is Bluedorn's (1982a) model of turnover management economics as seen in Figure 2-5:

Figure 2-5: Optimal turnover rate (Bluedorn, 1982a)



The concept can therefore also be expressed as a function of the **marginal** costs and revenues of turnover (Figure 2-5). Marginal costs and revenues reflect the relative costs vs. savings of reducing the turnover rate by another unit (such as percentage turnover per year, Bluedorn 1982b: 8).

Of course, in both cases organisations will differ as to the placement of their curves, based on the particular circumstances existing in the operational,

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of the business (see Baysinger & Mobley, 1983 litions).

Complex mathematical utility functions for the overall utility of separations (and acquisitions) have been developed as well. These are discussed as the main model in Chapter Three.

The distinction between functional and dysfunctional turnover is important because it shows that the imagined costs of voluntary turnover may be overstated (based as they often are on costs only). This overstatement of negative consequences is increased when we consider that some proportion of the dysfunctional turnover must be unavoidable for the organisation.

The next section will consider theories and evidence of the relationships between performance and turnover, a question which follows naturally on from the discussion of functional vs. dysfunctional turnover and which has bearing on the model under discussion.

B. Performance as a Driver in the Turnover Process

This section examines the link between individual employee performance and quitting. Specifically, the question of whether poor or good performers have the higher tendency to leave, and under what conditions, has caused much debate.

The reasons for this interest in the performance - turnover process are evident in the work on functional turnover and the utility of separations (Staw 1980; Boudreau & Berger, 1985; Hollenbeck & Williams, 1986). In the words of Martin, Price and Mueller (1981: 116)

> **"…it makes a major difference to the organization whether or not the job performance of those who leave is higher than those who stay. If an organization is disproportionately losing**

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employees, it is likely that its goal … adversely affected because those employees probably contribute more to goal achievement than do the low-performance employees" (Martin *et al.*, 1981: 116).

Early studies, which were largely not conducted in commercial settings but rather among educational or nursing samples, gave contradictory indications. While many found that better performers were more prone to turnover (e.g. Allison, 1974), others found that there was no significant relationship (e.g. Martin, Price & Mueller, 1981) or that better performers were more likely to stay (e.g. Stumpf & Dawley, 1981; Seybolt, Pavett & Walker, 1978; Keller, 1984).

Two main schools of thought have developed since these early findings (Dreher, 1982; Jackofsky, 1984). Both share a common basis in that they attempt an explanation in terms of adaptations of March and Simon's (1958) model, which focuses on the dual effect of desirability and ease of movement. Specifically, they postulate that high performance should:

- *Enhance* the ease of movement (consequently tendency towards turnover) in a clear and direct manner[5], and
- *Weaken* the desirability of movement (consequently tendency towards turnover) due to potentially higher satisfaction brought about by success, particularly in organisations that have a strong link between pay and performance (however see the debate on the moderating influence of performance).

[5] Due to higher relative labour market value, higher self-efficacy regarding future employment etc. See later for moderating effects.

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y finds an opposing effect whereby high y encouraged to stay by higher satisfaction and encouraged to leave due to greater perceived opportunities (Dreher, 1982: 138). These conclusions can be seen graphically in Figure 2-6 (Jackofsky, 1984)[6].

As can be seen in Figure 2-6, the model predicts that performance will influence ease and desirability of movement (in conjunction with other partial determinants). These in turn will influence intention to quit, voluntary turnover and ultimately (in conjunction with involuntary turnover) total job turnover[7]. Jackosfky's (1984) addition of involuntary turnover suggests that, in addition to employees being fired, transferred or promoted due to their performance (adding to total job turnover), some individuals may second-guess dismissal due to low performance and leave as a preventative measure. Such 'voluntary' turnovers lack individual volition and are largely not based on an evaluation of desirability or ease of movement, potentially skewing results (particularly in primary data[8]).

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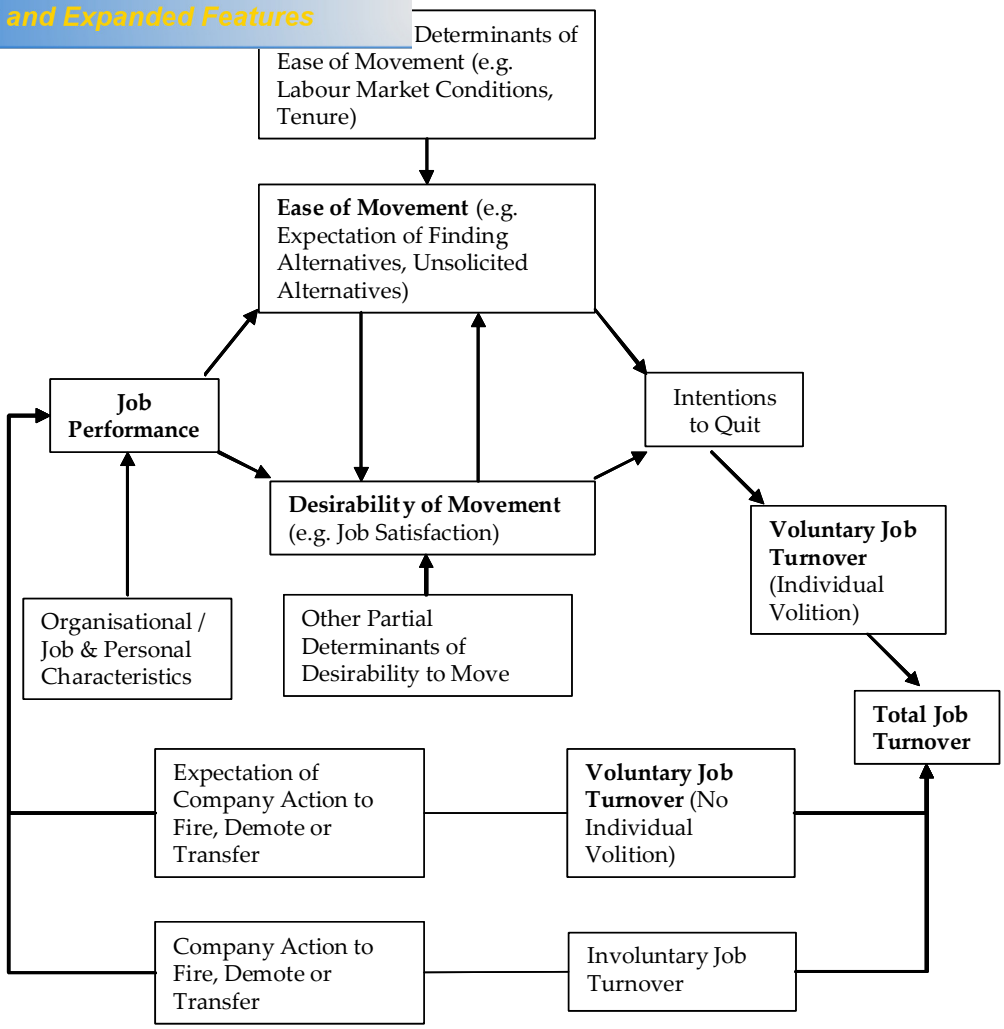
[6] Initially prompted by an earlier model linking ability to turnover (Jackofsky & Peters, 1983)

[7] Note that Jackofsky (1984) includes intra-organisational movement in this model, i.e. transfers, promotions etc. Wells & Muchinsky (1985), for example, found in a managerial sample that the highest performers were promoted within the organisation (job turnover but not organisational), while the quits were lower performers but significantly better than those dismissed.

[8] Organisations have been reported to allow employees to register their leaving as voluntary to save them the negative results of what would otherwise have been a dismissal.

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…nce-turnover model



However from this common base, two opposing streams of thought and research diverge. Conclusions based on this model by Dreher (1982), probably the first systematic theorist in this vein, and others, differ from those of Jackofsky (1984) and others. The two streams of theory have been respectively labelled the 'contingent rewards' and 'perceived alternatives' hypotheses (Lance, 1988: 271-272). The main points of divergence revolve around the performance-turnover[9] relationship and the potential influence performance may have as a moderator of the satisfaction-turnover relationship.

[9] Either voluntary or total turnover.

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Theories

The contingent rewards hypothesis focuses to a large degree on the importance of the desirability of movement effect. Dreher (1982) challenged the assertion that there is necessarily a positive relationship between performance and turnover. Instead he turned to moderators of the main effect findings for answers. He looked at the availability of *contingent rewards based on performance* (such as promotions or pay). If these were in place, satisfaction should increase with success, weakening desire to move and inducing high performers to stay rather than leave.

Under the 'contingent rewards' theory, there is of course the possibility that increased ease of movement due to greater success will overwhelm satisfaction, and lead to greater turnover. However Dreher (1982: 139) theorised that the ease of movement effect would to a large degree be reliant upon another moderator, namely the *external visibility of performance*[10]. He asserted that most performance appraisals are internal, and not externally visible (Schwab, 1991).

Dreher's specific hypotheses were therefore that high-performing employees would be particularly difficult to retain if (1) there is no performance-based pay (assuming pay is a retention motivator) and (2) the market can easily observe performance. However performing employees should tend to stay when their efforts are rewarded and the market cannot easily monitor their performance. He did not attempt any hypotheses with the other scenarios, leaving them open to the assumption of "competing expected utilities" (p139). His results, only applicable to the high performance pay but low visibility scenario (it was a case study of one organisation with performance pay and internal job appraisals) indicated that under those

[10] Without external visibility, Dreher postulated that the market would have no basis for comparison, and performance may not actually lead to greater ease of movement.

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did not have a significantly higher rate of re prone to stay.

The contingent-rewards rationale would therefore generally predict a negative relationship between performance and turnover, given the assumption that (1) most organisations try to keep their high-performers satisfied through various rewards (Spencer & Steers, 1981) and (2) true external comparability and visibility of performance is generally rare and only limited to some professions.

In this vein, some theorists (e.g. Spencer & Steers, 1981) propose a moderating effect whereby differences in satisfaction would have a significantly greater effect on voluntary turnover decisions for poor performers than good performers, again because more organisational attempts are made to keep high performers satisfied (also, low performers receive the psychological shock of a poor appraisal, and information search tends to follow shocks, Keller, 1984; Futrell & Parasuraman, 1984; Lee & Mitchell, 1994; McEvoy and Cascio, 1987; Orpen, 1985; Spencer & Steers, 1981).

Thus generally the contingent rewards hypothesis (given moderating influences) predicts a **negative** performance-turnover relationship and a stronger negative satisfaction-turnover relationship for **poor** performers than **good** performers.

ii. The 'Perceived Alternatives' Theories

On the other hand, the 'perceived alternatives' hypothesis places the emphasis upon the greater ease of movement predicted to arise from higher performance. Jackofsky (1984: 76, see model above), like Dreher (1982), agreed that increased satisfaction could arise from greater performance. She also predicted moderating influences, particularly performance-contingent pay

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behaviour and individual differences. However regarding total turnover, she hypothesised a **curvilinear** relationship between performance and total (involuntary and voluntary) turnover (a hypothesis that had been suggested by previous researchers). She came to this conclusion by looking at three levels of performers in terms of the model: a) High performers were expected to have high voluntary turnover *because their ease of movement increases accordingly*; b) Mid-level performers (adequate but not good) are the most likely to stay because they do not have high ease of movement and are not pushed out, c) Poor performers should have high involuntary turnover either because they are fired or because they themselves leave in anticipation of organisation action.

The importance of performance related rewards also has relevance here. Zenger (1992), for instance, found that merit systems that reward or punish only the extreme high or low performers helps to retain the very high performers, drive out very poor performers, and retain proportionately more of the below-average rather than the above-average large mid-performing section.

So for voluntary turnover, Jackofsky (1984) saw a potentially **positive** relationship with performance in opposition to previous (contingent rewards) theories. It is important however not to lose sight of the fact that the model is curvilinear, and that looking only for a linear relationship may confuse the truth.

As regards the moderating effect of performance, Jackofsky (1984) postulated the opposite to the contingent rewards theorists when it came to total turnover. She suggested that satisfaction changes would affect the turnover of good performers more than poor (she theorised that high performers should have a strong negative relationship between satisfaction and turnover, because ease of movement gives them the liberty to leave if

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rmers should have a zero relationship because nothing to do with satisfaction and mid-level performers have a minimal relationship between satisfaction and performance as their ease of movement is not high enough to give them a chance to move even if dissatisfied (see Flowers & Hughes, 1973).

The voluntary turnover section of the model was tested by Jackofsky and Slocum (1987), support being found for most of the links[11].

Various studies (Jackofsky, Ferris & Breckenridge, 1986; Mossholder, Bedeian, Norris, Giles & Feild, 1988; Williams & Livingston, 1994; Trevor, Gerhart & Boudreau, 1997) have also generally confirmed a curvilinear relationship between performance and turnover (but see Birnbaum & Somers, 1993). Although Jackofsky (1984) originally envisaged the curvilinear relationship for *total* turnover, many of the above studies extended it to voluntary turnover. It therefore seems as though the curvilinear hypothesis, *when studied in conjunction with moderators* (Trevor *et al.*, 1997), may provide the most help in explaining contradictory findings in future.

iii. The Importance of Moderators

Post-Jackofsky (1984) linear studies on the general direct relationship between performance and turnover have reported a moderate negative linear relationship (e.g. meta-analyses by McEvoy & Cascio, 1987; Bycio, Hackett, & Alvares, 1990; Williams & Livingstone, 1994). However it was also concluded that the possibility of positive relationships under certain circumstances could not be ruled out. Curvilinearity was either supported, could not be ruled out, or was not tested.

---

[11] The linkage between performance and satisfaction was tested with reinforcing leadership behaviours as a moderator, which was found to be significant. The direct relationship was not found, validating the contingent theories that, for example, performance-related rewards are a potentially important factor.

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arrison, Virik & William, 1996 and Lance, 1988) ship may at first seem to present a challenge to the Jackofsky (1984) hypotheses, as they appear to oppose her assumption that the ease of movement effect would generally dominate and produce a positive relationship especially among better performers. However the findings for curvilinearity (which many of the linear studies did not test), increasing diversity of findings, weaknesses in the meta-analyses and differences in samples suggest that the answers may be in the details (Trevor *et al.*, 1997). Specifically, the relationship between performance and turnover may be almost entirely reliant on the contingent factors in place. An understanding of such factors, then, will help to predict the nature of the relationship and reconcile all theories. Likewise, the moderating effect of performance may rely on situational factors such as demography and general job market alternatives.

Based on the aforementioned theories and subsequent research, the following moderators may affect the desirability of movement (job satisfaction) effect:

- *Contingent rewards*: Perhaps the most utilised and important of moderators is the availability of performance-related rewards (e.g. pay or promotions, as prompted by generally reinforcing supervisory behaviours, Jackofsky and Slocum, 1987: 264). Strong performance-contingent pay is theorised to increase job satisfaction for better employees. Thus the stronger the contingent rewards the more negative may become the relationship between performance and turnover (Trevor *et al.*, 1997). This effect has been confirmed in many studies, including meta-analysis (Williams & Livingstone, 1994), performance as a moderator of the satisfaction-

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Mossholder *et al.*, 1988[12]), the curvilinear 1997[13]) and for varying levels of contingency (Harrison *et al.*, 1996[14]).

Promotions are more complex than pay, as they simultaneously increase satisfaction but also increase ease of movement. This is because promotions are a signal of performance to the market, and head hunting will likely increase the higher one rises (Trevor *et al.*, 1997, who found that once pay rises were removed from the effect of promotions, there was a positive impact on turnover).

- *The nature of the task*: the more routine / bureaucratic instead of challenging the job the lower the person-job fit especially in the case of high growth-need or growth-coping oriented employees (Wright & Bonnet, 1993). Routine and/or bureaucratic jobs have been found to lower the job satisfaction of more able or higher performing workers, resulting in an increasingly negative relationship between ability or performance and turnover (also see Jackofsky & Peters, 1983a).
- *Age*: Werbel and Bedeian (1989) found that age significantly moderates the relationship between performance and turnover. Older and poorer performers were **more** likely to leave. They concluded that low satisfaction

---

[12] Mossholder et al (1988) verified Jackofsky's theorised direction regarding performance as a moderator of the satisfaction-turnover relationship but found that the effect reversed in the presence of contingent rewards

[13] Trevor et al (1997) found in their curvilinearity study that increased salary contingency accentuated the survival of good performers, i.e. greater contingent rewards lessened turnover at the good performer level

[14] Harrison et al (1996) tested the same group of salespeople experiencing differing levels of contingency over time, thus cutting out between-sample confounds, with an increasingly negative relationship over increasing contingency, and the highest negative relationship yet under the maximum contingency, being discovered.

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promotion overwhelmed ease of movement

Likewise, several factors may moderator the ease of movement effect:

- *External visibility of performance*: As stated above, ease of movement is expected only to increase significantly with higher performance if the success of that employee is objectively visible to the job market (Dreher, 1982: 139). Jackofsky (1984) postulated that enhanced perception of ease of movement due to higher performance was likely to come about from both the direct effect on the employee (enhanced self-efficacy) and also the indirect effect of greater solicitations (increased headhunting). While visibility may not affect self-efficacy, the lack thereof should stem external solicitations, thus decreasing ease of movement. This might often not be the case with internal performance appraisals. The higher external visibility, the more likely a positive performance-turnover relationship.
- *Job type*: The type of job studied may significantly affect the performance-turnover dynamic. Specifically, certain types of jobs lend themselves to ease of movement, either because they are more prone to head-hunting or because the job is externally observable by nature. Managerial and supervisory workers, for instance, often possess fairly ubiquitous skills (Wright & Bonett, 1993: 151). They are also more likely to be externally solicited. Both scenarios enhance ease of movement. Academics' research records are easily observable (Schwab, 1991: 968), as is the work of artisans and other design-type fields. Such jobs are more likely to have a positive relation between performance and turnover due to the enhanced ease of movement. Wright and Bonett, 1993, for instance, found that in a group of highly educated supervisory staff (probably quite mobile), who were not

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ere was a positive relationship. This is in line

tions based on moderators.

- *The job market*: The demand for labour in the external job market relative to the internal demand for labour should to some extent moderate the relationship between performance and perceived ease of movement (Jackofsky & Peters, 1983b: 494; Keller, 1984: 182). Since some of the performance-turnover models include job (intra-organisation) turnover, the chance of promotions or attractive transfers is also a factor (Jackofsky, 1984: 75). The extent to which an employee expects promotion / transfer or a slack external job market should enhance ease of job movement and lead to a stronger positive performance-job turnover relationship. A stronger external vs. internal demand should enhance organisation turnover. It is generally acknowledged in South Africa that in high-skill jobs there is a situation of scare skills (Department of Labour, 2005), which accords with high external demand. At the same time, the past two decades have seen massive downsizing and delayering of organisations, decreasing the opportunities for promotion (e.g. Lee, 2002).
- *Time / tenure*: Time may also have an effect. For instance, an employee who stays for some time in a position may be able to build a reputation in the market that allows for increased visibility of performance. Johnston, Futrell, Parasuraman and Sager (1988) found in a sample of salespeople a strong negative relationship between performance and turnover in the short run (possibly due to initial low visibility of performance). This changed to a positive relationship in the longer term (two years). Accordingly tenure may increase the positive relationship. Harrison *et al.* (1996) also found that turnover depends more on current performance levels than average, and the rate of change in performance levels also uniquely described some change in turnover. An understanding of temporal influences is therefore important.

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ess relationships between performance and turnover are amongst the most complex and disputed in the literature. It seems as if Jackofsky's (1984) curvilinearity hypothesis is the most supportable given the evidence, but that situational modifiers are of the utmost importance in understanding the links.

The final section considers components of turnover consequences for both the organisation and the individual. This rounds out explanations of why EF – in this case outflows – may affect customer and ultimately organisational performance.

C. Components of Turnover Costs and Benefits

Mobley (1982a&b) provided the now-seminal categorisation of individual and organisational turnover consequences (Figure 2-7), which will be utilised here.

Figure 2-7: The consequences of employee turnover (Mobley, 1982a&b)

	Consequences for Organisation	Consequences for Leavers
Possible negative consequences	• Costs (recruiting, hiring, assimilation, training) • Replacement costs • Out-processing costs • Disruption of social and communication structures • Productivity loss (during replacement search and retraining) • Loss of high performers • Decreased satisfaction among stayers • Stimulate undifferentiated turnover control strategies • Negative PR among leavers	• Loss of seniority and related benefits • Loss of nonvested benefits • Disruption of family and social support systems • 'Grass is greener' phenomenon and subsequent disillusionment • Inflation-related costs (e.g. mortgage cost) • Transition-related stress • Disruption of spouse's career • Career-path regression

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	ences for Organisation	Consequences for Leavers
	of poor performers	• Increased earnings
positive consequences	• Infusion of new knowledge / technology via replacements • Stimulate changes in policy and practise • Increased internal mobility opportunities • Increased structural flexibility • Decrease in other 'withdrawal' behaviours (e.g. absenteeism, see Rosse & Hulin, 1985) • Opportunities for cost reduction, consolidation	• Career advancement • Better 'person-organisation fit', thus less stress, better use of skills, interests • Renewed stimulation in new environment • Attainment of non-work values • Enhanced self-efficacy perception • Self-development

The major components above, and a few others, are now explicated in more detail[15].

i. Costs of Turnover for the Organisation

This review is meant only as a summary of the available literature, due to space constraints. However, turnover of individuals may be affected by organisational costs (depending on how aware the organisation is of these costs). This occurs because, the more dysfunctional turnover becomes for the organisation, the more effort the organisation is likely to place in retention efforts. The following have been mooted as possible costs of turnover for the organisation:

1. *Basic costs*: These are the direct financial costs of turnover for the organisation, such as the costs of recruitment, hiring, assimilation, training

[15] The review in Hom and Griffeth (1995) is acknowledged as the source of much of this material, including the many references which formed the basis for reading in this area.

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& Wedley, 1979; Jeswald, 1974). They are often eported in Hom & Griffeth, 1995: 15-18), in a study of mental health professionals[16], found that:

- Separation costs could be further deconstructed into the costs of exit interviews (interviewer's and interviewee's time), administrative costs (e.g. alteration of records), disbursement of unused vacation time, lost client revenues (overall service levels may drop), overtime paid to employees who have to cover for the vacant post or temporary workers wages for the same reason and case consultation (transferring clients to other workers).
- Replacement costs for the sample were composed of the costs of advertising for a replacement, personal recruiting, processing of applicants (e.g. reviewing), entrance interviews and applicant selection and miscellaneous costs (e.g. tests and travel costs).
- Finally, training costs were found to include instructor's and trainees time spent in formal orientation and formal job training, offsite training costs (costs of course and trainee's time), on-the-job training and the loss of client revenue while fewer are being serviced by replacements.

Mobley (1982a: 18) also added the costs of out-placement as a possible consideration.

2. *Productivity losses*: In addition to the obvious financial costs, which are measurable by standard accountancy procedures, there are somewhat more subtle problems stemming from turnover. Organisational productivity may be impacted by turnover. Progression of withdrawal models of turnover, for instance, hold that turnover may be preceded by

[16] Also see Cawsey & Wedley (1979) for a similar breakdown.

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ctivity, lateness and increased absence (Rossé & er, 1984). The turnover of key staff can lead to issues such as delays, lost contacts and projects not being fulfilled, leading to lost business opportunities (Mobley, 1982a: 20). In addition, leaving employees may compete with the organisation if not trade-restrained, impacting on future opportunities.

The productivity of those remaining may also be affected by turnover, especially in the case of a chronic turnover rate. This may occur through disruptions such as lower morale and impaired team- or sequential-work capacity (e.g. Sheehan, 1993 & 1995), disruption of social and communication structures (Mobley, 1982a: 20; Bluedorn, 1982c: 111), turnover of leaders, or impairment of the organisational system ('input-process-output cycle'), causing entropy and lowering efficiency (Bluedorn, 1982c: 104-108).

Finally, replacements generally need an initial period to rise to their full productivity levels, affecting both their own and their colleague's work. Of course, it is important to note that replacements must be judged relative to their predecessors. The concept of functional turnover compares the utility of replacements to those who quit, and allows for the prospect of productivity *improvements* should replacements be better performers.

3. *Lower service quality*: Customer loss due to turnover may also arise (e.g. Darmon, 1990; Fitz-Enz, 1997: 50). It is this effect that is of principle interest in this thesis, and as such will be dealt with in some detail. In the context of lower quality, this loss comes about mainly from reduced service and quality standards due to the lack of productivity of new and inexperienced employees. Customers can be lost merely because they like the continuity of doing business with familiar people and turnover means constantly changing faces. In the case of service organisations especially,

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ies, executives can deal with customers who s worth of business per year each. Customers who leave because they are no longer dealing with a trusted executive ('familiar faces') can therefore represent a substantial loss. The loss due to customer turnover is measured simply by lost revenue per customer, less variable costs.

It is also possible that, regardless of service, customers could perceive the overall organisational disruption brought about by turnover and react negatively by removing their business. Organisations with a reputation for turnover (and therefore, by implication, poor employment practises) could lose business quickly. As Dutton (1997:3) reports: "Customer surveys found that customers want to ensure that the organisation with which they conduct business has a sound employment package, a practical work-life program and a track record of good corporate citizenship".

Furthermore, the loss in market share due to lost customers will need to be remedied by marketing and sales efforts to win back new customers (Fitz-Enz, 1997: 50). In a customer-orientated organisation, the cost to win a new customer involves the full cost of the organisational marketing effort.

4. *Disruption of social and communication structures, demoralisation of stayers*: As mentioned above, employees who remain may be demoralised by the turnover among their colleagues (Sheehan, 1993 & 1995). Social and support networks may be significantly disrupted. Reasons for leaving may highlight actual or perceived negative aspects of the job for those staying. Productivity may drop in response, and higher turnover result. Alternatively, turnover may 'snowball' through informal networks in organisations (Krackhardt & Porter, 1986). Krackhardt and Porter (1985) did however find among one sample that satisfaction and commitment

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ind. This may indicate that contingent factors
ivity of turnover on those left behind. The perceived reason for turnover may be one example (i.e. did employees leave due to dissatisfaction with the organisation, or were they attracted away by positive 'pull' reasons, Sheehan, 1993 & 1995; Staw, 1980: 257?)

5. *Undifferentiated turnover control strategies*: The organisational effort expended to measure and contain turnover, and acquire replacements, will likely itself be a cost associated with turnover (Mobley, 1982a: 21). Efforts to manage turnover that do not distinguish adequately with regard to finer issues such as avoidability or functionality may be futile expenses.

ii. Benefits of Turnover for the Organisation

The following are potential benefits of turnover for the organisation, contributing to the functionality of the phenomenon. Again, the turnover of individuals may be affected since the more functional the turnover the less the organisation is likely to attempt to hold onto the employees.

1. *Displacement of poor performers*: As stated earlier, just as productivity may be lost by turnover it may also rise in the long term. This occurs especially if better performers are being hired in the place of those leaving, as research has sometimes found (McEvoy & Cascio, 1987; Williams & Livingstone, 1994).

   Besides productivity differentials, some poor performing employees who stay because they cannot go elsewhere might also engage in alternate forms of deviance. These include absence, lateness and even sabotage. The organisation would be better off in their absence (Mobley, 1982a: 22). It has also been suggested that job burnout leading to turnover in stressful,

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chnologically challenging and public service nctional. These professions often find higher performance among newcomers than longer serving employees (Staw, 1980: 259).

2. *Infusion of new knowledge and technology via replacements*: New personnel may import fresh ideas and approaches to an organisation, especially through new knowledge and technology. This effect may be especially important in key employee areas. These include research and development (e.g. Katz, 1982)[17], management (Staw, 1980: 269) or technical jobs, where tasks are often varied, constantly adapting and require high creativity and initiative. Zero turnover may lead to stagnation and loss of touch with industry and market advances.
3. *New business ventures*: Exiting employees may provide work for their former employers by maintaining ties and working relationships (Hom & Griffeth, 1995: 28). This may be especially true should employees move vertically up or down the supply chain.
4. *Labour cost savings*: Voluntary attrition provides a useful alternative for organisations that wish to reduce their workforces in order to reduce labour costs, but who would rather not achieve this entirely through retrenchments (which are also more costly due to severance costs, Hom & Griffeth, 1995: 29). The labour cost savings may be achieved through outcomes such as lower payroll and benefit costs and greater staffing flexibility (Muchinsky & Morrow, 1980: 282-283).
5. *Enhanced promotional opportunities and empowerment for stayers*: There may also be benefits for those remaining due to turnover (Hom & Griffeth, 1995: 29-30). Promotional opportunities, for instance, may increase.

[17] Research by Katz (1982) among research and development teams found an inverted curvilinear relationship between group tenure and project performance.

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nent may lead to subordinates being given more xperienced bosses. Finally, morale may increase if those leaving are unpopular (or in any other way the cause of tension).

iii. Costs of Turnover for the Individual

Although somewhat peripheral to the main topic, the negative consequences of turnover for the individual will very likely form a significant part of his/her decision as to whether or not to leave and therefore will be discussed here. The following are mooted as potential costs of leaving for the employee:

1. *Seniority and fringe benefits forfeited*: Loss of entrenched benefits accrued from past service can be a significant cost for employees, and may deter them from leaving (Mobley, 1982a: 28; Rusbult & Farrell, 1983: 341). Most notable is the accrued benefits of membership in benefit schemes, especially health and pension benefits (Ippolito, 1991). Also included here is the possible effect of losing seniority benefits, such as expected promotion.
2. *Relocation costs, personal and family networks and community services*: Sometimes, turnover requires movement to a new area. This can be extremely difficult, stressful and costly, especially if the employee is carrying the expenses (Mobley, 1982a: 28).

   In addition, employees leaving a job often leave behind their support networks. This can exacerbate the emotional and other costs of turnover. Turnover may possibly be affected by the extent of reliance on social and family networks (Farrell & Rusbult, 1983: 432). The effect on spouses and families may also curtail turnover and relocation attempts (Hom & Griffeth, 1995: 31). For example, families may be reluctant to leave behind

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s such as schools, doctors or churches (Abelson rrell & Rusbult, 1983: 432; Turban, Campion & Eyring, 1992).

3. *Transition stress of new job*: Moving to a new job may prove stressful for the employee (Mobley, 1982a: 28). Socialisation stress (i.e. adapting to the new organisation) can prove to be time consuming and difficult. Advance knowledge of such difficulties may deter turnover to some extent.
4. *Career of spouse*: The effect of turnover on the career of a spouse might be a negative individual consequence (especially if relocation is required, Mobley, 1982a: 28). Spouses may not be able to find work in the new area. Consideration of a spouse's career may therefore affect turnover decisions of employees (e.g. Milliken, Dutton & Beyer, 1990 and Turban *et al.*, 1992 for empirical findings).

iv. Benefits of Leaving for the Individual

The following benefits of turnover may also impact on the individual by acting as pull factors encouraging him/her to leave:

1. *Obtain better job elsewhere*: The promise of a better job elsewhere may be a significant benefit of turnover for the individual and one of the pulling forces inducing turnover (Muchinsky & Morrow, 1980: 273). Employees may leave for any number of reasons, including increased earnings, career advancement and more favourable relationships (Mobley 1982a: 26). A new job may also compare favourably with the old in terms of stress and discord. Hom and Griffeth (1995: 32) add that relocation might be a boon to some employees, due to potential access to a better community, with superior services, more safety or other amenities.

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ley (1982a: 26-27) suggested that, for some ight benefit them as it serves to revitalise them and provides time to renew commitment to careers and job foci. Wright and Bonett (1992) found in one study that turnover increased employees' job satisfaction and mental health.

3. *Attainment of non-work values*: Some employees leave work in order to pursue outside endeavours more effectively, such as family or hobbies. Alternative employment or situations may allow for more or better time for these pursuits (Mobley, 1982a: 27).
4. *Self-efficacy and development*: The process of "successfully testing oneself in the job market" (Mobley, 1982a: 26) through a job move may increase the individual's perceived self-efficacy, and prove to be a development experience.
5. *Facilitate spouse's career*: Finally, Hom and Griffeth (1995: 33) add that turnover may occur if it aids the spouse's career. For instance, relocation of one spouse often requires the other to quit too. In such a case, the benefit of the trailing spouse's turnover is in improving or supporting his/her partner's career.

The final review section to be covered in this chapter is that of the measurement of employee turnover.

2.4.4 TRADITIONAL MEASUREMENT OF EMPLOYEE TURNOVER

Understanding the measurement of turnover gives understanding to methodologies that have been used in turnover research or practice. As such it is discussed here, as it informs the potential difference and value of the approaches taken in this thesis.

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ve approaches to measuring turnover, drawn ional theory. These are:

1. Reasons for quitting,
2. Voluntariness,
3. Avoidability,
4. Functionality, and
5. Utility.

Several of these have already been covered. Only utility measurements of turnover, more simple and practical ratio-based formulas and statistical measurement of the phenomenon need be assessed further. The most complex of these, utility (decision theoretic utility analysis), will be covered in Chapter Three given its use as the independent variable in the empirical model, the others will be discussed here.

A. Ratio-Based Turnover Measurement

Ratio-based measurements tend to be used in more practical and managerial applications, although they are also utilised in organisational-level studies of turnover (e.g. Huselid, 1994). Examples include the Nett Turnover Rate (NTR, or 'separation or labour turnover rate') and the Replacement Turnover Rate (RTR), which are formulated as follows (Van der Merwe & Miller, 1988, and Blakeslee *et al.*, 1985):

$$\frac{S}{M} \times 100$$

where for the NTR, S = total separations (voluntary and involuntary), M = average number of employees on payroll and for the RTR S = separations

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nissals only, with retrenchments excluded) and

yees on payroll.

Mobley (1982a: 37) also suggests looking at survival and wastage rates, as a gross turnover statistic does not express retention dynamics (e.g. is twenty percent turnover twenty percent of the workforce leaving once, or ten percent leaving twice?). The wastage rate is:

$$WR = {}^{L_i}\!/_{N} \times 100$$

where WR = the wastage rate, L_i = the number of leavers in the cohort with specific length of service i, and N = no. in the original cohort. The survival rate is:

$$SR_t = {}^{S_i}\!/_{N} \times 100$$

where SR_t = the survival rate, S_i = the number of stayers in the cohort with specified length of service i, and N = original no. in cohort.

Some other ways of assessing gross turnover rates include median length of service of leavers, distributions of in-service employees, percentages of voluntary terminations (Van der Merwe & Miller, 1988) and comparisons between turnover and performance or employment equity (Mobley, 1982a: 42-43).

Other formulas attempt to measure cost directly. Simple cost formulas commonly utilise monetary loss of production (Blakeslee *et al.*, 1985):

$$\frac{P \times T}{M} = L$$

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of production in plant, division etc., T = hours lost due to turnover, M = manpower hours worked and L = monetary loss of production.

A review of these sets of formulae quickly reveals their limitations. They do not, for example, adequately distinguish between types of turnover. They also do not pick up much of the total cost arising from indirect cost components (as discussed). Their simplicity, although allowing for quick judgements, misses too much of the picture. Hom (1992), for example, used twenty-one formulae to calculate separation, replacement and training costs among mental health professionals. Because they are by nature aggregate measures, these formulae are also not useful for individual-level analyses of turnover, such as might be needed in this study of turnover process models.

Another type of turnover measurement surrounds that used for statistical academic studies.

B. Measuring Employee Turnover for Statistical Study

For academic study turnover can be measured in several ways and for several purposes. As stated above, ratio-level analysis can be used for unit- or organisation-level studies.

There are other varied statistical operationalisations of turnover. Quite popular, for instance, are various individual behavioural attitudes towards turnover (such as intent to leave) and measurements of withdrawal cognitions (such as self reported estimates of thinking about quitting or searching for alternatives). These can potentially be measured by multiple item scales, giving continuous data that are open to comparison with a host of predictor variables.

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nover measurement is, of course, the actual actual turnover can only be measured as a dichotomous variable, namely 0 = stayed, 1 = left. The data is usually collected in retrospect, through personnel records. Another problem, of course, is that the voluntariness of the turnover may not be documented.

Academic statistical studies are generally interested in how this variable is related to various predictor or dependent variables. Most of the latter will be continuous data (e.g. job satisfaction). Logistic regression or other similar procedures can be used to calculate relationships. Correlation or covariance matrices have also been used in many studies (e.g. Hom & Griffeth, 1991; Hom, Griffeth & Gaertner, 2000; McEvoy & Cascio, 1987).

However there is a methodological problem with correlating dichotomous variables with predictor variables (Hom & Griffeth, 1995: 11-12). Because of the nature of the data, there is an attenuation effect that limits the highest possible correlation to less than 0.8 (0.2 less than for predictor variables). Various authors have therefore developed correction formulae to bring the correlations to their true levels (Kemery, Dunlap & Griffeth, 1988; Hunter, Schmidt & Jackson, 1982; Steel, Shane & Griffeth, 1990). Although the practise of correcting has some detractors (e.g. Williams, 1990), others still contend that they should be used (e.g. Bass & Ager, 1991). These formulae will not be explicated further here, as it is not necessary for this particular study.

Another academic method of measuring turnover is survival analysis. In response to the growing criticisms of turnover methodologies (e.g. Peters & Sheridan, 1988) researchers began to utilise this method for the analysis of employee turnover (Morita, Lee & Mowday, 1989 & 1993; Peters & Sheridan, 1988; Somers, 1996 & 1999). Survival analysis originated in the biomedical life sciences. It is typically used to track aggregate life expectancies of a group of organisms under a given condition and over time (e.g. humans with a certain

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38: 242). Conversely, a hazard function typically
any individual given survival to that time.

As used in turnover research, the technique helps to overcome the one-shot measurement approach used by researchers. That is, instead of calculating the aggregate turnovers after a certain period the researcher can use survival analysis to track the cumulative survivals in the group over time until a certain point (the hazard rate curve would then allow for an analysis of turnover rates over time). Survival curves are far more detailed pieces of research information, more akin to time series data. The survival curves of differing treatment groups being studied for turnover reveal more due to the changes over time than the final turnover aggregates.

Survival analysis has received some interest in research (e.g. Hoverstaf, Moncrief & Lucas, 1990, Somers, 1996 & 1999). Such research seems to indicate that survival analysis works best for turnover models using descriptive, not process, variables (such as tenure, age, ethnicity and commitment). Whether the relative lack of success of survival analysis to improve *process* prediction is due to models or methodologies is open for debate.

2.4.5 CRITIQUES AND IMPLICATIONS FOR THIS THESIS

Turnover studies using the measurement techniques described so far have generally had the following characteristics: a) They focus on voluntary turnover as defined in Section 2.4.1A above, b) They have also, as stated, focussed largely on inter-organisational outflows, c) They are generally disconnected from inflows of staff, d) In statistical studies, issues of avoidability or functionality are often excluded in favour of simple event-based measures (Hom & Griffeth, 1995). However from the point of view of customer service, all of these dominant perspectives may be problematic.

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rspective, for example, the voluntariness of elevant. As discussed briefly in the transfer section, all outflows regardless of reason will be included. This is because the productive consequences of losing an employee can be the same whether his/her leaving was voluntary or involuntary – for example a good performer may reach retirement age, and be sorely missed, or a poor performer may decide to leave voluntarily to escape later dismissal (Hom & Griffeth, 1995). Since the thesis is interested in productivity consequences of flows not reasons, the type of turnover may be relatively irrelevant. Accordingly, the performance of the employee vis-à-vis job and organisational requirements is seen as the key issue, regardless of the type of turnover.

It is nonetheless potentially desirable to distinguish between voluntary and involuntary turnover in flow analyses because the normative consequences and recommendations to come out of the analysis will differ depending on the source of turnover. For example, if there is negative impact on performance that is primarily caused by voluntary turnover, then retention will become the focus. If the impact is from involuntary turnover, then dismissal systems may require revisiting.

Secondly, when considering boundaries, from the customer's point of view the loss of a contact employee may have the same effect whether it is inter- or intra-organisational outflows (i.e. traditional turnovers or transfers out to another part of the organisation, Bendapudi & Berry, 1997; Bendapudi & Leone, 1997). The distinction between transfers and turnovers will therefore be made with reference to the customer base served by the employee: if transfers move the employee to entirely another customer base then it will be considered unit-based turnover. This is explicitly taken into account in the research method of the empirical study through inclusion of both quantity and quality on internal transfers and promotions.

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disconnection of turnover research from is problematic. As discussed in Section 2.1, the simultaneous consideration of inflows and outflows (both inter- and intra-organisational) is more desirable because they affect each other. Therefore the approach taken in this thesis will enable the inflows and outflows of staff to be assessed together.

Finally, statistical studies of turnover generally ignore functionality of turnover in favour of event-based behavioural or ratio operationalisations (Campion, 1991; Hom & Griffeth, 1995). Such metrics assess quantity of turnover. However *quality* of turnover is the real issue: as discussed in Section 2.4.3A losing a poor employee may have as beneficial an effect as losing a good employee might have a deleterious effect. Therefore the approach taken in this thesis is to simultaneously take quantity and quality into account. This is achieved in the area of decision theoretic utility analysis, which is discussed in the next chapter.

2.5. CONCLUSION: EMPLOYEE MOVEMENT

This chapter has defined the major components of employee movement or flow and generally discussed the possible scope for impact on the organisation and customers, as this is the focus of this thesis. As stated initially, the impact of these areas is perhaps best dealt with in conjunction, instead of separately, as EF elements interact with each other. In addition, a more complete assessment of the impacts on the organisation of these employee areas is desirable. The next chapter accordingly attempts to achieve these aims by explicating the psychological area of EF utility.

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AS A WHOLE SYSTEM: THE 'UTILITY' APPROACH

Chapter Two defined EFs, and illustrated that they are a complex and interacting system primarily involving nett performance levels within incidences of employee acquisition, movement, retention and turnover. This chapter will now discuss the utility of nett EFs in given or multiple time periods. The aims of this chapter are threefold:

1. To move from analyses of EFs that are only quantitative (e.g. the traditional analysis of turnover rates) to one that incorporates *qualitative* elements. In the case of this chapter, the qualitative focus will be financial, however the principles developed here are transferred later to that utilised in the empirical study, namely global outcomes of customer service as well as intermediate service quality;
2. To develop an holistic system of EF analysis that not only can be qualitative but also integrative, i.e. consider each of the flow elements in isolation (as is normally done) but also in tandem.
3. To enable a later conceptual and empirical synthesis between the areas of study already discussed, namely EFs, marketing productivity and organisational financial success.

It is within the field of *decision theoretic utility analysis* that all of the EF variables discussed in prior sections have been incorporated in a way that allows for an holistic overview of EF over time, expressed in qualitative units (such as monetary terms). Therefore this area of study will be the focus of this analysis.

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of decision theoretic utility analysis, although
ed on mathematical modelling techniques, specifically psychometrics. This modelling approach is not in fact the end use of this area in this particular research, that is to say the modelling approach is not taken forward beyond this chapter. However the models built up in this chapter not only suggest a methodological approach that is utilised later in the empirical study (fulfilling the aims enunciated above) but, as will be seen, also help in statistical analysis later (e.g. in choosing measurement error levels) and suggest some further applications of the findings.

Accordingly, the decision theoretic models, notably those relevant to EF, are explored extensively below. The initial section undertakes a descriptive approach to the most relevant areas of the field, with only cursory attention drawn to the less relevant areas of the field. Critiques of the utility models presented are then given at the end of the chapter.

3.1. DECISION THEORETIC UTILITY ANALYSIS: INTRODUCTION

Decision theoretic utility analysis (hereafter referred to as UA for 'Utility Analysis') has been a prominent part of the human resource management and industrial psychology 'toolbox' for over sixty years. The vast majority of UA applications have been concerned with how to predict in advance what the real nett impact (generally monetary) of a certain management intervention or change will be for an organisation, so that decisions can be made about or between possible managerial decisions and implementation of the programmes can be improved.

UA in this context has accordingly been defined as "the determination of institutional gains or loss (outcomes) anticipated from various courses of action" (Cascio, 1999: 189).

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xamples of managerial interventions which are 1) value to the organisation of using a certain selection procedure or 2) a given training programme.

UA has principally been used in an *ex ante* sense to estimate or predict total utility (thus the 'anticipated' in Cascio's definition above), although *ex post* estimation is also possible and useful.

In order to explicate the development of the utility models for EF, the following sections will examine the development and theoretical underpinnings of UA. Thereafter, brief allusion to the UA models of employee stocks will be discussed. However, since these are somewhat peripheral to the discussion they will not be discussed in detail. Finally, the development of UA models for the assessment of EFs will be examined in great detail, as a prelude to using the principles drawn from them in the empirical model of this thesis.

3.1.1 GENERALISED UA REASONING

For typical applications, UA generally follows the following simple reasoning:

1. Something, the *predictor*, changes or is changed in the workplace, leading to
2. Differences in a *criterion* measure, such as nett employee performance, leading to
3. Improved institutional *outcomes*, generally higher economic value.

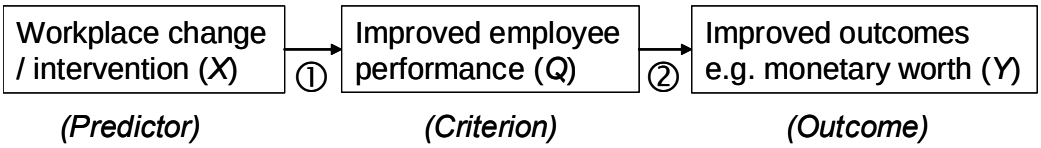
For instance, a better selection test (the predictor variable as operationalised by selection test scores of applicants) may alter the average quality of job selectees (the criterion measure as operationalised by work

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roved productivity and therefore profitability.

icture of this relationship:

Figure 3-1: Simple representation of utility analysis thinking / progression



From now on, the following notation will be given to each of these variables: Measurements of the predictor will be referred to as '*x*', employee performance '*q*' and the value of employee performance '*y*'. Boudreau and Berger (1985) suggest the concept of *service value* of employee performance as the main outcome measure *y* because it is generally through the delivery of service value to customers via employee performance that profitability occurs. This accords with the customer-focussed model of this thesis, therefore service value will generally be utilised as the outcome measure.

The normal role of UA is to estimate the nett effect on outcomes from an intervention, based on known changes in the predictor variable and impacts on the criterion variable. For example, one may be interested in estimating the nett monetary worth of an employee turnover reduction programme, based on the known turnover rates and intermediate impact on performance levels.

Direct measures of outcome changes are not estimated directly, either because they are not available (e.g. in *ex ante* prediction) or they are too difficult to gather (often the case). Surrogate estimation, which is essentially the role of UA, then requires *definite knowledge* of the relationships between the predictor and criterion (relationship ① in Figure 3-1) and also an *estimation* of the relationships between the criterion and outcome variable (relationship ② in Figure 3-1).

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TY ANALYSIS

Boudreau (1991: 624) identifies UA as a subclass of Multiattribute Utility Analysis (MAU), in terms of which any number of dissimilar attributes can be assessed to choose between multiple options. Boudreau (1991) suggests that the following are the steps in a MAU analysis:

1. Generate a group of *decision options*, in this case a set of comparable management interventions between which to choose;
2. Decide on a set of *criteria* on each option that are important to the decision makers and also amenable to change;
3. Objectively *assess (measure) each option* on its level of each criterion;
4. Generate a *payoff function* that weights each criterion relative to the others in relation to its importance;
5. Generate an overall *utility measure* for each option by combining the scores on each criterion (weighted via the payoff function), and choose the option with the highest score.

UA is therefore a specific version of MAU that incorporates the above elements into a decision framework. This framework is accordingly discussed step-by-step below.

A. The Decision Options in UA

UA is designed to focus on overall human resource management policies or environments. Notably, UA has two major areas of application (Boudreau, 1988):

1. Utility analysis for decisions affecting *employee stocks* (where 'stocks' refer to the value of current human capital in the organisation, such as training

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ting employee skills, abilities or motivation. The
ld assess HRM programmes and effects to do with these).

2. Utility analysis for decisions affecting employee flow (EF), i.e. assessment of HRM programmes and effects to do with the "composition or membership of the work force through employee movement", Boudreau, 1991: 627, such as employee acquisition or turnover.

Most notably, UA applications have been developed extensively to estimate the true, economic value of *selection methods* (especially Boudreau, 1983a; Brogden, 1946 & 1949; Cronbach & Gleser, 1965; Raju, Burke & Normand, 1990; Schmidt, Hunter, McKensie, & Muldrow, 1979); *performance improvement programmes*, notably training (Raju *et al*., 1990; Schmidt, Hunter & Pearlman, 1982); *EFs* (Boudreau, 1983b; Boudreau & Berger, 1985a&b), and various other applications to areas such as the value of emotional intelligence (Spencer, 2001) and skills development levy-grant systems (Lee, 2003a).

MAU allows for multiple decision options to be included (Sturman, 2001), however generally only one option at a time has been chosen in UA applications to improve robustness of the statistics or because the decision makers were not interested in multiple effects. As stated earlier, this thesis will focus on EFs only.

B. The Decision Criteria

The decision criteria are any set of outcomes of the programs under review that are considered important by the decision makers.

Boudreau (1991: 627-678) points out that, in a broad sense, the field of HR decisions tend to be assessed on the broad criteria of efficiency (for which he cites productivity criteria such as labour costs, job performance, sales

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arket share, etc) and effectiveness (for which he oyee attitudes, labour relations, previously disadvantaged and female representation, legality, and community relations).

In principle, almost any criterion could therefore be included as an important outcome of whichever decision option(s) is under review. However in the specific context of UA the following underlying criteria tend to underlie the utility payoff function:

1. *Quantity*: The number of people and time periods affected by a programme;
2. *Quality*: "The average effect of the program options on work force value, on a per-person, per-time-period basis" (Boudreau 1991: 628);
3. *Cost*: If applicable, the inputs required to generate the programme.

Therefore, given an assessment (measure) of each decision option on the above three criteria, based on a simple pre-defined payoff function, the utility of each is estimated.

C. Measuring the Criteria Variables

Far more will be said about this in the next section. Generally, quantity of a program impact has been measured in person-years, i.e. number of employees involved multiplied by time period of impact, discounted if necessary for future period impact. Quality of impact has been measured either in terms of the nett change in monetary value of performance or the impact on output. Cost has likewise been measured in monetary terms, thus arriving at an overall utility score for any given option which is monetary and reflects the expected value of that decision.

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This is the underlying way in which each rating for each decision's criteria will be assessed relative to one another and combined together into a single utility score. This will also be discussed in detail below with relevance to specific UA measures. In the case of UA for HR decisions, the payoff function has developed via mathematical statistical models relating the outcome to the programme predictor(s). It is the general case, however, that the payoff function is:

$$Utility = Quantity * Quality - Cost$$

As will seen later, this generalised payoff function can be used in complex ways to reflect various contingencies, such as EFs across multiple time periods and possible destinations, which is the focal issue in this thesis. The exact development of the payoff function is vital for the development of the methods of this thesis, and will therefore be dealt with next.

3.1.3 THE USES OF UTILITY ANALYSIS

Boudreau (1991: 625) references Huber (1980: 61-62) in suggesting five advantages of MAU models (and therefore UA) over "less systematic and structured decision systems:

- Because they make explicit a view of the decision situation, they help to identify the inadequacies of the corresponding implicit, mental model;
- The attributes contained in such models serve as reminders of the information needed for consideration of each alternative;
- The informational displays and models used in the mathematical model serve to organise external memories;

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ts of information in a prescribed and systematic

- They facilitate communication and support to be gained from constituencies." (Boudreau, 1991: 625).

Having discussed a broad basis to UA, the main uses of utility analysis will be discussed in detail next, with regard to isolated EF variables (notably selection), overall EF as used in the empirical section in a reduced form in this research, employee stocks (performance improvement programs) and, briefly, other uses.

3.2. UTILITY MODELS OF EMPLOYEE FLOWS

As stated above, the two major decision foci in UA have been EF and employee stocks. As EF forms the independent variable in the empirical model for this thesis, it is the focus of this chapter.

Table 3-1 shows the progression of the main EF models from the initial UA selection model to the final and most complex EF model[18].

As can be seen, selection utility was for many decades the main focus, not only of EF but of UA generally (the first major employee stocks analyses were really only begun in 1982, as discussed later).

Later, other EF variables were added to reflect all of the complexities of EF discussed in Chapter Two. The following sections will therefore discuss each of the models in Table 3-1 in some detail, building up to a complete model of EF utility in Model 6, starting with selection utility.

[18] Most of this table is from Boudreau (1988:1-144-1-145), however various amendments have been made including the addition of the RBN model and earlier selection models.

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Table 3-1: Summary of cost-benefit decision models for EFs

Decision Model	Added/altered Features	Decision to be addressed
Model 1: One-cohort external selection utility model (Brogden, 1947; Cronbach & Gleser, 1965; Schmidt *et al.*, 1979)		Deciding how to choose which external applicants should be hired in a particular time period
Model 1a: Alternate one-cohort external selection utility model (Raju, Burke & Normand, 1990)	Approached selection utility from more traditional test theory basis, leading to different formulation	Also deciding how to choose which external applicants should be hired in a particular time period, utilising alternative method
Model 1b: Alternate one-cohort selection model for categorical performance measures (Raju, Cabrera & Lezotte, 1996)	Derive monetary selection utility if employee performance is measured using categorical scale, e.g. 'successful/unsuccessful' (binary scale)	Also deciding how to choose which external applicants should be hired in a particular time period, utilising alternative method for binary / categorical performance measure
Model 2: *Financial* one-cohort external selection utility model (Boudreau, 1983a)	Effect of taxes, interest rates and costs of maintaining and improving employee performance	Financial value of deciding how to choose which external applicants should be hired in a particular time period
Model 3: Financial *multiple-cohort* external selection utility model (Boudreau, 1983:b)	Effects of re-applying the selection program to subsequent applicant groups	Financial value of deciding how to choose which external applicants should be hired in each future time period during which a selection program is applied

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Decision Model	Added/altered Features	Decision to be addressed
Model 4: Financial multiple-cohort external *recruitment* and selection utility model (Boudreau & Rynes, 1985)	Effects of recruitment decisions on the outcomes of selection, and vice versa	Financial value of deciding how to attract the applicant pool, as well as how to choose which external applicants should be hired in each future time period during which recruitment and selection programs are applied
Model 5: Financial multiple-cohort external recruitment, selection and *separation/retention* model (Boudreau & Berger, 1985)	Effects of employee separation/retention patterns on recruitment and selection, and vice versa	Financial value of deciding how to attract the applicant pool, how to choose which external applicants should be hired, and how to manage employee separations/retentions during each future time period during which recruitment, selection and separation management programs are applied
Model 6: Financial multiple-cohort *internal/external* recruitment, selection and separation/retention model (Boudreau & Berger, 1987)	Effects of recruitment, selection and separation/retention of employees moving between jobs within the organisation on external staffing decisions, and vice versa	Financial value of deciding how to attract the applicant pool, how to choose which external applicants should be hired, and how to manage employee separations/retentions from the organisation; as well as how to attract, choose and manage separations when employees move between jobs within the organisation, during each future time period in which internal/external recruitment, selection and separation management programs are applied
Model 7: Selection utility over multiple selection devices and multiple outcomes (Sturman, 2001)	Inclusion and separation of multiple selection devices and outcomes other than employee performance (e.g. turnover)	Value of deciding how to not only do the above in the context of financial outcomes but also other outcomes, with a complex and combined model generated

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LECTION UTILITY

UA initially developed as a result of the early interest of industrial psychologists in the value of employee selection procedures. As discussed in Chapter Two, in a selection procedure the organisation uses one or more selection devices / methods (for example structured interviews or selection tests such as aptitude scoring or weighted application blanks) in order to explicitly or implicitly score the perceived merits of an applicant (other judgmental techniques might include ranking or placement into groups). This judgment of applicants can be used as a more informed selection basis instead of random selection.

The question is, does the selection method really improve on random selection, and if so what is that improvement worth to the organisation?

The role of UA would therefore be to place a utility judgment on the various selection devices or programs open to the organisation, either to make explicit judgments or to aid decision making generally.

Selection utility initially arose with the development of two models, the Taylor-Russell (1939) and the Naylor and Shine (1965) models. These two models are discussed in Appendix A, and led to the model utilised today as explicated next.

A. Modern Selection Model: The Brodgen-Cronbach-Gleser Model

The models of selection utility used today are based on work done by Brogden (1949) and Cronbach and Gleser (1965), who built upon the earlier theories discussed in Appendix A. In accordance with the surnames, this model is therefore called the 'BCG' model of selection utility.

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d to the BCG model was that utility models had nits hard for managers to understand / work with, and which excluded cost factors.

The BCG model works on a basic linear relationship between predictor (selection test) scores and the actual outcome itself, i.e. the *value* of job performance. The basic linear model therefore assumed is (Schmidt *et al.*, 1979):

Equation 3-1: Relationship between employee service value and selection performance

$$y = \beta Z_x + \mu_y + \varepsilon$$

where y = the service value of job performance, Z_x = standardised performance on the selection measure in the applicant group, β = linear regression coefficient, μ_y = mean performance in dollars of randomly selected employees and ε = prediction error.

Raju *et al.* (1990: 4) point out that there is a crucial underlying assumption to the BCG model, namely that $r_{xq} = r_{xy}$, i.e. that the relationship between predictor and criterion is the same as the relationship between predictor and outcome. Schmidt *et al.* (1979: 613) discuss this in terms of the relationship between q and y, which they suggest are at least monotonically related and usually linear.

The BCG model therefore implicitly focuses on the validity coefficient (r_{xy}), and it yields a Y value for any *individual* applicant x. For the cohort of selectees, the expected performance can be shown as:

Equation 3-2: Formulation of main relationship in expected value terms

$$E(y_s) = E(\beta Z_{x_s}) + E(\mu_y) + E(\varepsilon)$$

Given that $E(\varepsilon) = 0$, and β and μ are constants, the equation for any individual in the selected group reduces to:

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Also, since $\beta = r_{xy}(\sigma_y/\sigma_x)$, where σ_y is the standard deviation of service value[19] and $\sigma_x = 1.00$ because predictor scores have been standardised to N (0,1), the equation can be written as:

Equation 3-4: Alternate form of relationship between mean criterion and standard performance

$$\overline{y}_s = r_{xy}\sigma_y \overline{Z}_{xs} + \mu_y$$

In practise, r_{xq} (which must be used as a surrogate for r_{xy}) should be adjusted upwards to account for unreliability in measurement, via the final validity utilised by the practitioner should be

Equation 3-5: Correction used in correlations for measurement error

$$\text{Actual validity used in practise} = \frac{r_{xq}}{\sqrt{r_{qq}}}$$

where r_{qq} is an estimate of inter-rater reliability.

Therefore Equation 3-4 can be rewritten as:

Equation 3-6: BCG utility corrected for measurement error

$$\overline{y}_s = \frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y \overline{Z}_{x_s} + \mu_y$$

[19] Amongst randomly selected employees

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ean value of job performance for the selected ate. However, as with the prior models we seek to estimate incremental utility over and above random selection.

Given this, it is noted that:

- μ_y is the value of job performance for a randomly selected group;
- $\bar{Y}_s$ is the value of job performance for a group selected using the selection method;

Therefore, if we designate the incremental average utility of the selection method as $\Delta\bar{U}$, from Equation 3-6 we get:

Equation 3-7: Basic BCG selection utility equation

$$\frac{\Delta\bar{U}}{selectee} = \bar{y}_s - \mu_y = \frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y \bar{Z}_{x_s}$$

Equation 3-7 allows for the determination of the average *increase* in the value of job performance per individual selected by the test. It is the heart of the BCG model.

Practically, although the average standardised selection score of selectees $\bar{Z}_{xs}$ can be calculated *ex post*, i.e. after selection has occurred, this is of no use to *ex ante* analysis. This is no obstacle, however, as the Naylor-Shine model discussed in Appendix A had already shown that $\bar{Z}_{x_s} = \lambda_i / \phi_i$ where ϕi = the selection ratio and λi = the ordinate of the normal distribution at the standardised predictor cut off Z_{yi}. The ratio $\lambda i/\phi i$ is calculable from tables using only the selection ratio as information. Therefore, combining the results of this finding (see Equation A1 in Appendix A) and Equation 3-7 the BCG equation becomes:

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$$\Delta U / selectee = \frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y \frac{\lambda}{\phi_i}$$

where λ_i/ϕ_i is calculated using Naylor-Shine tables, see Appendix A.

The only input that is required for calculation of $\overline{Z}_{x_s}$ is the selection ratio (SR or ϕi) which is often available *ex ante*, at least in-between the recruiting and selection stages. It is perhaps this crucial point that is most important to assimilate for the purposes of this thesis. The above equation tells us that the benefit from per-selectee movement (in this case only selection) is a factor of three major things: a) The qualitative link between selection and performance r_{xy}, b) The quantitative issue of selection ratio, and c) A scaling factor linking performance with outcomes. As will be seen as we progress, the statistical model of EF used for this thesis essentially pursues the first two and discards the scaling factor as being statistically irrelevant.

The marginal utility expressed in Equation 3-8 is a per-selectee estimate. Naturally, to calculate nett incremental utility all that is required is a simple multiplication by the number of people selected (N_s) such that:

Equation 3-9: Total selection benefits inclusive over entire cohort

$$\Delta U = N_s \left[\frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y \frac{\lambda}{\phi} \right]$$

where ΔU is nett incremental utility from the selection procedure[20].

Equation 3-9 is still not complete, as it is only benefits and does not include the costs of the selection procedure. Let the per-person cost of the selection procedure be *C*, in which case total per-selectee cost of selection is in

[20] Note that subscript *i* has been dropped to indicate group effects rather than individual effects.

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SR. This is because if SR < 1, then for every here are several applicants who also had to be tested and rejected (at the same cost). Therefore:

Equation 3-10: Selection utility inclusive of costs

$$\Delta\overline{U} / selectee = \frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y \frac{\lambda_i}{\phi_i} - \frac{C}{\phi_i}$$

and

Equation 3-11: Total selection utility inclusive over entire cohort

$$\Delta U = N_s\left[\frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y\left(\frac{\lambda}{\phi}\right)\right] - N_s\frac{C}{\phi}$$

or

$$\Delta U = N_s\left[\frac{r_{xy}}{\sqrt{r_{qq}}}\sigma_y\frac{\lambda}{\phi}\right] - N_a C$$

where N_a is the number of applicants.

The development of this model caused a renewal of interest and a large and sustained body of research into utility in the subsequent two decades. From the perspective of this thesis, the important culmination of this research came with the development of complete EF models, which are used later as a basis for forming the variable of study.

Since the technical development of the intermediate models (between the initial BCG model and the later EF ones) is relevant to the literature but not to the thesis in total, they are only discussed in a cursory fashion in the following section, and their details retained in Appendix A as directed.

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…ents in EF utility

After the development of the BCG selection model, the following variegated developments were made, all of which are contained in more technical detail in Appendix A:

1. The BCG equations represented incremental utility from a selection procedure for a single time period and without several financial variables. Time and the relevant missing financial issues were accordingly added next in the literature. As will be seen in the empirical section, the adjustments for time and financial variables were not needed in the statistical analysis, and are therefore not included in the main text here – the interested reader can find them in Appendix A (Sections A2.1 and A2.2).
2. Raju *et al.* (1990) suggested an alternative approach to selection utility (the RBN model), based largely on the proposition that the calculation of σ_y presents difficulties that may be overcome by the new formulation. Their alternative formulation, again not central to the thesis as it is not used in the empirical modelling, can be seen in Appendix A (Section A2.3). Although the RBN model is a potentially valuable and exciting innovation in UA, in a sense the distinction has little value in the context of this thesis, it does not affect the way that the measurement models in the thesis will develop. Also, EF models have been developed using the BCG approach.
3. Raju, Carera and Lezotte (1996) also developed a utility model for cases in which supervisors are only able to measure employee performance on a categorical scale, notably a binary 'successful' versus 'unsuccessful' scale (i.e. $q = 0,1$). This is discussed in Appendix A (Section A2.4).
4. The above models were all estimated for single cohorts of employees. They were fairly easily adjusted to multiple cohorts (i.e. multiple different

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utflows over time). Simply, the utility of each th earlier cohorts time-adjusted if necessary via a standard discounting factor. This is expressed further in the next section, and briefly in Appendix A2.5.

5. Martin and Raju (1992) also highlighted the need to include recruitment costs into the utility function. Appendix A (Section A2.6) contains some more information.
6. Sturman (2001) critiqued BCG-type utility selection models for not reflecting realistic selection practises (which typically involve multiple selection assessments from interviews to psychometric testing to reference checks). Also, selection is designed to improve not just performance on the job but often multiple other criteria, including but not limited to turnover, wage issues or information flow. He therefore developed a preliminary but largely untested multivariate procedure, the details of which can be seen in Appendix A (Section A2.7).

3.2.2 DEVELOPMENT TO A FULL EF MODEL

The culmination of utility analysis development with regard to EF is the chief interest of this thesis, as the models produced guide the empirical method regarding measurement of the variable. Therefore this section, which details the more complex EF models, is the relevant one for the thesis.

Subsequent to the work on selection utility (which is an employee inflow issue), the next extension of the EF models involved inclusion of separations and retentions, i.e. outflows. This was done by Boudreau and Berger (1985).

This EF utility model estimates the values of employees at a certain stage in the flow (e.g. all inflows in a timeframe) the usual way: by multiplying the quantity by the quality. In a given timeframe the outflows and inflows are balanced against each other in a simple arithmetic procedure (see below).

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e calculated in reference to each other using the lied in previous models.

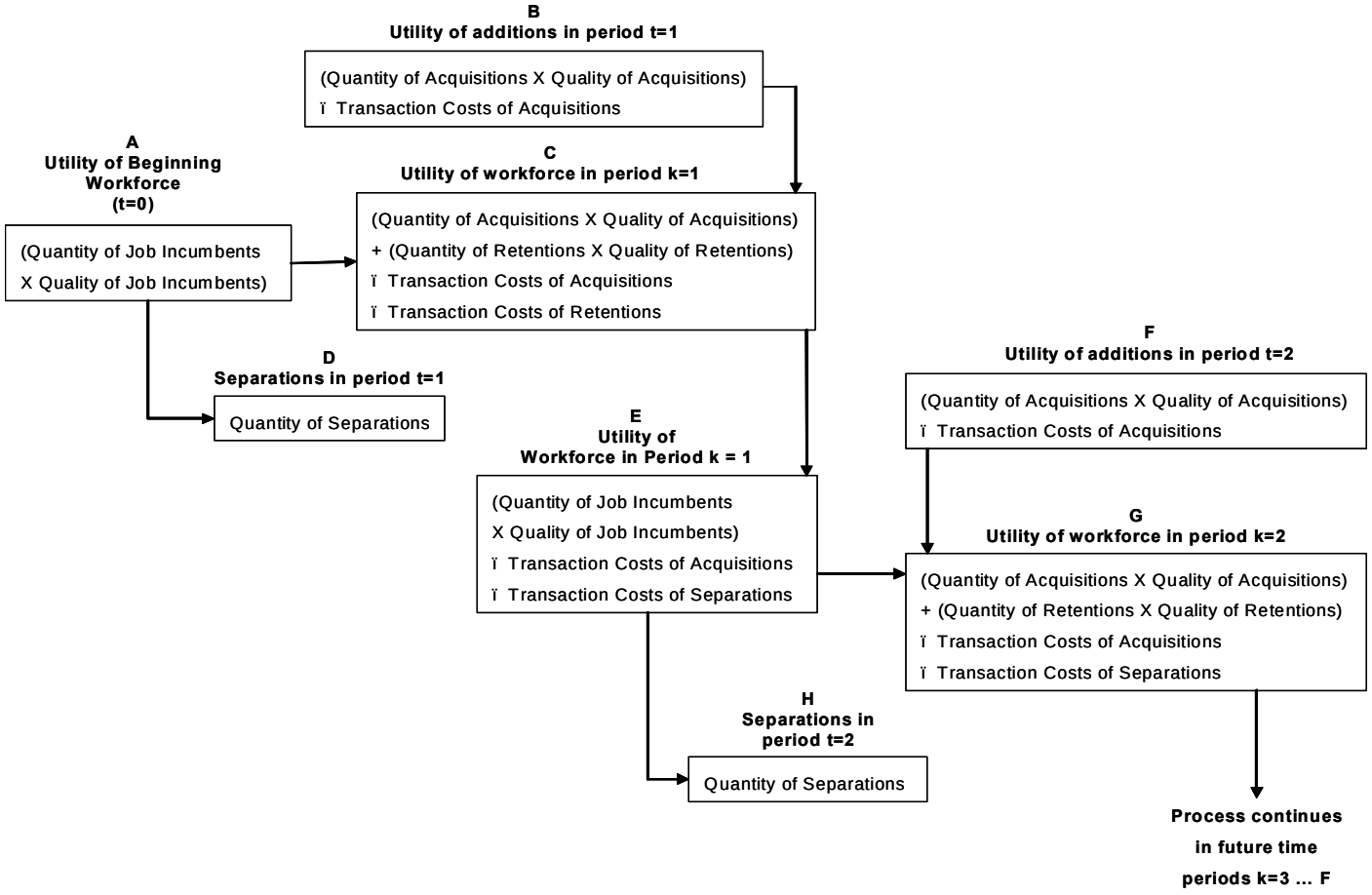
Figure 3-2 provides a pictorial representation that illustrates the various parts of the full, multi-period, EF model (Boudreau & Berger, 1985: 584).

In other words, for EFs the following is the broad relationship to be estimated:

1. *Change in the predictor variable* is operationalised as quantity of EFs of various types within a certain period,
2. *The relationship between predictor and criterion* is the differences in job performance between various categories of employees in the flow process,
3. *The relationship between criterion and outcome* is, when dealing with monetary worth of interventions, most often calculated via σ_y as before, and
4. *Calculating or estimating direct costs of the intervention* in the case of EFs involves adding the nett quantity times quality time σ_y of different types of EFs and subtracting the direct costs involved. These variables are also adjusted for the number of people affected, the time frame of the effect, direct costs, and various other variables (such as discounting, tax and impact on variable costs).

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Figure 3-2: Boudreau and Berger's (1985: 584) EF model, pictorial and verbal version



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movement model therefore requires each of the

a sensible manner. Equation 3-12 below shows the ultimate outcome of this process, namely a multiple-cohort model of EF valuation.

The principles underlying this model (notably the verbal and pictorial synthesis) will form the essential basis for the empirical study to be attempted in this thesis (see later for more methodological detail). The value of EFs is hypothesised to predict various customer equity variables (discussed in the next chapter).

Equation 3-12: Multiple-cohort acquisition and retention model (Boudreau & Berger, 1985)

Utility = (Quantity of acquisitions * Quality of acquisitions) + (Quantity of separations * Quality of separations) - Transaction costs of acquisitions - Transaction costs of separations; i.e.:

$$U_w = \left\{ \sum_{k=1}^{F} \left(1/1+i\right)^k \left[\left(N_{i0}\right)\left(\overline{sv}_0 - \overline{sc}_0\right) + \sum_{t=1}^{k} \left(N_{at}\right)\left(\mu_{svat} - \mu_{scat}\right) + \sum_{t=1}^{k} \left(N_{at}\right)\left(r_{x,\,svat}\right)\left(\overline{Z}_{xat}\right)\left(SD_{svat}\right)\left(1+V_t\right) \right.\right.$$

$$\left.\left. - \sum_{t=1}^{k} \left(N_{st}\right)\left(\overline{sv}_{it-1} - \overline{sc}_{it-1}\right) + \sum_{t=1}^{k} \left(N_{it-1} - N_{st}\right)\left(d_{svrt}\right)\left(1+V_t\right)\right] - \left(1/1+i\right)^{k-1} \left(C_{ak} + \Delta C_{ak} + C_{sk} + \Delta C_{sk}\right) \right\} \left(1 - \mathrm{TAX}\right)$$

Note: U_w = the utility of the workforce after all separations and acquisitions; N_{at} = the number of employees acquired in Future Time Period t; μ_{svat} = the average level of service value in the applicant population in Future Time Period t; μ_{scat} = the average level of service costs in the applicant population in Future Time Period t; $r_{x,\,svat}$ = the correlation between predictor score (x) and service value (sv) in the applicant population in Future Time Period t; $\overline{Z}_{xat}$ = the average standardised predictor score among selectees in Future Time Period t; SD_{svat} = the monetary standard deviation of service value in the applicant population in Future Time Period t; C_{ak} = the transaction costs of adding service value employees (excluding the incremental cost of non-random selection) in Future Time Period k; ΔC_{ak} = the incremental transaction cost of systematic selection in Future Time Period k.

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nclusion of intra-organisation flows was added dreau (1987)[21], also see Boudreau (1988). The principles are identical to the above and do not need further explication: in any given period an inflow cohort is treated in a subsequent period as either an input into intra-flows (including the possibility of a static segment) or outflows. Similarly, the intra-flows from a given period in subsequent periods can be inputs into these categories. Therefore the pictorial representation simply becomes slightly more complex with added paths for intra-flows.

3.2.3 SUBSEQUENT EF REFINEMENTS

Subsequent to the above, there was a continuing flow of further revisions and adjustments to the EF models. Examples include Russell, Colella and Bobko (1993); DeCorte (1996 & 1999); Murphy (1986); Hoffman and Thornton (1997); Law and Myors (1993), Myors (1998) and Martin and Raju (1992). Also see Cabrera and Raju (2001). Generally these are finer adjustments that, because this thesis will be using the overall framework of the EF utility model but not per se the mathematical detail, will not need explication here.

3.3. NOTE ABOUT σ_Y: THE VALUE OF PERFORMANCE

In the context in which it is usually discussed and utilised, the 'Achilles heel' of decision theoretic utility research is estimating the service value of performance. The BCG and RBN models above are reliant on the scaling variable that transforms improvements in performance (in standard score units) into economic value – these are σ_y and α respectively. As such commentary on the voluminous literature surrounding this variable is necessary.

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[21] This original research is contained in an unpublished working paper, which according to John Boudreau is unavailable. A copy of the personal communication in this regard is available.

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riables is by far the thorniest issue in the field of lysis (e.g. Judiesch, Schmidt & Hunter, 1993; Schmidt *et al.*, 1979). Considerable theory and empirical effort has gone into understanding how best the scaling variable might be estimated (e.g. Boudreau, 1991; Chapter 9 of Cascio, 1999 for reviews; Law & Myors, 1999; Raju *et al.*, 1990; Raju, Burke, Normand & Lezotte, 1993; Schmidt *et al.*, 1979).

It is certainly fortunate that this issue is easily avoided in this thesis. The use that the decision theoretic EF model is put is not the usual one of *ex ante* estimation, instead the model is utilised to guide empirical methodology culminating in the creation of a statistical variable. Since statistical variables (at least as utilised in this thesis, namely regression and structural equation modelling) are not affected by scaling of the variables, it is unnecessary to use the σ_y variable at all. Accordingly, notwithstanding its importance in the utility literature, the area is a moot one for the current research. Despite this, Appendix A (Section A3) provides a thorough treatment of the various approaches to the problem of estimating σ_y in recognition of its importance in the uses not given the models in this thesis.

3.4. FURTHER NON-FLOW ORIENTED UTILITY MODELS

In addition to the models discussed above, which were dealing with the components or whole view of EF, other models have been developed for other situations. These include the following:

- *Assessing performance improvement programs with UA*: The above EF variables are only one of the two major decision options for assessment in UA. As stated earlier, the other major area of decision is employee stocks, i.e. the quality of the employees holding flow constant such as knowledge, skills and abilities affecting performance. Therefore training programs

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oyee performance would be assessed here. This in great detail as it is does not directly impact on the study at hand, for models and discussion see Schmidt, Hunter and Pearlman (1982), Raju *et al.* (1990); Mathieu and Leonard (1987); Morrow, Jarrett and Rupinski (1997); Boudreau, (1991 & 1998) and Cascio (1999).

- *Risk and uncertainty*: Rich and Boudreau (1987) looked at four methods to estimate uncertainty around utility analysis. As Boudreau (1991) puts it, accounting for uncertainty and risk forces users of utility analysis to not only consider the expected values of the BCG formula, but also the distributions of these values. Methods include sensitivity analysis, break-even analysis (also see Cascio, 1999:276 and Weekley *et al.*, 1985), algebraic derivations of utility value variability (Alexander & Barrick, 1987; Boudreau, 1991) and Monte Carlo simulation (Boudreau, 1991:665, Brealey & Myers, 2000:268-273).
- *Emotional intelligence in organisations*: Spencer (2001) considered the value of improving emotional intelligence in a cohort of employees.
- *Skills development levies*: Lee (2003a) considered the value of training for organisations and sectors when there are governmental incentives via a levy-grant system for such training;
- *Outcome variables which are dichotomous*: Lee (2003b) considered a utility model for when the final outcome variable (y in Figure 3-1) is dichotomous. The Raju *et al.* (1996) model is for performance scaled in binary terms, i.e. q in Figure 3-1. The example utilised by Lee (2003b) is HIV/AIDS initiatives where the outcome variable is infection rate or rate of take-up of a certain HIV/AIDS programme.

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ND THESIS LINKAGES

There have been a variety of critiques of UA, ranging from the more strategic to the extremely technical and statistical. Given that the purposes of this thesis are somewhat different, once again, to the usual ascribed to UA, the critiques most relevant to this research are dealt with[22].

Perhaps the most trenchant issue has to do with managerial acceptance and use of UA models, based largely around the ability of the models to be understood and implemented. As stated by Boudreau (1991: 710):

> **Research must examine whether the UA results affect managerial decisions, whether decision makers' reactions to UA results are affected by different parameter estimation techniques, and whether UA models accurately reflect decision makers' concerns.**

Generally, concern has been registered with a possible disconnect between UA research and managerial practise. Issues in this regard might include the following:

1. Legitimate management concern that a focus on costs and benefits could undermine other important issues (such as labour relations, legislation, communities, etc, Boudreau, 1988);
2. The roles of politics, personalities, tradition, and power (Pfeffer, 1981; also see Tsui & Gomez-Mejia, 1988 on fear of evaluation), which may for various reasons undermine systematic and micro-level modelling as advocated by UA;

[22] I gratefully acknowledge Petker's (2005) collection of UA material and critiques which served as a review.

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lack of training with regard to statistical and (Cascio, 1999). Certainly, the UA models involving complete EF are very complex, if only by dint of their sheer algebraic scope.

In this regard, Latham and Whyte (1994) and Whyte and Latham (1997) presented research in which they suggested that the use of utility analysis actually led to management resistance. Their research has been strongly opposed however (e.g. see Cronshaw, 1997), on the basis that their methodology ensured that testing the informational effects of utility analysis was actually ignored, and instead, the effects of management persuasion was tested. Cronshaw (1997) pointed out that the studies actually evaluated how well managers were persuaded to accept UA information as presented by an expert as a decision aid for making HR interventions. While both studies showed the crucial role of communication (in demonstrating the fact that UA cannot easily be used as a means to 'sell' a programme), such findings do not successfully denigrate the ability of UA to be used either as a decision-aid, nor for the use it is put to in this thesis.

Along these lines, Sturman *et al.* (2003) suggest that the severity of communication issues in UA is mostly dependent on exchange between the researcher and the audience. Sturman (2000, in Sturman *et al.*, 2003) suggested that UA would gain most managerial acceptance and usage when 1) the audience is first instructed about UA concepts, and 2) taught how UA is applied. On the researcher's side, Boudreau and Ramstad (2002, in Sturman *et al.*, 2003) posited that UA communication should be presented in terms of impact on a valuable resource (i.e. money, productivity, etc). Sturman *et al.* (2003) also suggested that the presenter 1) Tell the audience about the complexity of determining some UA estimates, and in doing so create an expectation of complexity, 2) Start by presenting a broad overview of the UA,

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epresentation of the procedure to be followed ase of the complex EF models, e.g. see Figure 3-2), thereafter moving towards explicating the impact of the UA within the context of the figure, 3) demystify the assumptions, decisions, and subsequent estimates involved in attaining both individual and nett UA estimates, and where feasible, emphasise the conservative nature of various elements and calculations, and 4) use spreadsheets to enhance utility illustrations.

Further illustration of the communication and complexity problems and possibilities is provided by Hazer and Highhouse (1997). They found evidence suggesting that managers perceived UA as most credible and usable when the simplest rule of thumb for estimation of σ_y was utilised. This might suggest that ease of use determines managerial acceptance. In addition, for managers who lacked a strong grasp of the information provided by UA, presenting it as the opportunity cost of not implementing an HR intervention, as opposed to the benefits it provides, enhanced perception of usefulness. In this regard, Vance and Colella (1990) suggested that it might be easier for managers to grasp a non-monetary criterion such as that based on units of production. This however should be evaluated by the context within which utility analysis is applied. Finally, using measures to control for uncertainty may reduce managerial scepticism. These measures include breakeven analyses, Monte Carlo simulation, and algebraic derivation (Rich & Boudreau, 1987 in Boudreau, 1991).

With specific reference to this thesis, the potential for the model to be understood, communicated and implemented is perhaps less problematic than usual. This is again because the model is put to use in the empirical model in an atypical *ex ante* role, namely to operationalise the independent variable. In addition, as explained in Section 3.3, the most problematic sub-variable (the service value of performance) is not necessary in such an analysis. This removes much of the confusion potentially inherent in UA.

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ssible defusing of acceptance problems, many y. Just some of these include the following:

1. An important practical limitation is found in performance measurement. The well-known litany of rater errors in performance appraisal (e.g. Noe *et al.*, 2000), and issues of validity and reliability in measuring performance, are central to the correct estimation of the models. As will be seen in the empirical section, this issue is especially salient in the UA model constructed for this thesis, as it relies on global customer ratings of service employees. Biased performance measure which are not entirely corrected for rating error are expected to bias utility estimates.
2. Further issues of content validity arise in UA. Performance measures that have weak content validity may affect criterion-predictor validity and thus affect overall utility. This issue is mitigated in this thesis because a global measure is used;
3. Ultimately, the historical uses of UA are quite localised: they have been used to evaluate specific HR interventions or issues with regard to limited criteria, generally even a single criterion. This limited usage may often be the most complex that an average managerial agent can cope with. However Boudreau and Ramstad (2003a) have noted that links to a more strategic HR framework are possible and perhaps desirable in the longer-term. For example, they noted that early UA sought to link selection test scores with performance ratings, then to extrapolate this relationship to strategy by scaling the initial link into monetary units. This approach however ignored many alternate strategic HR factors such as how actions create talent pools, which in turn facilitate business processes, ultimately resulting in strategic success. Boudreau and Ramstad (2003a) therefore created a strategic model to attempt to aid decision makers in these and other wider decisions. This has relevance in this thesis, in which EF is

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to various elements of customer service, and plications are not operationalised even though they might be extrapolated.

4. It may be difficult to quantify certain long-term HR benefits such as succession planning in economic terms (Ulrich, 1989).
5. Some researchers believe that UA cannot be conducted unless the data exactly fits the linear homoscedastic model and all marginal distributions are normal. Schmidt *et al.* (1979) appears to have illustrated that these statistical assumptions are generally fulfilled. In fact the authors go on to suggest that although there may be statistical error within the 5% - 10% range, these errors are negligible when compared with the alternatives to utility equations. If overestimation is a problem due to the effects of error, conservative judgements should be used when estimating equation parameters.
6. Schmidt *et al.* (1979) and Hunter and Schmidt (1982) posited that – in cases where validity coefficients are part of the equations – that lack of generalisability in them may lead to problems. They did however present evidence suggesting that variability arises from controllable statistical or measurement artefacts unrelated to the underlying relationship. Hunter and Schmidt (1982) found that even if the situational specificity hypothesis cannot be definitively rejected, correcting a validity distribution for sampling error, attenuation due to criterion unreliability, and range restriction, may reveal that a large number of values within the distribution lie above a minimum useful level of validity. This weakness is less of a problem for the kinds of EF models used in this thesis.
7. Murphy (1986) noted changes required in UA flow models to take into account the unrealistic assumption that all applicants offered positions accept them. A perfect selection strategy in an imperfect scenario may overestimate utility by 30% - 80%.

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imperfections (such as skills gaps in the South the quality of those hired, requiring utility to be adjusted (Boudreau, 1991; Cascio, 1993). Labour markets also affect issues such as wages, training, the time an employee takes to learn and recruitment costs.

9. Changes in performance over time (e.g. as employee moves from initial placement to competence and mastery) affects the models (Cascio, 1993). Optimally, average stability functions to reduce overestimation may be required. Assuming maximum performance from the beginning of the process leads to utility overestimation.
10. Generalisability of predictor-criterion relationships may alter over time. As yet, this limitation has not been fully explored, but preliminary research suggests that adjusting for changes in individual variables may produce utility estimates that are up to 50% lower than unadjusted utility estimates (Cascio, 1993).

In conclusion, various critiques have been presented which to various degrees require consideration in the context of this thesis. Notwithstanding each of them, it is nevertheless believed that the broad use given to utility models of complete EF as presented earlier in the chapter are highly desirable for the purposes of this thesis, as discussed next.

3.6. RELEVANCE OF UA FOR THE THESIS

Primarily, the UA model of EF is seen as relevant to this thesis because UA addresses the critiques of individual areas of EF presented in Chapter Two.

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at the level of the organisation, but taking into
ts. This addresses the critique that there is a relative dearth of multi-level research on EF issues.

Perhaps most importantly, UA addresses the problem that individual areas of research into EF have typically not dealt in an integrated manner with the whole system of flows. That is, research into recruitment, selection, transfers or turnover tends not to consider each of these events/elements in relation to each other. UA does take an integrated, holistic approach, allowing for inflows, intraflows or outflows to balance or exacerbate each other. This conception of the problem as well as operational capability is central to this thesis.

Finally, individual areas of EF rarely consider quantitative and qualitative measures together in statistical studies, for example turnover studies have generally used quantitative event measurement as the primary measure as discussed in Section 2.4.4. UA integrates both qualitative and quantitative measures into its indices, and therefore addresses this issue.

In conjunction therefore with the considerable research that has gone into UA in the psychological and managerial literatures, which provides substantial support for its use, it is felt that the benefits of UA for this thesis may outweigh the critiques presented.

3.7. CONCLUSION ON DECISION THEORETIC UTILITY ANALYSIS

The field of decision theoretic utility analysis has formed a vibrant font of investigation in human resources and industrial and organisational psychology for some considerable time. Its resurgence in the past decades is elegant testimony to the continuing interest in understanding simultaneously the finer details and external impact of various systems within human resources, including EFs, the focal variable here.

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thesis, no other area of study addressing EF for variable and data synthesis that the latter models of Boudreau and colleagues do. Although the detailed mathematical modelling is not followed in the empirical section later (if only because nothing like that levels of data were available for the hundreds of organisations in the sample), the models used here are used for several purposes:

1. The general utility approach of estimating separate quantity and quality assessments for each element of flow is taken up in the empirical method;
2. The underlying synthesis model used to integrate the different elements of EF into a single EF system and metric, notably the Boudreau and Berger (1985) and Boudreau (1987) models and from those particularly the thinking contained in Figure 3-2, is utilised as the specific method in the empirical study later to finalise EF scores;
3. The research surrounding the use of global quality estimates is taken as a guide and justification for global quality estimates utilised in the empirical section (albeit not as finely there as here) and;
4. The research on measurement error in decision theoretic utility analysis is used as a foundation in estimating some a priori structural equation modelling estimations.

Therefore these utility models have provided the current research with invaluable guidelines in operationalising and researching EF in a systematic and yet manageable way.

Having dealt quite thoroughly with EF, however, it is noted that the broad service-profit chain initially discussed in Chapter One incorporates variables not mentioned overly much in the EF literature, namely customer metrics. If a qualitative system of EF is seen as the independent variable of

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mer metrics are seen as the dependents. r will investigate customer metrics and their possible links to EF.

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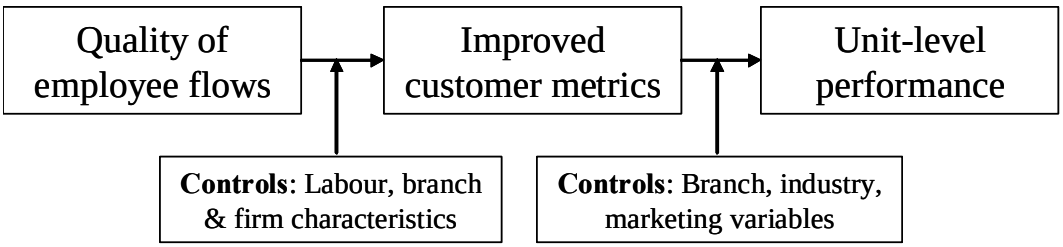
LOYEES, EF AND CUSTOMER METRICS

The previous two chapters examined the role and utility of EFs in the organisation. It is noteworthy that, except for the definition of the outcome variable *y* as 'service value' by Boudreau (1983a&b), there has been little reference to customers or clients.

However, returning to the concepts of the service profit chain, the intermediary role of customers or clients is crucial: it is, after all, the revenue from sales of goods or services that forms the majority of service value. This issue was briefly addressed in Chapter Two as a possible performance outcome.

Accordingly, this chapter will examine linkages between EF (and related employee constructs) and customers in the service profit chain. This is the first link in Figure 4-1 which is a repeat of the broad model discussed in Chapter One.

Figure 4-1: Broad model for empirical study



The first section below briefly introduces concepts of the customer metrics which form the dependent variables in this section.

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S: COMPONENTS AND ANTECEDENTS

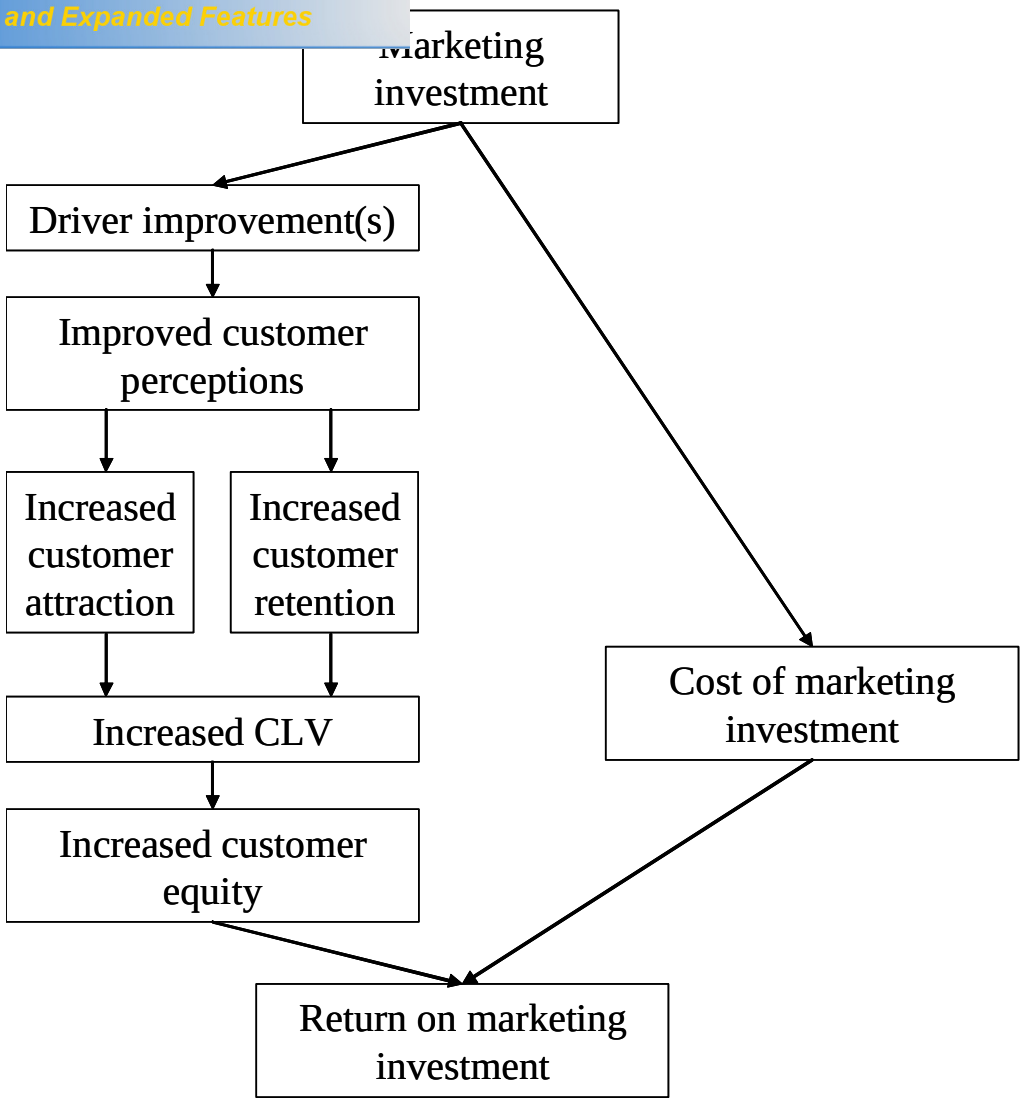
Broadly speaking, as seen above, customer metrics form the second link in the service profit chain, and therefore require brief introduction.

Most commonly, such metrics include customer satisfaction, retention, commitment and loyalty (e.g. Schleisinger & Heskett, 1991) although others are discussed below. Figure 1-3 seen in Chapter One, for example, shows some of these variables in an early conceptualisation of the service-profit chain, with customer metrics contained on the outer loop.

Important recent models, which link organisational activities to customer metrics and thereafter to organisation value, are the customer equity theories that have been developed over the past seven years. Figure 4-2 below shows a schematic overview of their proposed progression of customer equity value, in which components of customer equity are, sequentially:

1) Improvement in one or more marketing 'drivers' (any of the features of the organisation or product that affect the customer/client's brand choice, such as service, speed, price, quality); leading to
2) Improved customer perceptions of the organisational brand(s), leading to
3) Customer *satisfaction* and *retention*, which in turn lead to
4) Increased customer lifetime value (CLV) via greater customer spending and increased word-of mouth (recommendation of organisation to others). CLV leads to greater customer equity (nett CLV over all customers) and return on investment (customer equity scaled for cost to achieve it).

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More on the theory of customer equity, especially the final step above (the extension of customer metrics to organisation financial performance) is discussed in the following chapter. For this chapter, the intermediate links between employee activities (which in terms of this model would be marketing drivers) and improved customer service perceptions, satisfaction and retention (the traditional customer metrics) are the focus. Accordingly, these links are discussed below, firstly in terms of theoretical bases for the

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thereafter with regard to specific areas of study

4.2. EMPLOYEE CONSTRUCTS TO USE: BEYOND PURE FLOW VARIABLES

The focus of this thesis is on EF consisting, as discussed in the prior chapters, of inflow, internal flow, and outflow (turnover) variables. However when considering the theoretical and empirical linkages between EF and customers, especially the latter (published research findings), it may be efficacious to include employee variables that go beyond EF in itself.

Such further employee variables include similar constructs to the customer metrics discussed above: variables such as employee satisfaction, commitment, involvement, loyalty or emotion.

Why include these more general variables in a study that focuses on EF? The reasons for this are twofold. First, the broader employee variables discussed above have often been found themselves to affect EF variables. For example, two leading models of employee turnover (Hom & Griffeth, 1995) are presented in Figure 4-3 and Figure 4-4.

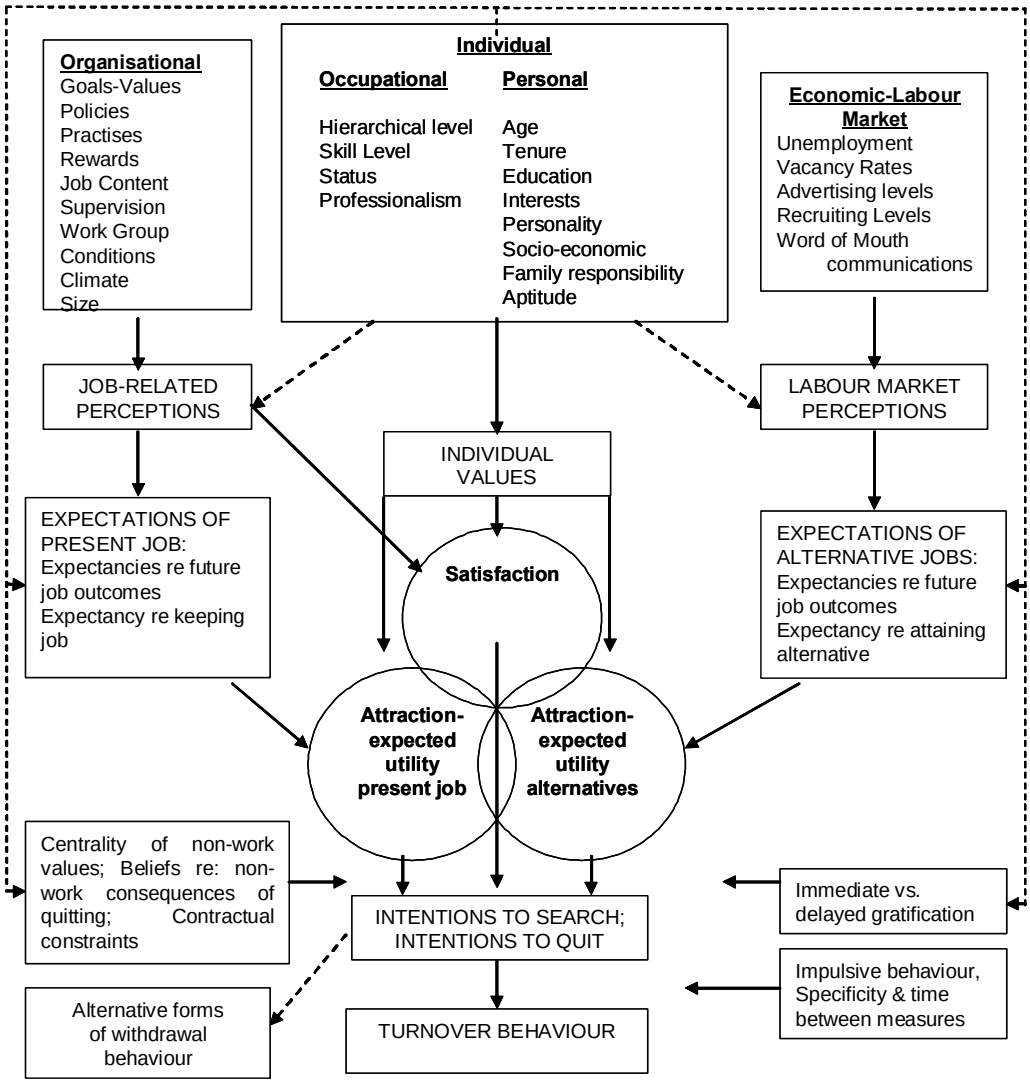
Therefore, although pure flow variables are the focus, the following sections will also examine both employee influence on customer and clients within broader behavioural, mental and relational contexts as well as human resource policies as disembodied variables / foci.

As seen in these models, broader employee variables such as expectations, satisfaction and commitment are expected to impact employee turnover. Therefore, studies investigating the impact of such variables on the customer, even if not inclusive of flow variables, may nonetheless have relevance.

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y have reciprocal causation with these variables urnover may impact on the satisfaction of employees who remain (e.g. through disruption of social and communication structures and impaired team- or sequential-work capacity, e.g. Bluedorn, 1982: 111; Mobley, 1982: 20; Sheehan, 1993 & 1995), or promotions may affect commitment (Schwartzwald, Koslowsky & Shalit, 1992).

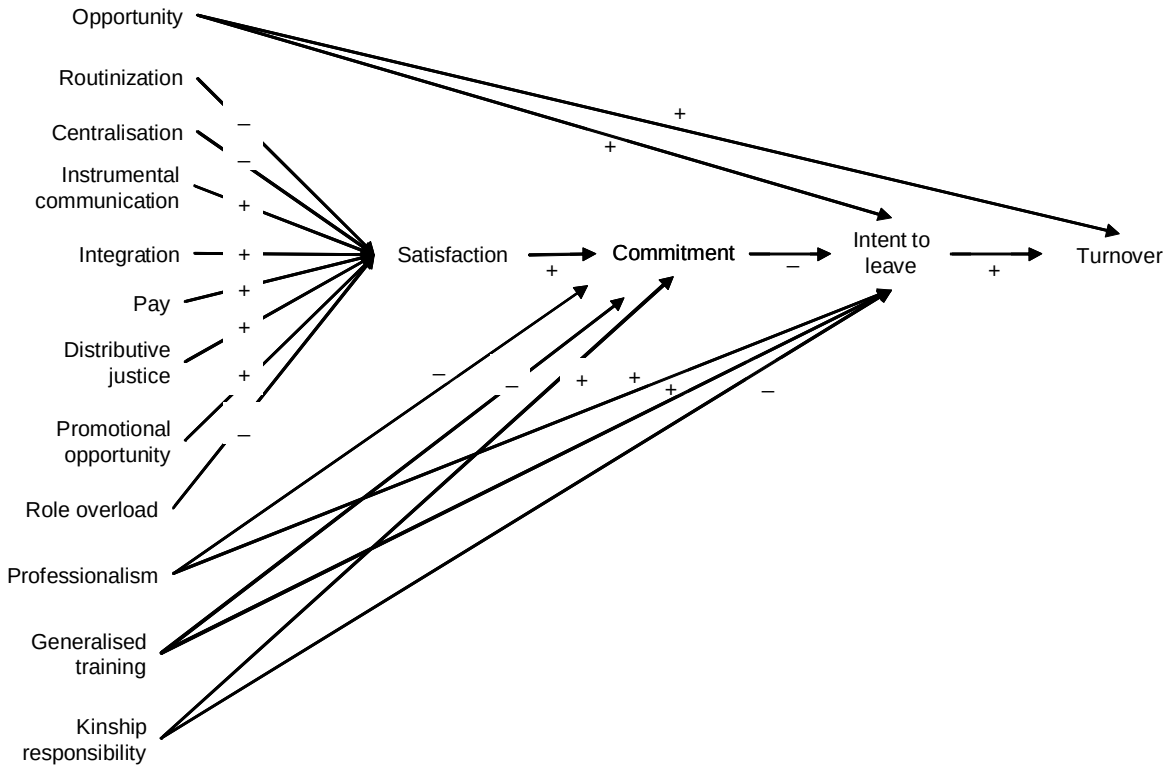
Figure 4-3: Mobley, Griffeth, Hand and Meglino's (1979) conceptual model of employee turnover



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flow variables are the focus, the following th employee influence on customer and clients within broader behavioural, mental and relational contexts as well as human resource policies as disembodied variables / foci.

Figure 4-4: Price and Mueller's (1986) causal model of employee turnover



The literature reviewed next is organised into two parts. First, theoretical bases to the employee variables-customer metrics link are discussed, without reference to empirical literature. Secondly, actual findings of various research studies in this regard are discussed.

4.3. THEORETICAL BASES TO EMPLOYEE-CUSTOMER LINKAGES

Why should the things that employees do, say, project or influence have an effect on customers? This section will attempt briefly to give some purely

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ion. Empirical evidence is not provided in this sequent sections.

4.3.1 EXPECTATION THEORY

One major theory underlying employee-customer links is that of expectation theory, that is, the effect of customers' expectations of either employees or the organisation as a whole. Expectations have been studied in two ways:

1. The *anticipation* approach studies expectations without regard to judgements about the final performance levels (LaTour & Peat, 1979; Oliver & DeSarbo, 1988). In this context, customers are posited to "assimilate satisfaction levels to expectation levels in order to avoid the dissonance that would arise when expectations and satisfaction levels diverge. This assimilation effect results in satisfaction judgements being high/low when expectations are high/low" (Szymanski & Henard, 2001: 17).
2. The *comparative referents* approach, otherwise referred to as the met expectations or disconfirmation of expectations theory, involves the customer making comparisons between initial expectations and subsequent outcomes, with satisfaction being positively related to increasingly met or overmet expectations (Oliver & DeSarbo, 1988; Szymanski & Henard, 2001: 17)

4.3.2 DIRECT PERFORMANCE EFFECTS

Performance of employees with regard to their interaction with the customer (e.g. service levels) is frequently hypothesised to affect customer outcomes directly. Theoretical bases to such an effect include:

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g. Rust *et al.*, 2004b) naturally suggests that increased benefits relative to costs will lead to increased satisfaction, so if 'performance' has any benefit to the customer then there should be a direct increase in metrics such as satisfaction or retention and ultimately purchase behaviours;

2. *Equity theory* (Adams, 1965; Szymanski & Henard, 2001) suggests that an individual evaluates a situation by comparing the ratio of his/her outcomes in a situation to his/her inputs, relative to the outcomes/inputs ratio of the relevant referent other. Therefore customers may evaluate the 'performance' of an organisation in terms of the perceived inputs (such as costs of using the organisation) relative to referent other customers, for example people in similar situations who are customers of other organisations;
3. *Distributive justice theory* (Greenberg, 1987 & 1990) also helps explain the underlying impact of positive performance. This dimension is discussed further in Section 4.3.5 below.

4.3.3 SOCIAL EXCHANGE THEORY

Social exchange theory Blau (1964) essentially proposes that "individuals make contributions or investments for which they receive certain outcomes or rewards" (Chenet, Tynan & Money, 2000: 477), specifically from another party. In a very general sense it suggests that norms of reciprocity and fair exchange arise in groups or relationships which drive not only the terms of exchange itself (as when a high or low exchange norm is the equilibrium) but also can create prosocial behaviours that exceed the exchange terms (e.g. George & Bettenhausen, 1990).

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ial to the current research because EFs have the t service provision standards but also the supplementary and interacting social bonds that arise as a result of such transactions. Therefore in the empirical model assessed later, 'soft process quality' entailing relational dynamics within service provision is explicitly assessed as a separate construct.

4.3.4 SOCIAL NETWORK AND BOUNDARY SPANNER THEORY

The role of social networks has influence in explanations of the employee-customer interface. For instance, social-influence literature posits that relational dyads or groups begin to share information due to ambient stimuli (available to all group members) or discretionary stimuli (shared at the choice of a group member). This information sharing causes a certain degree of uniformity in group members' behaviour and affect, and effects similar to other theories discussed in this section (George & Bettenhausen, 1990; Ryan, Schmit & Johnson, 1996).

The role of 'boundary spanner' employees (those who interact directly with customers, therefore straddling the boundary between the internal organisation processes and the client base) has been another area of research, although in many respects similar to social network theory just more salient given the direct contact (Bendapudi & Berry, 1997; Bendapudi & Leone, 2002; Crosby, Evans & Cowles, 1990; Dietz, Pugh & Wiley, 2004; Hansen, Sandvik & Selnes, 2003; Harris, Baron & Radcliffe, 1995; Hennig-Thurau & Klee 1997; Parkington & Schneider, 1979; Susskind, Kacmar & Borchgrevunk, 2003). This area has particular bearing on the current research because of its business-to-business nature, which in many industries places particular requirements on contact employees. The key elements in the peculiar nature of boundary spanners are: 1) their direct contact with customers, which facilitates both

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ng as well as other effects, such as emotional
n 4.3.7), 2) the multiple agency which may come with being a boundary spanner, which can create stress and confusion if the roles do not adequately match (e.g. Parkington & Schneider, 1979).

Susskind, Kacmar and Borchgrevunk (2003) presented theory suggesting that standards for service quality and co-worker and supervisor support are potentially key for such workers in creating customer orientation and ultimately customer satisfaction.

4.3.5 HUMAN CAPITAL AND FIRM RESOURCE THEORY

Human capital refers to all issues affecting the productive capabilities of employees, most commonly referring to knowledge, skills and abilities (e.g. Becker's human capital work on training, cf Becker 1975) but also issues such as employee health.

Human capital is therefore a concept very similar to, if not indistinguishable from, the UA concept of employee stocks as defined in Section 3.1.1. In that section, the Boudreau (1988) conception of employee stocks incorporated the value of current human capital in the organisation, such as training or other programmes affecting employee skills, abilities or motivation.

It was noted in Chapter 3 that the UA model of employee flow is not per se designed to affect the human capital of individuals. Other UA models do deal with HR programs such as training which is designed to affect the human capital of individuals.

However the aggregate human capital of a group is certainly posited to be affected by employee flow. This might occur in several ways. Firstly, the simple mechanism discussed earlier of aggregate replacement of average productivity levels is a direct reflection of human capital changes. For

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are leaving and being replaced by inferior promotions are moving individuals to less-productive uses of their talents (perhaps moving skilled engineers into supervisors positions they are not good at), such movements will potentially harm aggregate human capital. Hatch and Dyer (2004: 1158) express this as follows, in terms of resource based theory:

> **Where does human capital come from and how do firms manage it to competitive advantage? Human capital begins with human resources in the form of knowledge and skills embodied in people. The stock of human capital in a firm comes from its employee selection, development, and use (Koch and McGrath, 1996; Snell and Dean, 1992). Selection, development, and use are a sequence of human resource management functions that represent increasing human capital, increasing firm specificity, and decreasing imitability. In other words, these human resource management functions may contribute to sustainable competitive advantage. Initially, firms must identify applicants in the external job market that promise to be productive employees. The human capital embodied in these new employees is not firm specific so firms work to develop the employees, making investments in specialized human capital that improve their productivity and subsequently improve the rate of learning in the firm. However, hiring and developing human resources is not enough to ensure competitive advantage; deployment is critical. Unless the human resources are put to productive use, their potential goes unfulfilled (Huselid, 1995; Penrose, 1959).**

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tures the joint influence of inflows, outflows, s feedback effects, all of which are conjoint with the development of employee stocks.

Hatch and Dyer (2004) locate the important of human capital within the resource based theory of the firm, which posits that human capital is important because it is capable of providing sustainable competitive advantage. This is because human capital is often seen to fulfil the conditions for a sustainable, core resource, i.e. valuable, rare, inimitable and non-substitutable to prevent rivals from replicating the value of the resources and competing away their benefits. Resource based theory in addition suggests that the longevity of the advantage is determined by 'isolating mechanisms', such as firm specificity, causal ambiguity, social complexity, path dependence, and time compression diseconomies.

Some of these can be related to EF. For example, human capital is not only composed of knowledge, skills and abilities, which are more related to individuals than groups. The aggregate human capital, being productive capabilities, are also potentially related to group dynamics located outside the individual.

One large example of such extra-individual dynamic is corporate culture, with a reduced but related version being team culture. Another is the level of localised conflict between individuals. These dynamics have been discussed peripherally as incidences of turnover cost, but fall theoretically into the domain of human capital.

Employee flow might therefore affect aggregate human capital by disrupting or enhancing the intra-individual dynamics, which can affect both the ability of teams to function as well as specified individuals within the team. For instance, recent work on workplace bullying (e.g. Einarsen, Hoel, Zapf & Cooper, 2002) illustrates how the actions of a few people can disrupt the (satisfaction and stress-related) human capital of others.

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58) also highlight the the potential for relational effects in the retention of human capital:

> **Codified knowledge can be articulated and is at risk of expropriation, while tacit knowledge can not be articulated and is isolated from rivals because it is embedded in the firm's routines, human skills, and relationships (Liebeskind, 1996; Nelson and Winter, 1982; Polanyi, 1967; Winter, 1987; Zander and Kogut, 1995).**
>
> **Therefore human capital might be related to EF for a number of reasons, again reinforcing the salience of this variable.**

4.3.6 THEORIES OF JUSTICE AND CUSTOMER OUTCOMES

Similar to met-expectations theory, justice literature focuses upon dissonance and dissatisfaction that may arise from a discrepancy between experienced reality and a projected state (e.g. Bies & Moag, 1986; Greenberg, 1987 & 1990; Thibaut & Walker, 1975). However in this case the experienced reality specifically involves the relative *justice* of outcomes, procedures, or interactions that customers are subject to. The projected state is an expectation of 'how it should be'. If injustice is perceived, then dissonance and possible negative reactions may result.

Organisational justice literature (Bies & Moag, 1986; Greenberg, 1987 & 1990; Thibaut & Walker, 1975) has distilled three types of justice, namely:

- *Distributive justice*: refers to the perceived fairness of relative outcomes. Distributive justice refers to outcomes/benefits received in comparison to

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n the individual identifies him/herself (also see , Martin, 1981). Distributive justice is therefore similar in effect to equity theory, another underlying theory (refer to Section 4.3.2);

- *Procedural justice*: refers to the perceived fairness of procedures used to bring about outcomes. Typical determinants of procedural justice might include consistency, suppression of bias, accuracy of information used to determine procedures, correctability (i.e. appeal and grievance procedures), representativeness and ethicality (Noe, Hollenbeck, Gerhardt & Wright, 2000: 357).
- *Interactional justice*: refers to the interpersonal way in which the procedures were implemented. Determinants include explanation (whether the procedure was explained and justified), social sensitivity (dignity and respect were shown), consideration (listening to the person), and empathy (Noe *et al.*, 2000: 357).

Referent cognitions theory ('RCT': Folger, Rosenfield & Rheaume, 1983; Folger, Rosenfield & Robinson, 1983) ties together the justice types. It shows how they lead to dissatisfaction through a comparison of reality to a more favourable alternative. The theory speculates that people consider three 'simulations', namely:

- *Referent cognitions*: alternative scenarios that differ from their current reality. Generally stimulated by comparisons with others, people will be dissatisfied if they find themselves worse off. Thus distributive justice underlies referent cognitions.
- *Justifications*: procedures that lead to the current outcomes are also considered against referent procedures and, if found to be worse, dissatisfaction can result. If the procedure is found to be better than the

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e other hand, dissatisfaction with outcomes may

- *Likelihood of amelioration*: Finally, individuals may take into consideration whether circumstances are likely to improve in the future. If so, dissatisfaction with the current scenario may be less.

In short, justice theories are similar to met expectation theory in that they deal with a discrepancy between experienced reality and a projected state. This time, however, the projection is future-oriented. Justice in terms of employee- or organisation-customer transactions therefore has been postulated to explain outcomes (e.g. Masterson, 2001).

4.3.7 AFFECT-BASED SPILLOVER THEORIES

Many studies discuss the impact of affect (emotion and associated constructs) on customers. 'Affective delivery' refers to the "act of expressing socially desired emotions during service transactions" (Ashforth & Humphrey, 1993: 89). Negative emotions may, of course, also be delivered. 'Emotional contagion' then refers to a phenomenon whereby "customers, when exposed to the emotional displays of employees, experience corresponding changes in their own affective states" (Pugh, 2001: 1020).

Szymanski and Henard (2001) cite two theoretical bases for a transfer of affect from employees to customers:

1. *Affective-processing theory* proposes that positive emotions experienced by customers leave a residual affective 'trace' which reflects in satisfaction and repeat buying evaluations;
2. *Attribution theory* concerns the perceived causes of outcomes, in this case the customer's perceptions of the causes of employee-related outcomes.

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ribution theory suggested that causes can be
onsible (locus), extent to which locus was in control of the outcome (control) and perceived sustainability of the outcome (stability). Depending on whether the outcome was positive or negative, various theoretical effects were suggested, which subsequently have been shown to impact on affect as well as behaviour (Bitner, 1990). For example, customers may be more likely to be dissatisfied from poor service encounters when they attribute the blame to the organisation, and also when they think the problem may recur (Bitner, 1990: 72).

Tsai and Huang (2002), dealing specifically with positive affective delivery, also cite two theoretical bases for emotional contagion:

1. An *empathetic* response suggests that people 'put themselves in another's shoes', imagining themselves feeling what the other person is feeling;
2. *Primitive emotional contagion* expresses the possibility that individuals might "mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally" (Hatfield, Cacioppo & Rapson, 1994: 5 cited in Tsai & Huang, 2002: 1001).

Tsai and Huang (2002) suggest that primitive emotional contagion is more likely in the case of service encounters, where goals are not necessarily shared.

Ellis, Gurdergan, and Johnson (2001) used an agency theory perspective (Eisenhardt, 1989) to describe the underlying mechanics of the satisfaction mirror as described in Chapter One. They viewed the employee as being part of a principal-agent relationship suggesting then that the employee is part of two separate but related principal-agent dyads: first, an employee-customer

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loyer dyad. These two relationships affect and ther in reinforcing and placing upper limits on the possible impact of the satisfaction mirror. The principal-agent relationship in this case frames the the customer as principal and the employee as the agent, and the customer requires a specific outcome/need to be fulfilled. The customer's bounded rationality in monitoring the employee and the employee's relative inability to know the needs of the customer accurately present the core of the problems. Ellis *et al.* (2001) therefore suggest that the design of the service arrangement, or in other words, the process and quality of the service, should be such that it allows for the customer to gather enough observation of the employee so as to reduce possible shirking, and therefore induce better service deliver and hence increased customer satisfaction. By the same token, arrangements that minimise the employee's bounded rationality (e.g. lowering of turnover rates to ensure longer term relationships with the customer and therefore greater understanding of customer needs: a flow issue) may also reduce the agency issues involved.

Yet, if the relationship between employees and customers is such that both parties are efficiency maximisers, why then have reported correlations been, relatively speaking, low? Ellis *et al.* (2001) explain this with reference to the second principal-agent dyad between the employee and his/her organisation, suggesting that both the employee and the organisation want to maximise efficiency, that is, the organisation wishes to be satisfied with the employee, and the employee wishes to be satisfied with the organisation, more commonly presented as job satisfaction. In this relationship too, as in the customer-employee relationship, there are parallel aspects of bounded rationality and potential moral hazard on the part of both parties. However from the employee's perspective, he/she is faced with a dual issue of having to simultaneously manage (solve) the problems of the customer-employee relationship and the employee-organisational relationship. Ellis *et al.* (2001) -

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ns that 1) the weight of both relationships are iency maximisation equation resulting from the customer-employee relationship is conditional upon the employee-organisational relationship - suggest therefore that the second relationship hinders higher correlations between customer satisfaction and employee satisfaction. This is similar to the boundary spanner work described elsewhere in this section.

4.3.8 THEORIES OF THE INTERNAL CONTEXT AND HR SYSTEMS

> **"The management of individual [service] encounters is nested within the broader managerial issues of organizational structure, philosophy, and culture that also can influence service quality and ultimately customer perceptions of service quality" (Bitner, 1990: 69).**

Various theories explain effects that may accrue from the internal organisational environment, bringing about employee behaviours or attitudes that in turn impact on customers. Most notably, the various impacts of the human resource system, ranging from conceptions of the HR system as a whole to specific individual policies such as training or systems of practise will be dealt with.

A. Theories of Service Climate

A general 'climate of service' has often been posited to lead to improved customer metrics (Schneider & Bowen, 1985; Schneider, Parkington & Buxton, 1980; Schneider, White & Paul, 1998). Service climate has been defined as:

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…s of the practises, procedures, and …warded, supported, and expected with regard to customer service and customer service quality" (Schneider, White and Paul, 1998: 151).

In terms of theoretical basis, Liao and Chuang (2004) point out that the effect of environmental issues such as climate can be explained by Salancik and Pfeffer's (1978) social information processing theory, in terms of which "employees rely on cues from their surrounding work environments to interpret events, develop appropriate attitudes, and understand expectations concerning their behaviour and its consequences" (Liao and Chuang, 2004: 45).

In addition, a general theory behind why service climate might impact employee behaviours and customer outcomes is similar to social network theory, in that it predicts that information will be exchanged such that staff can observe customer wants and reactions and customers can observe organisation functioning, allowing for a convergence of states such as expectations and affect (Dietz, Pugh & Wiley, 2004: 83, citing Krackhardt, 1992).

B. Theories of Specific Human Resources Practises or HR Systems

Firstly, *systems* of human resource practises and policies that invest in the competence of the workforce, allow for reasonable employee empowerment and foster work motivation and incentivisation (generally referred to as high performance or high involvement work systems, e.g. Becker & Huselid, 1998; Becker & Gerhart, 1996; Clark, 1999; Delaney & Huselid, 1996; Dyer & Reeves, 1995; Guthrie, 2001; Harel & Tzafrir, 1999; Heffernan & Flood, 2000; Huselid, 1995; Ichniowski, Shaw & Prennushi, 1997; Kangis, & Williams, 2000; King,

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1995; McCartney, 2004; Pfeffer, 1998; Ramsay, rpstra & Rozell, 1993; Welbourne & Andrews, 1996) have often been hypothesised to lead to increased organisational performance, and often increases in such customer-based links such as sales.

Although these studies have largely been interested in manufacturing settings, increased attention is being given to services and customer effects (Batt, 2002).

The major theoretical approach to explaining such effects is suggested by Batt (2001), who relies on the theorised effect of organisation-specific human capital. Batt (2001) notes that specialised knowledge of the organisation and customer as well as ability and motivation to act on that knowledge (including understanding of the needs and realities of customers and the value chain) leads to efficiencies. Therefore this effect essentially suggests that employee competencies mediate between human resource systems and policies and direct performance and customer metrics (Liao & Chuang, 2004).

Secondly, Batt (2002: 589) suggests that turnover rates of employees may mediate the effect of human resource systems on organisation performance and customers. She points to a large body of work that confirms the impact of such HR systems on turnover (Batt, 2002) and then notes that turnover is posited to impact negatively on customers because of learning curves and loss of relationships, both of which can be based in theories mentioned above such as social networking and utility.

Furthermore, Batt (2002: 589) notes that the above effects can be based in:

1. *Resource-based theory* (Barney, 1995; cited in Batt, 2002: 589), because in investing in and fully utilising employees, the organisation is creating resources which increasingly fulfil the sustainable and critical resource criteria of value, rarity, non-substitutability and non-imitability, and

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& Van Buren, 1999; cited in Batt, 2002: 589) in e support structures for both staff and customer which allow knowledge sharing to deepen. This therefore references social networking effects.

Batt (2002) furthermore proposed that the market segment would mediate these relationships, in that the effect of high performance work systems would be higher for low-value-added market segments (where such skills are not the norm and would readily make a competitive advantage) but lower for high-value-added customer segments (where the nature of the value chain generally necessitates all competitors to use such systems). Empirical findings in her model are discussed in Section 4.4.

Having discussed some of the theoretical bases to various employee-customer linkages, the following sections discuss findings in particular areas, starting with the focal area of EF and moving onto other areas which may be affected by or affect EF.

4.4. SPECIFIC EMPLOYEE-CUSTOMER LINKAGES

Based on the above theories, various possible employee-customer linkages have been studied, including various sub-components of the focal one in this thesis, EF. However other linkages are also relevant to the study of EF, as they can be affected by or affect EF or its impact. For example, Batt (2002) found that human resource systems both directly impact on customer outcomes and also act through employee turnover. Similar effects may be observed for constructs such as affect.

Therefore in this section direct studies of the impact of components of EF on customer metrics are reported, and thereafter other relevant employee-customer linkages are also given to 'round out' the overall picture. Ultimately,

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ries such as the service profit chain literature,

xpected to occur.

4.4.1 COMPONENTS OF EF AND CUSTOMER METRICS

Significant prior research has been conducted on links between specific components of EF and customer metrics. This most commonly includes studies of the effect of employee turnover (which impacts closeness or length of contact between employees and customers) as well as employee scheduling as a specific internal issue and retrenchment/rationalisation as an outflow issue. These areas of research will therefore be discussed next.

A. Employee Turnover and Customer Metrics

Employee turnover is perhaps the most common EF variable studied with regard to effects on customers. This is probably because turnover is both a starkly visible variable, and because it affects subsequent acquisition because it creates vacancies.

A broad view of the various roles of employee turnover can be seen in early models of the service-profit chain, such as Schlesinger and Heskett's (1991) broad model explicating the 'cycle of organisational failure' (see Chapter One).

Schneider and Bowen (1985) furthermore suggested that turnover might affect customers because more experienced staff have greater understanding of the goals and needs of both the organisation and customers, therefore facilitating greater fit between the two. This is similar to the argument made by Batt (2002) seen in Section 4.3.8B.

Empirical evidence exists of the effect of employee turnover on customer metrics. Hurley and Estelami (2001) noted that although there was relatively poor evidence for employee satisfaction - customer satisfaction relationships,

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that nonlinear relationships between employee ction exhibited high levels of predictive power (quadruple that of satisfaction links). Schneider and Bowen (1985) found evidence for links between employee and customer turnover such that bank employees' and customers' attitudes to service quality may affect each others turnover intentions, although they found customer attitudes to service impact employee turnover more strongly than the inverse.

Batt (2002) found that employee turnover significantly mediated the link between human resource practises and customer outcomes such as sales, as well as overall organisational performance.

In a study of truck drivers, Keller (2002) found that driver turnover mediated and interacted with pay, time at home and dispatcher responsiveness (a form of managerial relationship) in predicting relationship quality with customers and driver performance with respect to customers.

Bendapudi and Leone (2002) studied the effect of key employee turnover within business-to-business relationships. They noted that prior literature has suggested a related but differential impact on customers for key employees versus the organisation itself, and that no prior research had properly studied the turnover of such key employees. In two studies they found the following:

- In focus group studies business customers were found to value relationships with key contact employees of suppliers, especially when competence, trust and empathy/likeability were present. The effect of turnover among key contact employee depended on factors such as 1) The salience of the employee in the supply process, 2) Whether the organisation could supply acceptable replacements and train them in good time, 3) Whether the vendor had superior products or good image.
- In further qualitative studies to explore the strategies employed by vendors to deal with customer concerns about key staff turnover, they

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ractises to exist. First were *strategies to deal with ey contact employee turnover*, and included (a) strategies around perceived criticality of the employee to customer satisfaction (including assigning multiple contacts, building vendor organisation image, using employee teams, and rotation of key employees), (b) acceptability of replacement staff (strategies included training, showcasing of staff, careful selection and hiring, and tangible cues such as employee presentation), and finally (c) strategies around the transition procedures (including advance notification to the customer and a planned transition period). Secondly were *strategies around retaining key employee knowledge*, including (a) valuing employee information (mostly via a culture of sharing), (b) motivating employees to share information (including performance appraisal, incentives and trust and commitment building around information sharing), and (c) employee ability to share information (including the availability of technology and a conducive organisational structure).

Koys (2001) however did not find turnover effects on customer satisfaction, although they utilised a small sample of only 28 restaurants.

In addition, much literature exists with regard to the effect of turnover on call centre customers and performance (e.g. Hillmer, Hillmer & McRoberts, 2004), although little of it has an empirical basis.

B. Retrenchment/Rationalisation and Scheduling

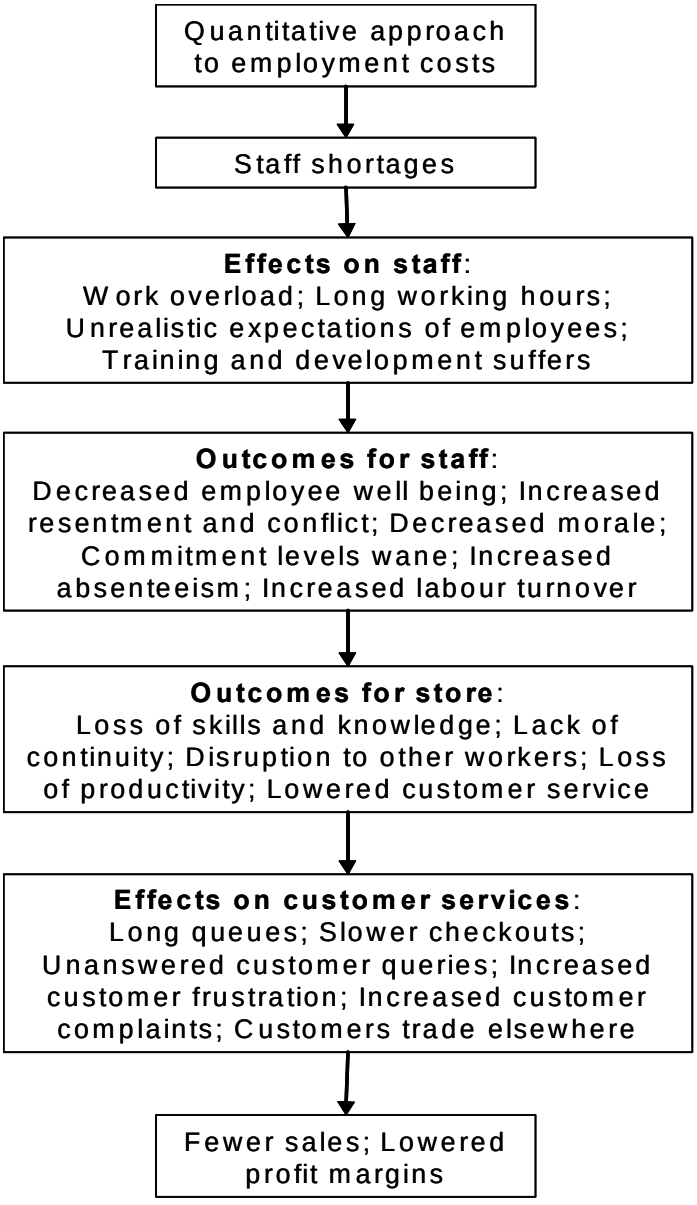
A potential variable with links to EF variables is that of employee rationalisation or scheduling in customer metrics (Sparks, 1992; Uncles, 2002). Sparks (1992) argued that labour supply is a major potential determinant of service provision, and therefore customer metrics.

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onalisation literature and a qualitative study, a possible negative progression in relation to problems caused by rationalisation issues in retail as seen in Figure 4-5. In terms of this model, rationalisation is expected to have similar impacts to turnover, although empirical evidence is relatively scant.

However this model has not to date received empirical validation and remains a theory.

Figure 4-5: Broadbridge's succession of negative rationalisation effects in retail



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of Contact

Other variables that are directly affected by employee turnover are also relevant to this discussion. Notably, research on the *closeness / frequency of contact or relationship* between employees and customers is often studied. This type of variable is relevant in this context because it can be altered by employee turnover of both an internal and external nature – i.e. true turnover as well as transfers. Examples utilising frequency of contact include Barnes (1997), Bendapudi and Leone (2002), Bove and Johnson (2000), Butcher, Sparks and O'Callaghan (2001), Crosby, Evans and Cowles (1990), Dietz, Pugh and Wiley (2004), Hartline and Jones (1996), Homburg and Stock (2004), Schneider, Parkington and Buxton (1980), and Schneider and Bowen (1985).

Significant literature has begun to build on the importance of relationships with customers – relational constructs form one of the primary marketing drivers for Rust *et al*'s (2004b) customer equity model (see Figure 4-2). In addition, customer relationship management (e.g. Reinartz, Krafft & Hoyer, 2004) and recent constructs of 'relational equity' (e.g. Sawhney & Zabin, 2002, who propose viewing the entire organisation as an interlocking system of relationships, which is similar to the concept of the service profit chain albeit more wide-spread and less deterministic) have become increasing foci.

This type of variable is accordingly taken explicitly into account later in the empirical study.

The above are some of the individual employee movement-related constructs that may affect customer metrics. Other related linkages are now discussed.

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Perhaps one of the most common assumptions in service profit chain and associated research is the assertion that mental constructs such as satisfaction, commitment, loyalty, involvement, climate and even positive affect or extroversion may have a spillover effect from employees to customers. This research is therefore discussed below.

A. Spillover of Satisfaction, Loyalty, Commitment and Involvement

The most common spillover effect studied is that of employee satisfaction, as well as other affect-based mental constructs such as commitment, loyalty and involvement. As seen in Chapter One, spillover of affect is a fundamental part of service-profit chain thinking, notably via concepts such as the so-called 'satisfaction mirror'. Service-profit chain thinking suggests that such constructs would influence customers' perceptions of value and therefore satisfaction and loyalty, an intermediate customer process similar to the Rust *et al*. (2004b) customer equity model presented in Figure 4-2.

Although links with customer metrics have been found, doubts continue to exist as to the possible final effects on organisational performance. Employee satisfaction has been shown to have fairly moderate links to individual performance (of the order of .3, Harter, Schmidt & Hayes, 2002). However others, e.g. Ryan *et al.* (1996) and Schneider and colleagues (Schneider & Bowen, 1985; Schneider, Goldstein & Smith, 1995; Schneider, White & Paul, 1998) have hypothesised that aggregate performance is more than the sum of individual performances, but is in addition a function of increases in shared values and teamwork over time, a state that is especially useful to employees in 'boundary spanner' roles (i.e. customer contact roles).

Empirical evidence for such satisfaction-type links is mixed. A large unit-level meta-analysis by Harter, Schmidt and Hayes (2002, N = 7939) found that

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ion had a true score Pearson correlation of .32 edibility value of .21 on a customer satisfaction-loyalty construct (adjusted for range restriction). Employee engagement was found in the same study to have a true score correlation of .33 and adjusted validity of .29 with 90% credibility value of .29 on the same construct. (In the same study, positive satisfaction impacts were found for employee turnover and organisational productivity, allowing room for the complex effects hypothesised in this thesis).

Gelade and Young (2005) undertook unit-level studies of a full service profit chain model among banking branches. They successfully found positive relationships between employee attitudes and climate and both customer satisfaction and branch sales performance (although when testing a full mediation model with customer satisfaction as the mediator, they concluded that the effect sizes were not big enough to merit serious acceptance of the model). Similarly, they found in structural equation models that although employee commitment successfully predicts sales directly, the path via customer satisfaction is far weaker. Therefore this study casts doubt over the intermediary role of customer satisfaction. However as discussed below, employee attitudes leading to 'harder' results such as objectively better service may be a better mediation model.

Homburg and Stock (2004) studied properly controlled employee-customer dyads in the context of business to business settings, confirming significant satisfaction contagion. Their study is discussed further later in this section.

Heskett, Sasser and Schlesinger (1997) studied the service profit chain within the context of a large retail case study, concluding that there was qualitative research evidence for the hypothesised links that employee satisfaction and loyalty would be mirrored in customers.

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ce within restaurants that employee satisfaction (R^2 = .31), although not subsequent profitability.

Ellis, Gurdergan, and Johnson (2001) noted results for the satisfaction mirror have been demonstrated to have results ranging from 0.34 to 0.53.

Ryan *et al.* (1996) actually found reverse links in which customer satisfaction significantly increased subsequent employee satisfaction but not vice versa. This finding may possibly arise in some environments (notably services) because the causal chain may be monitoring of customer satisfaction by managers, translating into concomitant management practises (e.g. bonuses) which may then impact on employee attitudes. Also, in service type settings, external issues common to both customers and employees (e.g. economic forces) may cause common effects.

Liao and Chuang (2004) found evidence that employee involvement explained significant between-store variance in restaurant customer outcomes.

Szymanski and Henard's (2001) meta analysis of antecedents of customer satisfaction indicates that the correlation between affect and customer satisfaction is in the order of .27, which was not as strong as more performance-based issues such as equity and disconfirmation of expectations.

Pritchard and Silvestro (2005) tested the satisfaction mirror concept in various chains of a British home improvement retail organisation. They found no support for the satisfaction mirror, although they did find that employee loyalty was positively linked with employee satisfaction, productivity, service value, customer satisfaction, and revenue growth.

Silvestro and Cross (2000), in their study of the service profit chain in a retail environment, noted that the satisfaction mirror did not appear to hold. However, in their supermarket-based study they noted that customer-employee contact was limited, with customer satisfaction being driven mainly by price, convenience, and product availability.

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5) built on Silvestro and Cross's (2000) finding s moderated by other factors like price and product availability. Citing correlations between employee and customer satisfaction ranging from 0.09 to 0.53, they investigated the reason for this variation as a function of salesperson characteristics interacting with customer characteristics, finding 1) that employee satisfaction does have an impact on customer satisfaction, with this relationship mediated by the employee's customer orientation, 2) that the direct relationship between employee satisfaction and customer satisfaction was moderated by employee and customer characteristics, in particular employee characteristics of empathy, expertise, and reliability and customer characteristics of trust in the organisation and importance of the product/service. Finally, they noted that price consciousness of customers was found to negatively influence the satisfaction mirror providing some evidence for Silvestro and Cross's (2000) proposition.

Vilares and Coelho (2003), instead of testing employee satisfaction and customer satisfaction correlations, examined relationships between consumer satisfaction and customer perceptions of employee satisfaction and loyalty. No direct link was be found between customer satisfaction and customer perceptions of employee attitudes, but customer perceptions of employee attitudes were found to directly influence customer perceptions of service value (in turn influencing customer satisfaction).

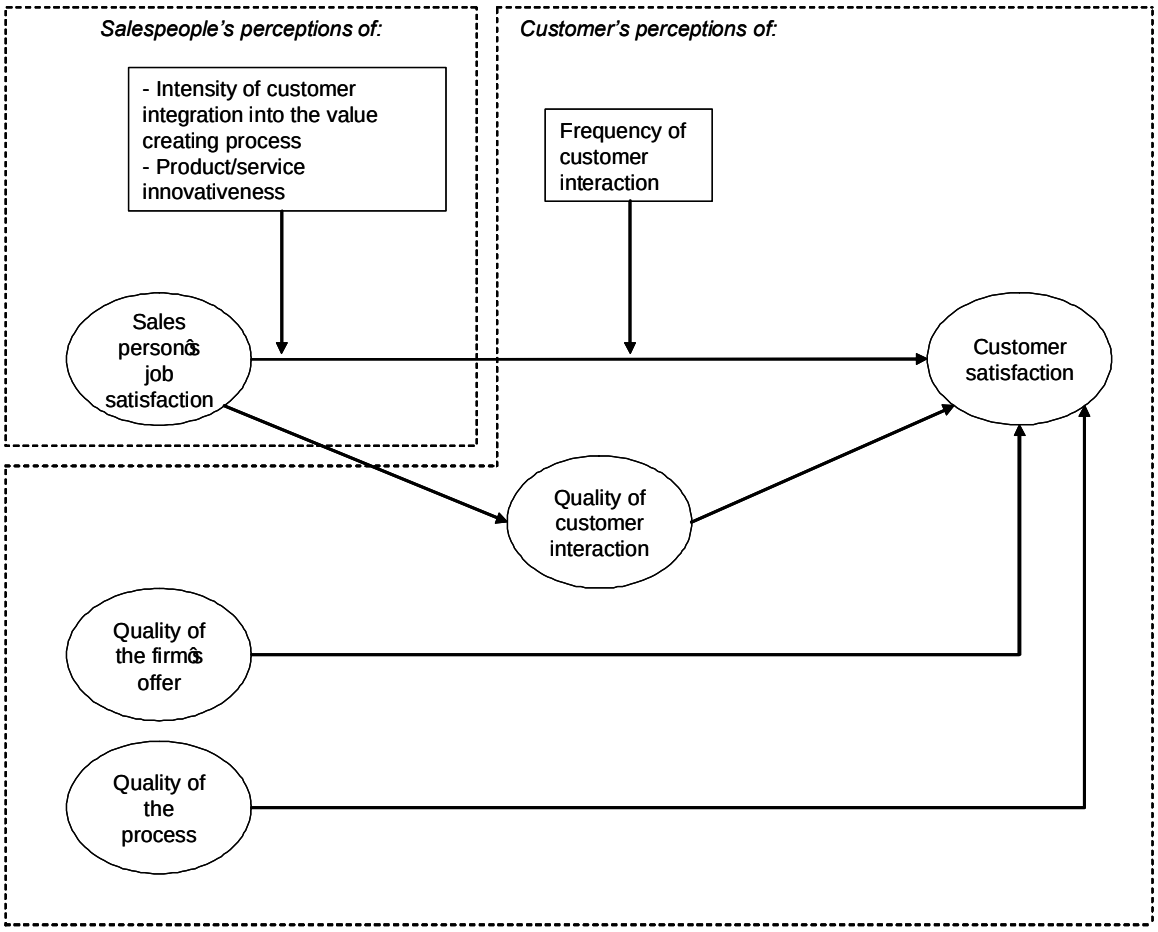
Commitment of customers towards individual employees and the organisation has also been studied. Handsen, Sandvik and Selnes (2003) found that affective commitment of a customer to an employee was positively related to commitment to the organisation, and thereby to customer loyalty and intention to stay. These authors also cite Price and Arnould (1999) who "found that both service providers and clients share a general sense of the content of what they label commercial friendships, where affection, intimacy,

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tent of these friendships" (Handsen, Sandvik &

A particularly salient model of employee-customer satisfaction linkages for the purposes of this thesis is that of Homburg and Stock (2002: 147) presented in Figure 4-6 below:

Figure 4-6: Homburg and Stock's (2002) model of B2B employee-customer satisfaction linkages



As seen later, elements of this model are utilised in the first empirical study of this thesis, which is itself a business-to-business model. The Homburg and Stock model therefore bears explication. As seen above, antecedents of customer satisfaction are hypothesised to be:

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partially mediated by quality of customer interaction. Homburg and Stock base the satisfaction sharing effect on the principle of emotional contagion (the transfer of emotion from one party to another), which is discussed further below;

2. Quality of the organisation's offering and process;

In addition, and most importantly for the use of the empirical study described later, moderators of the employee satisfaction-customer satisfaction link were hypothesised to be

1. The extent to which the customer is integrated into the supply chain (which increases visibility of the salesperson, therefore increases opportunity for emotional contagion),
2. The innovativeness of the organisation's product/service offerings (because customers are more reliant on the boundary spanner employees and less on their own experiences in the case of new or changing products), and
3. The frequency of interaction with customers (which increases visibility of the salesperson).

Homburg and Stock's (2002) study, conducted among 1305 salespeople in varied jobs, showed significant support for all the effects discussed above.

B. Spillover of Emotions

As discussed with regard to the Homburg and Stock (2002) model above, emotional contagion has become a major theory underlying models which seek to explain why employee and customer metrics may be linked. These

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as van Dolen, de Ruyter and Lemmink (2004), Pugh (2001) and Verbeke (1997) – these studies have found significant support for the positive impact of positive emotional contagion on outcomes such as customer attitudes to the product, encounter or relationship satisfaction (although see Sutton & Rafaeli, 1988 who unexpectedly found a negative relationship, and concluded that pace of work was a moderating factor such that greater pressure and pace may lead to negative relationships). Chebat and Slusarczyk (2005) reported evidence that emotions mediated various relationships between justice and customer loyalty and quit behaviour in retail banking, with interactional justice (which is delivered via employee relationships) showing the strongest effects on both emotion and customer outcomes. Furthermore, Tsai and Huang (2002) investigated the role of affective delivery on customer intentions of retention in retail stores, finding evidence of positive links mediated by customer in-store moods and perceived friendliness.

C. Other Mental Constructs: Personality and Stress

Employee personality traits such as extroversion and conscientiousness have been found to predict significant within-restaurant variance in customer outcomes (Liao & Chuang, 2004). Presumably such traits can lead to emotional contagion, or in the case of conscientiousness to service performance. Therefore such variables do fit well into the models discussed above.

Employee stress has also been found to be related to customer outcomes in the case of boundary spanner employees (Parkington & Schneider, 1979).

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The third broad area of discussion concerning the impact of employees on customers is to do with specific on-the-job staff behaviours, such as manifest service quality, positive encounters, reactions to negative customer feedback, inclusion of the customer in the service process and extra-role behaviours. These will therefore also be discussed.

A. Positive Service Encounters and Performance Behaviours

A service encounter is defined as "a period of time during which a customer directly interacts with a service" (Shostack, 1985: 243). The service need not always involve employees, it can also be an encounter with aspects such as the facilities or even the product. However employees are often the progenitors of the latter aspects, and are generally therefore seen as the primary determinants of the service encounter. Positive performance encounters with employees, notably in the case of service or sales staff, naturally forms a powerful hypothesised antecedent in the formation of customer metrics such as satisfaction and loyalty.

Theoretical bases to the importance of the service encounter were discussed in Section 4.3, and may include most notably expectations theory but also other theoretical processes such as social information and network effects.

Evidence for links between perceptions of positive service and increased metrics is extensive, and includes, but is certainly not limited to, Harris *et al.* (1995), Hartline and Jones (1996), Keaveney (1995), Liao and Chuang (2004), Mattsson (1994), National Consumer Council (1997), Naylor and Frank (2000), Rabinovitch (1997), Sweeney *et al.* (1997), Szymanski and Henard (2001), and Westbrook (1981).

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(2001) extensive meta analysis of antecedents of
es particular mention. They found that the strongest correlates with customer satisfaction were equity (r = .50) and disconfirmation of expectations (r = .46).

van Dolen, de Ruyter and Lemmink (2004) found evidence that employee performance vis-à-vis customers can be separated into employee-specific performance and interaction-induced behaviours.

Bitner (1990) furthermore confirmed that poor service encounters lead to greater dissatisfaction if customers attribute the blame to the organisation, and if they think the problem will recur.

B. Recovery of the Organisation after Poor Service

While the preceding research studied *a priori* service of a positive nature, limited research has also been conducted on the response of the organisation after an incidence of perceived poor service. Tax, Brown and Chandrahekaran (1998), for example, found that the justice framework could explain outcomes (after complaining customers reacted to perceived equitable outcomes, good procedures and good interpersonal handling of the situation). Customer satisfaction with complaint handling predicted future commitment, trust (moderated by prior positive experiences). Similar findings have been reported by Andreassen (2000). Babakus, Yavas, Karatepe, and Avci (2003) found that satisfaction and commitment mediated HR policies in predicting service recovery performance.

In a similar vein, Bagozzi, Verbeke and Gavino (2003) studied the effect of employee shame from poor customer reactions on subsequent customer-related performance, and specifically the effect of national culture on this process. They found that inter-dependent culture (an understanding that people are dependent on each other for meaning and need satisfaction) led to

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ship building, with the opposite effect for erstanding that people do not depend on each other).

C. Inclusion of the Customer in the Internal Service-Provision Process

A third area of research in this regard involves the effect of up-front inclusion of customers in the internal service process, which may for example be achieved via observable oral participation or as treating the customer as a quasi-employee (Harris, Baron & Ratcliffe, 1995; Homburg & Stock, 2004).

Two roles might exist for the inclusion of a customer in the internal supply chain process. First, it may act as a direct predictor of positive customer metrics. Secondly, the inclusion of customers might act as a moderator of the service quality-customer metrics process.

This possibility is therefore taken into account in the empirical model later, via explicit measurement of the inclusion of the B2B customer in the supply process.

D. Employee Organisational Citizenship

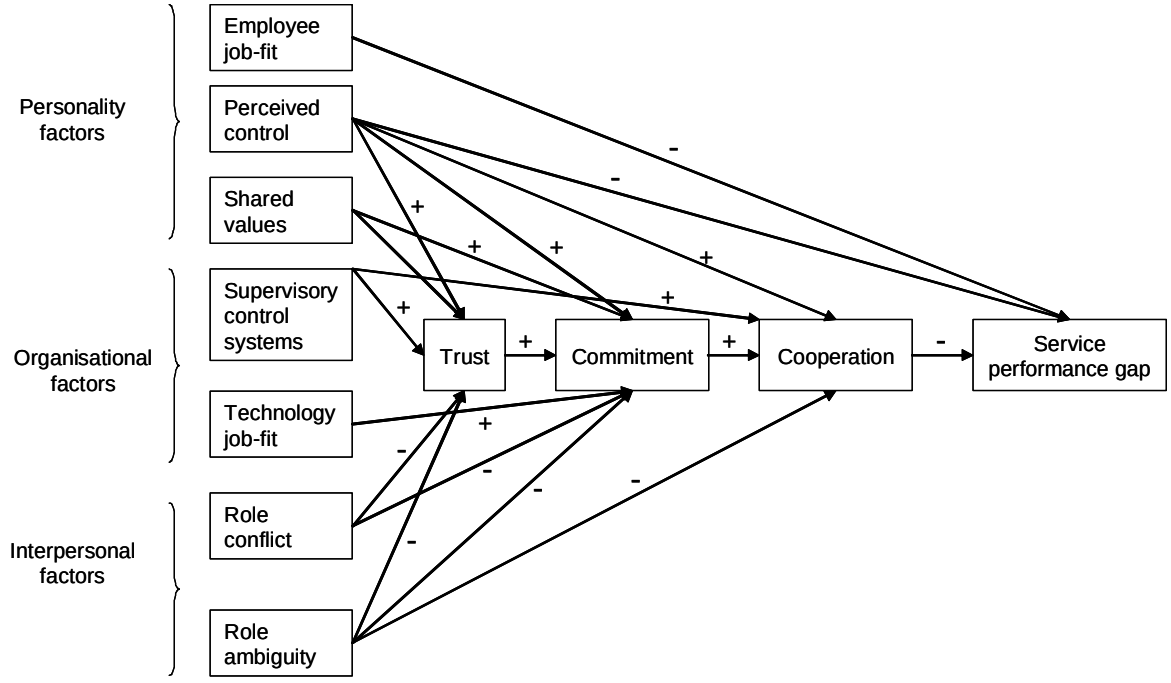
Organizational citizenship behaviours (OCB) by employees, involving extra-role behaviours such as altruism or pro-social behaviours (e.g. helping train a new colleague off the clock), have been hypothesised to affect customer metrics. Yoon and Suh (2003) found evidence for links between OCB and customer's service perceptions, as did Hui, Lam and Schaubroek (2001) in a banking environment. Koys (2001) failed to find evidence of links between OCBs and customer satisfaction, but did find significant relationships with organisational profitability. George and Bettenhausen (1990) also found links between prosocial behaviour and sales performance.

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Various attributes of the human resource management system and the consequences thereof are assumed to underlie the employee antecedents that affect customer metrics. For instance, Chenet, Tynan and Money (2000) researched the structural equation model shown in Figure 4-7, which includes HR system elements such as control, shared values, and use of technology.

As seen, in addition to personality factors, Chenet *et al.* (2000) suggest various HR and organisational factors. Their findings assessed via structural equation modelling analysis were confirmed in terms of the effect of employee job fit and perceived control on the service performance gap, and most of the other links were also confirmed.

Figure 4-7: Chenet, Tynan and Money's (2000) model of service-performance gap formation



In this sort of vein, in a sample of 142 automotive finance branches over two years, Ryan *et al.* (1996) found various partial correlation linkages

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nts and customer satisfaction as follows a) ress r = .30 to .41; c) training r = .28 to .29; d) supervision r = .13 to .22; d) customer focus of systems r = .16 to .22.

Specific HR system elements include the following:

A. Service Climate

As discussed more generally in Section 4.3.8A, employees' perceptions of the organisational climate, notably a climate of service orientation, have been theorised to affect customer outcomes (e.g. Bowen, 1990; Hensel, 1990), and frequently researched. There has been general empirical support for the existence of a perceived service climate or climate strength and subsequent customer satisfaction and other affective variables (Donavan, Brown & Mowen, 2004; Johnson, 1996; Liao & Chuang, 2004; Schmit & Allscheid, 1995; Schneider, & Bowen, 1985; Schneider, Salvaggio & Subirats, 2002; Schneider, White & Paul, 1998 Susskind, Kacmar & Borchgrevink, 2003).

Gelade and Young (2005) found that service climate was an antecedent to employee commitment and subsequent knock-on effects to customers and sales performance. Their model is significant for having explicitly tested mediation models.

Dietz, Pugh and Wiley (2004) found that the above relationship was moderated by (a) the proximity and relevance of the target of the service climate to customers (subunits had a greater impact than the organisation as a whole) and (b) the frequency of contact with the customer, a finding confirmed by Donavan *et al.* (2004).

Parkington and Schneider (1979) found that stress levels among boundary spanners impacted customers, and therefore that stress relieving interventions may ameliorate such issues.

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ously found support for the importance of a
uct, although elements differ (e.g. Johnson, 1996, Schneider, & Bowen, 1985; Schneider, Salvaggio & Subirats, 2002; Schneider, White & Paul, 1998). Specific elements of human resources systems are therefore dealt with next.

B. Overall high performance work systems

As introduced, high performance work systems (HPWS) are those characterised by skill development of staff, empowerment, and motivation and incentivisation of work (Batt, 2002).

HPWS have been shown to lead to organisational performance, but unfortunately predominance of studies in manufacturing settings led initially to little work on customer metrics such as satisfaction.

Batt (2002) investigated links within service contexts. She found that HPWS were generally linked to higher sales growth, an effect which was partially mediated by lower employee turnover.

In addition, Batt's research confirmed her theory that the above effect was stronger for smaller, lower-value-added market segments, whereas for high-value-added, bigger customer segments the HPWS seemed the 'price of market entry'.

Batt and Moynihan (2006) further confirmed a mediation model in terms of which greater employee training, discretion, and rewards were significantly related to greater service quality, which in turn was significantly related to higher revenue.

C. Overall Implementation Differences in the Service Profit Chain

Not all service profit chain research focuses only on causality. Some studies examine effectiveness of implementation and customisation of the

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dicate that customisation and adaptation of the
ry conditions, organisational and transaction-specific variables and so forth produced extremely encouraging results (e.g. Anderson, Mackoy, Thompson & Harrell, 2004; Bowman & Narayandas, 2004; Kamakura, Mittal, de Rosa, & Mazzon, 2002; Payne, Holt, & Frow, 2001; Skoog, 2003; Soteriou & Zenios, 1999).

One particular limitation does exist in confirming such hypotheses regarding customisation, namely that studies would involve complex modelling, including systems of equations, data envelopment analysis, and Bayesian network estimation, amongst others. Understanding and correctly using these complex techniques takes a large amount of time, and whether managers in specific situations are comfortable or not with these techniques is a research issue that must be urgently examined to ensure that managerial perceptions continue to remain favourable to the service profit chain concept. Indeed, Skoog (2003) already notes managerial concern about the lack of simplicity in measurement and evaluation that takes up valuable management time. Skoog (2003) further notes that in such complex measurement systems, managers may become 'prisoners of comparison', that is, managers may find it comfortable chasing a comparative other, rather than focusing on more important strategic transformations.

D. Empowerment

Empowerment has often been theorised to be a potentially valuable organisational aim (e.g. Kirkman, Rosen, Tesluk and Gibson, 2004 for a review). Evidence on customer outcomes is relatively limited. Batt (2002) found that involvement significantly predicted quit rates and sales growth in residential and small business sectors but not in large business sectors. In the context of virtual teams, Kirkman, Rosen, Tesluk and Gibson (2004) found

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team empowerment on customer satisfaction Yavas, Karatepe and Avci (2003) found that empowerment affected service recovery performance through satisfaction and commitment. Liao and Chuang (2004) found that employee involvement demonstrated significant effects on service performance after accounting for individual effects.

E. Initiation of the Internal Marketing Concept

The internal marketing concept, in terms of which marketing principles are applied internally to employees, has also occasionally been hypothesised to lead to improved customer metrics. This approach, it has been suggested, has fallen away somewhat, in favour of more modern approaches such as customer equity, however it may yet be efficacious as an element of a greater system of HR and Marketing linkages. For reviews see Lings (2004) and Rafiq and Ahmed (2000).

F. Training

It has been hypothesised that training may lead to customer outcomes such as satisfaction (Eaglen, Lashley & Thomas, 2000a). Evidence for this is mixed, however with some positive findings (e.g. Lashley & Thomas, 2000b; Babakus, Yavas, Karatepe & Avci, 2003) and others finding no relationship (Batt, 2002; Liao & Chuang, 2004). However a full framework considering the mediating impact of employee competence and positive affect stemming from training may aid understanding.

G. Performance Incentives

Some evidence suggests that customer outcomes may be affected by compensation elements. Batt (2002) found that incentive schemes significantly

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on sales growth. Further evidence exists that ecovery performance (Babakus, Yavas, Karatepe and Avci, 2003). Liao and Chuang (2004), however, could find no evidence for effects of the presence of incentive schemes on service performance.

H. Justice

Justice within the organisation has already been discussed as a significant antecedent to various customer outcomes (see the findings of Chebat & Slusarczyk, 2005 and Tax, Brown & Chandrahekaran, 1998). Further large-scale evidence of the importance of justice on service performance outcomes is provided by Simons and Roberson (2003, also see Masterson, 2001 for the case of instructors and students).

4.5. QUALIFYING THE SERVICE-PROFIT CHAIN

Criticism of the service profit chain by Silvestro (2002), Pritchard and Silvestro (2005), and Silvestro and Cross (2000) as discussed earlier confirms the view that the service profit chain should be seen within its environment. All the above studies have found that some elements of the service profit chain apply to varying degrees in the retail environment, while some elements do not apply, specifically the satisfaction mirror. Silvestro (2002) observed that employee satisfaction and loyalty act as predictors best when there is high contact between customers and staff, technology cannot substitute for human interaction, the creation of value is critically dependent on employee customer interaction, and the cost of labour is not a significant proportion of the total cost of service.

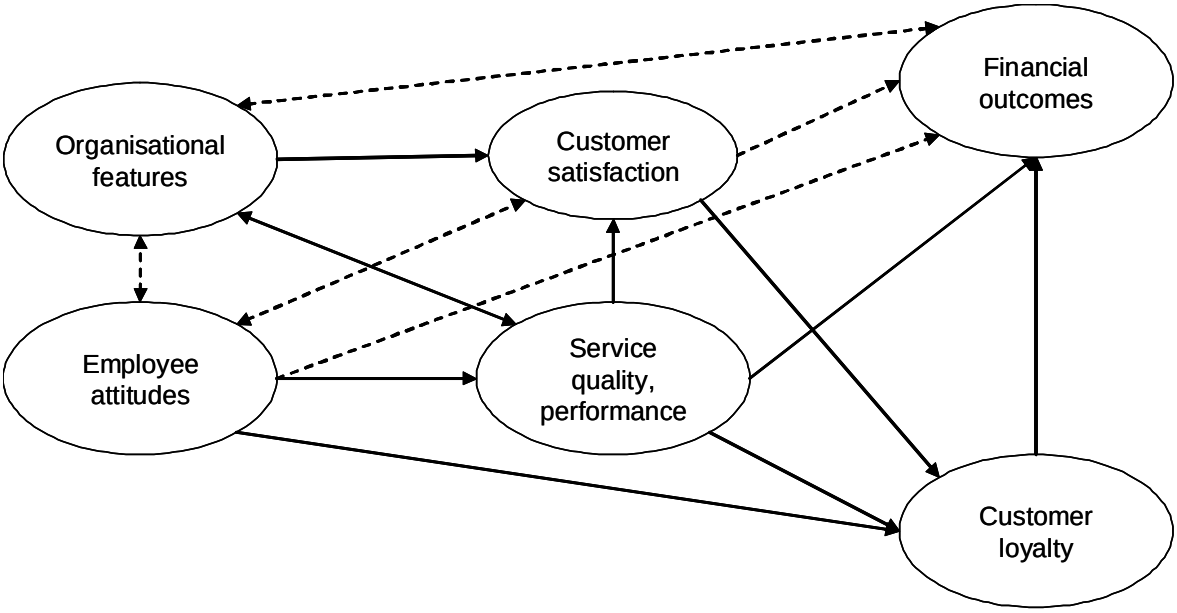
Dean (2004) in a comprehensive review of service profit chain literature found that the chain does not appear to occur in a linear sequence. Rather,

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synchronous or reciprocal with other elements, non-linear ways depending on context.

Dean (2004:342) posited that evidence suggests a form of the service profit chain as seen in Figure 4-8 below:

Figure 4-8: The service profit chain according to empirical evidence (Dean, 2004:342)



As Dean (2004) notes, a major challenge to the service profit chain's empirical investigation and understanding lies in the many conceptual complexities of the constructs, and therefore in their interpretations and measurement (for example, employee satisfaction and loyalty both suffer from variegated definitions and measures).

4.6. RELEVANCE, CRITIQUES AND THESIS

Ultimately the relevance of the material discussed in this chapter to the thesis is crucial. It helps inform the operationalisation of customer-level and other variables in the empirical study (e.g. as will be seen explicit operationalisation of soft process elements is done, and moderation variables

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and the theory above is essentially what the

Notwithstanding the helpfulness of the extant literature, there are several gaps to which it is hoped this thesis will contribute.

When considering the input variable, namely elements of EF, the critiques discussed in Chapters Two and Three apply equally here: EF has generally been operationalised in its isolated, unintegrated elements, it has been focussed on quantitative assessments rather than qualitative, it has been largely at the individual levels (although increasing research such as that of Rynes *et al.*, 1996 has ameliorated this) and it has focussed far more heavily on turnover rather than other elements. The critiques and contributions of this thesis discussed in Chapters Two and Three therefore apply equally here.

In addition, most of the employee-customer linkages studied and theorised within this chapter have not in fact been tested extensively, if at all, in the EF context. Areas such as emotional contagion, justice or service quality may have occasionally included a variable such as turnover as a limited dependent or moderation variable (e.g. Batt, 2002; George & Bettenhausen, 1990; Keller, 2002), but there has been relatively little focus on their detailed effect within the actual EF process, and certainly not within the integrated and qualitative EF context as used in this thesis. Therefore while the theories included in this chapter are fundamentally helpful in explaining possible findings of the empirical study discussed later, they require contextualisation within the EF framework. This thesis will aim to achieve this end.

Thirdly, very little work has been achieved on EF in business-to-business (B2B) contexts, and the one notable exception (Bendapudi & Leone, 2002) employed qualitative rather than statistical research designs. This thesis will accordingly aim to expand this area of study to the B2B setting, also therefore adding to the organisation-level literature.

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iables have often been quite limited. Very often, satisfaction) has been the focal variable. When 'harder' issues have been addressed – that is, those more proximal to operational or financial success such as service quality – these have often taken the form of a single, unidimensional construct (e.g. Gelade & Young, 2005; George & Bettenhausen, 1990; Liao & Chuang, 2004; Reinartz *et al.*, 2004; Ryan *et al.*, 1996; Susskind *et al.*, 2003). However multiple dimensions of customer outcomes and especially service are often found to exist (e.g. Brady & Cronin, 2001; Hansen *et al.*, 2003; Parasaruman, Berry & Zeithaml, 1991; Parasaruman, Zeithaml & Berry, 1994), including in B2B relationships (Durvasula, Lysonski & Mahta, 1999; Gounaris, 2005) and therefore should be investigated and employed. This thesis will also achieve this end, in investigating multiple dimensions of perceived customer service levels.

Accordingly, it is believed that this thesis will potentially add valuable findings to the extant literature on the relationships between employees and customers.

Having assessed the employee to customer link, the next chapter will assess the second link in the service-profit chain, namely the customer productivity elements.

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5. CUSTOMERS AND ORGANISATION VALUE

The previous chapter examined the link between employee variables, notably EF and variables affecting it, and customer metrics such as satisfaction and retention.

Returning once again to the concepts of the broad service profit chain, the aforementioned link, although crucial, is not the final say in a realistic business model. The final link must be organisation value or performance of some kind, or if done at the unit level at least performance of the unit. This is the second link in Figure 4-1.

As mentioned briefly in the previous chapter, the concept of customer equity is perhaps the fullest explanation of the links between customer responses to internal drivers and organisation or unit performance, and for some years has formed a central interest in the marketing literature (Rust, *et al*., 2004a). Accordingly, this chapter will explicate the concept of customer equity in a very perfunctory manner, even though customer equity is not per se utilised in its full form as a variable in the empirical model.

It is important to note for reasons of clarity that although a full customer equity model is not estimated for the empirical study in this thesis, the concept of customer equity will be discussed not only because it subsumes all the relevant customer metrics but it is also the assumed outcome construct in this portion of marketing literature, i.e. it is the assumed 'end goal' of any marketing metric.

5.1. A BRIEF INTRODUCTION TO CUSTOMER EQUITY

Customer equity (CE) can broadly be defined as "the total of the discounted lifetime values summed over all of the organisation's current and

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al., 2004b: 110). Like employee utility constructs, ultimately *ex post* concept, seeking ultimately to estimate what the customer base of an organisation is worth. This concept is a relatively recent one in marketing, having come into the spotlight only in the last five to ten years.

5.1.1 CUSTOMER LIFETIME VALUE: THE HEART OF CUSTOMER EQUITY

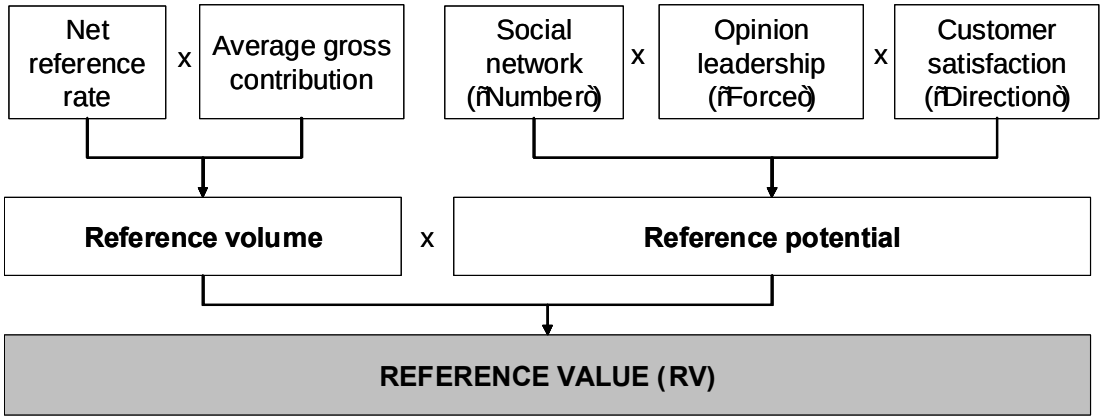
The basis of customer equity is that each customer has a *customer lifetime value* (CLV) to the organisation. This construct is composed of three major monetary categories (as summarised by Bauer & Hammerschmidt, 2005):

1. *Revenue*: Customers are expected to produce revenue for the organisation as a result of value-generating activities. Such value generating activities may include (Bauer & Hammerschmidt, 2005: 334-335):
   a. *Autonomous revenue and up-buying*: Representing straight sales to the customer. The former category involves sales brought about by the customer's reaction to the static brand and products of the organisation (i.e. without other marketing efforts), the latter being additional sales of the same or more expensive version of the same product to customers based on marketing efforts or the quality of the relationship;
   b. *Cross buying*: When, on the basis on satisfactory perceptions of the organisation based on purchasing of one of a few products, customers proceed on the basis of this positive brand strength to buy other products of the organisation too (e.g. customers buying the toothbrush product based on the toothpaste that they use);

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known as 'Reference Value' or RV (Bauer & 5: 334), where positive communication by a current customer regarding an organisation's brand(s) to others induces those others to buy the organisation's products or increase their buying. Cornelsen's (2002) model of the determinants of RV can be seen in Figure 5-1 (as cited in Bauer & Hammerschmidt, 2005: 334), in which total RV is made up of two components, namely reference volume (value of total current purchases of a brand or product which are induced by references) and reference potential (the ability of an individual customer to influence future buying in others, based on that individual's social network and the positivity of the reference).

Figure 5-1: Cornelsen's (2002) reference value model



2. *Retention*: The second component of CLV is the expected retention of the individual. The retention of the customer is, of course, a factor that will determine the amount of value generating activities to be expected – a customer who stays with the organisation for longer is expected to generate a longer revenue stream. Marketing theory has tended to deal with the retention rate in one of two ways:
   a. *Lost-for-good* models of retention assume that once a customer has left the organisation, (s)he cannot be reclaimed. Such models tend to

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e reflecting the probability that an individual
n loyal to the supplier for the next period, provided that the customer has bought from that vendor on each previous purchase (Dwyer, 1997 cited in Bauer & Hammerschmidt, 2005).

b. *Share-of-the-customer* models assume that the organisation can always have a proportion of the customer's spend. Such models are characterised by ever-present probabilities of switching between brands, and are therefore generally modelled via stochastic modelling such as Markov chains (Bauer & Hammerschmidt, 2005: 334; Rust *et al*., 2004b).

3. *Cost*: The third element of CLV involves the costs expended to obtain, keep or develop the customer and to service them with product, therefore categories include:
   a. *Acquisition costs*: Inducing customers to try and 'join' the brand involves costs such as advertising. Costs can be included for both current and prospective customers –Jain and Singh (2002) suggest that acquisition costs for current customers, although sunk, should nonetheless be included for purposes of valuation;
   b. *Marketing costs*: Costs incurred to retain and deepen the relationship with the customer, such as promotions to the customer list. Efforts to retain current customers and regain lost customers can fall here as 'recovery costs' (Bauer & Hammerschnidt, 2005: 336);
   c. *Sales costs*: These costs incorporate the 'normal' costs of producing the product and servicing the customer.
   d. *Termination costs*: Costs to terminating a relationship with a client whom the organisation does not think can or should be recovered (e.g. closing of an account, Bauer & Hammerschimdt, 2005: 337).

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s that of *contribution margin*: the difference between expected revenues and costs for the customer or the average customer.

The above categories of revenue, retention and cost (with varying degrees of inclusion of all categories) have formed the nucleus of a large number of CLV and CE models (e.g. Bauer & Hammerschmidt, 2005; Jain & Singh, 2002; Gupta, Lehmann, & Ames Stuart, 2004; Rust *et al*., 2004b). Just one of these models is that of Gupta, Lehmann and Ames Stuart (2004) in Equation 5-1:

Equation 5-1: Gupta, Lehmann and Ames Stuart's (2004) model of customer value

$$Value = \int_{k=0}^{\infty} \int_{t=k}^{\infty} n_k m_{t-k} e^{-ik} e^{-\left(\frac{1+i-r}{r}\right)(t-k)} dtdk - \int_{k=0}^{\infty} n_k c_k e^{-ik} dk$$

Note: '*Value*' refers to the pre-tax total customer lifetime value of the organisation, k = designates the number of the customer cohort, t = the time period, n_k = the number of new customers in cohort k, m_{t-k} = the margin of cohort k at time $t = 0$, i = the discount rate, r = the customer retention rate, c_k = the acquisition cost per customer for cohort k.

There are a variety of other CLV models in this vein presented in Appendix B. All share variations on these common elements.

5.1.2 ESTIMATION OF CUSTOMER EQUITY FROM CLV MODELS

The extrapolation of customer equity (CE) from CLV is generally a relatively simple step. CE is simply the total value of all the organisation's customers, and is therefore an aggregation of the individual CLVs discounted to the present in terms of general finance principles.

For instance, Bauer and Hammerschmidt (2005: 340) give the following CE equation (based on a somewhat pared version of their CLV equation in Appendix B):

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$$CE = \sum_{s=0} \frac{1}{(1+d)^s} \sum_{k=(v_{s-1}+1)} \sum_{t=s} r_i^t \frac{(R_{ti} - C_{ti})}{(1+d)^t}$$

Note. v_s = customers acquired at time period s, k = the index over customers of a particular cohort, R and C are total revenues and costs; other notation as in prior equations and in Appendix B.

Other models use variegated but similar aggregation methods for translating CLV into CE.

5.1.3 PROBLEM WITH STANDARD CLV MODELS FOR THIS THESIS

The representative CLV equations given above are accounting-type models, in that they only consider the value of a customer body vis-à-vis itself, i.e. without reference to internal organisational states or activities that might alter the status quo.

Unfortunately, such externally-focussed models are not really applicable to this thesis, as they leave no space for theoretical insertion of the major independent variable, namely EF. Instead, models of the above nature take the methods of gaining customers as given, and treat them as costs, but with no focus on *effectiveness* in such independent variables nor of the effect of *changes* in them.

However a recent high-profile model of CLV and CE is given below which does circumvent this particular problem and provides the full linkages necessary to consider the role of EF. This model is reported next.

5.2. THE RUST, LEMON AND ZEITHAML (2004) CUSTOMER EQUITY MODEL

As stated above, although various customer equity models have been presented over the past decade, they include little or no attention to the precursors of CLV, which is what EF is presented as.

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current model in the literature, that of Rust *et al*. inkage, and therefore will be presented here as the most helpful for the purposes of this thesis.

Rust *et al*. (2004b) present the customer equity model shown briefly (in pictorial fashion) in the previous chapter in Figure 4-2. As introduced there, this model suggests that components of customer equity are, sequentially:

1. Improvement in one or more marketing 'drivers' (any of the features of the organisation or product that affect the customer/client's brand choice, such as service, speed, price, quality); leading to
2. Improved customer perceptions of the organisational brand(s), leading to
3. Customer *satisfaction* and *retention*, which in turn lead to
4. Increased customer lifetime value (CLV), equity and contribution to return on investment.

As can be seen, the Rust *et al.* customer equity model involves the value of having customers choosing brands, which in this case can involve the organisation itself as a brand or a particular branded product. The distinction will not be explored here, it will be assumed for simplicity that the organisation itself is the brand (with competing organisations acting as competing brands).

Further details of the particular features of the Rust *et al.* customer equity model are as follows. A customer is assumed to make choices between competing brands based on features (marketing 'drivers') such as price, speed or perceived quality. Marketing science has traditionally been interested in the statistical relationship between marketing drivers and purchases of a brand, normally estimated via multinomial logit models with the customer's probability of buying a given brand (given a certain prior purchase) generated via the behavioural utility model seen in Equation 5-3 (Rust *et al*., 2004b: 114).

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ing brand choice (Rust et al., 2004)

Where: U_{ijk} = the utility of brand k to individual i who most recently purchased brand j, $LAST_{ijk}$ = an ôinertiaô dummy variable equal to one if $j = k$ and equal to zero otherwise; $\beta 0_k$ = is the logit regression coefficient corresponding to inertia, $\boldsymbol{X}$ = a row vector of marketing drivers as described above, $\boldsymbol{\beta}_{1k}$ = a column vector of logit regression coefficients corresponding to the drivers, ε_{ijk} = a random error term that is assumed to have an extreme value (double exponential) distribution, as is standard in logit models. The β coefficients can be modelled as either homogeneous or heterogeneous.

Broadly speaking, Rust *et al.* (2004b) identified three categories of marketing drivers: a) *Value drivers*, such as price and quality of the brand, b) *Brand-related drivers*, such as effectiveness of the advertising and image building efforts of the organisation, and c) *Relationship-related drivers*, such as involvement in loyalty programs and mutual knowledge between the customer and organisation. The latter is naturally the most important for the purposes of this thesis.

Within the context of the current study, EF utility is the specific 'marketing driver' under review: improved EF as explored in the previous chapter is expected to lead to improved customer perceptions of the organisation and therefore improvements in the other elements of the CE chain. As a driver in the broad model above EF may fall into a) The broad relationship mostly under the relationship-related category, as it involves employee contact with representatives of the organisation, however b) also, a main criteria would be the ability of EF issues to generate improved value/brand enhancement via good service.

Customer perceptions of the marketing drivers of each competing brand under review, estimated via survey-based methods, are used to estimate the parameters in the utility model above. This model can then be used to produce the probability that any given customer will pick a certain brand given any levels of the drivers.

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that customers are not exclusive to one brand, is calculable via the 'share of the customer' approach, represented by the proportional split between defined brands, that can be apportioned to each competing brand. Therefore a customer may switch between brands over time within the context of a Markov transition process, at a frequency determined by his/her logit-modelled probability. This switching process, allied with the 'probability-of-purchase' results of Equation 5-3, gives the overall 'share-of-the-customer' expected over time. This figure is then simply adjusted for the amount per purchase spent by the average customer ('contribution margin), the frequency and volume of purchase, and discounted over time to produce the following estimation of customer lifetime value:

Figure 5-2: Rust et al. (2004b) CLV equation

$$CLV_{ij} = \sum_{t=0}^{T_{ij}} \left(1 + d_j\right)^{-t/f_i} v_{ijt} \pi_{ijt} B_{ijt}$$

Note: CLV_{ij} is the lifetime value of customer i to brand j; T_{ij} is the number of purchases customer i is expected to make before organisation j's time horizon, H_j, d_j is organisation j's discount rate, f_i = customer i's average purchase rate per unit time; v_{ijt} = customer i's expected purchase volume in a purchase of brand j in purchase t, π_{ijt} = expected contribution margin per unit of organisation j from customer i in purchase t; B_{ijt} is an organisation specific element of **Bit** (the 1*J row vector of probabilities that customer i buys brand j in purchase t)

As introduced briefly above, organisations are interested primarily not in individual customers but rather in their total consumer base. This aggregated value of all CLVs is the customer equity (CE), defined formally as "the total of the discounted lifetime values summed over all of the organisation's current and potential customers" (Rust *et al.*, 2004: 110). Once this is achieved, expenditure is included to estimate a typical return on investment is estimated:

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leading to $ROI = \frac{\Delta CE - E}{E}$

Note: CE_j is the customer equity of organisation *j*, *POP* is the total number of customers in the market across all brands; *ROI* refers to the return on investment of marketing-related investments in brands; ΔCE = the improvement in customer equity that the expenditures produces; *E* = the discounted expenditure stream. Other notation as above.

Practically, the CE model is populated using surveys of representative consumer samples in which the marketing drivers and the relative choices between brands are elicited. These findings are then aggregated to the population. The forecasting element is achieved via sensitivity analysis: essentially a calculation of what occurs within the model if a marketing driver of an organisation changes, assuming that competing brands have retained their features.

The Rust *et al*. (2004b) model is not a perfect reflection of the possible components of CLV as discussed above: for example it does not utilise reference value or termination costs at all, and can be criticised for not allowing for a distinction between strategies to acquire new customers and retain existing ones (Reinartz, Thomas & Kumar, 2005: 63). However it is perhaps the leading model in the field and has at least the important salience for this research that it can incorporate employee constructs such as movement and wrap them into the overall marketing productivity view.

5.3. CUSTOMER EQUITY AND ORGANISATION/UNIT VALUE

Increasing research (e.g. Anderson, Fornell & Mazvancheryl, 2004; Bauer & Hammerschnidt, 2005; Gupta, Lehmann & Ames Stuart, 2004; Kim, Kim & An, 2003; Lehmann, 2004; Srivastava, Shervani & Fahey, 1998) has been conducted about the relationship between customer constructs, such as initial

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financial constructs to do with the value or
n or unit (such as shareholder value).

There is a certain amount of debate about whether customer valuation tools are valid or useful measures or part-measures of total organisation value – evidence differs in its conclusions, and financial theorists often disagree about the usefulness of the measure (Rust *et al.*, 2004).

The debate does have a certain salience for the current research because it speaks to the veracity of the final empirical link between customer metrics and organisation/unit performance and value (even though I do not propose to actually measure customer equity itself, the metrics used are the foundation of such value).

Bauer and Hammerschmidt (2005) suggest that customer equity forms a strong component of the operational parts of shareholder value (SHV), notably through the mechanism of increased sales as discussed in the revenue concepts of Section 5.1.1 (see Gelade & Young, 2005 for a review of empirical findings in this regard). Therefore various models have been presented incorporating those parts of SHV which can be covered by the CE model with the parts (e.g. debt and tax components) which cannot, essentially leading to an overall estimation of organisation value. For example, Bauer and Hammerschmidt (2005) propose the following model of total organisation value:

Equation 5-4: Bauer and Hammerschmidt's (2005) total shareholder value equation

$$FV = CE - \sum_{t=0}^{T}\left(\frac{FC_t + InvWC_t + InvFC_t + Tax_t}{(1+d)^t}\right) + \frac{CV_T}{(1+d)^T} + NA - D$$

Note. FC_t = fixed costs for period, $InvWC_t$ = nett investments in working capital in period t, $InvFC_t$ = nett investments in fixed capital in period t, Tax_t = tax payments for cash flow in period t, CV_T = continuing value, NA = non-operating assets, D = the market value of debt. Other notation as in previous equations.

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be garnered from such research are not in the ne crux lies in the prediction of positive but not necessarily strong relationships between CE and organisation value: there are simply too many extra financial variables involved.

5.4. CRITIQUES AND THESIS

It is not actually within the proposed purview of this thesis to measure full customer equity models. The reasons for this are twofold. First, the research to be reported is of an ex ante, statistical, explanatory form, not a valuation exercise. Therefore if the Rust *et al*. (2004b) model presented in Figure 4-2 is true, it will be sufficient to measure the underlying customer metrics. Second, the data requirements of the customer equity model are unnecessarily prohibitive in the context of an exploratory statistical study.

Why then review CE and SHV concepts? There are several reasons. First, the usefulness of this chapter has been to provide a theoretical and literature base to the assertion that EF may ultimately affect organisation value, in other words this literature provides a background to the second link in the broad service-profit chain. Also, although the customer equity models presented above are not necessarily the only presentation of marketing productivity, they do relate the important initial customer metrics – notably underlying customer perceptions and consequent customer satisfaction and retention - and show a process towards organisational value that equates in some ways to the employee utility models produced earlier. It is these intermediate customer metrics that are traditionally used as dependent variables in customer-related research, and that will be used in this study. It is also helpful in this context to see the similarities in the utility and CE/SHV models, again providing further justification for relating the two.

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cal gaps in the literature reviewed to date that rections for this thesis. These will be further discussed here and commensurate research questions drawn.

Second, the most salient theoretical gap in the customer equity literature is that CE models - even the Rust *et al*. (2004b) model - treat the internal organisational variables to do with employees largely as a 'black box'. Exactly how EF constructs affects CE drivers such as perceived value, relationship and brand separately and in conjunction has neither been demonstrated nor discussed. This thesis will aim to some measure to address this gap.

Third, as seen in the CLV equations, the progression to value is modelled for the organisation. The value links for the customer are typically not modelled in conjunction. This thesis will explicitly model and in fact focus upon the customer's value progression arising from EF, and therefore address this gap. The generation of value for the customer was seen explicitly in service profit models as seen in Chapter One (Heskett *et al*., 1997), but was left implicit in the more detailed CLV models.

Fourth, only limited work has been conducted with regard to the situational influences upon these relationships (Homburg & Stock, 2004). The thesis will examine situational influences including characteristics of the B2B organisations – both client and supplier – including factors such as organisation size, industry, and type of offering, and in addition situational characteristics of the relationship such as frequency of interaction and integration of the customer into the supply chain (Ryan *et al*., 1996).

This chapter completes the literature review put forward for the study. In the following chapters, the research directions, empirical method and findings of the empirical study testing the proposed relationships between EF, customer metrics and organisation/unit value are reported in a business to business setting. Thereafter discussion, recommendations and conclusions are entered into.

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RESEARCH DIRECTIONS

This brief chapter will in essence collate the arguments made for new research based on gaps in the various literatures covered, and present the consequent research questions and directions that give rise to the empirical research. Specific hypotheses are given in the following chapter once specific operationalisation of variables has been made.

The major research questions revolve around the independent variable, EF.

6.1. RESEARCH QUESTIONS AROUND EF

The critiques presented in Chapters Two and Three lead to the major research questions being dealt with in this thesis. As discussed, the following general gaps may exist:

1. *Integration of EF areas*: With the exception of UA literature, employee acquisition, transfers and outflows have rarely been statistically investigated relative to each other (Boudreau & Berger, 1985);
2. *Level of research*: Research at the unit- or organisation-level has been considerably rarer than that at the individual level (Rynes & Cable, 2003; Taylor & Collins, 2000);
3. *Qualitative measures*: In statistical investigations, measures of EF constructs such as recruitment source or employee turnover have generally engaged only in quantitative measurement. However qualitative measurement is perhaps more desirable, based on the notion of functionality of EF (Dalton, Todor & Krackhardt, 1982; Dalton, Krackhardt & Porter, 1981);
4. *Historical limitations of UA usage*: UA literature, although providing a model for integrated, qualitative and organisation-level EF, has not been

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EF in a statistical setting, rather the only heoretical models for *ex ante* valuation.

It is the essential thesis of this investigation that statistical organisational investigation utilising measures that fulfil the above – i.e. *integrated and qualitative EF measures at the organisational level* - would be of value as an explanatory variable in the organisational literature generally, and specifically in the context of the service profit chain.

It is believed that the questions addressed by this thesis will, to some measure, address many of these problems. Dealing with different dimensions of EF as a single model may help to address the lack of integration. The empirical study of the thesis addresses organisation-level issues as called for, and is more likely to lead to practical guidance for managers as issues of EF lend themselves to direct interventions such as retention policies.

Therefore the first research question is:

> ***Research question 1*: Would an integrated and qualitative measure of EF have significant explanatory ability in a service-profit chain type study?**

It is believed that answering this question in the affirmative may have several benefits for organisational theory including:

1. Some of the interactions between dimensions of EF might become better understood;
2. The traditionally quite moderate statistical findings for isolated EF variables (Hom & Griffeth, 1995; Saks, 2005) might be improved with integration;

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may be developed relating to EF, since this is UA;

4. Although a full UA model of EF is not used in the operationalisation, the statistical study of this thesis will help to provide validity tests of the somewhat simplified form used (see Chapter Seven). This has rarely been achieved in UA literature.

Specific operationalisations and hypotheses regarding these issues are given in Chapter Seven.

6.2. B2B CUSTOMER MEASURES AND LINKAGES

As discussed in Chapters One, Four and Five, customer issues specifically in B2B relationships form the dependent variables and foci. This thesis asserts that there are gaps to be filled with regard to linkages between EF and customers. These include the following issues, summated from critiques discussed previously:

1. *Internal performance foci*: The focus in EF studies has generally revolved around internal performance dimensions. EF-customer linkages have not been studied as much. Furthermore, integrated and qualitative EF of the nature put forward in this thesis has not been linked to customers outside of very broad qualitative studies (Bendapudi & Leone, 2002);
2. *Affective and unidimensional customer outcomes*: All too often, customer outcomes in EF studies have been very affective (which although valuable is two steps removed from actual behaviour). Variables closer to behaviour and more useful for informing managerial action such as service quality have been utilised less often. Also, in many instances customer outcomes have been unidimensional. However CE models such

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004b) posit multidimensional drivers such as value among others. On the other hand, CE models have their limitations in that they are really organisational valuation models not conducive in themselves to the kind of investigation sought in this thesis;

3. *Application to a B2B setting*: There has been a dearth of EF studies applying specifically to organisational customers in a B2B setting (Bendapudi and Leone, 2002).

This thesis therefore asserts a customer focus centred on B2B relationships, is multidimensional and more proximal to actual customer behaviour. Specific operationalisations of these variables are discussed in the next chapter, but the general research questions that are therefore generated include:

> ***Research question 2*: Do B2B service outcomes for customers have multiple dimensions (i.e. a complex sub-structure composed of several distinct facets) including those related to customer equity drivers?**

> ***Research question 3*: Do integrated indices of EF quantity and quality in a B2B business environment positively affect B2B service outcomes?**

Also relevant if multiple dimensions of customer outcomes are used is the potential for differential effect sizes from EF (for example, EF may impact more on a relational dimension of customer service than harder process elements of service, especially where the human element has been removed from the service process, Ryan *et al.*, 1996). Therefore:

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If the impacts posited in research question 3 are found to exist, do they have different effect sizes?

In addition, multiple dimensions of customer service allow for more complex inter-relationships between them, which opens up the possibility of mediation-type relationships (e.g. does EF only impact some dimensions of customer outcomes through other dimensions?) Therefore:

***Research question 5*: If the impacts posited in research question 3 are found to exist, do complex interrelationships such as mediation exist, in terms of which 'input' type elements of customer service such as relational quality mediate between EF and the outcomes of service for the customer?**

Once again, the specific hypotheses and model developed later develop this research question more fully.

It is believed that answering these questions may help to achieve several benefits for organisational theory including:

1. Linking EF to various customer outcomes will achieve a test of the criterion validity of the EF variables utilised with the rare focus on customer outcomes. As stated in Chapter Five, the employee drivers of CE such as value generation and relationship are mostly dealt with as a black box. This research may help to bring EF out of the darkness somewhat, explicating how and under what circumstances the relationship holds;

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3 environments will add to the rare literature
a;

3. A closer study of the kinds of interrelationships between the customer outcomes may help marketing theorists and practitioners to better understand the complexities involved in B2B service quality;
4. Once again, some possibilities for managerial action may arise from the results, specifically for managers of B2B supplier organisations, but also for customer managers who may better be able to engage with their suppliers for maximum service outcomes;
5. A broad comparison of UA and CE concepts, which are mathematically and conceptually similar, will be at least somewhat achieved through this thesis.

Accordingly, it is believed that this thesis will potentially add valuable findings to the extant literature on the relationships between employees and customers. Specific hypotheses and operationalisations of variables as seen in the following chapter will be designed to achieve these aims, notably *multidimensional measures of B2B customer outcomes including elements such as relationship, brand and value which lines up somewhat with CE literature*.

It was also noted in the literature review that situational influences upon these questions and relationships should be addressed. Therefore the final set of research questions revolves around some of these

6.3. SITUATIONAL FACTORS

Various situational factors involving characteristics of the relationship between supplier and customer, as well as characteristics of the organisations themselves, are posited to have potential effects on EF effects.

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OF THE RELATIONSHIP

The characteristics of the relationship posited to impact on EF effects are a) *frequency* of contact between customer and supplier employees and b) *integration* of the customer into the supply chain process.

The impacts of frequency and integration have been discussed generally in the context of the broader employee–customer links (see Chapter Four). An increase in either frequency or integration is expected to act in an interactive way, in regression terms as a 'moderator' of the main relationships to do with EF (Baron & Kenny, 1986; Cohen, Cohen, West & Aiken, 2003).

Both variables increase the opportunities for bonds of a social or reciprocal nature to arise, therefore increasing the chance that theoretical effects talked about previously (e.g. social bonding in stable relationships) may occur. Integration may impact on the supplier's ability to understand the needs of the customer, which may in turn impact actual objective service quality. Frequency is also expected to impact on service quality to customers for the same reasons, but given the social bonding theories discussed earlier it is rather expected to impact on more relational than objective elements (Barnes, 1997; Bove & Johnson, 2000; Butcher *et al*., 2001; Crosby, Evans & Cowles, 1990; Homburg & Stock; 2004). Both may also impact on the more proximal outcomes of service for customers such as value creation, as issues such as integration may facilitate monitoring, creation of specific human capital, and lead to improved perceptions of value (Rynes *et al.*, 1996). This possibility is also expressed by transaction cost economics (Barnes, 1997; Bolton, 1998; Bolton & Lemon, 1999; Harris, Baron, & Radcliffe, 1995; Homberg & Stock, 2004; Lacity & Hirchheim, 1993; Williamson, 1985). (Ryan *et al.*, 1996).

Therefore the following research question arises:

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Do frequency and integration of the ply chain moderate the effects of EF on customer outcomes?

Once again, specific hypotheses in this regard are given in Chapter Seven after operationalisation of variables.

The last section to be discussed is interactions with characteristics of the organisations.

6.3.2 CHARACTERISTICS OF THE ORGANISATIONS

Finally, although characteristics of organisations are often taken merely as control variables, in this case there may be theoretical bases for including some explicit research questions. Specifically, the following may be possible:

1. Economies of scale and back-up capabilities are more likely to attach to organisations or transactions of certain natures (especially bigger organisations, which have more supply resources);
2. Due to the social bonding, networking possibilities and emotional contagion inherent in employee movement as discussed in Chapter Four, any characteristic that enhances or denudes the ability of groups to bond might be hypothesised to respectively enhance/denude the impact of movement on perceptions of service quality, since negative movement would disrupt these processes;
3. In addition, the ability of customer managers or employees to observe supplier employees may not only be affected by the aforementioned moderators. Visibility of supplier employees may also be affected by organisation demographic features. Greater visibility/monitoring capability may be expected to enhance any relationships between EF and

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since it is the customer's ability to observe the
s supply efforts that allows for observations to be made (e.g. Susskind *et al.*, 2003);

4. Incentives of suppliers to act swiftly and efficiently to cushion problems in service may attach to certain aspects of the customer such as size (e.g. where a large account is at stake).

The following demographic features may therefore allow for research questions and hypotheses in this regard:

1) *Supplier size / no. of contact employees*: Larger suppliers or numbers of contact employees are likely to
   a) lead to greater economies of scale and capacity for dealing with problems (e.g. Hendrikse, 2003), therefore dampening problems from EF,
   b) reduce the ability of supplier and customer employees to bond, network and experience emotional contagion (e.g. see Kidwell & Bennett, 1993; Knoke, 1990; Knoke & Wright-Isak, 1982), therefore again reducing the import of EF, and
   c) Render contact employees less visible to customers (Albanese & Fleet, 1985; Kidwell & Bennett, 1993; Jones, 1984), again reducing the perceptions and therefore impact of flow;
2) *Customer size*: Larger customers (i.e. those with larger numbers of employees) are likely to:
   a) Be more able themselves to deal with problem in suppliers with alternative capacity (e.g. they may have a network of suppliers which can 'pick up the slack', e.g. Lacity & Hirshheim, 1993), therefore reducing the impact of adverse EF in the supplier;

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ceive care from suppliers to protect a large pliers may act more swiftly/efficiently to deal with the consequences of EF issues), therefore reducing the impact of movement;

c) for the same reasons as above may provide less social bonding/networking and fewer monitoring options.

3) *Industry/type of service*: Certain industries or types of service provision may be more likely to have the following effects (Albanese & Fleet, 1985; Ashforth & Humphrey, 1993; Bove & Johnson, 2000; Crosby, Evans, & Cowles, 1990; George & Bettenhausen, 1990; Harris, Baron & Radcliffe, 1995; Hartline & Jones, 1996; Jones, 1984; Keaveney, 1995; Kidwell & Bennett, 1993; Knoke, 1990; Knoke & Wright-Isak, 1982; Morris, 2000; Yoon & Suh, 2003):

a) Facilitate social bonding/networking and therefore accentuate the impact of employee movement. Specifically, service-oriented industries and offerings may by nature be more likely to be affected by the relationships and specific knowledge capital vested in people;

b) Facilitate visibility, therefore again accentuating the impact of EF. Once again, service industries are expected to exhibit this sort of effect, for the same reasons as above.

Accordingly, the following broad research proposition is proposed with specific hypotheses proffered in Chapter Seven:

> ***Research question 7*: Do characteristics of the organisations including supplier and customer sizes, number of contact employees, type of industry and type of supplier offering act as moderators of EF effects?**

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ore presented the major research questions ew. These can be stated in the following overall research question:

> *Overarching research question*: **Does EF seen as an integrated and qualitative variable add significant value in explaining relationships between and within multi-dimensional customer service outcomes in B2B settings, dependent on characteristics of the relationship and organisations involved?**

The following chapters present an empirical research study which operationalises and tests variables and hypotheses in this regard.

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EMPIRICAL RESEARCH METHODS

This chapter seeks to build on the research questions developed in the previous chapter. To assess these issues and questions, the empirical section will undertake a specific, unit-level study of the broad EF→customer metrics→organisation performance relationship (Figure 4-1). These broad relationships are refined to a specific path model after considerations of hypotheses.

The study focuses on business-to-business (B2B) level relationships, i.e. the effect of EFs on organisations that are business clients of an organisation. In this chapter the method of the study is reported.

7.1. RESEARCH DESIGN

The study involved a cross-sectional, quantitative, survey-based research design. Primary data were collected from business managers who are directly involved in the management or operation of B2B relationships. The survey (see Appendix C) assessed their perceptions of EF quantity and elements of service quality in a key business supplier as well as the service quality of the supplier. Specific operationalisations of the measures are discussed in the next section.

7.2. MEASURES

The following measures were utilised, with operationalisation of each variable considered in light of the discussion and research questions contained in Chapter Six.

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YEE FLOW AND SUB-COMPONENTS

EF in the supplier is operationalised as a perceived variable seen through the eyes of the client organisation's manager. The basic modelling principles and lessons of the decision theoretic utility models from Chapter Three as well as the issues discussed in Chapter Two were taken into consideration when measuring the EF variable, as follows:

- Different sources of flow needed to be analysed individually;
- Quantity and impact/quality of each flow source/stream should be separately assessed;
- Based on the lessons learned in UA regarding assessment of σ_y, global estimation of the impact of EF may be attempted (i.e. managerial estimates of impact may be used).

Therefore the following was measured and aggregated to develop a 'soft' EF utility estimate for statistical use:

- *Quantity* of EF was measured via several questions asking the client manager to assess where supplier frontline staff who had left the job went (quit the supplier, promoted, transferred) and where staff who had joined the client's account had came from (new hires, transfers). Constant sum scoring was used. To be clearer, respondents were asked to reflect on the percentage of leavers going to each of the three sources of outflows, with these percentages adding up to 100%. Similarly, 100% of inflows were

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and tranfers. Exact questions are given in

- Secondly, flow *quality* was assessed by asking the managers to rate the impact of each type of flow (quit the supplier, promoted, transferred, new hires, transfers) on a seven-point semantic differential scale running from 'Extremely harmful' to 'Extremely beneficial' with a 'Not applicable' category for no movement in a category.

The quantity and quality variables for each movement type were then appropriately scaled[24] and multiplied together (for example, the percentage of flow ascribed to quits is multiplied by the rescaled semantic differential score for quits). These scores were then added together in two different manners to give estimated utility of supplier employee movement, as seen in Figure 7-1. The following were the two strategies for combination.

A. Aggregated and Disaggregated EF

The decision theoretic utility analysis model utilised as the core model is one that ultimately aggregates all the components of EF. Therefore the first method of scale combination is what shall hereafter be referred to as aggregated: in the spirit of UA, all the quality-scaled scores for components of flow as discussed above are summed into a single aggregated score which represents EF utility.

---

[23] The exact numbers of movements in the supplier's staff were not asked. It was decided that this would probably be impracticable – client managers would be hard pressed to know the exact numbers of staff movements in another organisation. Instead, percentages of movement were assessed as a general trend in the supplier.

[24] The quality of employee flow variable was rescaled from -3 to +3, where zero can be equated with neutral impact.

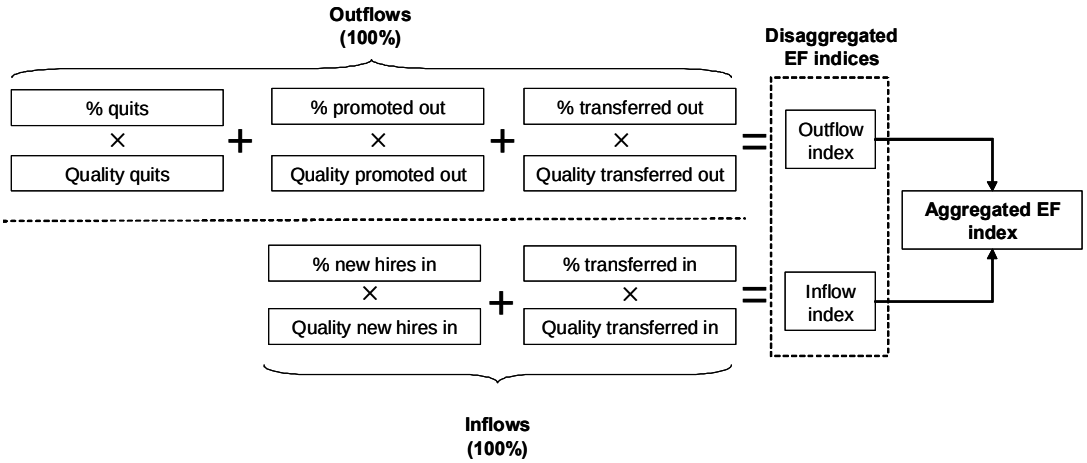
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erred to as the disaggregated method. For this
F utility are kept separate. It is noted that the method utilised in scoring the quantity of movement section was a constant sum method (across departmental inflows and outflows respectively). This means that the EF variables cannot completely be disaggregated, because these quantity scores are only relevant in relation to each other. In addition, the quality score, although a semantic differential scale, is relatively unhelpful without the quantity score, as even movement that is dysfunctional can be mitigated if it is limited to only a few people. Therefore the most theoretically meaningful disaggregation strategy is to group quality of inflows and quality of outflows as one variable each.

Aggregated and disaggregated EF will be separately assessed as predictors of the outcome variables.

For clarity, Figure 7-1 shows the measurement process underlying the aggregated and disaggregated EF variables.

Figure 7-1: Measurement process behind EF variable(s)



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BLE(S): SERVICE QUALITY ELEMENTS

The dependent customer metric utilised is based on the service perceptions literature discussed. Lessons and principles drawn from Chapters Four and Five are utilised, namely:

- Multidimensional aspects of service quality assessing both input, process and output of service are desirable;
- In addition to 'harder' aspects of service provision (e.g. issues to do with distributive justice and equity), the 'softer' elements of service that reflect social bonding and networking, interpersonal justice and possible emotional contagion should preferably be accounted for separately;
- The impact of EF on harder customer outcomes (e.g. sales, financial outcomes) is desirable as such variables are closer to true customer equity;

To achieve this, the four-factor INDSERV scale of Gounaris (2005) was utilised. This scale was developed specifically to evaluate customer perceptions of service quality in B2B settings. Evidence could not be found for the use of this scale so far elsewhere except for the original study of Gounaris (2005), or in South Africa for which there are no references in ISAP. The INDSERV model consists of four sub-dimensions, namely:

1. *Potential quality 'PQ'* (current study $\alpha = .70$, Gounaris original $\alpha = .81$): This dimension evaluates the a priori elements that assumedly must be in place in order for the supplier to provide services adequately to the customer. Therefore this dimension might be said to be the *a prioi* input into the service process. Sample items include "The supplier has the required personnel" and "The supplier has all the facilities needed to meet our needs";

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current study α = .79, Gounaris original α = .79):

re objective and task-oriented issues within B2B supply, therefore 'hard process' issues. Sample items include "The supplier keeps to agreed time schedules" and "The supplier honours financial agreements";

3. *Soft process quality 'SPQ'* (current study α = .78, Gounaris original α = .83): These items refer to issues within the B2B relationship which are oriented on people, communication and relational quality. Sample items include "The supplier listens to our problems", "The supplier's contact employees have pleasant personalities" and "The supplier is open to our suggestions / ideas about their service or product".
4. *Output quality 'OQ'* (current study α = .78, Gounaris original α = .84): This dimension is essentially the ultimate dependent variable in the B2B service setting. It refers to the relative impact of the supplier's services on issues such as the customer's profitability, strategy and ability to operate. Sample items include "The supplier has a notable, good effect on our business" and "The supplier contributes positively to our sales or image".

In addition to the main variables, as discussed in Chapter Seven there are two sets of interaction variables. The first set includes two characteristics of the relationship between the two firms, namely frequency of contact and integration of the client onto the supply chain process. The second are organisational characteristics.

7.2.3 INTERACTING VARIABLE 1: INTEGRATION OF CLIENT INTO SUPPLY CHAIN.

As discussed in Chapters Four and Six, this construct refers to the extent to which the client is involved in the design or ongoing enactment of the

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tain supplier. For example, a retail organisation clothing supplier, feeds back information on product issues, and is consulted by the supplier at various points in the supply chain might be said to have integration into the supply chain. For this variable, Homburg and Stock's (2004) 4-item scale of customer integration into the supply chain was utilised, which has been adapted from previous theoretical development (e.g. Kelley, Donnelly & Skinner, 1990; Zeithaml, Parasaruman & Berry, 1985), and does not appear to have been utilised in South African research before. Homburg and Stock (1984) utilised confirmatory factor analysis to assess reliability, which was high in their model. The summated scale is expected to form quasi-interval data, and had a coefficient alpha of .88.

7.2.4 INTERACTING VARIABLE 2: FREQUENCY OF CONTACT.

Again as discussed in previous chapters (notably see Chapters Two and Four), the frequency of contact between the supplier and client may impact the relationship between employee movement and perceived service quality (Homburg & Stock, 2004). Therefore frequency of contact is a possible moderating variable. A single question asking how often contact occurred with the supplier was utilised as a measure, and the option of answering in months and/or years was given. Frequency per month was utilised as the final unit of analysis.

7.2.5 CHARACTERISTICS OF THE ORGANISATIONS

As discussed in Chapter Six, a further research question involves the potential moderating effects of characteristics of the supplier and customer organisations. Accordingly, demographic variables used as controls include size of the client organisation, estimated number of contact people in the

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...e supplier, industry of the client and service

7.2.6 RELIABILITY, VALIDITY AND LIMITATIONS OF MEASURES

Unfortunately the reliability, validity and limitations of the survey instrument are somewhat dispersed in this thesis. This section merely mentions the tests performed and discussions presented so that the reader may gather all the relevant information at will.

A. Internal Reliability

Where relevant the coefficient alphas of each construct have been mentioned in this section, as a measure of internal reliability. This does not apply to the EF measure, which is an index. The Cronbach alphas are acceptable, and indicate sufficient reliability.

B. Convergent and Discriminant Validity

The convergent and discrininant validities of the measures are estimated using the confirmatory factor analysis (CFA) method (Kline, 2005). This method simultaneously estimates the extent to which observed manifest variables (survey items) covary in such as way that they load on the same latent variable (convergent loading), as well as the extent to which they do not simultaneously load on another latent variables in the system (discriminant ability). The CFA results are not reported here, rather they are given in the results section as a prelude to the structural regressions which relate the actual latent constructs. The reader is referred to Section 8.2.3, the finding of the CFA is positive confirmation of convergent and discriminant validity.

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rument

The survey instrument has a variety of potential limitations. These are discussed in Section 7.6 under the limitations of the overall methodological approach.

7.3. HYPOTHESES AND MODEL

Given the variables and research questions developed, hypotheses to be tested include the following. Firstly, starting 'backwards', relationships are hypothesised among the elements of B2B service quality as operationalised in the INDSERV scales (see above). Specifically, *outcome quality* (*OQ*) is hypothesised to be the ultimate dependent variable, impacted upon variously by all three other facets of service. *Hard process quality* (*HPQ*) and *soft process quality* (*SPQ*) are seen as the actual process implementation issues, as such these are the intermediate service elements with direct impacts upon *OQ*. They in turn are generated by the input issues of *potential quality* (*PQ*), i.e. *PQ* impacts *OQ* through the mediating impacts of *HPQ* and *SPQ* (see Figure 7-2 below). Also *PQ* is hypothesised to affect *OQ* directly, which expresses effects not captured in the other two process elements (e.g. where customers may have expectations of improved outcomes premised on PQ but have not yet had time to evaluate process quality). Therefore the following hypotheses expressing relationships within the dependent variable(s) are suggested:

H1: There are direct positive relationships between a) *PQ* and *OQ*, b) *HPQ* and *OQ*, c) *SPQ* and *OQ*

H2: There are direct positive relationships between a) *PQ* and *HPQ* and b) *PQ* and *SPQ*

H3: Partial mediation roles for a) *HPQ* and b) *SPQ* exist in the relationship between *PQ* and *OQ*

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the independent variable (quality of EF), it is plausible that this variable will impact elements of service quality. Chapter Four discussed in detail the theoretical reasons why EF might impact on service quality. But given the four-faceted operationalisation of B2B service quality given above, which elements might be directly impacted by EF?

1. At the least EF might be construed as being closely related to PQ, indeed the latter broadly includes questions around adequate staffing;
2. It is also possible that EF might impact directly on SPQ (because of the social or relational theories discussed in Chapter Four).
3. It is also possible that direct effects may occur on HPQ independently of an impact on PQ, for example where employee movement affects short-term process issues (such as process timing) but will not affect the more long-term potential quality of the supplier;
4. Although it is possible that employee movement may impact directly on OQ, this will be assumed for the time being to occur *through* the prior two effects, therefore mediation effects are hypothesised.

Therefore the following hypotheses will be tested:

H4: Higher nett quality of EF (hereafter 'EF') will directly and positively affect PQ

H5a: *HPQ* will be affected directly and positively by EF

H5b: *HPQ* will be affected indirectly and positively by EF via a mediation relationship through *PQ*

H6a: *SPQ* will be affected directly and positively by EF

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ndirectly and positively by EF via a mediation

Q

H7a: *OQ* will be affected indirectly and positively by EF via a mediation relationship through *PQ*

H7b: *OQ* will be affected indirectly and positively by EF via a mediation relationship through *HPQ*

H7c: *OQ* will be affected indirectly and positively by EF via a mediation relationship through *SPQ*

Research question 6 in Section 6.3.1 discussed the role of the moderators to do with characteristics of the relationship (frequency of contact and integration into the supply chain). As discussed there, both variables increase the opportunities for bonds of a social or reciprocal nature to arise, therefore increasing the chance that theoretical effects talked about previously (e.g. social bonding in stable relationships) may occur. There may be some overlap between them, which will be assessed in the analysis, as integration into the supply chain of a customer may possibly lead to greater frequency of interaction. Integration is likely to moderate relationships to do with *potential quality* (because it impacts on the supplier's ability to understand the needs of the customer in the first place) as well as *hard process quality* (the previous effect impacts on actual objective service quality). Frequency is also expected to impact on relationships involving PQ for the same reasons, but given the social bonding theories discussed earlier it is rather expected to impact on *soft process quality* (if one has frequency without integration then HPQ is not expected to be affected).

In Section 6.3.1 it was also posited that frequency and/or integration may impact on relationships to do with *outcome quality*, which would express the

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supply relationship on the customer's business

ecificity and frequency of the relationship.

Therefore the following hypotheses are given:

H8: ***Frequency of contact*** **will act as a moderator such that greater frequency will strengthen relationships between a) EF and PQ as well as b) EF and SPQ**

H9: ***Integration into the supply chain*** **will act as a moderator such that greater integration will strengthen relationships between a) EF and PQ as well as b) EF and HPQ**

It is noted that frequency and integration are expected to be exogenous (i.e. not caused by any other variables in the model, including EF), because these variables are presumably largely based on the fundamental nature of the relationship, rather than situational constructs. Therefore EF is not hypothesised to lead to either frequency or integration.

Given the above, the broad major relationships hypothesised in the empirical study are seen in Figure 7-2, and the links between the hypotheses and the paths in the diagram are shown in Table 7-1 below the figure.

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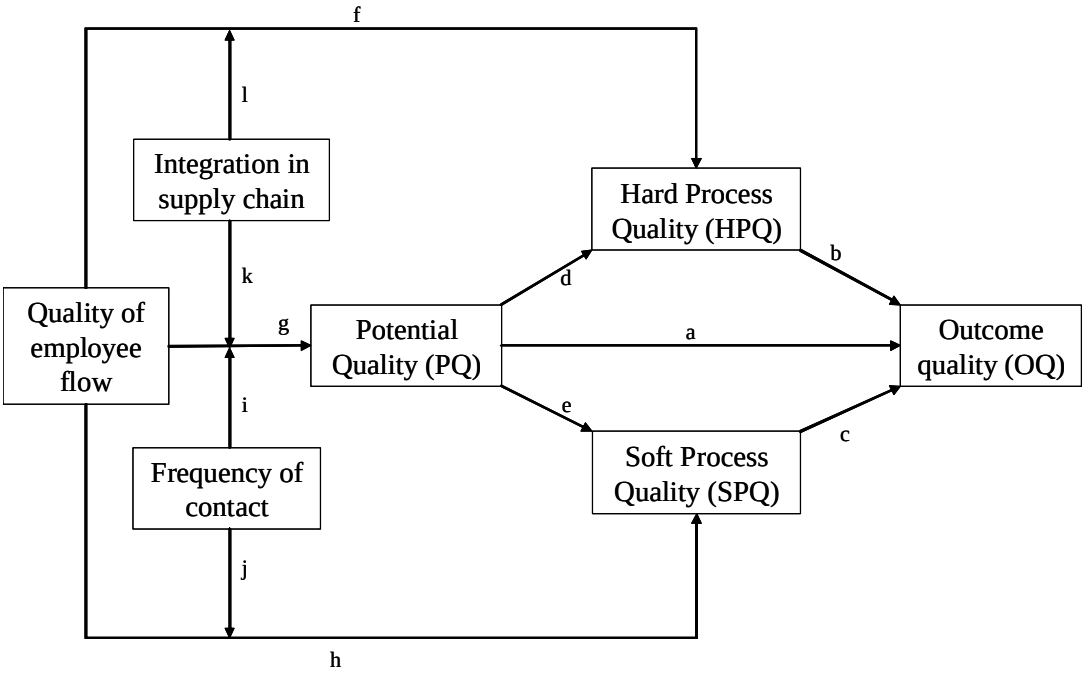


Table 7-1: Link between hypotheses and Figure 6-1 paths

HYPOTHESIS		EFFECT	HYPOTHESIS		EFFECT
H1a	PQ→OQ	*a*	**H6a**	EF→SPQ	*h*
H1b	HPQ→ OQ	*b*	**H6b**	EF→PQ→SPQ	*e*×*g*
H1c	SPQ→OQ	*c*	**H7a**	EF→PQ→OQ	*a*×*g*
H2a	PQ→HPQ	*d*	**H7b**	EF→HPQ→OQ	*c*×*h*
H2b	PQ→SPQ	*e*	**H7c**	EF→SPQ→OQ	*c*×*h*
H3a	PQ→HPQ→OQ	*b*×*d*	**H8a**	EF→PQ|Frequency	*i*
H3b	PQ→SPQ →OQ	*c*×*e*	**H8b**	EF→SPQ|Frequency	*j*
H4	EF→PQ	*g*	**H9a**	EF→PQ|Integration	*k*
H5a	EF→HPQ	*f*	**H9b**	EF→HPQ|Integration	*l*
H5b	EF→PQ→HPQ	*d*×*g*			

| refers to 'moderated by'.

Finally, also as discussed in detail in Section 6.3.1, characteristics of the organisations may have an effect. Although these types of variables are often taken merely as control variables, in Section 6.3.1 theoretical bases for including some explicit hypotheses were discussed. These included possible

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es (relationships and visibility are harder in more contact employees, and their larger resources may mitigate EF problems), as well as type of business environment (service environments or offering are perhaps more conducive to relational bonding and visibility). These possibilities therefore suggest the following hypotheses:

H10: EF is more likely to affect service provision in the case of a) smaller suppliers, b) fewer supplier contact staff;

H11: EF is more likely to affect service provision in the case of smaller customer organisations;

H12: EF is more likely to affect service provision in a) service oriented industries and b) service-type offerings.

7.4. PARTICIPANTS

An initial group of 420 organisations drawn from the Gauteng province in South Africa was approached to participate in the study. A high response rate of 341 companies (81%) was achieved, however of these only 170 respondents were retained based on the a priori requirement (assessed in the survey) that the managers have usable knowledge of EF in a key supplier's frontline staff. The final response rate was therefore 40%.

As stated above, the sample is actually composed of managers of these organisations, who were chosen due to their proximity to the supply chain in question (i.e. these managers have active control over or involvement in the client side of the supply chain).

It was ascertained in advance whether these organisations had supplier relationships in which at least some EF had occurred to analyse. In addition, it

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supply relationship had to be a key one in the
ness.

The demographics of the sample relationships are as follows (as summarised in Table 7-2): the two organisations interacted on average 163 times a year (median = 96), but with very high variability of 170 (interquartile range = 48-240). A median of 5 vendor employees were estimated to work directly on the customer's account (median = 5, interquartile range = 4-12). Of the customer managers who attempted to give quantitative estimates of supplier size, average size obtained was 1108 (median=60), with SD and interquartile range of 3397 and 30-200 respectively. Many more gave qualitative interpretations of small medium and large, which were matched with quantitative scores as follows: small=0-50 employees (25.61% of answers), median = 51-250 (27.44%), large= >250 (46.95%).

Table 7-2: Demographics of the firms and relationships

	Central tendency	Spread
Supplier size	Ave = 1108 Median = 60	SD = 3397 IQR = 30-200
Customer size	Ave = 8427 Median = 30	SD = 79.19 IQR = 9-292
Per annum interaction frequency	Ave = 163 Median = 96	SD = 170 IQR = 48-240
No. of service employees	Median = 5	IQR = 4-12
Industry	Services = 59.19% Retail/wholesale = 25.59% Hard = 23.21%	
Type of offering	Services = 29.09% Products = 71.91%	

SD = standard deviation. IQR = interquartile range

The customer managers estimated the own size of their workforces at an average of 8427 (median = 30, SD = 79,192; interquartile range = 9 – 292), which indicates skew due to the inclusion of some giant corporations in the sample. The industry in which the customer operates was coded as follows: services (approximately 59.19% of the sample, including health, IT and

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(25.59%) and manufacturing, building, utilities eated as a single group (referred to below as 'Hard' industries, 23.21%). Type of offering given by the supplier was hugely varied, and crudely divided into services (29.09%) and products.

Given the diversity of the sample, the population is assumed to represent South African organisations generally, although generalisability may extend to a more international audience given the relatively first-world and international nature of South Africa's corporate sector.

The sampling method was convenience sampling, organisations were drawn on the basis of availability and referrals.

Also indirectly sampled were the organisations supplying the client organisations, i.e. every manager answered for the activities within their supplier.

7.5. DATA CAPTURING AND ANALYSIS

Data was captured in Microsoft Excel and transferred into SAS for analysis.

Given the interval nature of the variables and the complex nature of the model, statistical analysis techniques were firstly hierarchical multiple regression with mediation and moderation testing (Baron & Kenny, 1986) and secondly structural equation modelling. Data was analysed in SAS 9.1.3 including mostly Base SAS and Enterprise Guide. Modules required included PROC CALIS, PROC REG, PROC SYSLIN, PROC ROBUSTREG, PROC UNIVARIATE, PROC CORR, PROC IML, PROC MODEL, and various macros including the MULTNORM and ROBCOV macros. The following are some noteworthy procedural issues and method notes.

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ION ANALYSES: METHOD NOTES

Hierarchical multiple regression is generally well known and will not be discussed in great detail. The majority of the analyses were done using SAS PROC REG. There are however four particular testing issues or statistics that are worth discussion. The first regards the form of the hierarchical regression used, which was hierarchical set regression (Cohen *et al.*, 2003). Generally, in stage 1 characteristics of the organisations were added into the regression. Then, in stage 2, characteristics of the relationship (frequency and integration as discussed above) were added. Third, elements of EF were added. Finally, when assessed, particular terms were added to assess the mediation or moderation hypotheses involved.

At each stage in the hierarchical regression the change in R^2 was assessed for significance via the standard test as follows (Cohen *et al.*, 2003: 171) where set b is added to set a:

Equation 7-1: Test for significance of change in R^2

$$F = \frac{\left(R^2_{ab} - R^2_a\right) / k_b}{\left(1 - R^2_{ab}\right) / \left(n - k_a - k_b - 1\right)}$$ with degrees of freedom k_b and $(n - k_a - k_b - 1)$.

The adaptation of Fisher's protected t test for hierarchical set regression (Cohen *et al.*, 2003: 187-190) was adopted to control for Type II error. This requires that generally the significance of the parameter estimates should only be considered if the set to which they belong adds significantly to R^2.

With regard to mediation tests as hypothesised, Baron and Kenny's (1986) mediation method is used to test these assumptions (also see Hoyle & Kenny, 1999; James & Brett, 1984; Mackinnon, Lockwood, Hoffman, West, & Sheets, 2005) with the following conditions:

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uld regress significantly on the ultimate dependent variable. For H3a and H3b, PQ should regress on OQ. For H5b and H6b, EF should regress significantly on HPQ and SPQ respectively. For H7 EF should regress on OQ;

2. *Independent variables(s) should regress on the mediator*. For H3a and H3b, PQ should regress on HPQ and SPQ respectively. For H5b, H6b and H7a EF should regress on PQ. For H7b and H7c EF should regress on HPQ and SPQ respectively;
3. *When the mediator is included as a predictor along with the original independent variable, a) The mediator should be a significant predictor of the outcome, and b) the coefficients of the independent variables should be significantly reduced*. For H3a and H3b, when HPQ or SPQ respectively are included as a predictor, PQ should regress with a significantly lower effect on OQ. For H5b and H6b EF should regress with a smaller effect on HPQ and SPQ respectively when PQ is included and for H7a, b and c EF should regress significantly less on OQ when PQ, HPQ or SPQ respectively are included.

The significance of mediation effects is assessed via hand calculation of the Sobel test (Sobel 1982, 1986) which gives the following Z test where x leads to y via path a and y leads to z via path b:

Equation 7-2: The Sobel test of indirect effects

$$z = \frac{ab}{SE_{ab}} = \frac{ab}{\sqrt{b^2 SE_a^2 + a^2 SE_b^2}}$$

Tests of moderation roles, as hypothesised for the characteristics of the relationship and the organisations, typically involves testing product terms in the relationships (Cohen *et al.*, 2003; Baron & Kenny, 1986; James & Brett,

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roach taken, in which products of the proposed
) are tested for significance.

In addition to the above, as will be seen in Chapter Eight, the regression analysis required some robust regression modelling to be done. This will be discussed more when it arises.

7.5.2 STRUCTURAL EQUATION MODELLING: METHOD NOTES

The structural equation modelling (SEM) analyses utilised the common two-step modeling approach (Hatcher, 1994: 345; Kline, 2005: 215-218). The first step involved testing of the measurement portion of the model via confirmatory factor analysis to assess whether the observed variables load onto the hypothesised latent factors as suggested by Figure 7-2. Secondly, structural models assessing the paths between latent constructs, again as seen in Figure 7-2, were assessed. The more involved four-step procedure was not utilised as there were not sufficient manifest variables per latent factor (Kline, 2005).

The SEM models were initially performed using maximum likelihood estimation in SAS PROC CALIS, although as will be seen a large number of other analyses were required to deal with the assumption checks. Although the measurement model was successfully established using maximum likelihood estimation, the structural model using various full-information estimation options (ranging from maximum likelihood to asymptotically distribution free and others) all evidenced Heywood cases which alternative specification testing suggested were entrenched (see the following chapter for more on this). Accordingly, the structural model was re-assessed using two-stage least squares (2SLS) estimation procedures (Bollen, 1996, 2001; Bollen & Paxton, 1998; Oczkowski, 2002 & 2003) utilising SAS's PROC SYSLIN and PROC MODEL modules.

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nifest variables as indicators of latent factor se a range of manifest variables are assumed by default to be unrelated to the error terms of the endogenous variables) allowing for least squares estimation of SEM models (Bollen, 1996). As will be seen in the results, some of the 2SLS models did manifest possible heteroscedasticity issues. These were dealt with via the heteroscedastic 2SLS procedure (Green, 2003: 398-401), which uses White's (1980) consistent variance-covariance estimator in a respecified Generalised Method of Moments (GMM) estimator.

In addition to the above, 2SLS estimation of the SEM models allowed for the direct testing of the moderation hypotheses. The procedure discussed by Bollen and Paxton (1998) was utilised, in terms of which if we have a part of a structural model as seen in Equation 7-3 (Marsh, Wen & Hau, 2006; Oczkowski, 2003):

Equation 7-3: Bollen and Paxton's (1998) latent variables model with interactions

$$\eta_1 = \beta_0 + \beta_1\xi_1 + \beta_2\xi_2 + \beta_3\xi_1\xi_2 + \mu_1$$

where

η_1 = a latent dependent and endogenous variable with indicators ($y_1 \ldots y_n$);

ξ_1 = a latent independent variable with indicators ($x_1 \ldots x_n$);

ξ_2 = a latent independent variable with indicators ($w_1 \ldots w_n$);

$\xi_1\xi_2$ = the interaction (moderator) term;

$\beta.$ = parameters to be estimated;

μ_1 = the disturbance;

If we utilise as scaling variables y_1, x_1 and w_1 then because these are related in linear relationships with parameter = 1 to their corresponding latent

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equation can be re-written as seen in Equation

Equation 7-4: Manifest variable version of latent variable model with interactions

$$y_1 = \beta_0 + \beta_1 x_1 + \beta_2 w_2 + \beta_3 x_1 w_2 + \mu^*_1$$

where μ^*_1 is a composite error term including the original disturbance and elements of the errors of the interacting manifest variables.

Valid instruments include all the non-scaled x's and w's as well as all their possible cross-products (Oczkowski, 2003).

With regard to the SEM statistics utilised, it is useful to mention briefly the statistics used to assess model fit, especially because such a large number of fit statistics have been developed. There are a variety of fit statistics given by PROC CALIS for maximum likelihood estimation. Table 7-3 shows which fit statistics were used for analysis, and the cut-offs or caveats adhered to.

Table 7-3: Structural equation modelling fit statistics and indices used in the thesis

Fit index	Presentation	Interpretation
Chi-Square	The chi-square fit test has the null hypothesis that the observed matrix differs from the predicted. Non-significance indicates fit.	The chi-square stat is sensitive to sample size, as such the significance test is universally ignored. Change in chi-square between models is considered more useful.
Root mean square error approximation (RMSEA)	The point value for RMSEA is given as well as the 90% confidence interval.	The following cut-offs are sometimes suggested: good = <.05, adequate = <.08, poor = >.1 (with confidence intervals falling within these limits). However the RMSEA is also sample-size dependent and therefore cut-offs should be considered in this light.
Goodness of Fit Index (GFI)	The point value is given	Generally suggested that 0 < GFI < 1, if negative or > 1 then may fit poorly
Root Mean Square Residual (RMR)	RMR is based on the scale of the variables so no definite cut-off	Perfect fit is RMR = 0, increasingly higher RMR means worse fit.
Bentler's Comparative Fit Index (CFI)	The point estimate is given	Generally suggested that values > .9 indicate adequate fit

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	...tion	Interpretation
Criterion		
Bozdogan's (1987) CAIC	These are predictive fit statistics for comparing two or more models	Model with smaller AIC, CAIC or Bayesian criterion considered best
Schwarz's Bayesian Criterion		
Bentler and Bonett's (1980) Non-normed Index	Also called ôNNFIõ or ôTLIõ. This statistic is sample-size adjusted, therefore considered desirable.	Values > .9 = adequate fit
Normalised residuals	The largest normalised residuals are examined, as well as the distribution of residuals	*Residuals larger than an absolute value of 2-3 are flagged as potentially large. The distribution should be tightly and normally distributed.*
Squared multiple correlation	*R^2 statistics exist for endogenous variables*	*'Large' squared multiple correlations in the context of the specific variable and study are desired.*

For 2SLS models, fit statistics utilised included the following:

1) Bollen's (1996) test for model fit is utilised to test specification of the 2SLS models. This test proceeds in four steps:
   a) The 2SLS model residuals regressed against all the instrumental variables, and the R^2 statistic for this step is drawn;
   b) The test statistic $N*R^2$ is assessed (where N = sample size);
   c) The test statistic is assessed as having a chi-square distribution with degrees of freedom equal to the number of instruments less the number of regressors in the original 2SLS main model;
   d) Significance of the test statistic may indicate model mis-specification, since it indicates that residuals may not be independent of the instruments.
2) Pesaran and Taylor's (1999) RESET test is used, which proceeds as follows:
   a) 2SLS forecasts are squared;
   b) A new 2SLS model is run in which the original dependent variable is regressed against the original regressors as well as the squared forecasts;

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quared forecasts is assessed, if significant then

3) Pesaran and Taylor's (1999) heteroscedasticity (HET_1) test is used:
   a) The squared residuals are regressed on the squared forecasts;
   b) Significance of the t-statistic indicates possible heteroscedasticity problems;
4) White's (1980: 825) Corollary 1 heteroscedasticity test is given by the PROC MODEL procedure, significance again indicating possible issues.

Paths in the structural equation models are treated as regression paths, and the Sobel test Equation 7-2 particularly applied to test the significance of indirect effects.

7.5.3 REGRESSION AND SEM: COMPARISONS

Given the use and contrast of regression and SEM techniques, this section discusses briefly some key comparisons and differences between the two techniques.

Standard OLS multiple regression is generally used to model a single endogenous variable at a time, e.g. in the case of two predictor variables (X_1 and X_2) and one dependent variable (Y) the regression estimation is arrived at via OLS estimation of the following:

Equation 7-5: Estimation equation for 2-variable, unstandardised regression

$$Y = A + B_1X_1 + B_2X_2 + \varepsilon$$

or the standardised version:

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where A is an intercept in the unstandardised model, B_i and β_i refer to unstandardised and standardised parameters respectively, z_i refers to z-scores of the variable corresponding to the subscript, and ε refers to error. The standardised parameter is arrived at via:

Equation 7-7: Estimation of standardised regression parameter

$$\beta_1 = \frac{r_{Y1} - r_{Y2}r_{12}}{1 - r_{12}^2}$$

where r refers to the Pearson correlation between the two sets of variables indicated in the subscript. The unstandradised parameters are arrived at via:

Equation 7-8: Estimation of unstandardised regression parameter

$$B_1 = \beta_1 \frac{SD_Y}{SD_1}$$

where SD is standard deviation.

On the other hand, SEM solves a system of equations, generally iteratively, in which a system of endogenous variables is solved, or rather estimated, simultanously, for example with two endogenous variables and four exogenous variables ()

Equation 7-9: Typical SEM system of equations

$$\begin{aligned} \xi_1 &= \beta_{11}\eta_1 + \mu_{11} \quad \text{and} \quad \xi_3 = \beta_{23}\eta_2 + \mu_{23} \\ \xi_2 &= \beta_{12}\eta_1 + \mu_{12} \qquad\qquad \xi_4 = \beta_{24}\eta_2 + \mu_{24} \\ \eta_2 &= \beta_3\eta_1 + \varepsilon \end{aligned}$$

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η_i = latent dependent and endogenous variables with indicators (ξ_1 ... ξ_n);

ξ_j = manifest independent variables;

β_{ij} = parameters to be estimated for the regression of manifest indicator ξ_j on latent variable η_i;

μ_{ij} = the disturbance or error associated with the regression of manifest indicator ξ_j on latent variable η_i;

ε = the error of the structural equation for which latent variable η_2 is treated as endogenous on latent variable η_1.

The standard SEM procedure solves this entire system simultanously, or similar ones of greater scale, therefore allowing not only for multiple dependent (endogenous) variables, but also for the endogenous variable in one equation to enter as a predictor in another equation. In addition, the measured, manifest variables are treated here as predictive inputs into latent variables, again something not even considered in normal OLS. Finally, if desired the errors can correlate in SEM.

Given the above specifications, it can be seen that regression and SEM are related, in that they are both covariance structure-based modelling techniques, which seek to model an observed covariance structure from a fit structure. However, there are also key differences. The most salient differences in the two techniques can be stated as follows (Bollen, 1989; Cohen *et al.*, 2003; Kline, 2005):

- SEM allows for consideration of all partial correlations on all endogenous variables simultaneously. This is a key difference that recommends it over regression: the latter can only cope with a single endogenous variable at a time;

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ntage of being able to model latent variable ory factor analysis stage. This procedure allows for removal of measurement error from multi-item constructs, which creates 'purer', assumedly truer measures of the target constructs, in trun strenthening the structural analysis. This assumes, of course, that this step does in fact fit. It is further noted that latent variable modelling provides at least some within-construct protection against specification error, in that it provides an analysis of whether or not the latent variable model has been adequately represented by the manifest variables actually measured;

- SEM can deal with correlated errors, something standard regression cannot do;
- A large variety of fit tests have been developed for SEM modelling, including static and model-comparison options. This gives it a more impressive array of analytical options than standard regression;
- SEM can model non-recursive relationships much more fully than regression, as it more naturally allows for the system of equations that is required to estimate feedback loops.

Given the above, SEM allows the research to claim that (s)he has tested the convergent and discrimnant validity of measured constructs (through use of latent variable analysis). Secondly, it allows the research to claim that all specified variables, including other endogenous variables, have been accounted for in estimating a given endogenous variable's role. Thirdly, it allows the researcher, if necessary, to test the relative effect across estimation equations of the impact of non-specified variables (through the explicit correlation of errors), although this can obfuscate interpretation of other parameters.

There are, however, also crucial differences that lend regression a potentially important role:

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, as utilised in this thesis, has the advantage of being able to absord large numbers of covariates that do not necessarily have roles as predictors. For example, individual or firm demographics do not necessarily belong as predictor variables, but controlling for them as covariates can be crucial. SEM can do this only with some difficulty and, in the case that the covariates are categorical, rather disproportionate effects on the model structure. Generally, in SEM, specific structural paths are needed to include a variable. Regression, on the other hand, can absorb these covariates quickly and relatively effortlessly into the model, and then compare their impact via the partial regression attributable to the true predictors.

- Regression that is performed with OLS-type estimators is stable. Most SEM models, especially normal-theory, ML-based SEM, is prone to modelling breakdowns, as I indeed observed in this thesis (as reported in the subsequent Chapter);
- Related to the point above, regression can deal with larger sets of observed predictors as long as sample sizes are large enough.

Therefore, with regression, the researcher can be assured of a stable set of relationships that are free from estimation problems such as local optima. Although these should be tested for in SEM, they are sometimes missed by researchers.

It is noteworthy that the relative advantages of SEM and regression are met halfway by the intermediate technique of 2SLS SEM (Bollen, 1996, 2001; Bollen & Paxton, 1998; Oczkowski, 2002 & 2003). This was the approach eventually used in this thesis. The 2SLS SEM procedure allows for latent-structure modelling and a reduced but still prevalent allowance for whole-model partialling, while including the stablity of OLS-type estimation. With

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is thesis, this is therefore a powerful and useful

7.6. LIMITATIONS OF EMPIRICAL RESEARCH

There are several limitations in this empirical research method. First, as mentioned above, there are limitations in the sampling procedure. Convenience sampling has several drawbacks (Cooper & Schindler, 2001). These possibly include self-selection, which in this case might include the possibility that only respondents with strong feelings on the various antecedents replied. Another limitation of convenience sampling is a lack of controls on precision, especially as regards demographic generalisability.

Second, limitations may exist with regard to the research design. Firstly in this regard, the nature of the empirical research design of this study is retrospective (i.e. managers were assessed on past EF and service provision in suppliers through recall). This type of study is not necessarily optimal as regards conclusions to be drawn about the prediction of future issues. Recall of attitudes can be biased by multiple events, not least of which concerns what has happened most recently (maturational or historical artefacts).

Third, the sample size, although fairly big for an organisation survey set (170) is nonetheless not large enough to be sure of stability. The sample size limits the ability to split the sample, notably in the structural equation modelling methodologies (Kline, 2005).

In addition, the organisational performance section of the above model is limited, as the client was not called upon to comment on exact profitability. While the INDSERV scale does ascertain the effect of the supplier on the customer's outcomes, absolute outcomes are not assessed per se.

Finally, there are also potential limitations with regard to the data collection. Collection was done through self-report surveys, which have well-

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Schindler, 2001). The major problems include n the interviewee and interviewer (especially if there are questions about meanings in the survey), the self-selection problem (discussed above) and the omission of alternative language surveys where these might have been necessary (note that no indication of language issues was given by respondents, however any issues may not have been known). A further possible limitation of self-reports in this context concerns possible bias in answers stemming from the relationship. In other words, customer answers regarding the 'harder' aspects of service such as HPQ and OQ may be biased upwards or downwards by the general affective timbre of the relationship between the parties (this exact possibility is contained within the emotional contagion literature, Homburg & Stock, 2002; Howard & Gengler, 2001; Pugh, 2001; Sutton & Rafaeli, 1988; van Dolen, de Ruyter & Lemmink, 2004; Verbeke; 1997). This is essentially a form of common source bias and may lead to reduced disciminant validity in the multidimensional INDSERV scale. Finally, possible primacy effects might be in play in terms of which respondents may choose the first-presented options in surveys more often (Kronsnick & Alwin, 1987).

Limitations of 2SLS (Oczkowski, 2003) include especially the fact that it is not a full-information estimation procedure, so unlike maximum likelihood estimation the paths are not estimated using all possible model information. The 2SLS estimator also does depend on the choice of scaling variable. However the former limitation is a necessary one in cases where ML estimation cannot work, and the latter is mitigated by noting that judicious choice of scaling variable is possible on content bases (i.e. certain manifest indicators do stand out as probably most representative of the constructs).

Further limitations of the empirical study are discussed later, in the broader context of the actual results and data analysis strategies undertaken.

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thod, the results of the empirical studies will

ons, recommendations and conclusions given thereafter.

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CHAPTER 8. RESULTS

As outlined in the previous chapter, the study involved data from organisations involved in business-to-business (B2B) relationships, wherein a vendor supplies a customer with business services or products. The reader is again referred to the empirical model as seen in Figure 7-2.

Firstly, to test the above model multiple regression on aggregated scales is undertaken to assess initial relationships. Secondly, structural equation modelling (SEM) is used to account for a more complete and integrative model including measurement error and latent variable structuring.

For reasons of space, this chapter will provide summary tables and figures of the statistical findings. Full printouts of all procedures are available on request through the thesis supervisor (see inside front cover of the thesis).

8.1. MULTIPLE REGRESSION ANALYSIS

The correlation table and descriptive statistics between the summated variables is given in Table 8-1 below:

Table 8-1: Correlations and descriptive statistics for regression variables

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. EF	-1.09	2.11	-								
2. Inflows	-.50	1.29	.82†	-							
3. Outflows	-.59	1.28	.82†	.35†	-						
4. PQ	17.83	2.81	.12	.00	.20**	(.70)					
5. HPQ	18.07	3.12	.16**	.09	.17**	.74†	(.79)				
6. SPQ	20.93	3.10	.10	.04	.13*	.63†	.74†	(.78)			
7. OQ	15.21	2.35	.14*	.10	.13*	.72†	.76†	.76†	(.78)		
8. Frequency	162.54	170.58	.05	.04	.04	-.01	-.08	-.03	-.02	-	
9. Integration	11.66	1.88	.01	.04	-.02	.24†	.27†	.39†	.37†	.03	1.00

Numbers in parentheses are coefficient alphas. † *= p<.01;* ** *= P < .05,* * *= p < .1.*

Initial correlational relationships suggest some significant but not particularly strong relationships between the quality of EF variables and other variables EF is hypothesised to predict. Aggregated quality of EF is correlated

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OQ, outflows are correlated with all of the dings provide some initial support for some of the hypothesised relationships, although analyses including partial and latent variable correlation are preferably required for a complete analysis, as provided in the rest of the chapter. Inflows are weakly and non-significantly correlated with the INDSERV variables, suggesting little role.

Regression analysis, allowing for partial regressions, is done next with tests for the assumptions of multiple regression discussed first.

8.1.1 MULTIPLE REGRESSION ASSUMPTION CHECKS

Multiple regression has the assumptions of normality of residuals, linearity, homoscedasticity, and reasonable levels of outliers and multicollinearity (Cohen *et al.*, 2003). These assumptions for the variables were assessed via the examination of residual plots and diagnostic statistics from an initial regression analysis, as well as the correlation tables given above. The following was found.

Univariate and multivariate outliers for variables, and related diagnostics, were assessed using a) Univariate analysis of skewness, kurtosis and plots, b) partial studentized residual plots and bivariate scatterplots between each variable, c) raw studentized residuals, DFfits and DFBetas, d) multivariate outliers, utilising hat scores (h_{ii}) and squared Mahalanobis distances (D_i^2).

The outcomes of the outlier analysis are as follows:

1. One variable (frequency) was radically skewed in its raw data. For the purposes of structural equation modelling later and likely regression problems the variable was log transformed, bringing the normality within range, with univariate skewness reducing from 2.16 to -0.57;

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w multivariate residuals remained above the s suggested by Belsey, Kuh, and Welsch (1980),

3. Two significant multivariate outliers were evidenced in Mahalanobis distances adjusted for sample size.

This analysis suggests that influential points may possibly exist and play a role. However these outliers did not show evidence of data entry mistakes or systematic answers indicative of lack of respondent care in answering. Deletion was therefore not considered a viable strategy – these data points are legitimate cases in the sample. To delete them would reduce sampling strength. Therefore other approaches were taken after considering further assumptions.

Other assumptions produced no discernable issues. Examination of residuals after outliers had been dealt with suggested that univariate skewness and kurtosis statistics were within simulation-based ranges of 10 and 3 respectively[25] suggested by Curran, West and Finch (1996)[26]. In addition, no evidence of non-linearity or heteroscedasticity was detected in the studentized residual scatterplots. The further model specification test for homoscedasticity had a chi-square (27) = 25.16, p = .57, indicating that an hypothesis of homoscedasticity should not be rejected.

Multicollinearity also appeared reasonable. First, there were no overly high correlations between variables. Second, Variance Inflation Factor (VIF) scores, eigenvalues and Condition Indices were within ranges suggested by Belsey, Kuh, and Welsch (1980): no VIF score exceeded 10 or was overly high compared to the others. There were condition indices larger than 10, but only

---

[25] Skewness was -.75, kurtosis 4.34 (which is still within range) and most normality tests were non-significant (the exception being the Shapiro-Wilks with w=.95, p<.01)

[26] Kline (2005: 50), also see West, Finch & Curran (1995).

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of variation larger than .5 for two or more other . Since this is a moderator, not a main effect variable, it is not considered necessary to be concerned with this. The moderation analysis will reveal further considerations in this regard. Assumption checks for disaggregated EF suggested similar conclusions, namely that some outliers exist but that other issues (muticollinearity[27], heteroscedasticity[28] and normality of residuals[29]) were sufficiently under control to proceed.

In conclusion, the only potential concern suggested by the above tests is to do with possible outliers. These seem not to be affecting any of the other diagnostics seriously, however to allow for possible effects, robust regression techniques (Huber, 1973; Rousseeuw, 1984; Rousseeuw & Van Driessen, 2000; Rousseeuw & Yohai, 1984; Yohai, 1987) were adopted in conjunction with standard OLS regression, as discussed below.

8.1.2 MAIN EFFECT HIERARCHICAL REGRESSION MODELS

The initial models to be assessed are those featuring main effects. The dominant focus in this initial phase is on the role of EF variables over and above the explanatory influences of two sets of variables, namely firm demographic variables and characteristics of the relationship.

As stated above, the only potential issue highlighted by the diagnostic phase appeared to be the potential presence of some outliers. Accordingly, ordinary least squares (OLS) is compared to robust regression for main effect analysis.

---

[27] Again VIF are controlled relative to each other and quite low, condition indices and proportions of variation have similar conclusions to the previous regression

[28] Note again that the test for homoscedascisity is chi (35) = 29.94, p = .71 which is acceptable.

[29] Residuals are sufficiently normal, with skewness = -=78 and kurtosis = 4.44, both of which are under the acceptable cut-offs.

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ession

For the major hypotheses involving EF, hierarchical set regression (Cohen *et al.*, 2003) is utilised to allow for the partialling out of other non-focal variables. The order in which variables are entered is as follows: In Step 1 organisation demographic variables were entered as a set; in Step 2 frequency and integration into the supply chain were entered to account for characteristics of the particular relationship; in Step 3 EF was entered. In Step 3a aggregated EF was entered, in Step 3b disaggregated inflows and outflows (see Section 7.2.1A) were entered in its place.

At each of the stages, change in R^2 is assessed using the guidelines and tests discussed in Section 7.5, and significance tests of parameters are assessed if the stage added significant explanatory value.

The results for the hierarchical regression using OLS estimation are given in Table 8-2.

Generally, in the main effect models relatively small effects accruing from EF in its aggregated form (Step 3a) can be seen. The addition to R^2 over demographics and the nature of the relationship (frequency and integration) is significant in the case of HPQ (B = .22, $p < .1$, $\Delta R^2 = .022$) and OQ (B = .14, $p < .1$, $\Delta R^2 = .016$) for the OLS. These findings are particularly worth noting with respect to Hypothesis 6, as they fulfill, albeit marginally, the first two requirements for mediation as postulated in Figure 7-2, which postulates a mediation effect of HPQ between EF and OQ.

Aggregated EF is not a significant predictor of PQ or SPQ in the OLS models, and these should therefore not be treated as mediators for this predictor.

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Table 8-2: Hierarchical OLS regression: Main effects (B) on INDSERV variables

	INDSERV dependent variables															
	PQ				HPQ				SPQ				OQ			
Steps:	**1**	**2**	**3a**	**3b**	**1**	**2**	**3a**	**3b**	**1**	**2**	**3a**	**3b**	**1**	**2**	**3a**	**3b**
Industry																
Retail	.41	.20	.14	.35	.21	-.07	-.16	-.04	.16	-.14	-.21	-.06	.30	.07	.01	.08
Hard	-.07	-.06	-.04	-.03	.15	.19	.22	.23	.67	.67	.70	.70	-.01	.00	.02	.02
Service firm	.62	.49	.42	.46	.19	.04	-.07	-.05	.15	-.04	-.12	-.10	.22	.08	.01	.02
Contact level (high)	-.43	-.43	-.46	-.47	.05	.10	.04	.04	-.50	-.51	-.56	-.56	-.20	-.21	-.24	-.24
Size of client																
Small	-1.24*	-1.02	-.97	-1.46**	-1.16	-.90	-.82	-1.11	-1.26*	-.92	-.86	-1.21*	-1.03*	-.77	-.72	-.89*
Big	-1.84**	-2.14†	-2.07†	-2.25†	-1.01	-1.40*	-1.29	-1.40*	-.44	-.88	-.80	-.93	-.74	-1.08*	-1.00*	-1.07*
Size of supplier																
Small	.41	.30	.34	.15	.51	.42	.48	.37	.30	.13	.18	.04	.21	.08	.12	.05
Big	.50	.43	.48	.35	-.67	-.69	-.62	-.70	-1.00*	-1.13**	-1.08**	-1.17**	-.03	-.13	-.08	-.13
Frequency		-.08	-.10	-.02		-.22	-.25	-.21		-.06	-.09	-.03		-.05	-.07	-.04
Integration		.45†	.45†	.43†		.54†	.54†	.53†		.68†	.68†	.67†		.52†	.52†	.51†
EF			**.14**				**.22***				**.16**				**.14***	
Inflows only				**-.39****				**-.09**				**-.21**				**-.04**
Outflows only				**.65**†				**.52****				**.52**†				**.32****
R^2	.065	.144	.154	.216	.040	.136	.158	.175	.067	.210	.222	.247	.029	.175	.191	.201
ΔR^2	.065	.078†	.010	.072†	.040	.090†	.022*	.039**	.067	.143†	.012	.037**	.029	.146†	.016*	.026*
F	1.31	2.48†	2.44†	3.36†	.78	2.33**	2.50†	2.58†	.23	3.95†	3.82†	3.99†	.56	3.13†	3.15†	3.07†

N = 159. † = p<.01; ** = P < .05, * = p < .1

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is painted for EF that has been disaggregated ep 3b). In all cases, disaggregating the variable leads to significant gains – both inflows and outflows are revealed as significant predictors of PQ (B = -.39, p < .05 for inflows and B = .65, p < .01 for outflows, ΔR^2 = .055), and outflows are also found to be a significant predictor of HPQ, SPQ and OQ, with consistent and significant gain in R^2.

Again, this suggests that the hypothesised mediation paths as shown in Figure 7-2 might be investigated in the case of outflows (the lack of a relationship between inflows and any of the more distal INDSERV measures means that it cannot be assessed for mediation). It is also notable that in all cases outflows are significantly more influential than inflows, having generally up to twice or more the coefficient size. This is discussed further in the next chapter.

As stated above, the presence of some outliers suggests caution. Robust regression is undertaken next to compare the effects of outlier treatment with the findings of the straight OLS.

B. Main effects: Robust regression

The first step was to choose the form of the robust regression to use. The assumption analysis suggested that contamination exists in the x-space (predictor vectors) in addition to the y-space – DFbetas, for example, are high for some specific variables, including the most prominent outlier. Accordingly, M-estimation was not utilised given its inability to handle contamination of this nature (Chen, 2002). Instead, Least Trimmed Squares (LTS, Rousseeuw, 1984; Rousseeuw & Van Driessen, 2000), S-estimation (Rousseeuw & Yohai, 1987) and MM estimation (Yohai, 1987) were initially compared by comparing results for all other main variables regressed on OQ.

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v, standard OLS results suggest that the simple < .01) with $R^2 = .63$. Examination of the leverage and outlier points suggested again that there are only one or possibly two points that are 'worrisome' outliers, notably one particular outlier. The diagnostics disagreed about one other data point, with LTS finding it to be an outlier but the other two methods not. Other than these two points, the other outliers of consequence are not in fact leverage points, which was borne out by plots showing the potential influence of these two outliers. In each case the robust methods agreed on outlier and leverage detection and essential treatment, producing the parameter and models seen below.

Table 8-3: OLS and robust regression comparison for main variables on OQ

Model	R^2	Parameter Estimates on OQ					
		EF	PQ	HPQ	SPQ	Frequency	Integration
OLS model	.63	.04	.19†	.20†	.24†	-.02	.19†
LTS model	.65	.01	.25†	.21†	.23†	.06	.12**
S model	.69	.03	.23†	.20†	.25†	.03	.10*
MM model[30]	.51	.04	.22†	.19†	.28†	.05	.11*

*N = 159. † = p<.01; ** = P < .05, * = p < .1 Fit for OLS model: F(6)=46.86†.*

Most notably, the parameter estimates for most of the variables are very similar across the models, as are the significance findings, with the two exceptions of potential quality (to which the robust models attach a higher parameter) and integration (to which the robust models attach a lower parameter and for which the significance findings change between models). The PQ finding is important as this is a significant variable in the model to be tested, therefore it does appear that outliers are affecting the impact of this variable. The integration finding may be due partially to the potential collinearity of this variable as mentioned above, which is picked up differentially by the estimation methods. Again, however, it is not considered

[30] Note that the MM test included the Yohai, Stahel, and Zamar (1991) bias test and adjustments, and the SAS chif = yohai estimation option.

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able is a moderator which will enter the model

The conclusion of this initial comparison is that robust regression may be desirable in dealing with the one or two problematic outliers in the sample. Accordingly, the requisite models are tested with these adjustments, MM estimation being utilised because it has the great advantage of having extra model testing and comparison statistics in the modified Akaike's Information Criterion and Schwarz Information Criterion equivalents (AICR and BICR). These allow different models to be compared in more than just R^2.

The robust regression results for the main effect findings are shown in Table 8-4. Firstly, with regard to the differences in the OLS and robust regression models, it can be seen when comparing Table 8-2 and Table 8-4 that there is very little substantive difference between the two models after outliers have been dealt with. Once again aggregated EF adds significant explanation of HPQ and OQ (the robust regression AICR and BICR also improve in Step 3a, indicating that aggregated EF does improve the model over and above its mere addition as an extra predictor).

One difference is that aggregated EF is nominally a significant predictor of SPQ in the robust regression only ($B = .18$, $p < .1$), however in no parts of the change in R^2 (which is not significant), AICR or BICR (which increase) suggest that its addition improves the model. Therefore SPQ should not be considered as a mediator when aggregated EF is considered.

Similar findings are also discovered for disaggregated EF, where again outflows are the significant predictor. One point to note, however, is in the case of HPQ, where although there is gain in R^2 and AICR in the robust model, the BICR only drops for HPQ, suggesting caution in over-reading these results.

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Table 8-4: Hierarchical Robust (MM) regression: Main effects (B)on INDSERV variables

	INDSERV dependent variables															
	PQ				HPQ				SPQ				OQ			
Steps:	**1**	**2**	**3a**	**3b**	**1**	**2**	**3a**	**3b**	**1**	**2**	**3a**	**3b**	**1**	**2**	**3a**	**3b**
Industry																
Retail	.18	-.06	-.12	.06	.21	-.07	-.16	-.04	.16	-.09	-.17	.00	.30	.07	.01	.08
Hard	-.03	.03	.07	.04	.15	.19	.22	.23	.67	.48	.50	.49	-.01	.00	.02	.02
Service firm	.35	.21	.14	.19	.19	.04	-.07	-.05	.15	.03	-.05	-.02	.22	.08	.01	.02
High contact	-.24	-.21	-.25	-.26	.05	.10	.04	.04	-.50	-.62	-.67	-.68	-.20	-.21	-.24	-.24
Client size																
Small	-1.25**	-1.01*	-.96	-1.37**	-1.16	-.90	-.82	-1.11	-1.26*	-1.02	-.96	-1.37*	-1.03*	-.77	-.72	-.89*
Big	-1.41**	-1.73**	-1.66**	-1.84†	-1.01	-1.40	-1.29	-1.4*	-.44	-.89	-.80	-.95	-.74	-1.08*	-1.00*	-1.07*
Supplier size																
Small	.35	.26	.32	.14	.51	.42*	.48	.37	.30	.08	.13	-.04	.21	.08	.12	.05
Big	.46	.44	.49	.36	-.67	-.69	-.62	-.70	-1.00*	-1.28**	-1.22**	-1.34**	-.03	-.13	-.08	-.13
Frequency		-.14	-.16	-.10		-.22	-.25	-.21		-.08	-.11	-.04		-.05	-.07	-.04
Integration		.49†	.49†	.47		.54†	.54†	.53†		.71†	.71†	.70†		.52†	.52†	.51†
EF			.14				.22*				.18*				.14*	
Inflows				-.30**				-.09				-.25				-.04
Outflows				.55†				.52†				.61†				.32**
R^2	.039	.131	.139	.186	.033	.138	.164	.189	.071	.217	.220	.262	.026	.176	.192	.212
ΔR^2	.039	.092†	.008	.055†	.033	.105†	.026**	.051**	.071	.146†	.003	.045**	.026	.150†	.016*	.036**
AICR	148.8	161.0	157.8	158.2	156.7	147.1	140.8	132.8	148.4	142.8	150.6	137.8	149.4	153.5	145.3	147.2
BICR	178.6	197.9	198.9	203.9	187.0	185.0	184.1	181.2	178.7	182.2	192.9	185.3	179.4	190.6	187.3	194.0

N = 159.† = p<.01; ** = P < .05, * = p < .1

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F

Although the measurement utilised for quantity of movement does not facilitate complete disaggregation, the quality of movement scales were measured on semantic differential scales as mentioned above. While in principle this data should not be analysed separately from the quantity data (as low quantity but pernicious movement within, say, turnover, may have an overall low impact due to not being a common problem), it is also possible that respondents might read the quality of movement questions to indicate nett/total impact on the organisation. For example, the departure of a single key employee may so disrupt a network that the effect is catastrophic, or the opposite may be found for the arrival of someone excellent. Although not high in quantity, such movement has an effect disproportionate to its quantity.

Accordingly, the quality of movement sub-questions for each type of separate movement were also analysed as predictors in the regression equations. However none of these were significant and R^2 did not improve. Therefore it is concluded that further disaggregation is not of particular benefit.

The above findings lead to some support for certain of the mediation hypotheses. Mediation tests are therefore discussed next.

8.1.3 MEDIATION MODELS

As seen in Figure 7-2, the model to be tested primarily predicts various mediation relationships as follows:

- Hypothesis 1 and 3 suggest that PQ not only affects OQ directly but also affects it through the mediating mechanisms of HPQ and SPQ;

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at quality of EF is an antecedent of PQ, which affects OQ, HPQ and SPQ through a mediating effect of PQ;

- Hypotheses 5a and b and 6a and b suggest that quality of EF is also potentially a direct antecedent of SPQ and HPQ, and therefore that it affects OQ through a mediating effect of SPQ and/or HPQ;

Baron and Kenny's (1986) mediation method is used to test these assumptions (also see Hoyle & Kenny, 1999; James & Brett, 1984; Mackinnon, Lockwood, Hoffman, West, & Sheets, 2005) with the following conditions:

1. *Independent variable(s) should regress significantly on the ultimate dependent variable*. For H1 and H3, PQ should regress on OQ. For H4, EF should regress significantly on SPQ, HPQ and/or OQ respectively. For H5 and H6 EF should regress on OQ;
2. *Independent variables(s) should regress on the mediator*. For H1 and H3, PQ should regress on HPQ and SPQ. For H4 to H6 EF should regress on PQ and SPQ respectively;
3. *When the mediator is included as a predictor along with the original independent variable, a) The mediator should be a significant predictor of the outcome, and b) the coefficients of the independent variables should be significantly reduced*. For H1 and H3, when HPQ is included as a predictor, PQ should regress with a significantly lower effect on OQ. For H4 and H5 EF should regress with a smaller effect on SPQ when PQ is included and on OQ when SPQ is included respectively;

The significance of mediation effects is assessed via calculation by hand of the Sobel test (Sobel 1982, 1986) as discussed in Section 7.5. There are two sets of mediation hypotheses, the first concerning relationships within the

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econd with the EF variables as the independent

A. Mediation within the INDSERV variables

The INDSERV mediation hypotheses involve mediation by HPQ and SPQ of the relationship between PQ and OQ. These are posited as partial mediations, therefore the reduction in the PQ coefficient should be significant but not full.

Table 8-5 shows the results for these relationships. Note that the results are partialled for firm and relationship characteristics, as well as for disaggregated EF (since above this was found to have greater explanatory power than aggregated flow).

Table 8-5: Mediation regression effects (B) within only INDSERV variables

	Step 1 Main effects on...			Step 2 Mediators added...	
	HPQ	**SPQ**	**OQ**	**HPQ**	**SPQ**
Industry					
Retail	-.33	-.30	-.12	-.01	-.01
Hard	.25	.72	.03	-.05	-.24
Service firm	-.42	-.40	-.24	-.10	-.09
Contact level (high)	.42	-.24	.02	-.12	.12
Size of client					
Small	.08	-.23	-.05	-.08	.04
Big	.43	.57	.23	.08	.01
Size of supplier					
Small	.25	-.06	-.03	-.12	-.01
Big	-.98**	-1.40†	-.33	.00	.22
Frequency	-.19	-.02	-.03	.04	-.02
Integration	.17*	.38†	.26†	.20†	.12*
Inflows only	.23	.05	.18	.11	.17
Outflows only	-.01	.09	-.05	-.05	-.09
PQ	.82†	.67†	.58†	.30†	.32†
Mediator				.34†	.39†
ΔB^{a}				**-.24†**	**-.19†**
R^2	.600	.529	.568	.647	.692
F	16.76†	12.51†	14.65†	18.83†	23.11

N = 159. † *= p<.01;* ** *= P < .05,* * *= p < .1*

[a] *Significance test for change in B as per Section 7.5*

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thesis of partial mediation: the coefficient of PQ
d (as seen by findings in bold) when the HPQ and SPQ variables are added.

B. Mediation of EF effects

The more important mediation effects are those posited for EF. The final two requirements for a mediator as per Baron and Kenny (1986) – that a) the mediator significantly load on the outcome, and b) that a significant main prediction effect of the independent variable disappear or significantly drop in the presence of the mediator – are tested simultaneously via the introduction of the mediator into the final steps of Table 8-2 above. The addition of the mediators can be seen in Table 8-6.

Table 8-6 shows that the third requirement for mediation was fulfilled in all cases: the mediator was always significantly related to the outcome variable. Therefore the mediation relationships for which the first two steps were fulfilled could be finally assessed via the Sobel (1982) test. Significant changes in coefficients can be seen in bold in the table. As seen there, the only mediation hypothesis that could be tested for aggregated EF (EF → HPQ → OQ) was not upheld at the 5% significance level.

For disaggregated flow, there was a significant drop in the coefficient for outflows in each of the cases. Specifically, the effect of outflows on HPQ and SPQ seems to be almost fully mediated by PQ, and the effect of outflows on OQ is again mediated almost fully by the combined presence of PQ, HPQ and SPQ. The structural equation models presented in the next sections allow greater distinction to be made between these multiple paths.

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Table 8-6: Hierarchical OLS regression: Mediation effects (B)

Predictor:	**Aggregated EF**					**Disaggregated EF**				
Outcome:	**HPQ**	**SPQ**	**OQ**			**HPQ**	**SPQ**	**OQ**		
Mediator:	**PQ**	**PQ**	**PQ**	**HPQ**	**SPQ**	**PQ**	**PQ**	**PQ**	**HPQ**	**SPQ**
Industry										
Retail	-.28	-.31	-.07	.09	.12	-.33	-.30	-.12	.10	.11
Hard	.25	.72	.04	-.10	-.38	.25	.72	.03	-.10	-.38
Service firm	-.41	-.40	-.23	.04	.08	-.42	-.40	-.24	.04	.07
Contact level (high)	.41	-.24	.01	-.27	.07	.42	-.24	.02	-.27	.07
Size of client										
Small	-.05	-.21	-.18	-.28	-.23	.08	-.23	-.05	-.31	-.21
Big	.36	.58	.15	-.32	-.55	.43	.57	.23	-.33	-.54
Size of supplier										
Small	.21	-.05	-.07	-.14	.02	.25	-.06	-.03	-.14	.03
Big	-1.00**	-1.40†	-.35	.25	.52	-.98**	-1.40†	-.33	.24	.53
Frequency	-.17	-.02	-.01	.07	-.02	-.19	-.02	-.03	.07†	-.02
Integration	.18*	.38†	.27†	.23†	.13	.17*	.38†	.26†	.23	.13*
EF	.11	.07	.07	.03	.05					
Inflows only						.23	.05	.18	.01	.08
Outflows only						-.01	.09	-.05	.05	.03
Mediator	.80†	.67†	.56†	.53†	.56†	.82†	.67†	.58†	.53†	.57†
ΔB^{a}	-.11	-.09	-.07	**-.11***	-.09	**-.51**†	**-.43**†	**-.47**†	**-.47****	**-.49**†
$\mathbf{R^2}$	.598	.529	.564	.598	.622	.600	.529	.568	.599	.623

N = 159.† *= p<.01;* ** *= P < .05,* * *= p < .1.*

[a] *For changes in disaggregated flow coefficients, only outflows are reported as inflows did not predict OQ*

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ses concern interactions between characteristics

nship and main relationships, as assessed next.

8.1.4 ORGANISATION AND RELATIONSHIP FACTORS

Interactions with characteristics of the relationship and organisation were hypothesised as moderations of the main relationships between EF and service quality elements. Moderators have already been included in the regressions as control variables, but moderation typically involves testing product terms as well (Cohen *et al.*, 2003; Baron & Kenny, 1986; James & Brett, 1984). Therefore products are added to the appropriate incarnations of Step 3b in Table 8-2. First, characteristics of the relationship (frequency and integration of the supplier into the supply chain) were considered.

A. Moderation effects of frequency and integration

Frequency and integration were hypothesised essentially as moderators. Essentially, frequency was hypothesised to moderate relationships with PQ, SPQ or OQ as a dependent variable and integration with PQ, HPQ and OQ.

Table 8-7 examines possible moderation effects for relationships involving disaggregated EF (because disaggregated flow was previously found to be more powerful). This requires all possible two-way interactions to be tested, including between both EF types, referred to as 'EFin*EFout', and the interaction between the moderator with EFin and EFout respectively (Cohen *et al.*, 2003). Finally, disaggregated EF forms two variables so three-way interactions were also tested. As usual in moderation, all continuous predictors were centered, with the exception of quality of EF[31].

[31] This is because quality of employee flow already has a meaningful zero point, namely the midway between negative and positive quality of employee flow – essentially 'neutral' EF. Therefore it is best to keep it in this metric (Cohen et al, 2003: 267).

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Table 8-7: Interactions between relationship characteristics and disaggregated EF: OLS effects (B)

	Interactions by frequency on...				Interactions by integration on...			
	EF→PQ		EF→SPQ		EF→PQ		EF→HPQ	
	2-way	3-way	2-way	3-way	2-way	3-way	2-way	3-way
Industry								
Retail	.34	.25	-.03	-.08	.26	.27	-.06	.27
Hard	.04	-.07	.73	.67	-.15	-.14	.18	-.14
Service firm	.53	.36	-.07	-.14	.40	.41	-.06	.41
Contact level (high)	-.43	-.36	-.52	-.49	-.51	-.54	.04	-.54
Size of client								
Small	-1.35**	-1.18*	-1.14	-1.07	-1.24*	-1.24*	-.96	-1.24
Big	-2.18†	-2.17†	-.89	-.89	-2.06†	-2.08†	-1.21	-2.08
Size of supplier								
Small	.19	.22	.06	.07	.27	.27	.52	.27
Big	.47	.57	-1.12**	-1.07†	.64	.66	-.45	.66
Frequency	-.28	-.42**	-.17	-.23	.02	.01	-.22	.01
Integration	.48†	.51†	.69†	.71†	.30*	.30*	.53†	.30
Inflows	-.37*	-.35*	-.25	-.24	-.46**	-.46**	-.11	-.46
Outflows	.57†	.52†	.48**	.46**	.66†	.65†	.53**	.65
EFin*EFout	-.05	-.09	-.06	-.08	-.04	-.05	.00	-.05
Moderator*EFin	-.28	-.06	-.11	-.01	**-.26***	**-.29****	-.15	-.29
Moderator*EFout	-.08	.01	-.09	-.05	.09	.08	.17	.08
Moderator*EFin*EFout		**.27****		.12		-.03		-.03
R^2	.246	.276	.255	.260	.247	.248	.189	.189
ΔR^2	.030	.030†	.008	.005	.031*	.001	.014	.001
F	3.10†	3.38†	3.26†	3.11†	3.13†	2.93†	2.23†	2.07†

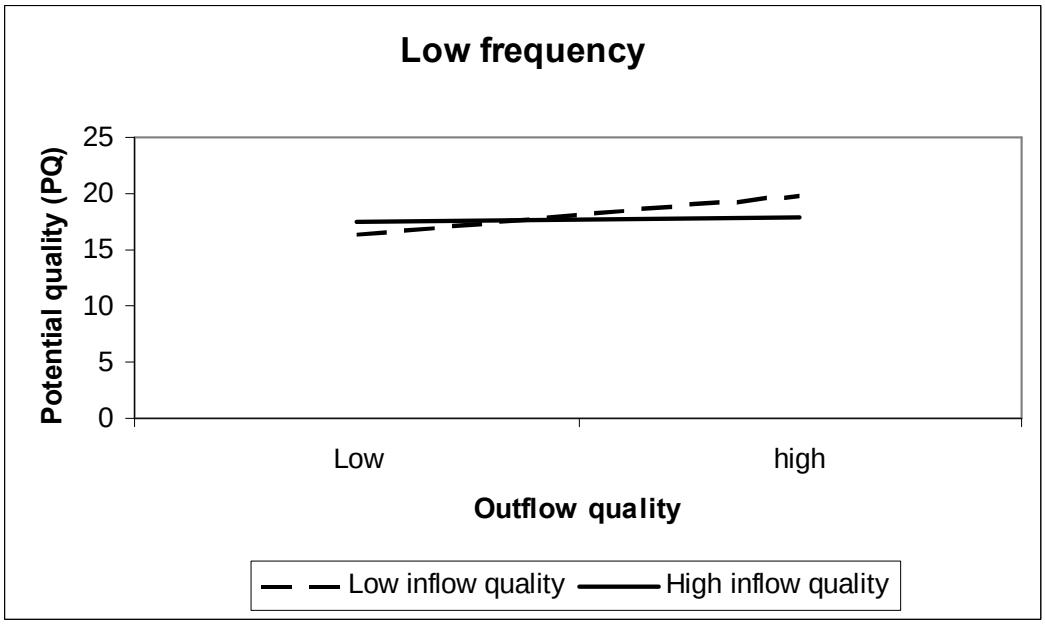
N = 159. † = p<.01; ** = P < .05, * = p < .1

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l regression in Table 8-7, moderation effects of rst. Although the two-way interactions for the EF-PQ relationship were not significant, the addition of a three-way interaction was.

The nature of the three-way interaction between frequency, inflows and outflows on PQ was examined further. The relationship between outflows and PQ at different levels of inflows is shown for low levels of interaction frequency (Figure 8-1) and high levels (Figure 8-2) respectively.

Figure 8-1: Relationship between outflow quality and PQ at low frequency levels



As seen in Figure 8-1 at low levels of frequency, there is a stronger positive relationship between outflows and PQ at *lower* inflow quality. On the other hand, Figure 8-2 shows that at high levels of frequency, there is a stronger positive relationship between outflows and PQ at *higher* inflow quality.

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vs and PQ at high frequency levels

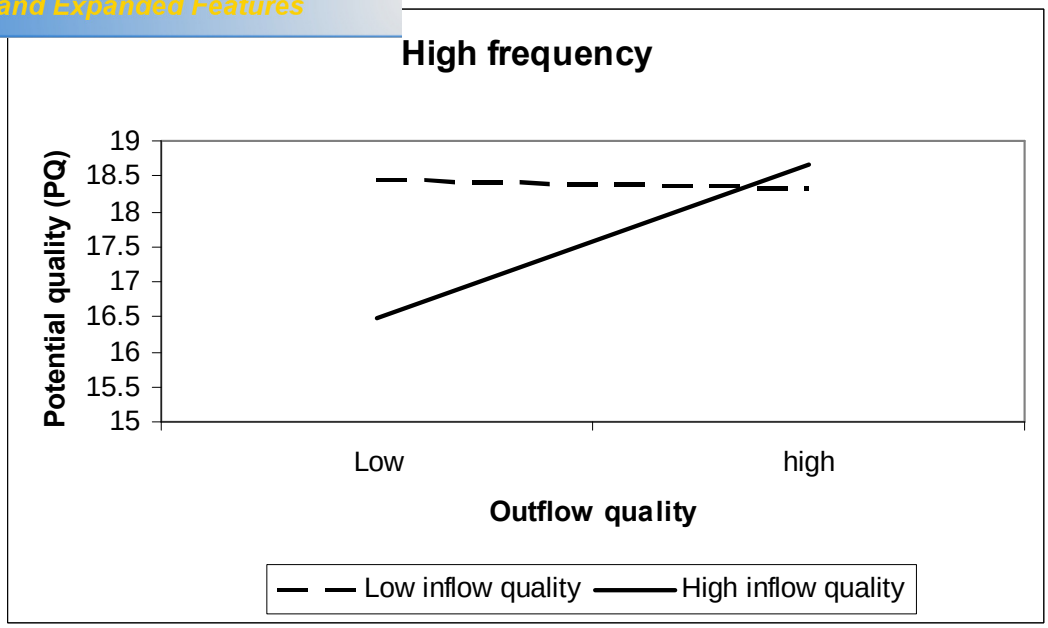
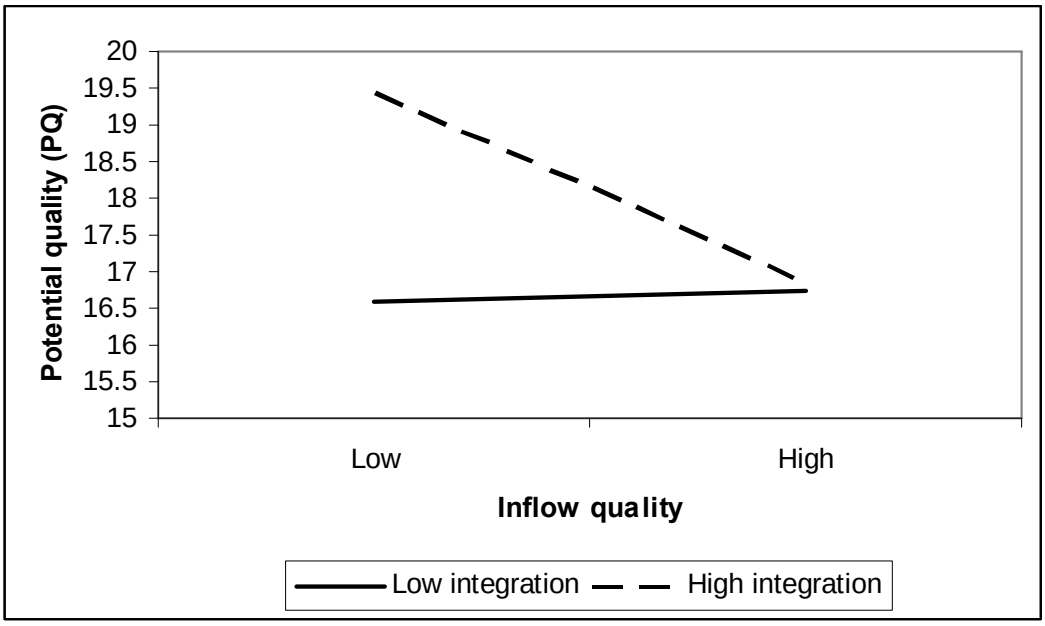


Table 8-7 shows a significant two-way interaction for integration, which moderates the relationship between inflows and PQ, shown in Figure 8-3, such that a negative Inflows→PQ relationship seems to exist predominately at high levels of integration. This finding is discussed further in the next chapter.

Figure 8-3: Moderation effect of integration on the relationship between inflows and PQ



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teractions involving the mediated INDSERV 8-8. No evidence was found for any interactions with frequency or integration however.

Discussion regarding the above analyses is limited to the next chapter.

Table 8-8: Regression interactions (B) between relationship characteristics and PQ

	Interactions by frequency on...			Interactions by integration on...		
	PQ→SPQ	**PQ→OQ**	**SPQ→OQ**	**PQ→HPQ**	**PQ→OQ**	**HPQ→OQ**
Industry						
Retail	-.29	-.12	.11	-.33	-.12	.13
Hard	.70	.02	-.38	.26	.04	-.01
Service firm	-.41	-.25	.07	-.42	-.24	.02
Contact level (high)	-.24	.02	.07	.42	.02	-.25
Size of client						
Small	-.26	-.06	-.21	.09	-.05	-.24
Big	.58	.23	-.55	.45	.24	-.23
Size of supplier						
Small	-.10	-.05	.04	.26	-.03	-.06
Big	-1.40†	-.33	.53**	-.98**	-.33	.25
Frequency	-.02	-.03	-.02	-.19	-.03	.07
Integration	.38†	.26†	.13*	.17*	.26†	.19**
Inflows	.04	.18	.08	.23	.19	.04
Outflows	.09	-.05	.03	-.01	-.05	.03
Predictor[a]	.67†	.57†	.57†	.81†	.57†	.53†
Interaction	-.02	-.01	.01	.01	.00	.03
R^2	.529	.568	.623	.600	.568	.606
F	11.57†	13.54†	16.98†	15.46†	13.58†	15.84†

N = 159. † = p<.01; ** = P < .05, * = p < .1. [a] 'Predictor' refers to the predictor in the column heading.

B. Moderation effects of organisation characteristics

Hypotheses 9 to 11 suggest that various characteristics of the supplier and customer organisations may impact on the relationships above. Notably, supplier size (measured as approximate number of employees in the supplier), customer size, number of contact employees, and/or type of industry and service were hypothesised to have potential interaction effects.

Interactions by organisation demographic feature were tested on quality of EF, but not on INDSERV relationships as these were not per se the focus of this thesis despite their interest. Interactions were again tested on disaggregated EF because of the main effect findings.

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Respondents were asked to estimate the number of supplier employees, or, failing that, to estimate number qualitatively as 'small, medium or big'. Many used the latter distinction. To marry the two sets of answers, numerical answers were translated into the latter as follows: small 0-50 employees, medium 51-250, large > 250 staff, which approximates sizes employed in common usage (e.g. legislation) and gives sufficient group sizes for testing.

This required dummy coding, where medium was held as the baseline referent. Dummy coding regression was therefore done as a statistical analysis technique. It is noted that once again EF, because it has a naturally-defined zero point, is not centred, thus parameters are interpreted with regard to an organisation with neutral EF. The main effect and interaction results can be seen in Table 8-9.

Table 8-9: Main regression effects and interactive effects (B) of supplier size (control=medium)

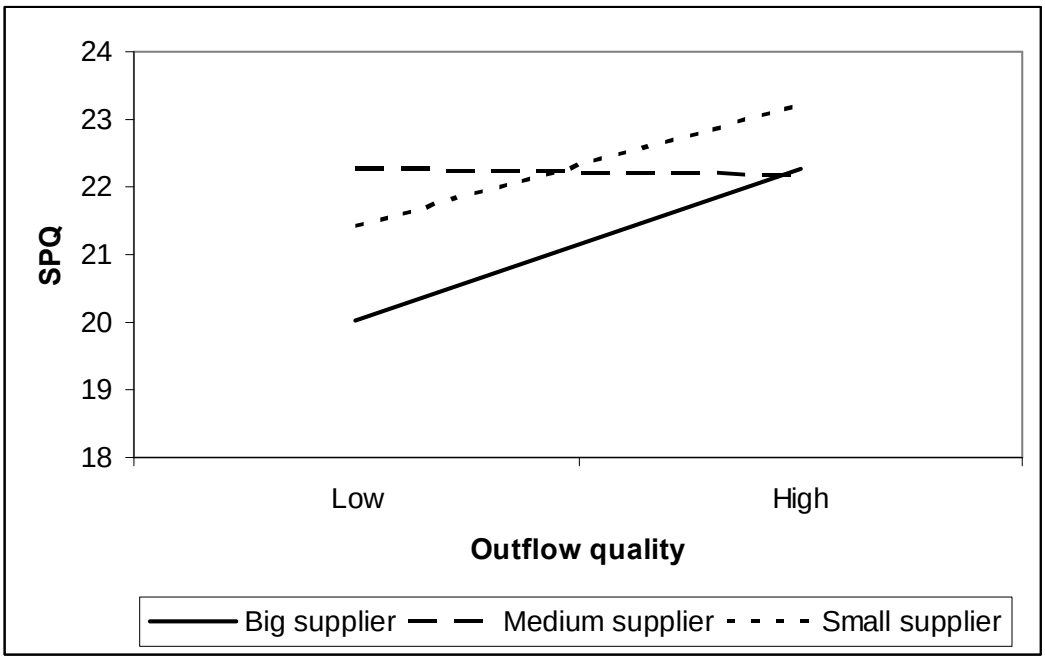
	Moderation effect of supplier size on...			
	EF→PQ	**EF→HPQ**	**EF→SPQ**	**EF→OQ**
Intercept	19.29	19.39	22.30	16.24
Industry				
Retail	.41	.01	-.05	.03
Hard	.02	.30	.70	.00
Service firm	.45	.11	.01	-.11
Contact level (high)	-.48	.02	-.55	-.24
Size of client				
Small	-1.38**	-1.10	-.87	-.63
Big	-2.17†	-1.47*	-.61	-.70
Size of supplier				
Small	-.13	.33	.21	-.01
Big	.27	-.49	-.93	-.34
Frequency	-.02	-.21	-.03	-.02
Integration	.45†	.55†	.73†	.55†
Inflows	-.09	.08	.22	.47
Outflows	.57	.20	-.07	.26
EFin*EFout	-.05	.01	-.06	.04
Small*EFin	-.70	-.59	-.57	-.27
Small*EFout	.11	.58	.68	-.17
Big*EFin	-.42	-.12	-.72	**-.84****
Big*EFout	.13	.40	**.84***	.20
R^2	.229	.184	.270	.236
ΔR^2	.013	.009	.023	.035
F	2.46†	1.87†	3.07†	2.56†

N = 159. † = p<.01; ** = P < .05, * = p < .1

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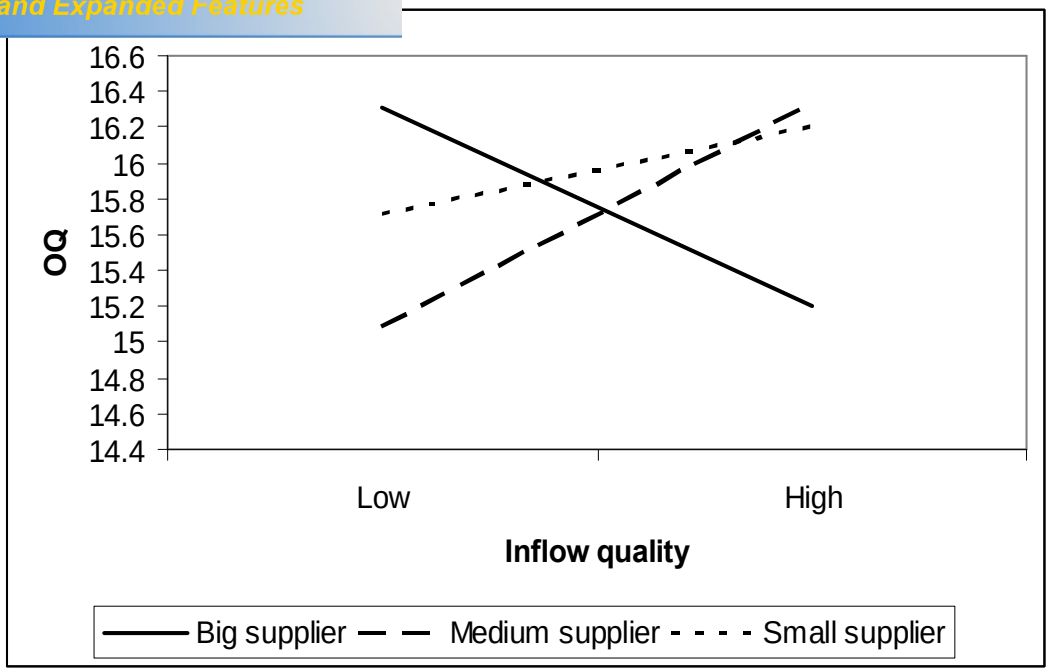
appears to have a possible effect, namely in the SPQ ($\Delta R^2 = 2.3\%$) as well as OQ ($\Delta R^2 = 3.5\%$), as seen in the bold parameters. In the first instance, outflows appear to have a *stronger* effect on SPQ in the case of bigger supplier firms ($B = .84$, $p < .1$), although as can be seen in Figure 8-4 the result for big firms has an analogous coefficient to that of small firms.

Figure 8-4: Interaction between supplier size and the relationship between outflows and SPQ



The second interaction effect suggests that in bigger firms inflows appear to have a significant *negative* effect on OQ compared to medium sized firms. Figure 8-5 shows this relationship. Note that the other two supplier sizes are in fact positive in relation.

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ii. Customer organisation size

Customer managers were also asked to estimate the size of their own organisation. In this case, almost all managers gave numerical answers, with only one missing and one qualitative answer. However it was noted earlier that this variable had very large variance, due to presence of extreme outliers.

Accordingly, the same procedure was adopted here as for supplier size: organisations were coded as small, medium and large and analysed as such. The main effect findings and interaction results can again be seen in Table 8-10.

Potentially significant interactions existed for PQ (ΔR^2 = 4.2%), HPQ (ΔR^2 = 5.1%) and OQ (ΔR^2 = 4.6%). Firstly, the relationship between outflows and PQ was found to be stronger in the case of bigger customer firms, as seen in Figure 8-6.

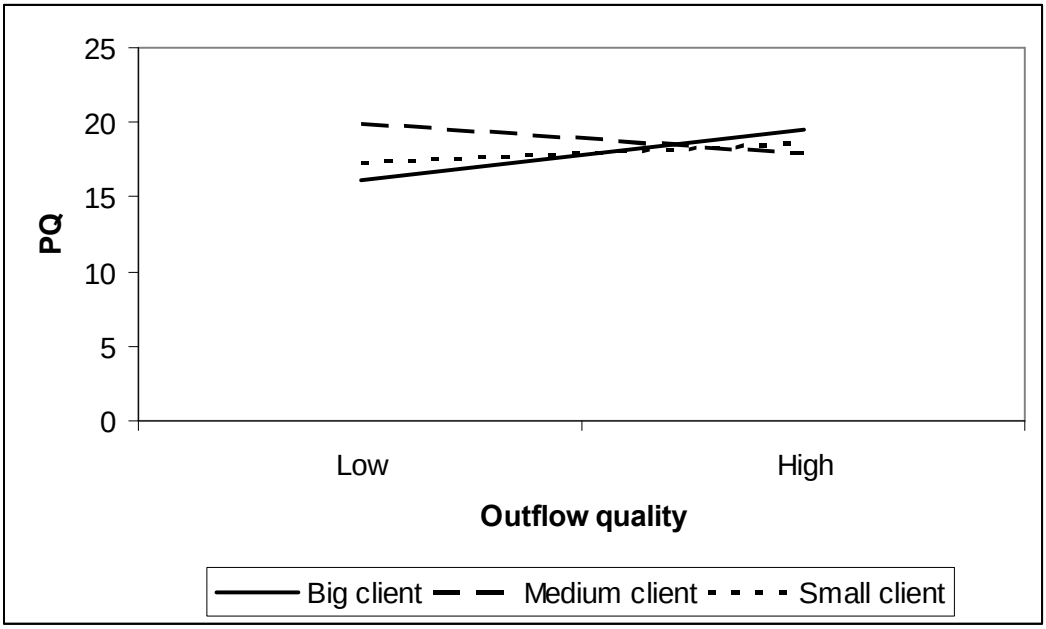
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ffects (B) of customer size (control=medium size)

	n effect of client size on...			
	EF→PQ	**EF→HPQ**	**EF→SPQ**	**EF→OQ**
Intercept	18.53	18.57	22.30	15.65
Industry				
Retail	.44	.08	-.01	.14
Hard	-.05	.31	.68	.11
Service firm	.35	-.17	-.18	-.07
Contact level (high)	-.52	-.02	-.54	-.27
Size of client				
Small	-.74	-.26	-.81	-.40
Big	-1.00	.19	-.25	-.09
Size of supplier				
Small	.28	.50	.10	.12
Big	.45	-.67	-1.10*	-.12
Frequency	-.01	-.20	-.03	-.04
Integration	.47†	.59†	.71†	.57†
Inflows	-.35	-.18	.01	.08
Outflows	-.26	-.71	-.07	-.50
EFin*EFout	-.05	.00	-.03	.07
Small*EFin	-.02	-.08	-.44	-.37
Small*EFout	.74	**1.18***	.65	**.92***
Big*EFin	-.29	.23	-.21	.16
Big*EFout	**1.64****	**1.96**†	.84	**1.20****
R^2	.258	.226	.259	.247
ΔR^2	.042	.051	.012	.046
F	2.89†	2.43†	2.90†	2.73†

N = 159. † = p<.01; ** = P < .05, * = p < .1

Figure 8-6: Interaction between client size and the relationship between outflows and PQ



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between outflows and both HPQ and OQ was ger in the case of bigger firms and smaller firms when compared to medium-sized firms, as seen in Figure 8-7 and Figure 8-8 respectively.

Figure 8-7: Interaction between client size and the relationship between outflows and HPQ

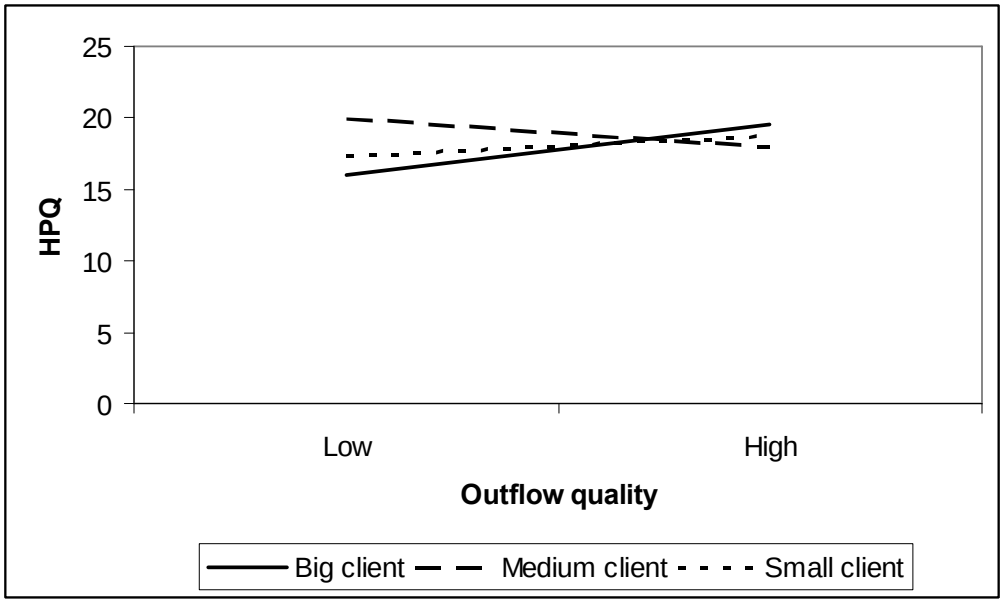
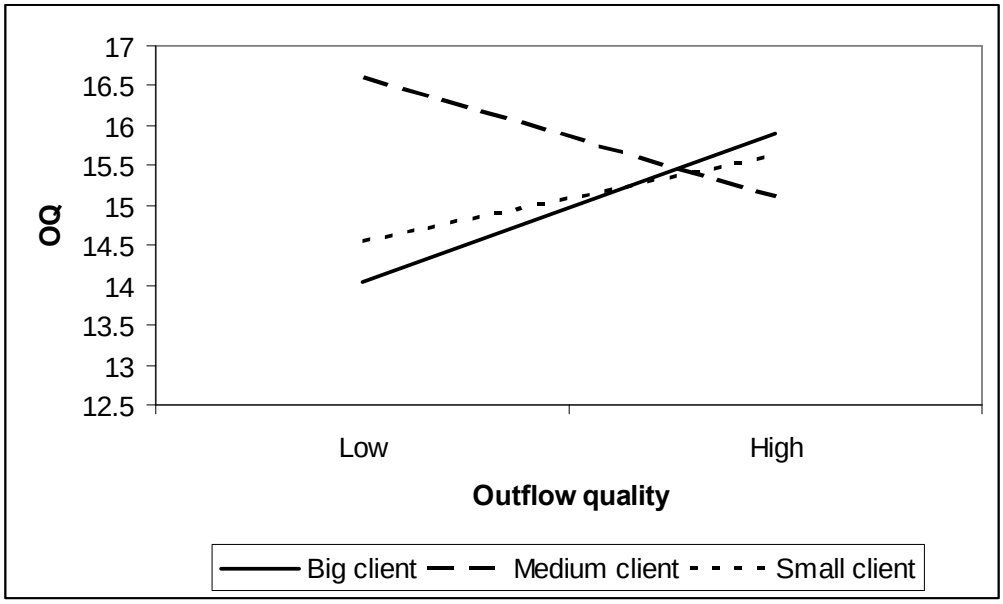


Figure 8-8: Interaction between client size and the relationship between outflows and OQ



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The number of contact staff in the supplier with which the customer works was also estimated. The general interquartile range was quite low (ranging from 4-12), but again with some extreme outliers. Approximately half the sample worked with five or fewer contact staff, therefore the sample was split into two groups: one to five contact staff, and more. Results are given in Table 8-11.

Table 8-11: Main & interactive OLS effects (B) of no. of contact employees (control=small no.)

	Moderation effect of no. of contact staff on...			
	EF→PQ	**EF→HPQ**	**EF→SPQ**	**EF→OQ**
Intercept	19.41	19.71	22.44	16.42
Industry				
Retail	.47	.07	-.14	.14
Hard	-.11	.17	.62	.00
Service firm	.39	-.07	.24	.00
Contact level (high)	-.82	-.31	-.45	-.49
Size of client				
Small	-1.31**	-1.01	-1.07	-.84
Big	-2.10†	-1.30	-.96	-1.02*
Size of supplier				
Small	.14	.34	.34	.03
Big	.34	-.72	-.93*	-.14
Frequency	.00	-.18	-.07	-.02
Integration	.42†	.51†	.69†	.50†
Inflows	-.31	-.05	-.23	.04
Outflows	.82†	.75†	.28	.47**
EFin*EFout	-.08	-.03	-.07	.03
Large no.*EFin	-.29	-.12	-.02	-.11
Large no.*EFout	-.37	-.49	**.82***	-.30
R^2	.232	.187	.266	.211
ΔR^2	.016	.012	.019	.01
F	2.87†	2.19†	3.46†	2.54†

*N = 159. † = p<.01; ** = P < .05, * = p < .1*

The results for this interaction suggest that only the moderation effect in the case of SPQ was significant (ΔR^2 = 1.9%, *B* = .82, p<.1), so that the relationship between outflows and SPQ is stronger when there are more contact staff. Figure 8-9 shows the interaction.

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iv. Industry

The industry in which the customer operates was coded as follows: services (approximately 59.19% of the sample, including health, IT and financial), retail or wholesale (25.59%) and manufacturing, building, utilities and transport which were treated as a single group (referred to below as 'Hard' industries, 23.21%). The services industry – perhaps the most amenable to relational contracting – was held as the control. Results are given in Table 8-12.

Industry effects also manifested significant differences, as hypothesised. First, outflows had a significantly stronger impact on OQ ($\Delta R^2 = 5\%$) and SPQ ($\Delta R^2 = 4\%$) in the services industry when compared to other industries such as manufacturing, construction or utilities. These two interaction effects can be seen in Figure 8-10 and Figure 8-11 respectively.

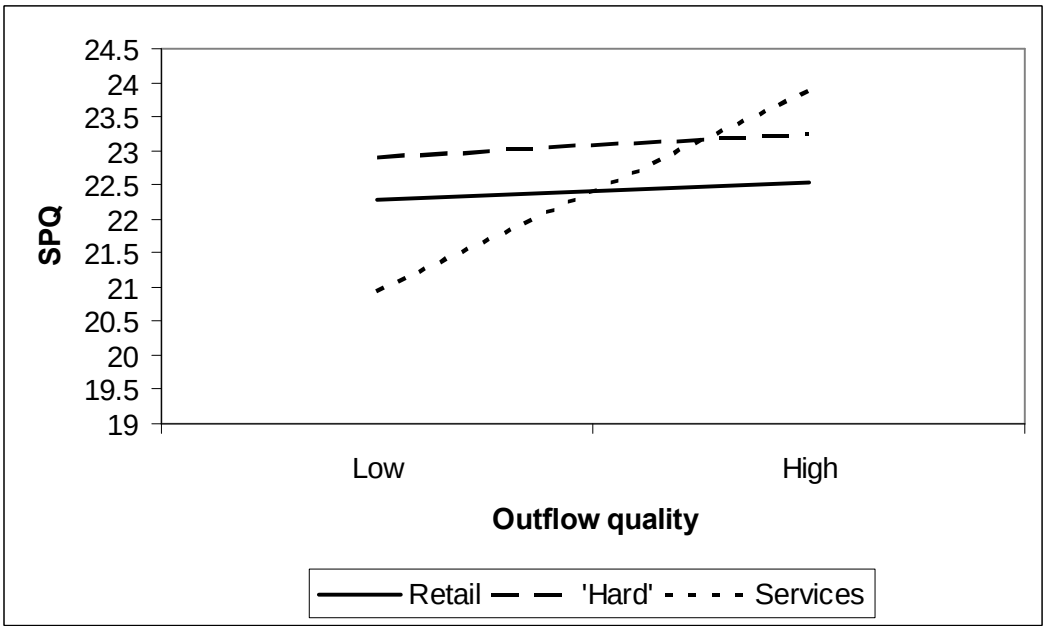
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(B) of industry (control=services)

	n effect of industry on...			
	EF→PQ	**EF→HPQ**	**EF→SPQ**	**EF→OQ**
Intercept	19.50	19.85	23.02	16.60
Industry				
Retail	.05	-.44	-.64	-.47
Hard	-.69	-.65	.02	-.64
Service firm	.40	-.11	-.07	-.03
Contact level (high)	-.48	.05	-.47	-.19
Size of client				
Small	-1.42**	-1.06	-1.15*	-.92*
Big	-2.51†	-1.63**	-1.04	-1.32**
Size of supplier				
Small	.16	.41	.12	.13
Big	.42	-.62	-1.09**	-.06
Frequency	.01	-.16	.01	.00
Integration	.45†	.54†	.66†	.51†
Inflows	-.42	.01	-.18	.13
Outflows	.88†	.87†	1.05†	.70†
EFin*EFout	-.05	.00	-.01	.07
Retail*EFin	.71	.18	-.13	.07
Retail*EFout	-.74	-.64	**-.96***	**-.83****
Hard*EFin	-.57	-.62	-.16	-.49
Hard*EFout	-.49	**-.79***	**-.94****	**-.61***
R^2	.257	.211	.287	.251
ΔR^2	.041	.036	.040	.050
F	2.86†	2.21†	3.34†	2.78†

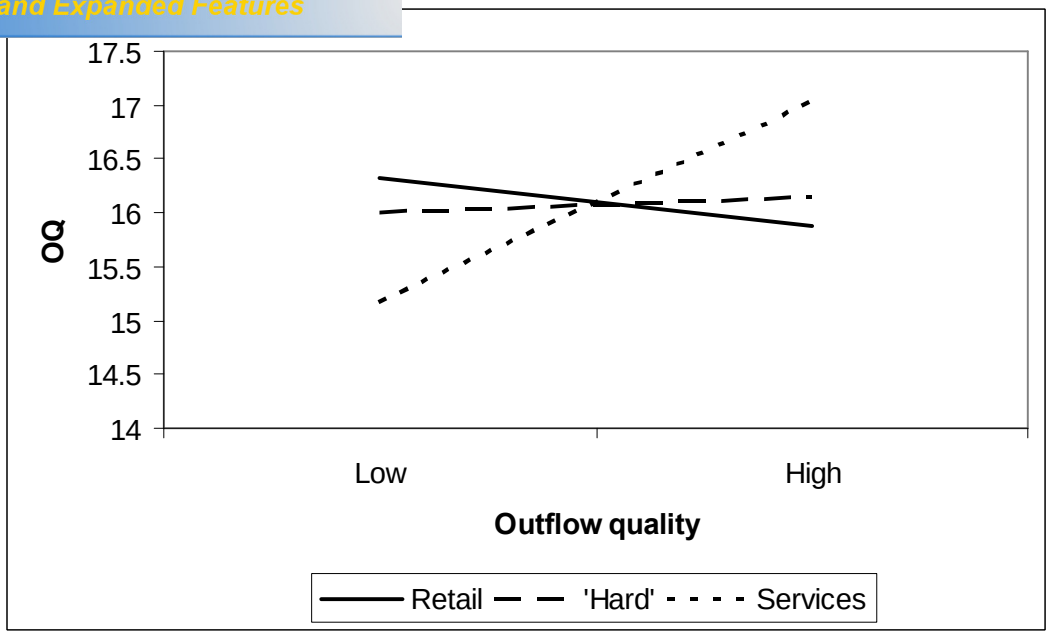
*N = 159. † = p<.01; ** = P < .05, * = p < .1*

Figure 8-10: Interaction between industry and the relationship between outflows and SPQ



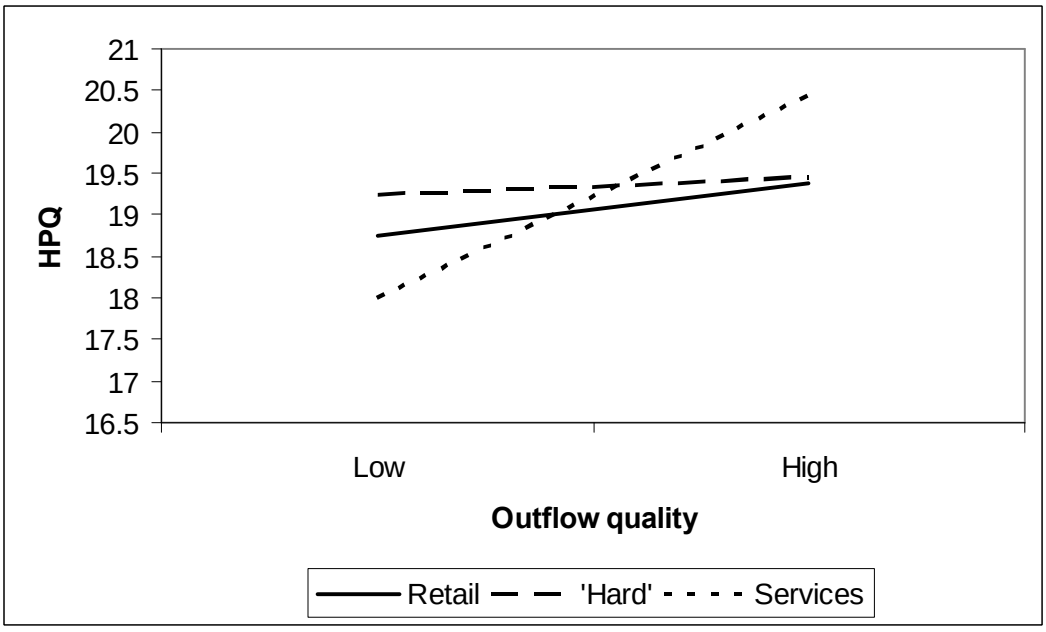
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ry and the relationship between outflows and OQ



In addition, outflows had a significantly stronger impact on HPQ in the services industry when compared to specifically the 'hard' industries (ΔR^2 = 3.6%), as seen in Figure 8-12.

Figure 8-12: Interaction between industry and the relationship between outflows and HPQ



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Having looked at the type of industry in which the customer operates, the type of offering provided by the supplier to the client is considered. There were an extremely wide range of offerings. Generally, these could be divided into services (29.09%) and products; no further subdivision gave adequate sizes to subdivide further. Results can be seen in Table 8-13:

Table 8-13: Main and interaction OLS effects (B) of type of offering (control=products)

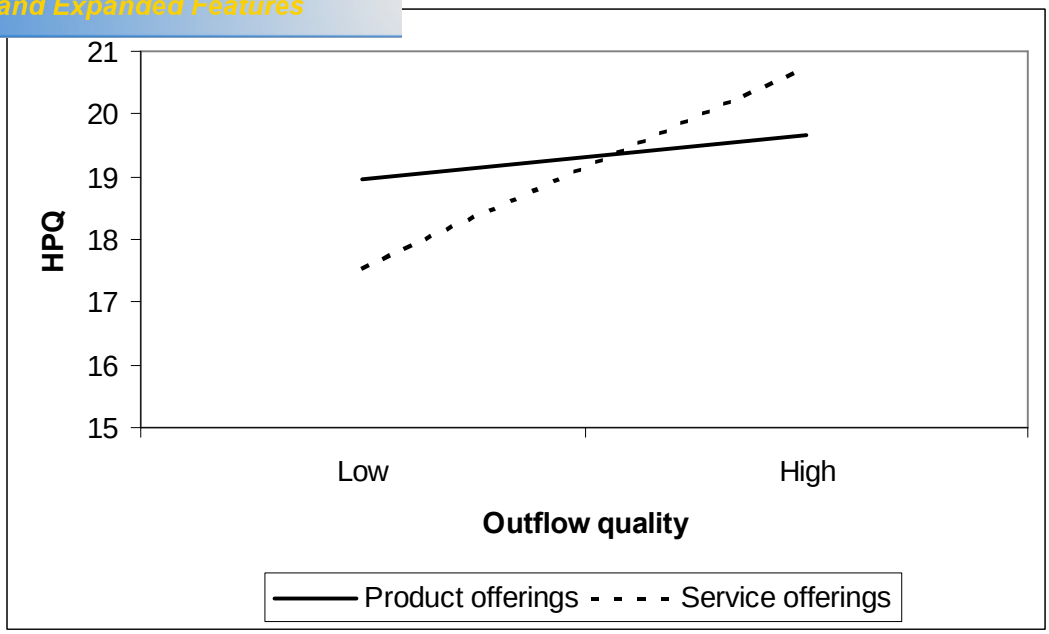
	Moderation effect of type of offering on...			
	EF→PQ	**EF→HPQ**	**EF→SPQ**	**EF→OQ**
Intercept	19.20	19.55	22.97	16.21
Industry				
Retail	.34	-.25	.12	.02
Hard	-.06	.00	.60	.00
Service firm	.54	.05	-.15	.16
Contact level (high)	-.43	.01	-1.05*	-.22
Size of client				
Small	-1.41**	-1.10	-1.03	-.87
Big	-2.24†	-1.45*	-.75	-1.12*
Size of supplier				
Small	.23	.58	.01	.17
Big	.41	-.53	-1.20**	-.03
Frequency	-.03	-.20	.00	-.05
Integration	.44†	.54†	.65†	.52†
Inflows	-.42	.19	-.19	.02
Outflows	.58†	.27	.83†	.24
EFin*EFout	-.05	.04	-.10	.04
Services*EFin	-.01	-.65	-.20	-.03
Services*EFout	.22	**.89***	**-.67***	.34
R^2	.219	.199	.271	.207
ΔR^2	.003	.024	.024	.006
F	2.67†	2.37†	3.55†	2.49†

N = 159. † *= p<.01;* ** *= P < .05,* * *= p < .1*

The relationship between outflows and HPQ was found to be significantly stronger for suppliers who tender product than service offerings (ΔR^2 = 2.4%), see Figure 8-13.

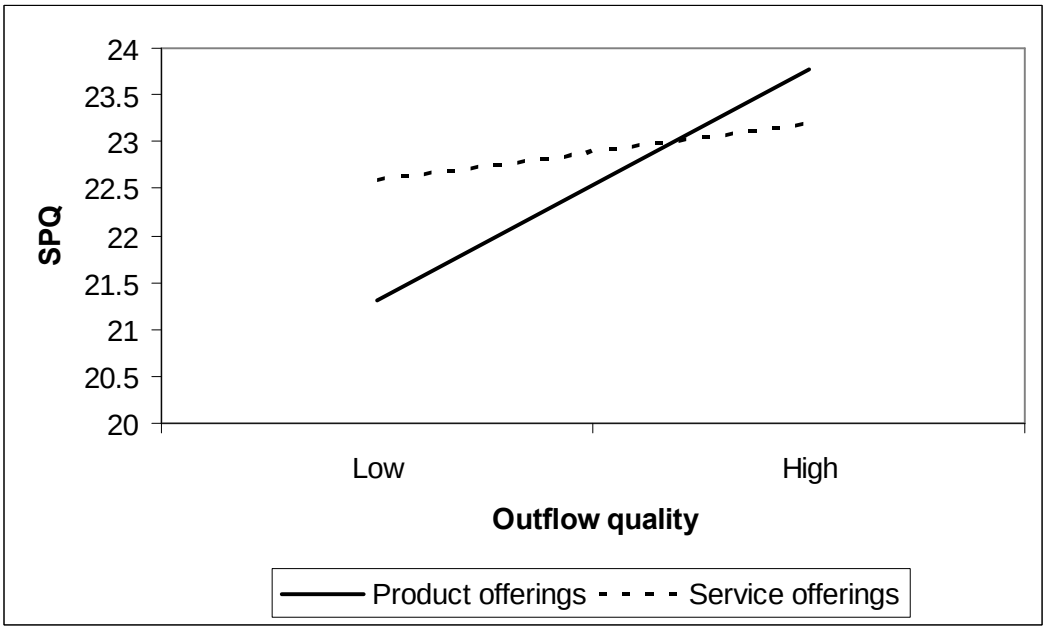
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offering and the relationship between outflows and HPQ



Conversely the relationship between outflows and SPQ was significantly stronger for service-type offerings ($\Delta R^2 = 2.4\%$), see Figure 8-14.

Figure 8-14: Interaction between type of offering and the relationship between outflows and SPQ



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s have certain limitations when considering the
ably, they cannot easily test the entire model at once, and do not take into account measurement error. These issues can be dealt with by structural equation modelling (SEM), which is therefore undertaken next.

8.2. STRUCTURAL EQUATION MODELS

As with the regression models, the first step in assessing the structural equation models are those to do with assessing data and model assumptions.

8.2.1 DIAGNOSTIC TESTS FOR STRUCTURAL EQUATION MODELS

As is well documented, normal theory SEM requires the assumptions of sufficient multivariate normality, lack of overly influential outliers, linearity, homoscedasticity and reasonably low multicollinearity to be fulfilled (Kline, 2005: 47-58). Many of these can be fulfilled through checks of normality diagnostics, as they are inter-related.

The initial analysis involved the 32 observed variables described in the methods (i.e. individual questionnaire items, excluding demographics).

Univariate normality was assessed in the same manner as for the regression diagnostics (Section 8.1.1) and multivariate normality via Mardia's Normalised Multivariate Kurtosis (Bentler & Wu, 1993)[32]. Once again the frequency variable was log-transformed to attain normality, other univariate normality scores were within acceptable range. Multivariate kurtosis was

[32] Via the SAS MULTNORM macro and SAS PROC CALIS. The commonly recommended cutoff is 3. It has also been suggested that exact hypotheses based on the normalised Mardia score is sensitive to sample-size, like univariate tests such as that of Shapiro-Wilk (Stephens, 2002). This sort of problem has led others, such as Newsome (2005), to suggest higher cut-offs for this statistic, in the latter case 30. However the more conservative cut-off of 3 will be taken seriously here.

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ect normality of zero (normalised Multivariate sum, the raw variables did seem sufficiently problematic with regard to multivariate normality for concern to be warranted. Accordingly, remedial possibilities were considered. Specifically, it was worth considering that the scale may be partly responsible for non-normality: the scales of most of the manifest variables are four point Likert-type scales, as discussed earlier, which is essentially a forced choice ordinal response format. Several authors (e.g. Bandalos & Finney, 2001; Kline, 2005: 197-198; Little, Cunningham, Shahar & Widaman, 2002) discuss the use of parceling, i.e. combination of indicators into 'parcels' based on criteria such as intercorrelation and item content, specifically for use in such cases. Therefore this approach was followed. The log of frequency and quality of flow were far more finely scaled data and left unchanged.

For the twenty four INDSERV items and the four 'integration into the supply chain' items, correlation coefficients between items within the same hypothetical sub-scales were examined, and in conjunction with considerations of similarity in item content, parceling was done on all items. This resulted in a reduction of items from the aforementioned theory to ten related parcels. **Note that all variables will be referred to as parcels from now on in the analysis.**

The parcels showed good univariate normality, although improvements were generated with transformations in several parcels. Transformed parcels were furthermore assessed for efficacy through examination of multivariate outliers, utilising hat scores (h_{ii}) and squared Mahalanobis distances (D_i^2) as with the regression diagnostics. There remained some 8 observations for which the hat and Mahalanobis distance cut offs were exceeded. These findings lead to an initial conclusion that outliers may play a part in estimation. Moving on to multivariate normality for the parcels, the results of the SAS MULTNORM macro are summarised in Table 8-14 and Table 8-15.

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for transformed variables

				Kurtosis
v1	-0.53	1.29	0.30	-0.16
v2	-0.60	1.28	0.26	0.15
v3	6.07	1.29	-0.39	-0.38
v4	15.06	4.16	-0.16	0.05
v5	33.68	12.70	0.19	0.43
v6	2.47	0.26	-0.58	0.05
v7	5.94	1.16	-0.21	-0.17
v8	5.92	1.33	-0.30	-0.17
v9	5.96	1.07	-0.12	0.00
v10	8.68	1.61	0.00	-0.10
v11	2.49	0.20	-0.15	0.02
v12	13.42	3.75	0.21	0.58
v13	1.83	0.11	-0.30	-0.05
v14	15.09	3.99	0.24	-0.21
v15	38.85	13.46	0.10	-0.54
v16	32.39	13.00	0.68	0.11
v17	3.75	1.02	-0.58	0.09

Table 8-15: Multivariate normality scores for tranformed variables

Multivariate Statistic	Score
Mardia's Multivariate Kurtosis	42.16
Relative Multivariate Kurtosis	1.13
Normalized Multivariate Kurtosis	10.75
Mardia Based Kappa (Browne, 1982)	0.13
Mean Scaled Univariate Kurtosis	-0.01
Adjusted Mean Scaled Univariate Kurtosis	-0.00

As seen in Table 8-14 and Table 8-15, univariate scores are again very good in comparison to their cut-offs. Mardia's normalised multivariate score improved dramatically, by four-fifths to 10.75 (still somewhat above the suggested cut-off of 3) at this stage. However, crucially, the shape of the chi quartile versus squared Mahalonobis distances plot suggested that the data is generally multivariate normal – it follows a 45 degree line with little systematic deviation, but that there are potentially influential multivariate outliers (as discovered earlier). In conjunction, these results suggest strongly that outliers may be responsible for any deviation from multivariate non-normality. Indeed, preliminary testing with the outliers systematically removed indicates that removing them reduces the Mardia normalised normality score by over 1 point per outlier removed, decreasing slightly per

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removal of the 10 or so outliers would bring Once again, however, deletion of outliers was not considered desirable as this would reduce sampling strength. Possibilities for dealing with this issue are discussed below, after further diagnostic tests.

Further tests of linearity and homoscedasticity were done using the same methods as the regressions. No evidence of non-linearity or unequal variance could be detected in joint distribution scatterplots. Multicollinearity (and therefore the possibility that a variable will not contribute to identification, possibly leading to empirical underidentification) was initially assessed through the descriptive tables of Table 8-16 (note that the notation 'EF' refers to employee flow, 'Int' to integration into the supply chain, and 'Freq' to interaction frequency. The INDSERV notations are as described previously).

No correlation was so high as to merit concern about these issues (generally correlations higher than .85 might be flagged, Kline, 2005). Also no Variance Inflation Factor (VIF) exceeded 10 or is overly high in relation to the others. Therefore it is concluded that multicollinearity and empirical underidentification is unlikely.

Therefore, as in the regressions, the only issue suggested by diagnostics is multivariate outliers. Specifically, multivariate normality may be slightly affected by outliers. With regard to solutions, although alternative SEM estimation procedures (e.g. weighted or partial least squares) or robust estimation procedures (e.g. Satorra-Bentler statistics) are possibilities in the case of uncertain multivariate normality, another possibility presented itself. Since outliers were seemingly responsible for remaining normality issues, while other issues were resolved, robust covariance theory can be utilised (Huber, 1973; Huber, 1981; Rousseeuw, 1984; Rousseeuw & Van Driessen, 1999; Rousseeuw & Yohai, 1984; Yohai, 1987). Robust covariance theory allows covariance matrices adjusted for outliers to be generated, which can be used as an input to normal theory SEM. This approach was therefore adopted.

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Table 8-16: Correlation table for transformed and rescaled variables (N=168)

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. EFIn	-.53	1.29	1.00	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2. EFout	-.60	1.28	.36	1.00	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3. PQ1	6.07	1.29	-.05	.04	1.00	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4. PQ2	3.76	1.04	-.01	.14	.51	1.00	.	.	.	.	.	.	.	.	.	.	.	.	.
5. PQ3	2.59	.98	.07	.25	.29	.37	1.00	.	.	.	.	.	.	.	.	.	.	.	.
6. HPQ1	9.88	1.02	.10	.20	.48	.56	.48	1.00	.	.	.	.	.	.	.	.	.	.	.
7. HPQ2	5.94	1.16	.09	.13	.44	.58	.43	.65	1.00	.	.	.	.	.	.	.	.	.	.
8. HPQ3	4.23	.95	.06	.09	.52	.50	.34	.49	.49	1.00	.	.	.	.	.	.	.	.	.
9. SPQ1	5.96	1.07	.02	.04	.34	.41	.40	.39	.51	.49	1.00	.	.	.	.	.	.	.	.
10. SPQ2	5.79	1.07	.06	.11	.47	.49	.36	.48	.60	.60	.58	1.00	.	.	.	.	.	.	.
11. SPQ3	12.47	1.02	-.03	.14	.43	.32	.41	.40	.49	.53	.45	.54	1.00	.	.	.	.	.	.
12. OQ1	3.35	.94	.21	.16	.32	.36	.32	.32	.46	.33	.36	.58	.37	1.00	.	.	.	.	.
13. OQ2	18.26	1.08	.12	.23	.54	.51	.53	.54	.60	.58	.48	.59	.53	.44	1.00	.	.	.	.
14. OQ3	3.77	1.00	.03	.00	.48	.47	.39	.42	.50	.56	.49	.57	.45	.31	.67	1.00	.	.	.
15. Int1	3.24	1.12	.07	-.03	.13	.14	.19	.05	.16	.25	.19	.24	.19	.22	.29	.33	1.00	.	
16. Int2	2.70	1.08	-.06	-.04	.29	.21	.13	.10	.27	.34	.34	.39	.26	.28	.29	.30	.35	1.00	
17. Freq	3.75	1.02	.08	.00	-.02	.00	.02	-.12	-.10	.04	-.03	.00	-.09	.06	.04	-.05	.03	-.03	1.00

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Various robust estimation procedures have been suggested for situations such as this. In this case the minimum covariance determinant (MCD) method of Rousseeuw and Van Driessen (1999) is used, as it is generally acknowleged as one of the most stable and commonly used methods (e.g. Friendly, 2007) although others are available (e.g. the Minimum Volume Estimator or 'MVE' which minimises the space within the k-dimension ellipsoid containing *n*, Rousseeuw 1984). The Pison, Van Aelst and Willelms (2002) correction to the MCD was furthermore applied.

To estimate the robust MCD covariance matrix, Friendly's (2007) 'ROBCOV' (version 1.3.2) macro was used. This macro also optionally utilises the Pison *et al.* (2002) correction. The application of the MCD algorithm to the data resulted in the covariance matrix reported in Table 8-17, which is used as the input to the initial SEM analyses below.

8.2.3 CONFIRMATORY FACTOR ANALYSIS MEASUREMENT MODELS

As discussed, a two-stage SEM procedure is utilised (Hatcher, 1994: 345; Kline, 2005: 215-218). The first stage involves testing of the measurement portion of the model via confirmatory factor analysis.

A. Single Latent Factor Model

In accordance with suggested practice (e.g. Kline, 2005: 180) a one-factor solution is tested first with all manifest variables loading on that factor. The model is known to be identified in terms of the three-factor rule (there are more than two manifest variables to the single factor and the model is unidimensional, Bollen, 1989).

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Table 8-17: Final robust MCD-derived covariance matrix used as initial SEM input

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. EFIn	2.00	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2. EFout	1.23	2.26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3. PQ1	-.16	-.05	2.08	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4. PQ2	.00	.15	.63	1.00	.	.	.	.	.	.	.	.	.	.	.	.	.
5. PQ3	.14	.23	.51	.39	1.11	.	.	.	.	.	.	.	.	.	.	.	.
6. HPQ1	.06	.39	.93	.63	.43	1.32	.	.	.	.	.	.	.	.	.	.	.
7. HPQ2	.06	.25	1.06	.78	.64	1.05	1.52	.	.	.	.	.	.	.	.	.	.
8. HPQ3	.01	.06	.56	.38	.28	.49	.55	.48	.	.	.	.	.	.	.	.	.
9. SPQ1	-.23	-.04	.82	.57	.63	.76	.97	.50	1.30	.	.	.	.	.	.	.	.
10. SPQ2	-.19	-.09	.98	.73	.58	.79	1.10	.62	1.04	1.68	.	.	.	.	.	.	.
11. SPQ3	-.07	.10	.73	.44	.49	.57	.74	.44	.66	.79	.95	.	.	.	.	.	.
12. OQ1	.15	.17	.46	.38	.45	.39	.70	.28	.50	.72	.45	.91	.	.	.	.	.
13. OQ2	.23	.31	.90	.63	.66	.79	1.09	.58	.75	1.05	.70	.67	1.49	.	.	.	.
14. OQ3	-.06	-.04	.87	.61	.41	.51	.84	.44	.78	.94	.60	.59	.93	1.25	.	.	.
15. Int1	-.03	.02	.07	.07	.08	.04	.07	.04	.06	.10	.04	.07	.11	.09	.05	.	.
16. Int2	-.04	-.03	.24	.15	.14	.12	.20	.12	.17	.26	.16	.21	.23	.23	.03	.12	.
17. Freq	-.04	.11	.07	-.04	-.04	-.25	-.08	.01	.04	.11	.09	.06	.10	.01	.01	.03	1.32

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e examined first (see Section 7.5, p201 for the
plied). For the single factor model fit statistics included Chi square (120) = 474.84, $p < .001$; RMSEA = .13 (90% CI = .12-.15); GFI = .76; RMR = .33; CFI = .78; NNFI = .75. These clearly manifest lack of fit for the single-factor model (as explained in Table 7-3, significance chi-square, RMSEA > .1, RMR significantly larger than zero, and CFI or NNFI < .9 all indicate possible fit issues). In addition, there were a large number of normalised residuals larger than 2, again indicating poor fit. This finding supports some sort of multi-dimensional model as hypothesised. Therefore the measurement model as hypothesised in Chapter Seven was estimated as reported below.

B. Multi-Factor CFA Model – Maximum Likelihood Estimation

The initial measurement model that was estimated involved the core latent variables of Figure 7-2, namely those involving EF and the INDSERV sub-items.

There was an initial issue to be dealt with in the fact that in the model both quality of employee flow and frequency are single-item indicators, which violates the requirements for identification. As usual in such cases, the variance of the indicator in each case is estimated *a priori*. For frequency, the straightforward and objective nature of the variable leads to a conclusion that measurement error is likely to be low – it is unlikely that managers will misestimate the frequency of interaction. Therefore a 5% measurement error is applied to this variable. The measurement error in the quality of employee flow variable is more difficult, but much work has been done in the decision theoretic utility field in estimating measurement error of such variables. Evidence from such studies (e.g. see Boudreau, 1991) suggests measurement

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ions. These errors were therefore utilised to nces for these two indicators.

Identification checks for the initial CFA model suggest overidentification – observations exceed parameters and the model passes the two-factor rule (Bollen, 1989) except for the first two which due to the procedure above are identified. Constraint interaction tests (Steiger, 2002) also indicate no cause for concern. These checks are not further reported unless necessary.

The initial predicted measurement model exhibited fit of Chi square (58) = 148.01, $p < .001$; RMSEA = .096 (90% CI = .077-.116); GFI = .821; RMR = .073; CFI = .928; NNFI = .887. This initial fit remains fairly poor, including some very large residuals.

Examination of the residuals, standardised coefficients, actual vs. predicted covariance tables as well as the modification indices suggested that a problem may exist with the integration factor, which fits poorly with the rest of the model. Given the relative lack of importance of the integration concept in the overall model (the variable was added based on only a few other studies, and it is essentially a moderator not a core variable), and the theoretical inadvisability of adding paths to other factors or variables, it was also decided to drop the integration variables and latent factor altogether from the model. The new model without integration exhibited radically improved fit, with indices including Chi square (41) = 70.09, p =.003; RMSEA =.065 (90% CI = .038-.090); GFI = .583; RMR = .05; CFI = .974; NNFI = .958. As seen above, the chi-square statistic was more than halved by this modification, with Chi_D (17) = 77.92, $p < .001$. Nonetheless, fit is adequate but not optimal.

Examination of the residuals, actual vs. predicted covariance tables as well as the modification indices suggested that two further alterations could be made to the model. Both of these changes involve allowing manifest variables in the INDSERV scale to covary, firstly one of the OQ and one of the

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one of the SPQ and one of the HPQ items. actual vs. predicted covariance tables suggest strongly that a covariance be added between the error terms of one of the Outcome Quality (OQ) variables and the error term of one of the Hard Process Quality (HPQ) items. Specifically, the OQ variable is that concerning success of the supplier in reaching its objectives, while the HPQ item is that dealing with the ability of the supplier to understand the customer's needs and know the details of their business. The residual between these two variables is exceptionately large, greater than 4, and the Phi matrix improvement is almost one quarter of the extant chi-square score.

This respecification route expresses the possibility that these variables share some cause common to both of them, which could range from common measurement (which is the case here) to more fundamental reasons such as the similarity of management or operational processes which produce both the 'intermediate' process quality issues addressed by the HPQ and SPQ variables and the outcomes thereof. This would seem to be defensible here: the particular covariance here suggests that process quality with regards to timing of supply shares a common cause with the outcomes of that supply. What common cause could underlie both timing and outcomes? Macro-economic variables (or any micro-economic variables of an exogenous nature such as industry strikes) could do so, as well as communalities between the supplier and customer firm with regards to integration in supply chains. Therefore there is sufficient theoretical reason to accept a possible covariance between the error terms of these two variables.

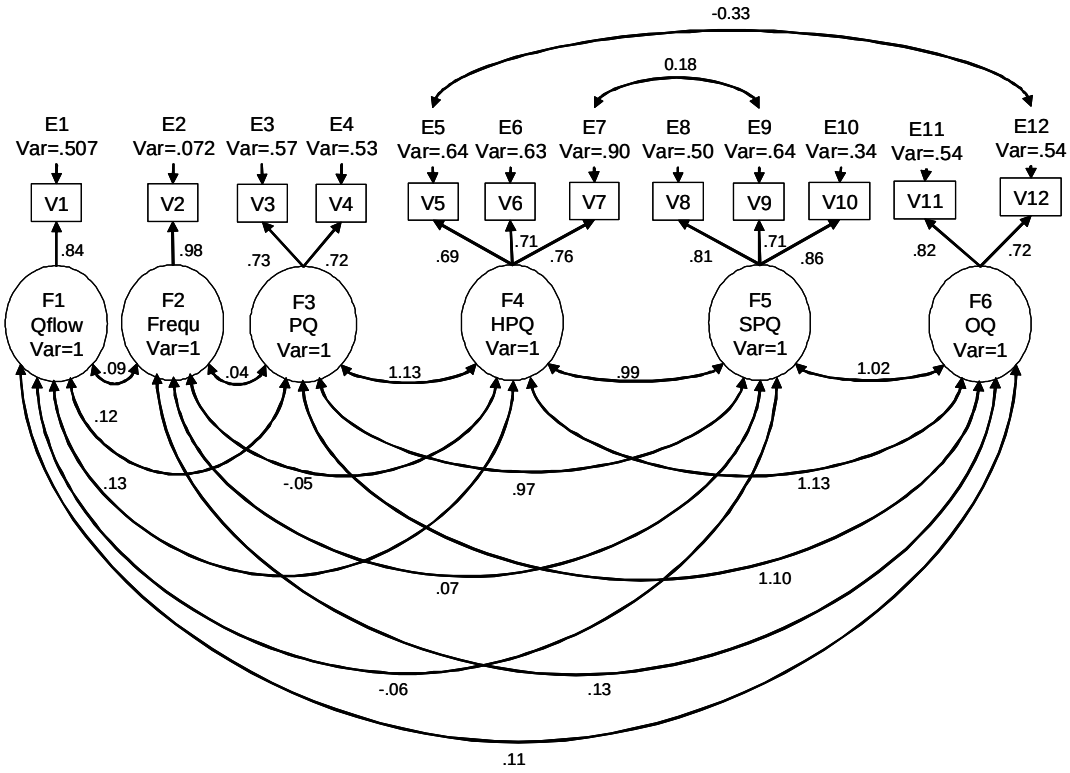
These changes produce remarkably good fit in the model, with indices including Chi square (39) = 49.18, p =.127; RMSEA =.039 (90% CI = 0-.070); GFI = .954; RMR = .045; CFI = . 991; NNFI = .985. There remain few large residuals and standardised coefficients are all reasonably high (none smaller than .65). In addition, examination of modification indices indicate that there is no

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y decreases the chi-square statistic at the .01

The measurement model produced is shown in Figure 8-15, with standardised coefficients.

Figure 8-15: ML measurement model with aggregated EF (standardized coefficients)



A similar result was obtained for a measurement model in which EF was disaggregated and therefore where the factor had two indicators.

Notwithstanding these encouraging results, the inability of the measurement models to fit integration – which, after all, was a significant regressor in the multiple regressions – led to two further estimation approaches to be considered. One possibility for a measurement model is a hierarchical second-order factor analysis in which a second-order 'INDSERV' factor underlies all the first-order INDSERV factors. This option may be

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on of INDSERV as an implicit second-order
s considered next. Secondly, two-stage least squares estimation of the CFA model is considered.

C. Second Order Factor Analysis

Two models in this regard were tested. First was the insertion of a second-order 'INDSERV' factor into the main model reported above. Second was the examination of the INDSERV parcels model only, with an underlying 'INDSERV' factor.

However both of these models presented with very poor fit, effectively with retarded optimisation. The option of a second-order factor was therefore rejected as a possibility.

This finding does cast effective doubt in this study on the cohesion of the INDSERV concept and model altogether, since INDSERV is supposed to be a single latent construct. This is discussed further in the next chapter.

Two-stage least squares estimation is considered next.

D. Two-stage Least Squares (2SLS) CFA Model

As discussed in Section 7.5, two-stage least squares (2SLS) is an alternative estimator for SEM models that can help overcome issues such as Heywood cases (Bollen, 1996), as it is a partial information method, stable by definition against such issues. In the method, the fit of each manifest variable's is assessed vis-à-vis the scaling variable for its latent factor.

The fit of the 2SLS measurement model equations was found to be sufficient to proceed to structural estimation – all latent variable measurement equations had significant F statistics, reasonably high R^2 statistics, and no other issues were found. Therefore the structural models are estimated next.

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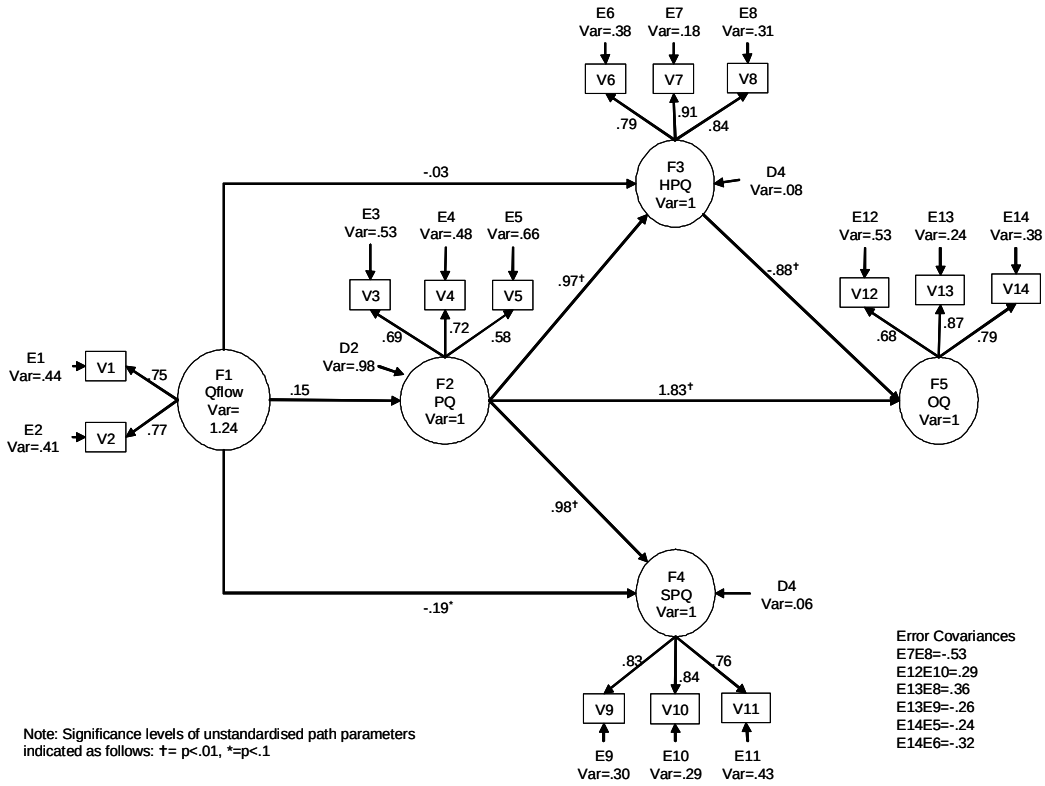
The structural model was first fit with maximum likelihood estimation, with structural paths fit between latent variables as dictated by theory.

A. Maximum Likelihood Structural Model

Several initial models were fit in this phase to accord with the hypothesised model. Firstly, the model from Figure 7-2 was fit using the exact measurement model from the CFA phase, first with EF disaggregated. After some structural alterations, notably the removal of a problematic path between SPQ and OQ, the model produced had fit statistics including Chi square (65) = 85.68, p = .044; RMSEA =.044 (90% CI = 008-.067); GFI = .934; RMR = .078; CFI = .985; NNFI = .980, indicating acceptable fit.

This structural model is shown in Figure 8-16.

Figure 8-16: Initial structural model (standardised paths including problematic Heywood cases)

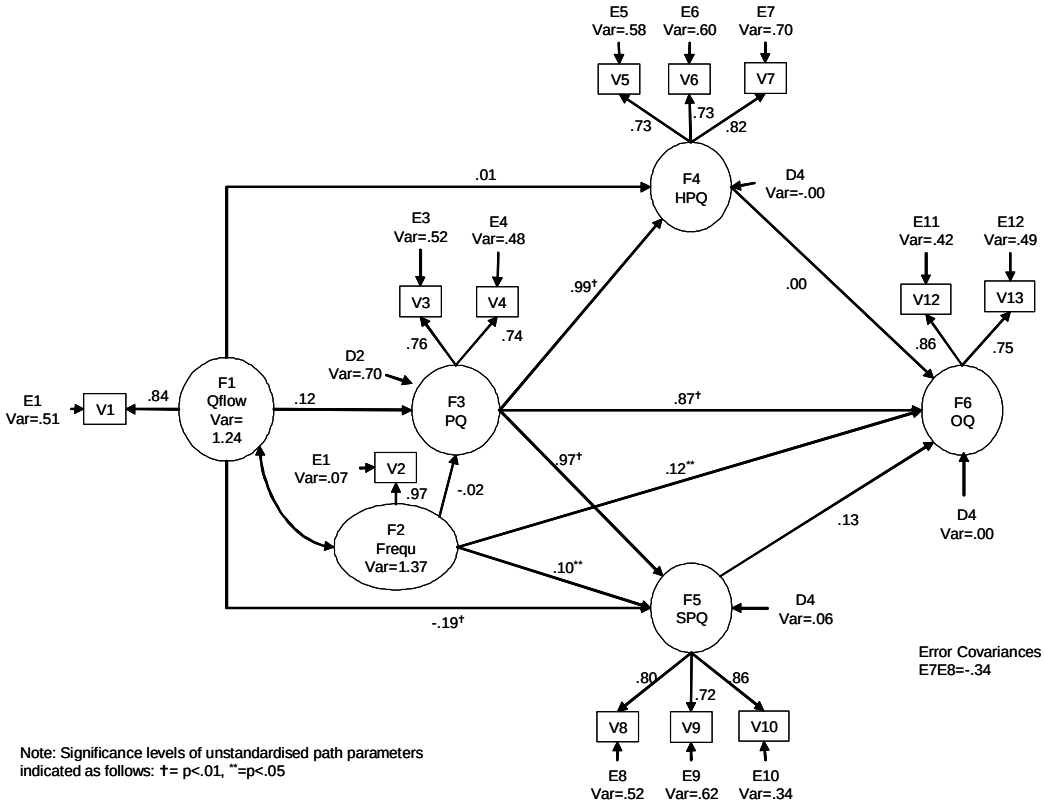


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s development this model produced several possible fit problems in the structural model. Diagnostic analyses – including examinations of scaling of the covariance matrix, misspecification and constraint interaction – could not find the source of the problematic cases.

A large number of alternative structural models were also attempted, with various specifications (such as casting EF as a single or multiple-indicator latent variable) and numerous different means of parcelling indicators. The best of these is shown in Figure 8-17 below because it is used in equivalent model estimation below, is a model using the aggregated EF indicator, and includes frequency. However all these models continued to have Heywood case issues.

Figure 8-17: Structural model with single EF item model (also with problem Heywood cases)



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of the problems with estimation, the same mation was adopted, namely estimation of the structural model with 2SLS.

B. Two-Stage Least Squares Structural Regression

The 2SLS structural model was first estimated using the main variables, being disaggregated EF as well as the INDSERV sub-items. As per the Bollen (1996) model (see Section 7.5), one parcel per latent variable was chosen as a reference variable; in each case the parcel thought to be best representative of the general factor was chosen (for EF, outflows were used as a reference variable, because of their efficacy in the regression models). Due to the nature of 2SLS, the final OQ variable was summated in total, as the parcels of this variable cannot be used as instruments for any factor (Ockowski, 2003).

Table 8-18 shows the fit tests associated with 2SLS SEM models (Bollen, 1996, Pesaran & Taylor, 1999; White, 1980; see Section 7.5 for a description of the tests), and Table 8-19 shows the initial 2SLS path coefficients.

Importantly, Table 8-18 shows that three of the models may suffer from possible fit problems, the PQ, HPQ and SPQ equations (for all three of which the White heteroscedasticity test showed significant departure, and for which at least one of the general goodness of fit tests evidenced significant departure).

Table 8-18: Fit tests for initial 2SLS models

	PQ	HPQ	SPQ	OQ
Fit test[a]	$\chi(3)=7.36$	$\chi(6)=12.65^{**}$	$\chi(6)=13.74^{**}$	$\chi(7)=5.98$
FF_2 (t) test[b]	-2.47^{**}	-1.53	-1.00	-.21
HET_1 (t) test[c]	1.64	$-3.55^{\dagger}$	$-3.93^{\dagger}$	-.82
White test[d]	$\chi(2)=11.52^{\dagger}$	$\chi(5)=23.71^{\dagger}$	$\chi(5)=29.13^{\dagger}$	$\chi(9)=6.03$
F	4.60^{**}(df=1)	$59.58^{\dagger}$(df=2)	$47.47^{\dagger}$(df=2)	$62.93^{\dagger}$(df=3)

[a]General model specification test (Bollen, 1996) [b]Specification error test (Pesaran & Taylor, 1999) [c]Pesaran and Taylor's (1999) heteroscedasticity test [d]White's (1980, 825) Corollary 1 heteroscedasticity test

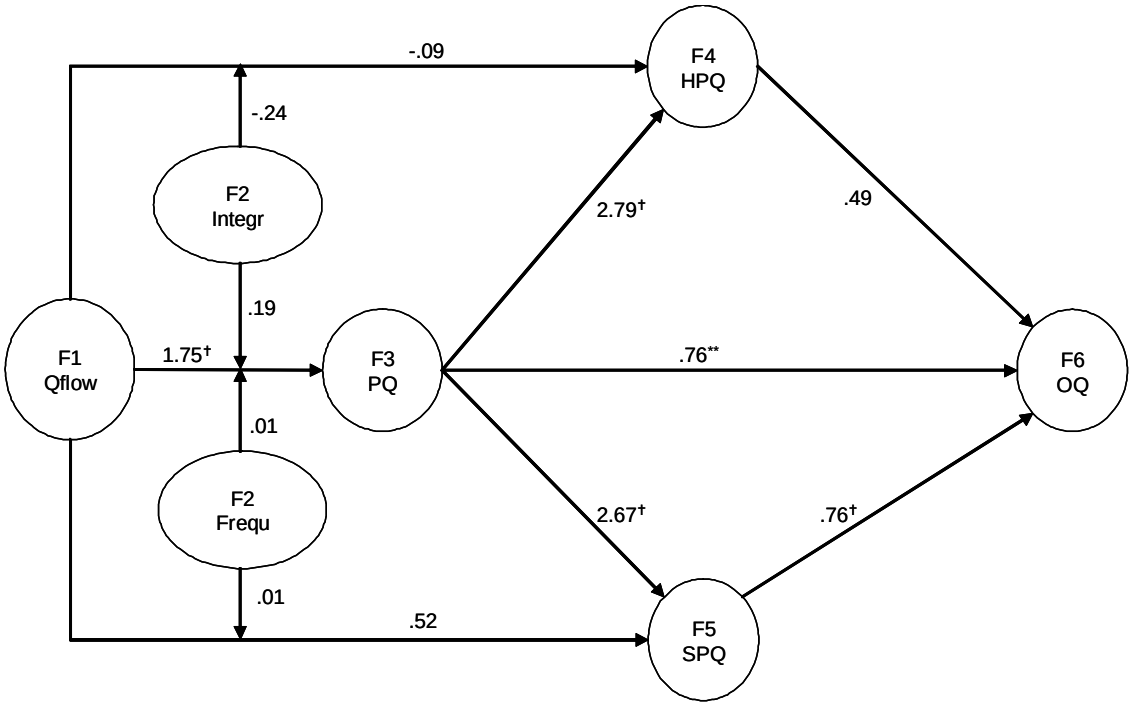
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eroscedasticity issues, the equations were re-
edastic 2SLS procedure (Green, 2003: 398-401), which fits a generalised moment of means (GMM) estimator with White's (1980) consistent variance-covariance matrix adjustment. The alternative GMM parameters are also shown in Table 8-19, and repeated diagrammatically in Figure 8-18.

Table 8-19: Initial 2SLS parameters and final instrumented GMM parameters

	PQ		HPQ		SPQ		OQ	
	2SLS	GMM	2SLS	GMM	2SLS	GMM	2SLS	GMM
EF	1.47**	1.75†	.20	-.09	.75	.52	-	-
PQ	-	-	2.75†	2.79†	2.46†	2.67†	.78**	.76**
HPQ	-	-	-	-	-	-	.55	.49
SPQ	-	-	-	-	-	-	.63**	.76†
R^2	.03	-.31	.42	.24	.36	.06	.53	.51

Figure 8-18: 2SLS structural equation model estimated via GMM method



Note: Significance levels of unstandardised path parameters indicated as follows: †= p<.01, **=p<.05

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e in both types of 2SLS estimation used here for , which is the case for the GMM estimation of PQ. This does not invalidate the equation (Green, 2003; Oczkowski, 2003), but does make the interpretation somewhat difficult.

Table 8-20 shows the effects decomposition for the GMM structural model, utilising unstandardised paths and standard errors (standardised paths are not provided for GMM estimation). The standard errors for the indirect paths are estimated using the Sobel (1982) method, although it is noted that the GMM standard errors are only approximate.

Table 8-20: Structural model effects decomposition (unstandardised GMM paths and SEs)

	Endogenous variables							
	PQ		HPQ		SPQ		OQ	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
EF								
Direct effect	1.75†	.66	-.09	.49	.52	.58	-	-
Indirect effect	-		4.88†	1.89	4.67†	1.82	1.68	some[b]
Total effects	1.75†	.66	4.79	ns[b]	5.19	ns[b]	1.68	some[b]
PQ								
Direct effect	-	-	2.79†	.24	2.67†	.25	.76**	.36
Indirect effect	-	-	-	-	-	-	3.40	some[b]
Total effects	-	-	2.79†	.24	2.67†	.25	4.16	some[b]
HPQ								
Direct effect	-	-	-	-	-	-	.49	.43
Indirect effect	-	-	-	-	-	-	-	-
Total effects	-	-					.49	.43
SPQ								
Direct effect	-	-	-	-	-	-	.76†	.29
Indirect effect	-	-	-	-	-	-	-	-
Total effects	-	-	-	-	-	-	.76†	.29

Notes. SE = standard error. † = p < .01, ** = p < .05. '*ns*' = SE not calculable but assumed not significant, see [b] '*some*' = some indirect paths significant but not all, see [b]

[a] The significance of single-mediator indirect effects with paths a and b is estimated via the Sobel (1982, 1986) test: $SEab = (b^2SE_a^2 + a^2SE_b^2)^{1/2}$.

[b] The significance of multiple-mediated indirect effects is assumed utilising the Cohen and Cohen (1983) guideline that each component path should be significant at the same level of α.

Finally, Table 8-21 shows the moderation tests, as described in Bollen and Paxton (1998) and discussed in Section 7.5.

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	Moderation effect			
	Frequency moderating...		Integration moderating...	
	EF→PQ	EF→SPQ	EF→PQ	EF→HPQ
EF	-.59	-.56	-.41	2.09
PQ	-	2.36†	-	2.87†
Moderator	.03	.00	1.10	.43
EF*moderator	.01	.01	.19	-.24

Table 8-21 suggests that none of the hypothesised moderation effects hold in the 2SLS models.

8.2.5 FURTHER AND EQUIVALENT MODELS

Two further sets of models were considered. Firstly, a great number of models were tested in which the EF variable was split into various further constituent parts. These models did not fit or, in the case of maximum likelihood, even converge.

Secondly, equivalent models with identical fit to that above were considered (Kline, 2005: 153-156). In the context of ML estimation where chi-square distributions are relevant, equivalent models are statistically inseparable from each other, and have identical fit indices. Therefore it is important to consider theoretically plausible equivalent models.

However the final models pursued above are 2SLS and associated models. These are not amenable to equivalent model estimation because, as alternative specifications arise, the instruments utilised alter. As as a result, the fundamental equations and fit change. There do not appear to be any extant investigations into equivalency in 2SLS, and equivalency is not usually considered for 2SLS estimation (Bollen, personal communication, 2008; Oczkowski, personal communication, 2008).

However it was decided to try and pursue some options for ML equivalency to see if the Heywood case issue might be overcome via alternate

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l in this case was that seen in Figure 8-17 where
d EF had a single aggregated indicator.

The Lee-Herschberger respecification rules (Herschberger, 1994; Lee & Herschberger, 1990) were utilised to decide on equivalent models. These rules allow for respecification of paths (e.g. reversal of direction, switching between causal paths and covariances) in two cases: 1) where a block of models at the beginning of a model is just-identified, or 2) where two or more later endogenous variables share the same antecedents.

Working from the path model of Figure 8-17, the only main beginning block that is just-identified is that involving EF, frequency and PQ. Paths linking EF to HPQ and SPQ and frequency to SPQ and OQ are just identified in themselves, but respecification renders the model non-recursive, which does not result in equivalent models. These changes were nonetheless tried, but the resulting respecifications would not converge, or again generated significant Heywood cases, suggesting possible loss of identification.

Therefore the equivalent models that were considered involved changes within EF, frequency and PQ. The following were considered and are showed in Table 8-22:

1. *Equivalent model 1*: Instead of covarying EF and frequency of interaction, flow is respecified to affect frequency directly. This may be plausible in the event that social networking/bonding forces are high, in which case greater EF may disrupt relationships and therefore decrease frequency;
2. *Equivalent model 2*: Instead of hypothesising any causation, EF, frequency of interaction and PQ can be respecified only to covary (intimating that they share some common external causes but do not cause each other directly). This goes against the hypotheses offered in the thesis, but may be plausible given that the varied antecedents used in this model may be

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ussed in the regression analysis) on factors such
n size.

3. *Equivalent model 3*: In this model two respecifications are made: a) PQ is respecified to affect perceptions of quality of EF, b) frequency is respecified to EF. The former effect is perhaps possible in situations where the client has confidence in the general potential of the supplier to provide service, and based on this perceives EF to be in accordance with this ability. The latter respecification may occur if frequency allows the customer to perceive more details of the supplier's operations and therefore to have the opportunity to accumulate critical incidents.
4. *Equivalent model 4*: In this model PQ and frequency again affect quality of EF. However, a further change is that frequency is specified to covary with PQ, and so share outside influences. The same justifications as equivalent model 2 apply.
5. *Equivalent model 5*: Again PQ affects EF and, in this case, frequency of interaction as well, and frequency further leads to quality of EF. PQ may possibly impact on frequency if the customer's management of the relationship depends on their confidence in the potential of the supplier.

With regard to subsequent endogenous variables, no two endogenous variables have exactly the same causes, and therefore cannot be used to generate equivalent models.

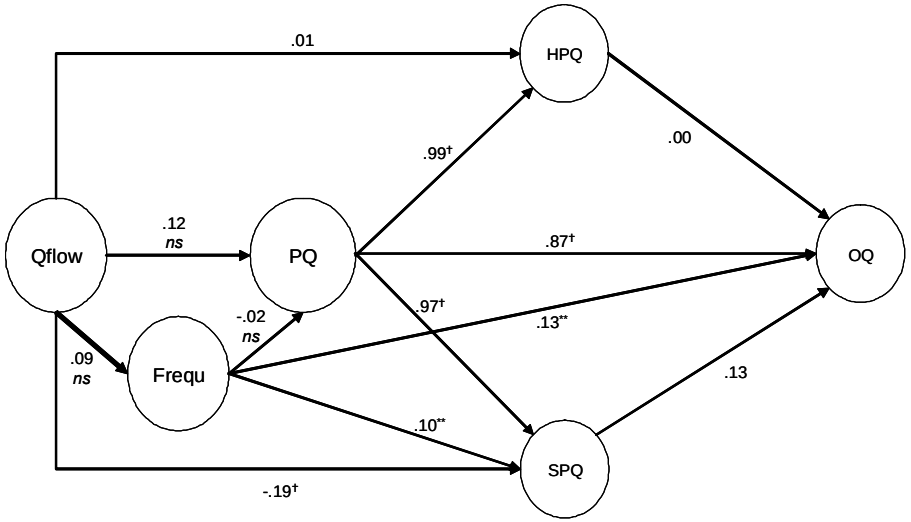
As seen in the equivalent model figures, none of the respecifications provides particular cause for comment – none of the paths are significant, and no new covariance is so high as to merit model preference. Furthermore, most important, the Heywood case problem was not eliminated, suggesting that it lies in the subsequent variables which are not amenable to equivalent model respecification. Therefore the GMM model retained in Figure 8-18 is the leading model produced and will be discussed in subsequent analyses.

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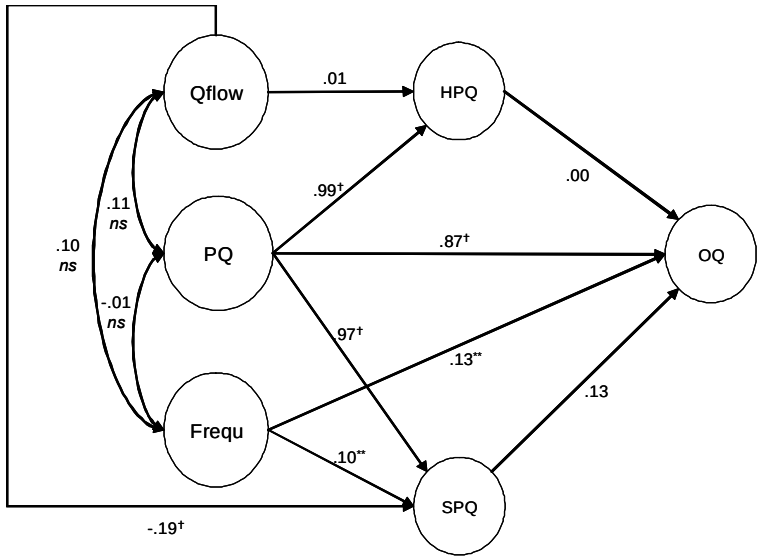
Table 8-22: Equivalent models applying to previous SEM model

(Note: Equivalent models are statistically indistinguishable from prior model, fit statistics are identical)

Equivalent model 1: EF causing frequency of interaction

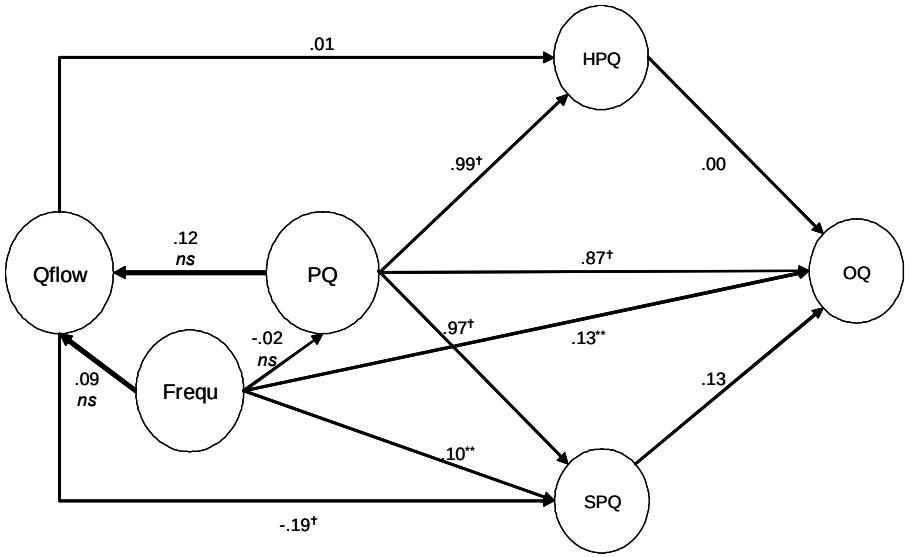


Equivalent model 2: EF, frequency of interaction and PQ covary (share some common external causes) but do not cause each other directly, All three exogenous

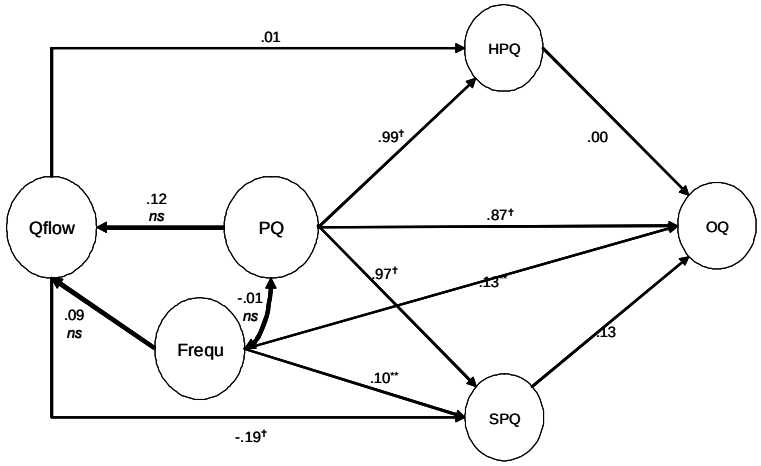


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Equivalent model 3: Generalised potential quality affect specific perceptions of quality of EF, and frequency of interaction affects perceptions of quality of EF.

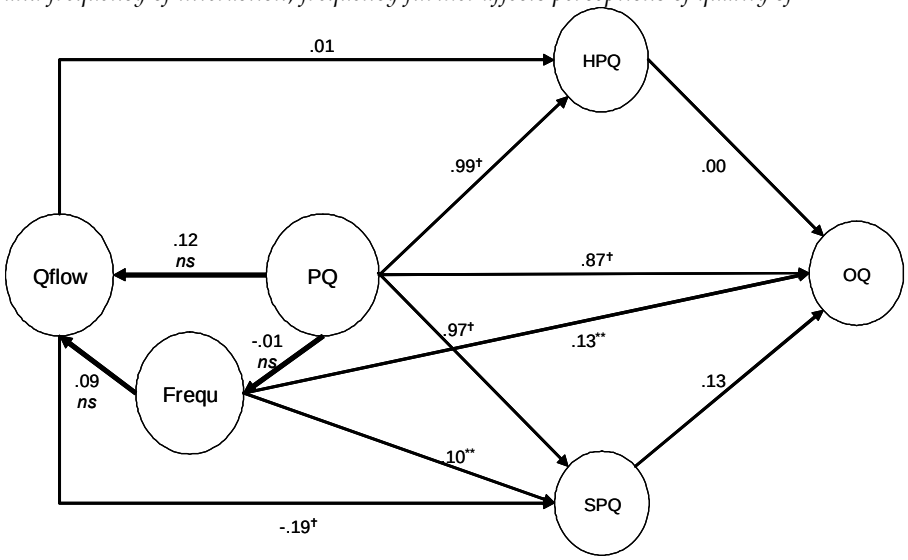


*Equivalent model 4: Generalised potential quality affect specific perceptions of quality of EF, frequency of interaction affects perceptions of quality of EF **and** PQ and frequency covary.*



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Equivalent model 5: Generalised potential quality affects both specific perceptions of quality of EF and frequency of interaction, frequency further affects perceptions of quality of EF



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demographic splits of the SEM models (via Kline, 2005) were not considered, as even with two categories the resulting sample sizes would be too small for adequate SEM estimation. The multiple regression findings serve however to answer the hypotheses in this regard.

8.3. CONCLUSION ON EMPIRICAL FINDINGS

A general summary of the empirical findings is as follows:

1) Perhaps most importantly, EF (employee flow) as an integrated construct was found to have various effects on different elements of B2B service quality:
   a) When operationalised as a latent variable in 2SLS SEM models, EF impacted directly and significantly on PQ, and via mediation had seemingly significant paths through PQ to all other elements of service.
   b) On the other hand, EF conceived as a single aggregated manifest variable was found to have significant (albeit generally small) direct effects on some of the more distal elements of B2B service quality but not on the first element of PQ. Notably, the standard regression models found a small effect on HPQ.
   c) The explanatory ability of EF was significantly improved by the disaggregation of the variable into quality of outflows and quality of inflows. This disaggregation leads to outflows being a significant positive predictor of all elements of INDSERV. In the regressions, inflows were significantly but negatively related to PQ.
2) Furthermore, PQ, HPQ and SPQ were found to mediate between disaggregated employee outflows and OQ in the regression models (and HPQ mediated when aggregated flows were utilised in regression).

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ng characteristics of the relationship (frequency
upply chain) are summarised in Table 8-23, as discovered in the regression models.

Table 8-23: Summary of regression interaction findings

Moderator	Main effects relationship			
	EF→PQ	**EF→HPQ**	**EF→SPQ**	**EF→OQ**
Frequency	Outflows stronger with a) poor inflows under low frequency and b) good inflows under high frequency	-	No interaction	No interaction
Integration	Inflows more negatively related with greater integration	No interaction	-	No interaction
Size of supplier	No interaction	No interaction	Outflows stronger for bigger firms	Inflows have negative impact for big suppliers vs. positive for smaller
Size of client	Outflows stronger for bigger clients	Outflows negative for medium clients vs. positive for small/big	No interaction	Outflows weaker for medium clients
No. contact staff	No interaction	No interaction	Outflows stronger when more contact staff	No interaction
Industry	No interaction	Outflows stronger for services than ‘hardô	Outflows stronger for service industry	Outflows stronger for service industry
Type of offering	No interaction	Outflows stronger for service offerings	Outflows weaker for service offerings	No interaction

The conclusion of the empirical tests therefore is that EF does appear to have potential as an explanatory variable in B2B service quality settings, with interesting and potentially useful refinements depending upon context. The results are discussed and compared further in the next chapter, which provides a discussion of the findings, recommendations based on these results, and limitations.

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9. DISCUSSION AND RECOMMENDATIONS

This section proceeds with discussion, recommendations and conclusions regarding the results discussed in the previous chapter. Results are discussed in light of the research questions and hypotheses, as summarised in Table 9-1.

Table 9-1: General links between research question, hypotheses and findings

Research question	Corresponding hypotheses	Comments
Research question 1: Would an integrated and qualitative measure of EF have significant explanatory ability in a service-profit chain type study?	H4-H7.	EF was a significant antecedent, although complete integration was less efficacious than partial disaggregation.
Research question 2: Do B2B service outcomes for customers have multiple dimensions (i.e. a complex sub-structure composed of several distinct facets) including those related to customer equity drivers?	(Effectively) H1-H3.	CFA confirmed expected multi-dimensional measurement qualities of INDSERV, which has parallels to CE drivers.
Research question 3: Do integrated indices of EF quantity and quality in a B2B business environment positively affect B2B service outcomes?	H4-H7.	EF was a significant antecedent of INDSERV elements.
Research question 4: If the impacts posited in research question 3 are found to exist, do they have different effect sizes?	H1-H7.	As expected, effect sizes were greatest for more proximal service outcomes
Research question 5: If the impacts posited in research question 3 are found to exist, do complex interrelationships such as mediation exist, in terms of which 'input' type elements of customer service such as relational quality mediate between EF and the outcomes of service for the customer?	H4-H7.	EF affected all other aspects of service via mediation through PQ, and OQ via both PQ and the indirect PQ→OQ path.
Research question 6: Do frequency and integration of the customer into the supply chain moderate the effects of EF on customer outcomes?	H8-H9.	Integration moderated the Inflows→PQ path, frequency has a complex three-way interaction.
Research question 7: Do characteristics of the organisations, including supplier and customer sizes, number of contact employees, type of industry and type of supplier offering, act as moderators of EF effects?	H10-H12.	Various interaction effects with size/scale and industry/offering variables were discovered.

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w summarises specific findings and conclusions

l hypothesis, as an aid to a broad view.

Table 9-2: Specific findings and commensurate outcomes of hypotheses testing

Specific hypotheses	Findings	Rejection/support for hypotheses
H1: Direct positive relationships between a) PQ and OQ, b) HPQ and OQ, c) SPQ and OQ.	PQ→OQ and PQ→SPQ supported, HPQ→OQ supported in regressions but not SEM.	H1a and H1c supported, H1b probably rejected.
H2: Direct positive relationships between a) PQ and HPQ and b) PQ and SPQ.	Both paths supported by all statistics.	H2 supported.
H3: Partial mediation roles for a) HPQ and b) SPQ exist in the PQ→ OQ relationship.	PQ→SPQ→OQ supported PQ→HPQ→OQ supported in regressions but not SEM.	H3a probably not supported, H3b supported.
H4: Higher nett quality of EF (hereafter 'EF') will directly and positively affect PQ.	EFagg→PQ supported in SEM Outflows→PQ supported, inflows has negative effect.	Partial support, SEM seems to indicate confidence in hypothesis.
H5a: HPQ will be affected directly and positively by EF.	EF→HPQ effect disappears with inclusion of PQ, suggests no/little direct link but mediation through PQ.	Not supported.
H5b: HPQ affected indirectly and positively by EF mediation through PQ.	See H5a finding.	Supported.
H6a: SPQ will be affected directly and positively by EF.	Same as H5a finding.	Not supported.
H6b: SPQ affected indirectly and positively by EF via mediation through PQ.	Same as H5a finding.	Supported.
H7a: OQ affected indirectly and positively by EF via mediation through PQ.	EF→OQ relationships disappear with inclusion of PQ, suggests no/little direct link but mediation through PQ.	Supported.
H7b: OQ affected indirectly and positively by EF via a mediation relationship through HPQ.	HPQ→OQ link supported in regression but not SEM.	Probably not supported, SEM contains more information.
H7c: OQ affected indirectly and positively by EF via a mediation relationship through SPQ.	EF→SPQ→OQ not supported, but EF→PQ→SPQ→OQ supported.	Supported.

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	Findings	Rejection/support for hypotheses
moderates a) EF→PQ and b) EF→SPQ relationships.	e way relationship between inflows, outflows and frequency found.	Partial support in certain cases, see Table 8-23
H9: Integration moderates (strengthens) a) EF→PQ and b) EF→HPQ relationships.	High integration associated with a negative EF→PQ relationship.	Not supported.
H10: EF is more likely to affect service provision in the case of a) smaller suppliers, b) fewer supplier contact staff.	Generally, larger organisations had stronger relationships and medium organisations weak.	Generally not supported.
H11: EF more likely to affect service provision in smaller customer organisations.	Same as H10.	Same as H10.
H12: EF more likely to affect service provision in a) service oriented industries and b) service-type offerings.	Services generally had stronger effects, except for EF→SPQ effect.	Mostly supported.

The discussion begins with various aspects of the major focus of the thesis, namely the role of EF.

9.1. THE ROLE OF EMPLOYEE FLOW

Generally the results in this study suggest significant moderate effects for at least some elements of EF on B2B service quality, as assessed by the INDSERV dimensions. This at least somewhat answers Research Questions 1 and 3 in the affirmative. A more complete summary of the main effect findings includes (with discussion following):

1. With regard to *a priori* measurement modelling of constructs, both EF and the various INDSERV dimensions were found to have satisfactory scale qualities including convergent and discriminant validity. This confirms Research Question 2 regarding dimensions of B2B customer service.

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all but significant effects on Outcome Quality not hypothesised to have a direct effect), with aggregated EF having $B = .14$, $p < .1$ and disaggregated outflows $B = .32$, $p < .05$. Addition to R^2 for this outcome variable ranged from 2.5% to 3.5%. Inflows were not significant. There were also some significant effects when considering certain interaction effects, see below. Finally, the mediation and SEM models suggest that any effect of flow on OQ occurs entirely through intermediate INDSERV variables, seemingly mainly through potential service quality (PQ) as hypothesised.

3. EF does appear to affect PQ notably in the disaggregated regression model (where both inflows and outflows were significant, $B = -.36$, $p < .05$ and $B = .66$, $p < .01$, $\Delta R^2 = 7{,}2\%$), the structural equation model ($B = 1.75$, $p < .01$) and under various conditions to do with organisation and transaction characteristics (see below). This main effect for the disaggregated flow elements suggests much support for Hypothesis 4, although the result for inflows in the regression model was negative instead of positive. However, the logic of latent variable estimation suggests that the structural model should be taken more seriously as it takes into account more information than the regression models.
4. There were variable results for the intermediate hard and soft process quality as follows:
    a. In the main effect regression models, aggregated EF directly affected HPQ ($B = .22$, $p < .1$, $\Delta R^2 = 2.5\%$), also in conjunction with certain organisation characteristics (see below). Disaggregated employee outflows again provided significantly improved explanation ($B = .52$, $p < .05$, $\Delta R^2 = 4\%$). This main effect suggests some support for Hypothesis 5, however in subsequent mediation analyses it appears that any effect on HPQ occurs via mediation through PQ first. This is confirmed in the 2SLS models, in which EF did not directly affect

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th EF→PQ→HPQ was the only way that EF HPQ. Both sets of models therefore suggest this mediation path of Hypothesis 5b as the predominant one over the direct path of Hypothesis 5a.

b. SPQ was predicted in the main effect regressions by employee outflows only (B = .52, $p < .01$, ΔR^2 = 3.7%), but was not significantly directly predicted in the SEM model, although again in both regression mediation models and the SEM model the path EF→PQ→SPQ was the significant one. Therefore as before Hypothesis 6 has mixed evidence: the mediation path of Hypothesis 6b specifically is seemingly dominant while the direct path of Hypothesis 6a seems largely rejected.

Generally, these results provide support to the primary research proposition that EF affects B2B customer service. Research Question 4 was also answered in that effect sizes for EF differed.

Predominantly, increased quality of EF, notably outflows, appears to affect the potential service quality impressions that B2B customers have of their key suppliers, providing support for Hypothesis 4. The results suggest that mediation through PQ is the predominant effect of EF on the more distal elements of service including the more transactional (HPQ) and relational (SPQ) aspects of process implementation as well as the outcomes of service (OQ). This seems to confirm the mediation Hypotheses 5b, 6b and 7a (and answering Research Question 5) rather than the direct paths of Hypotheses 5a, 6a and 7b&c, which suggests that EF is predominantly a distal and more long-term input into service quality rather than having more proximal effects on the actual performance of service.

It appears therefore that EF can be confirmed as a preparatory input, a potentially important element of human capital (Boudreau, 1991) and a

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that is an organisation's frontline employees. It
g models and management should to a greater degree consider EF as a meaningful antecedent. If this is the case, greater synthesis between human resources and marketing departments would seem to be indicated. For example, HR costing and accounting models to do with EF – such as Boudreau and Berger's (1985) utility model - could perhaps be adapted to include issues related to customer service. Since CE and CLV models as discussed in Chapter 5 translate issues such as customer service measures into the same metrics as the EF utility models – namely ultimate financial gain (Rust *et al.*, 2004b) – it appears that a synthesis between the models might be possible. This would then entail a decision theoretic utility model that considers EF as an input and translates EF changes into ultimate gain through the estimation of an intermediate CLV model as an extra layer.

Failing such a complex model, these results probably still indicate benefit in closer collaboration between HR and marketing in issues such as the collection and use of data (e.g. including EF issues in customer research), sharing of information and decision frames (for instance, the considered involvement of marketing personnel and issues in recruitment decisions if that is not already the case), support for the inclusion of customer issues in employee and unit-level performance management (e.g. applications of the balanced scorecard) and so forth. As stated in the introduction to this thesis, this is perhaps especially important in the B2B environment where employee-customer involvement has the potential to be far deeper and of more value than in environments focussed on individual consumers.

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F ON OQ

Given that outcome quality for customers is in fact the ultimate aim of the process, it is worth summarising the ways in which EF was found to affect OQ.

From Table 8-20, it appears that the paths EF→PQ→OQ and EF→PQ→SPQ→OQ are the primary significant paths, whereas a path through HPQ might not be significant (although HPQ predicted OQ as a mediator in the regressions, controlling for all variables in the SEM appears to partial out this effect somewhat).

The first of the mediation paths, directly through PQ, is the more expected path, but is perhaps less open to discussion. It states that EF is an antecedent of an organisation's ability to provide service, which is expected. However the second, less direct route through SPQ is open to some interesting discussion, and is explored in the following section.

9.1.2 EFFECTS THROUGH SPQ

With regard to soft process quality, the SEM model found that the path EF→PQ→SPQ→OQ seems to be significant (the regression models also found this for outflows specifically). In words, it appears that being more prepared for good service, partly through greater quality of EF, leads to stronger relationships between contact employees and therefore perceptions of better outcomes. This effectively provides support for Hypothesis 6b.

These findings lend special credence to 'soft' (SPQ) issues in B2B customer service. SPQ was composed of elements such as communication and personal affective reactions between contact employees. In the SEM, SPQ garnered the greatest total effect from EF, which supports theories such as social bonding, social exchange, 'commercial friendships' and emotional contagion (e.g. Blau, 1964; Chenet, Tynan & Money, 2000: 477; George &

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n, Sandvik & Selnes, 2003; Ryan, Schmit & mar & Borchgrevunk, 2003). As discussed in Chapter 4, these theories suggest that EF may lead to stronger SPQ for several reasons, including a) longer and more intimate contact times between individuals (because EF may entail retention), especially individuals who are more likely to work well together (because high EF entails higher quality staff); b) greater levels of contact and exchange lead to better mutual understanding of needs and methods of work (Susskind *et al.*, 2003), which is expected to improve both effectiveness and efficiency. Fewer conflicts may also result.

Perhaps one methodological caveat arises based on the perceptual nature of the links: this finding suggests that better perceived soft process leads to better *perceived* outcomes, a finding that may be somewhat wrapped up in the general affective tone of the relationship. In other words, a 'feel good' interpersonal relationship may lead to perceptions of good outcomes even in the face of potential problems, due to the potential for spillover of affect (e.g. Butcher *et al.*, 2001). This difference should be examined in future research, although it may not be as important in practice, as the perception of good service by customers is in fact the major issue for suppliers, so long as this perception is maintained.

Managerial implications arising from these findings include perhaps a greater focus on relationship management and soft skills in B2B customer contact. Generally with regard to skills development and performance management requirements, the salience of an SPQ link would seem to correspond with the performance dimensions of Motowidlo and colleagues especially which hypothesised a separate and important 'context performance' dimension (Borman & Motowidlo, 1993; Motowidlo, Borman, & Schmit, 1997; Motowidlo & Van Scotter, 1994; Van Scotter & Motowidlo, 1996; Viswesvaran & Ones, 2005). Technically trained salespeople, for example,

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ments. Performance management systems may nteractional issues. Recent movements towards the removal of interpersonal contact and personal relationships may require review. These include developments such as call centres (Higgs, 2004), technological bridges such as videoconferencing and email communication (Schlesinger & Heskett, 1991; Sharma, 2002), and customer self-service ability (Meuter, Ostrom, Roundtree & Bitner, 2000), all of which may remove or radically alter one of the ways in which good service operates, namely SPQ, leaving only the more objective PQ→OQ link. This precise possibility – that technological bridges could denude soft, relational links to service - was one focus of Schlesinger and Heskett (1991) in their original service-profit chain work. This may not be beneficial to a supplier, despite the illusion of input cost savings. Attention should still be given to the extent to which interpersonal processes might be a partial driver of outcome quality, perceived or actual, for a customer. This is discussed further below in relation to effect magnitudes.

9.1.3 DISAGGREGATION AND THE SALIENCE OF OUTFLOWS

The results of this study suggest that disaggregating EF quality from a single variable into two separate inflow and outflow variables led to improved and differential explanatory ability. Outflows had far stronger effects on various aspects of service quality in the eyes of customer than did inflows – outflows were significantly and positively related to all elements of customer service while inflows had smaller and fewer significant impacts. (However, it is noted that this conclusion is somewhat ameliorated by the fact that the two elements of EF were nonetheless found to be sufficiently convergent indicators in the SEM measurement model to form a single latent construct. However it does appear that outflows had more effect generally.)

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utflows specifically may be due to the different

ypes of flows including the following theoretical possibilities:

1. Once again, the considerable discussion with regard to the supplemental impact of social bonding, social networking and emotional contagion apply (Albanese & Fleet, 1985; Ashforth & Humphrey, 1993; Bove & Johnson, 2000; Crosby, Evans, & Cowles, 1990; George & Bettenhausen, 1990; Harris, Baron & Radcliffe, 1995; Hartline & Jones, 1996; Jones, 1984; Keaveney, 1995; Kidwell & Bennett, 1993; Knoke, 1990; Knoke & Wright-Isak, 1982; Morris, 2000; Yoon & Suh, 2003). These arise over time and may have an impact in addition to more objective and transactional considerations in the service process. Outflows of employees are almost by definition going to have a greater impact on such socially-constructed issues, because outflows involve employees whom customers have come to know (e.g. Barnes, 1997; Bendapudi, & Leone, 2002; Blattberg, Getz & Thomas, 2001; Bolton, 1998; Bove & Johnson, 2000; Crosby, Evans & Cowles, 1990; Keller, 2002; Keltner, 1995; Payne, Holt & Frow, 2001; Sawhney & Zabin, 2002) - recall that their replacement with other employees whom customers have also come to know has been factored out by the method. Therefore the loss of built-up relationships is focal here. On the negative side, the loss of employees with whom positive social bonds have been formed has been hypothesised to lead to greater impressions of service problems. On the positive side, the loss of employees whom customers have come to dislike socially, not trust or in other ways feel negatively towards, may lead to more positive reactions than the more objective, process-oriented issues merit. Inflows (at the point that they are actually inflows and before that cohort has been able to build relationships) can only really be judged by customers on shorter-

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In psychological contract terms, a relational ental to a transactional contract, and which can be very powerful) will tend to grow over time, and can have greater impacts when broken via outflows of the staff with whom it has been formed (Robinson, Kraatz & Rousseau, 1994; Rousseau & Wade-Benzoni, 1994).

2. On the more transactional, objective and process-oriented side, inflows of staff are probably more amenable to change, and therefore correction, than outflows: initiatives can be used such as training to correct for poor initial skills, reallocations, or systems to ease inflows (e.g. Cascio, 2003; Leopold, Harris & Watson, 1999; Redman & Wilkinson, 2001). Outflows, however, are less amenable, if at all, to correction – a worker will rarely if ever return to an organisation they have left, a promoted employee is never likely to 'drop back down', a transfer out has usually departed for good reasons and for good (Hom & Griffeth, 1995). Therefore outflows are not only more immediate but their (often high) cost is less open to amelioration.
3. Outflows are also more likely to be unexpected, whereas inflows on average are perhaps a little more planned (even in the case of replacement of turnovers, the replacement strategy may be predicted but not the turnover event, e.g. Cascio, 2003; Redman & Wilkinson, 2001). The increased difficulty of prediction and planning adds more uncertainty to outflows, which in terms of behavioural conceptions such as prospect theory (Tversky & Kahneman, 1991) and other theories of risk and uncertainty (e.g. see Wiseman, Gomez-Mejia & Fugate, 2000 for a useful review). Ultimately, this may activate risk issues for customers (e.g. Rust *et al.*, 1999), leading to more adverse reactions from customers in the case of outflows than inflows, even regardless of objective outcomes.

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utflow-based results provide some empirical more qualitative findings of Bendapudi and Leone (2002) on turnover in business-to-business settings.

The results for outflows suggest support for the functional turnover literature discussed previously (Dalton, Krackhardt & Porter, 1981; Dalton & Todor, 1979 & 1982; Dalton, Todor & Krackhardt, 1982; Hollenbeck & Williams, 1986; Park, Ofori-Dankwa & Bishop, 1994; Williams & Livingstone, 1994). Functional turnover involves the departure of employees who are undesirable to the firm or customers, therefore a) those employees who are poor performers as regards hard process issues, b) possibly those with whom customers are less likely to form positive interpersonal relationships, therefore c) those who provide poor outcomes.

The results do not suggest therefore that retention is key but that correct and targeted retention *and* turnover are both key, as long as it is the correct employees leaving (see Lee, 2005 for broad turnover process considerations and Lee, 2006 for an industry examination of retention interventions in South African businesses). Mobley's (1982a) conception that one possible cost of turnover is undifferentiated retention strategies comes to bear here – organisations may reap rewards in aiming for functional turnover rather than indiscriminate retention.

In addition, Batt's (2002) assertion that turnover mediates between human resource policies and organisational outcomes should perhaps be refined to incorporate the issues discovered here. Notably, she asserted that greater retention would improve skills and capabilities (a resource-based theory argument, perhaps according with the INDSERV PQ and HPQ dimensions) and social capital (clearly according with the INDSERV SPQ dimension). However the present research suggests that it is not so much total turnover that hinders both these aims as dysfunctional turnover, with a positive role

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urnover. It is possible that the turnover in Batt's

functional.

9.1.4 A NOTE ON THE MAGNITUDE OF EFFECTS

Notwithstanding the above discussion on those paths that were significant, it is also noted that of all the main effects tested, only some were significant, mostly for outflows. Inflows were generally not significant, some total effects were non-significant or at least inferred to be so (Table 8-20) and change in R^2 from the addition of EF constructs to the overall model was moderate at best – generally in the order of 5%. Although this is quite analogous to the effect contribution of other social science variables (Cohen *et al.*, 2004), as a whole the conclusion must be made that EF has at best moderate effects on elements of customer service. Some discussion is desirable.

First, it is possible that the processes implemented in the sampled organisations are such that EF has been to some extent 'factored out' of the general process. In other words, structures, systems and processes may have been set up in such a way that the acquisition, internal movement and (to a lesser extent) departure of employees has been 'buffered', for example by factors such as increasing computerisation of ordering systems, increased multiskilling (allowing for less reliance on any given employee), improved staffing systems or increase in the effective use of flexible staffing (e.g. Braverman, 1974; Clark, 1993 & 1995; Coy, 2000; Gerwin, 1987; Slack, 1983, 1987 & 1990; for the above issues in South Africa specifically see Allan, Brosnan, Horwitz & Walsh, 2001; Horwitz & Franklin, 1996; Lee, 2006). Trends removing, replacing or ameliorating significant employee-customer contact have been observed in many industries, including but not limited to retail (e.g. Neathey & Hurstfield, 1995), fast food (Dutta & Manzoni, 1999) and

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ield, 2007 for South Africa). As discussed above ends include the growth in call centres, which are inherently impersonal in nature and can erode a sense of personal service, process visibility and the like.

Second, on a more methodological note, the method used to measure EF may contribute to inconsistency. Customer managers were asked to estimate the extent and impact of different types of flow in the supplier. It is recalled that this approach (of exploring the customer's impressions of EF in the supplier) was initially taken precisely because the perceptions of the customer are in fact what counts: objective supplier flow issues must first be processed by the customers as 'bad' before any effect can be seen *that is directly interpretable by the customer as EF issues*. Although there was screening to make sure that the respondents dealt directly and at least to a decent degree extensively with the supplier, this method may have compromised findings for a number of reasons. Firstly, by nature such measurement adds to measurement error and therefore complicates substantive findings. Secondly, and probably most importantly, this approach may hide the true impact of EF. If the customer cannot see the EF that has, in reality, led to a change in service process quality elements, then the perception of flow is not in fact a helpful variable, as its effects will instead be subsumed directly into the later INDSERV elements. In particular, more of the impact of EF may be hidden in the 'potential quality' variable than was revealed by this study. Instead, objective supplier-side data on EF would be a better method – this data could then be utilised in a dyadic study (such as Homburg & Stock, 2004) where customer-side service quality data is assessed.

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The one significant effect for inflows was an unexpected negative regression effect on PQ, which runs against Hypothesis 4. Moderation showed that this negative effect operated at a) high levels of customer integration and b) in the case of big suppliers.

This effect may occur because higher scores on inflows mean that the supplier has a high *quantity* influx of new staff, which customers may interpret as a threat to long term PQ, especially as when there is high integration there is interdependence and visibility (Homburg & Stock, 2004) but with larger suppliers there is less scope for relationship building. New employees, regardless of initial quality, are by definition low in experience (Mobley, 1982a). Customers may value experience and continuity over quality.

However given the strong results for outflows, and that inflows replace outflows, it is suggested that this finding suggests merely that careful replacement is key. The joint results may suggest support for the use of probation policies, as these allow for functional turnover and considered inflows over time.

9.1.6 THE ROLE OF HPQ

The HPQ scale assessed three major dimensions: time issues (for example whether the supplier could get work done within agreed time schedules), financial issues (for example whether the supplier could get work done with agreed budgets or had good financial systems) and the supplier's ability to understanding the business of the customer (Gounaris, 2005). Two paths regarding these more objective, harder process issues require discussion.

First, HPQ was found to be a significant outcome of EF (via a mediation relationship through PQ). Second, HPQ was a significant antecedent of OQ in

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SEM models, where it is assumed that the joint
rtialled out the role of HPQ. Accordingly Hypothesis 7b is seemingly not supported.

This is an unexpected effect especially because it was assumed that outcomes of service would be more fully explained by more tangible service issues, rather than softer inter-personal issues.

However this finding does not necessarily obviate the role of HPQ. On the contrary, HPQ might be seen as a valid outcome of its own. In many respects HPQ speaks to the internal outcomes of the relationship, rather than the more distal overall impacts represented by OQ. It is possible therefore that environmental factors (e.g. economic factors such as interest rates) have a confounding effect on the HPQ→OQ relationship to some extent, so that longer term value can only be unlocked within the context of a strong interpersonal relationship (e.g. see Williamson, 1985 on relational contracts in transactional cost economics). This would infer a complementary rather than exclusive role for the HPQ and SPQ relationships, explaining the partialling out of the former. Having suggested this, however, it is noted that no paths between HPQ and SPQ were indicated by any of the models.

The positive relational path to HPQ, regardless of the lack of a further independent path to OQ, could suggest several managerial implications. Focus may need to fall on buffering service-related systems from flow problems. Strategies such as multiskilling of teams or job rotation of boundary spanner employees to different customer accounts, for example, may ameliorate an adverse impact on process scheduling, financial issues or customer knowledge (Boyer, 1987; Neathey & Hurstfield, 1995; O'Reilley, 1992). On the positive side, there may be objective gains to be made via improved EF in these areas that customers can easily see, therefore potentially improving the organisation's service image.

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A further set of discussions involves the various moderation relationships tested, namely those to do with the characteristics of the relationship and the characteristics of the organisations.

9.2.1 CHARACTERISTICS OF THE RELATIONSHIP: INTEGRATION AND FREQUENCY

As discussed, integration had an effect on the Inflows→PQ relationship. The other moderation result was a three way interaction in terms of which outflows were found to have a stronger positive relationship on PQ where there existed either a) poor inflows under low frequency and b) good inflows under high frequency. In other words, if the customer had little contact with the supplier, then if there were poor inflows the impact of outflow quality on PQ was stronger. On the other hand, if the customer had substantial contact with the supplier, then if inflows were of good quality the impact of outflow quality on PQ was stronger.

This finding may again be interpretable due to the visibility that frequency may engender (Homburg & Stock, 2004). Increased frequency was posited to enhance the customer's ability to observe the process behaviour of the supplier, close to the time in which it occurs in the supplier, and therefore to act to ameliorate problems (or at least complain) as they arise.

Accordingly the following two effects may operate:

- Under conditions of low frequency it is possible that customers are unable to perceive the inputs to service quality as much as the outcomes. By extension they are less able to perceive the effect of employee inflows close to the time that they occur. Instead, their most tangible – possibly only - view of human capital changes may be outflows. When inflows are

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man capital in the supplier is poorer, but the
on of improvement is in outflows. Therefore outflows might be particularly noticed as the customer's only means to see change in the poor human capital situation;

- On the other hand, where frequency is high then visibility is high, and customers are able to perceive and react to the input elements of service including the impact of staff inflows. Good inflows lead to stronger human capital which can be perceived at the edge of operation by customers. Outflows may then be more perceived by customers as an enhancement and manifestation of the generally strong human capital. Another explanation for this particular relationship could be the creation of 'commercial friendships' (Price & Arnould, 1999), which are most likely to be formed when there is both high frequency and where incumbent supplier staff are of suffiently high quality to mitigate against professional disagreements.

This finding provides some support for Hypothesis 8a, in that under complex conditions it appears that outflows do have a stronger impact on PQ. Admittedly, three-way interactions are hard to interpret, and the above explanation would require at the least a replication study and preferably experimental manipulation to verify.

As discussed previously, the second interaction effect involved integration of the customer into the supply chain. In this case, inflows had a stronger *negative* relationship with PQ when customers were more integrated into the supply chain. This finding runs against Hypothesis 9a. This effect may also be a function of visibility. Customers who are more integrated into the supply chain process are in a better position to perceive the skills and experience levels of the supplier. As discussed in the main effect, an influx of

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hey have long-term potential, may be seen to potential (Bendapudi & Leone, 2002).

Taken together, the finding for frequency and integration, which were expected to be similar in effect, seem to be contradictory, although the difference may again lie with the differences between inflows and outflows rather than between the moderators. However it is possible that there are fundamental differences between the moderators rather than similarities:

1. *Social bonding and networking*: As discussed in Section 7.2.3, greater frequency may lead to closer working relationships, potentially greater reliance, and possibly greater social bonding and networking. These factors may then lead to a stronger reliance of potential quality on EF issues, as discussed, under certain conditions. This effect may not necessarily operate when only integration exists, since integration is a business construct that defines process cooperation but not necessarily interpersonal relationship building. Integration may, for example, be achieved via technological solution (such as email, networking or videoconferencing) that leaves little room for social interaction. Although under conditions of integration customers may suspect poor potential quality when they perceive inexperience, the more positive relationships such as that for frequency may not operate.
2. *Transaction cost economics explanations*: It is possible that *types* of transactions (supply relationships can be seen as a transaction) are the key as per transaction cost economics (TCE, Hendrikse, 2006; Lacity & Hirschheim, 1993; Williamson, 1985). In terms of TCE, frequency, asset specificity (i.e. degree to which the transaction is idiosyncratic to the relationship as opposed to generally similar to other relationships) and complexity of the transaction are key features. In terms of contract type, Williamson and others (Hendrikse, 2006; Lacity & Hirschheim, 1993;

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ed that a) greater frequency, b) greater asset conditions of high asset specificity, greater complexity would tend the transaction towards either greater levels of relational contracting and internalisation of contracts or greater use of control mechanisms and complex contracting. Asset specificity is seen as key: in general, TCE sees this feature as needing to be at least quite high to tend a transaction towards internal and relational contracting (also see Lepak & Snell, 1999). In terms especially of the integration construct, it is possible that greater integration is symptomatic of greater use of control mechanisms and complex contracting rather than increased relational contracting (in other words, integration may be a substitute for relational contracting). Accordingly, frequency and integration may have different effects because they work towards the same end but through opposite means. The TCE view might therefore predict stronger relationships to do with outflows when frequency is present, because of the increased social and relational contracting discussed above, but with high integration a focus on control and monitoring may lead customers to focus negatively on process inputs and therefore inflows.

It is noted that the above findings at least partly answer Research Question 6, which sought to investigate these moderation effects.

9.2.2 ORGANISATION CHARACTERISTICS

Hypotheses 9 to 11 suggested various demographic impacts from supplier or customer size, number of customer employees, industry and supply type on the role of EF. The following was generally discovered (see Table 8-23):

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employee outflows and SPQ was stronger for contradicts Hypothesis 10a), whereas the relationship between inflows and OQ was negative in the case of big suppliers but positive in the case of small or medium (possibly lending support to Hypothesis 10a);

2. The relationship between outflows and PQ was stronger for bigger clients (opposing Hypothesis 11), whereas the relationship between outflows and both HPQ and OQ was weaker for medium-sized clients than smaller or bigger clients – in fact in the case of HPQ outflows had a negative impact for medium clients vs. positive for small/big;
3. The relationship between employee outflows and SPQ was stronger when there was greater numbers of contact staff at the supplier, this goes against Hypothesis 10b;
4. The relationship between employee outflows and SPQ and OQ was significantly stronger in the services industry than the other industries (retail and the harder industries such as manufacturing), which would provide support to Hypothesis 12a. A similar interactive effect existed for HPQ except that services were only significantly stronger than the so-called 'hard' industries (such as manufacturing or construction). This partially confirms Hypothesis 11a;
5. The relationship between outflows and HPQ was stronger for service than product offerings, which supports hypothesis 12b, however the inverse is true of the relationship between outflows and SPQ.

The interaction effects suggest that EF may have a significant impact on service quality, but that this operates differentially – and with variegated strength - in various contexts. Research Question 7 is therefore aswered in the affirmative: organisational characteristics do interact with the main

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ntexts are discussed next and explanations for ssible recommendations.

A. Organisation Sizes and Number of Contact Employees

It had been expected that relationships between EF and service provision variables would generally be stronger for smaller organisations (either suppliers or customers) or for fewer contact employees because of increased networking and bonding opportunities in smaller groups and decreased scale of operation (which it was thought might lead customers to rely more on specific individuals, Hendrikse, 2003).

However generally the opposite findings were discovered – bigger organisations usually evidenced stronger positive relationships between EF and service than especially medium-sized organisations.

This finding may point to the possibilities that bigger organisations have the capability in terms of scope and scale of economy to cover for issues in the relationship and to take maximum advantage of changes in the B2B relationship. The impact on SPQ, for example, which is stronger in bigger suppliers and for more customer contact employees, may be partly influenced by general brand image held by the customer. A customer may be more likely to have continued confidence in the general relationship with a large supplier than with a small one, where just a small amount of turnover may strip the smaller supplier of its essential human capital (Dundon, Grugulis & Wilkinson, 2001). In addition, changes in personnel may be more likely to positively impact HPQ and OQ with larger organisations because they have the back-up support and resources to ameliorate any problems.

With client size specifically, small organisations also had stronger relationships (than medium-sized firms). This may provide some support to

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curvilinear role for client size, which should be

The generally weak relationships in medium-sized organisations may point to their peculiar placement in the middle of both the relationship and scope continua, in other words medium-sized organisations may be too big for intimate relationships to form, but too small to enjoy the scales of economy and scope that bigger organisations can take advantage of.

Finally, the results suggest that supplier size may explain at least some of the negative impacts of inflows that were discovered in the main effect. Specifically, the inflow-OQ relationship was only negative for big suppliers. It may be that the inflow of newcomers to a big supplier may translate into lower perceived OQ because it is harder for customers to form relationships and partnerships. This need not necessarily contradict the previous paragraph: the ability of the big supplier to ameliorate turnover by use of current resources does not necessarily equate to new inflows (e.g. the supplier might transfer the customer's account to another service team), whereas customers may fear being given the services of novice newcomers in a large bureaucracy.

B. Service Environments

As hypothesised, suppliers in service industries as well as those who offer services rather than products (in any industry) generally evidenced stronger positive relationships between employee outflows and elements of service. Service-type environments are perhaps most likely to be affected by the relationships and specific knowledge capital vested in people by the people-intensive nature of the tasks (Ashforth & Humphrey, 1993; Bove & Johnson, 2000; Crosby, Evans, & Cowles, 1990; George & Bettenhausen, 1990; Harris, Baron & Radcliffe, 1995; Hartline & Jones, 1996; Keaveney, 1995; Morris, 2000;

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environments allow more for visibility and e & Fleet, 1985; Kidwell & Bennett, 1993; Jones, 1984).

The one exception to this was the weaker role of outflows on SPQ where suppliers tender service offerings. This goes against Hypothesis 12b. The juxtaposition with the HPQ relationship is interesting. Perhaps again the nature of service organisations is that the relationship lies in a deeper organisation-on-organisation relationship, and therefore trust can be maintained in the overall relational equity. However the departure of employees with specific technical process skills relevant to HPQ may be more deleterious in service suppliers by nature of the knowledge-intensive nature of their work, regardless of the underlying relationship.

Managerial implications to arise out of these findings might include the following. Firstly, managers in service environments should perhaps most carefully consider EF as an important variable in the service provision process. This is notwithstanding the recent assertion that service-industry principles should be extended to more traditional industries such as retail or manufacturing (e.g. Pritchard & Silvestro, 2005; Silvestro & Cross, 2000). This point should not be underplayed, the influence of EF was significantly important in the services industry.

Secondly, the fact that retail industries were not significantly weaker in the effect of EF on hard process quality may be indicative of the quasi-service nature of retail (Pritchard & Silvestro, 2005; Silvestro & Cross, 2000), although hard process issues are more common across organisations than are the needs for relational-based soft process issues. Therefore retail managers may wish to address EF as a function of their process delivery, and keep metrics regarding the impact on objective hard process issues.

Generally, the departure of employees in service environments should most carefully be assessed for impact on the more technical hard process

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consistent variable over the relationships. This ht the crucial importance of skills and indeed experience in knowledge work, which makes up a large percentage of the services surveyed.

The above discussed the findings for EF as a predictor. The other set of relationships had to do with the subsequent relationships within INDSERV itself. These relationships have somewhat less salience given that they are not per se the focus of the thesis. However the findings for these variables will nonetheless be discussed as they are interesting and do impact the mediation processes.

9.3. INTERNAL STRUCTURE OF INDSERV

The implications of this research extend also to the area of business-to-business service quality and the inter-relationships between elements of such service. This research provided the opportunity to examine Gounaris's (2005) INDSERV scales and structure more closely and to draw some conclusions in this regard. Two areas of consideration can be broached here, namely issues to do with the structural and construct validity of the INDSERV scale and sub-constructs as well as interrelationships between elements of the sub-scales. The following conclusions lend themselves to consideration:

1. The findings support a multi-faceted approach to B2B service quality generally, including the following considerations:

    a. The INDSERV scales showed generally good internal reliability, with coefficient alphas being high (greater than .70 which are generally acceptable levels, Cohen *et al.*, 2003) and CFA results finding good overall structural properties;

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etween the various elements of the scale as well her variables were found, as the CFA analyses generally illustrated that the individual parcels for each construct loaded on the correct factor and not on factors to do with variables outside of INDSERV;

c. Considering the CFAs, the measurement model was supportive of the formation of the sub-scales with a convergent model with good fit being formed. There were limitations to the methods used (see Section 9.4) but overall the CFAs appeared to support the INDSERV sub-scales;

2. Considering the internal structure proposed in this research (notably the mediation model as proposed in Hypotheses 1-3), results were mixed. When utilising regression models with aggregated scales, and therefore essentially removing measurement error, the proposed mediation model in terms of which potential quality would largely lead to outcome quality through hard and soft process elements was supported. As predicted, PQ does lead to OQ directly, but a significant part of this relationship can be partialled out when either the intermediate HPQ and SPQ elements are considered, which supports the notion of a mediation effect (Baron & Kenny, 1986; James & Brett, 1984). However when including measurement error in a 2SLS SEM model, the proposed mediation effects were only supported for the PQ→SPQ→OQ relationship, since the HPQ→OQ relationship was not significant this path was not supported.

Note that Gounaris (2005) did not per se suggest internal structure of this kind, but it seems likely given the innate construct definitions.

The managerial implications of these findings are probably largely to do with the SPQ variable. The PQ, OQ and HPQ variables are more conventional

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vision chain (e.g. Besanko, Dranove & Shanley, conception and test of a SPQ factor is not as conventional, and gives credence to the salience of a relational component (e.g. Blattberg *et al.*, 2001; Rust *et al.*, 2004b).

Managers might respond to this element of service by utilising the INDSERV scale in marketing metrics, thereby measuring soft process quality as a separate element, and perhaps taking seriously emerging conceptions of so-called 'relational equity' (e.g. Sawhney & Zabin, 2002).

9.4. CONTRIBUTIONS AND THEORETICAL IMPLICATIONS

The following contributions have been made by this thesis:

1. The thesis tested what is believed to be the first major statistical test of EF as not only as an *integrated* construct – including elements of acquisition, internal flows and turnover – but also as a *qualitative* variable. Integration of flow variables that are generally treated separately - such as turnover, external acquisitions and internal flows – allows for the effects of isolated effects in one aspect of flow to be balanced by another type of flow. For instance, the impact of employee turnover can be attenuated by adequate replacement strategies. The research investigated both full integration of all the flow types (aggregated flow) as well as two-part integration (dissagregated flow, where all inflow types were integrated together as were all outflow types, but these broader categories were not finally aggreagted). Also, because a given quantity of a certain type of flow can be functional, dysfunctional or neutral in effect, measuring and integrating quality of flow with quantity is important. For example, although employee turnover is often assumed to be costly, some turnover has been shown to be functional. Therefore the integration of different types of flow

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quantitatively and qualitatively, is considered to l advance. Although the effect sizes discovered in this study were not particularly large compared to studies examining singular and quantitative flow variables, there were significant findings, especially in certain contexts, that lend support to the idea that the approach taken in the thesis has unique value. It is also believed to be the first major attempt to validate statistically models of EF based on the decision theoretic utility tradition.

2. With regard to the outcome variables, it is believed that this thesis provides the first targeted and specific test of a service profit chain model that uses such a complex conception of EF as its internal organisation antecedent variable. Previous research has almost exclusively been tested with constructs such as employee affect (satisfaction or commitment) or human resources policies (e.g. training) as dependent variables. This research provides depth and specificity to what has largely been an atheoretical and quite general set of models.
3. In addition, as noted by Gelade and Young (2005) previous service profit chain tests have almost never explicitly tested the mediation hypotheses inherent in service profit chain theory. Theirs was only the second study to have done so, and the first to have done so fully. This study provides another full mediation test, but as stated one with a new antecedent.
4. Service profit chain tests, especially with EF, have rarely been conducted in the context of the business-to-business (B2B) environment. This thesis addresses this environment, providing new knowledge, potential comparisons with other environments, and possibly targeted managerial applications for this particular type of service profit relationship.
5. Given the demonstration of the integrated and qualitative EF construct, further theory may accordingly be developed around this variable using either other service profit chain variants (such as affective or behavioural

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Young, 2005), or other theories that involve es to do with interactions between elements of EF (notably various inflows and outflows) may also be developed, given that the current study demonstrated that disaggregation of the constructs may be statistically valuable but that fundamental interactions may also exist.

6. Contextually, to the researcher's knowledge this is the first full service-profit model tested in South Africa. Searches within ISAP provide no evidence of prior published contributions. Given a chronic shortage of skills in South Africa (Department of Labour, 2005) allied with an increasingly competitive business milieu, it is asserted that discovering new ways to view, measure and test the antecedents of customer impressions, reactions and ultimately equity is a potentially valuable contribution.
7. The thesis has demonstrated various contextual factors such as aspects of the relationship (frequency and integration) and aspects of the organisations (size, industry, etc.) which add complexity to the field of study and may open up various possibilities for new theory. Notably, explicitly investigating the relevance of theories such as transaction cost economics, the various social relation and exchange theories as well as agency theory in the context of EF and the service-profit chain may add considerable value and help to increase explanatory ability.
8. As stated previously, the thesis has proposed and tested interrelationships in B2B service quality that were neither posited in the original conception of INDSERV nor tested. The findings add to theoretical development by providing justification for complex structure to future outcome variables in B2B settings to do with service, rather than using the service variables as separate outcomes.

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such as that of Rust *et al*. (2004b) might be inputs and INDSERV outcomes when used in B2B settings, instead of the broader value, brand and relationship drivers suggested by them.

10. Finally, managerial models may be developed from this thesis, which will be a significant practical addition in this field of study. Specifically, the merging of decision theoretic utility capability with customer outcomes may provide a managerial toolbox in which various changes in personnel can be used to predict possible issues with service quality. It is suggested that such applications only be entered into after replication, however a start has been made. The addition of a soft process quality variable, especially, may warrant new managerial measures when doing B2B market research as well as tracking of balanced score card-type performance management.

Overall, this thesis provides significant overall complexity over the many partial employee flow studies that have come before. The sheer complexity of the way employee flow was operationalised and tested here is considered to be a major advance, far more in line with the realities of the business environment than previous measures, which were either unintegrated or only quantitative. In addition, the test of a full and latently-observed process flow of service quality as the outcome also adds significant complexity and value over prior studies.

9.5. LIMITATIONS OF THE RESEARCH

The research as reported does suffer from several methodological and statistical limitations which may not only help partially to account for the various findings but lend suggestions for further research.

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5.3, the perceptual nature of the focal predictor n parts by customer-side managers) may have had methodological limitations that either hid true effects (e.g. where managers could not see flow in the supplier) or increased measurement error. On a similar note, the approach taken to measure EF was one that required at least a certain level of aggregation, notably because the quantity of EF was relative to other flow elements. Disaggregation to the inflow versus outflow level was found to be a more successful strategy than complete aggregation, however this was the smallest possible level of disaggregation due to the research design. This was possibly a limitation, and future studies should test quantity via a method different to constant sum measurement, to facilitate testing of even further disaggregation. However it is noted that the precise reason that this strategy was taken in the first place was that in reality these variables are generally held to be fundamentally interrelated. Therefore this is a statistical but not a theoretical limitation, and a strong argument might easily be made for not moving away from the theory. Nonetheless, it did restrict statistical testing ability.

The statistical method utilised had the possible limitation of common measurement and source bias (e.g. Blumberg, Cooper & Schindler, 2005), an issue possibly seen in the fact that the CFA measurement model required several covariances to be added between the errors of the INDSERV manifest variables (although this may have been due to Heywood cases).

The parcelling of predictor items within INDSERV was a statistical necessity that has some detractors in addition to its supporters (see Bandalos & Finney, 2001; Kline, 2005: 197-198; Little, Cunningham, Shahar & Widaman, 2002 for reviews of both sets of arguments?) Certainly an optimal strategy would have been to use individual items as manifest variables, however problems with the diagnostics especially normality did not allow for this, parcelling has the limitation that it hides between-item variability.

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5.3, convenience sampling with all its attendant selection, lack of controls on precision, retrospective recall, primacy and recency) was used. Furthermore, sample size was not large enough to be sure of stability, and limited the ability to split the sample in the structural equation modelling tests.

Self-report surveys may limit interaction between the interviewee and interviewer, and did not include alternative language surveys (although no indication of language issues was given by respondents, however any issues may not have been known). Also, as stated in Section 7.5.3 the general quality of the general relationship between the parties may have led to emotional spillover to perceptions of the other elements of service quality.

The methodological limitation of the sample to organisations within largely the Gauteng region means that generalisability is harder to extrapolate. This limitation may be ameliorated by the similarity of organisations across geographical regions, especially given that many of the organisations sampled are large multinationals with at least some common corporate culture and processes across regions. In addition, increasing globalisation, standardisation and homogeneity in the business environment may help to increase generalisability. However this is best dealt with via broader measurement than was attempted here.

Also to do with generalisability, this research largely covers the formal business sector, and is probably largely inapplicable to the smaller business sector, including but not limited to micro- and small businesses, new start-ups, family businesses and the informal sector. It is quite possible that EF may actually be more crucial in some of these economic sectors.

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IS FOR FURTHER RESEARCH

Many of the recommendations for further research arise naturally out of the conclusions and limitations discussed above. Perhaps most obvious are recommendations to ameliorate some of the methodological issues, possibly including the following:

1. As discussed above, an objective supplier-side measure of EF may be desirable in the future. Perhaps further research could devise multiple indicators each one of which is a whole-system view of EFs (perhaps one each from matched customers and suppliers). The use of more global measures of EF quality may be feasible (which would accord to some extent with the movement in this direction within decision theoretic utility analysis, especially with the Schmidt *et al.*, 1979 and subsequent work on SD_y).
2. Certainly, dyadic research may provide more answers, helping to disaggregate the role of perception (especially on the customer's side) from realities (especially those experienced on the supplier's side), and the effect of actual EF versus perceived EF from the customer's side;
3. In a similar vein, added qualitative research such as that done by Homburg and Stock (2004), but involving all aspects of EF, may be helpful in supplementing quantitative research such as that done here – again, it may help to separate perception from 'reality' and also help to understand better the variable roles of such constructs as integration into the supply chain and frequency, which may have quite complex and interacting effects (for example the role of social processing in the hypotheses was different to that possibly suggested by the findings, but it was not possible to tell in this type of study whether this or other effects were at play).

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of manifest items on a finer-tuned measurement better enable a structural equation modelling method, notably to a) increase the chance that parcelling will not be necessary by having variables that are more likely to be normally distributed and have other statistically desirable properties, b) even if parcelling is still necessary, allow for all latent variable to have more than two parcels, including and especially EF.

5. Generally, the above measures and/or others might possibly be utilised with the specific objective of drawing differently-measured manifest items, which may minimise any common measurement effects.
6. The inclusion of extra interaction and control variables may help to improve specification. Notably, perhaps, Homburg and Stock's (2004) 'inovativeness of the supplier's product/service offerings' could be included.
7. Research in and between broader geographical and economic areas may increase generalisability, and lead to some larger effects as discussed above (e.g. EF within start-ups is probably a stand-alone case due to high reliance in many cases on very specific and limited human capital).
8. As stated above, the measurement of the EF variable was predicated on theoretical grounds as covered earlier in the thesis. Therefore, although it led to some statistical limitations, this was considered defensible. Notwithstanding this fact, if the above mix of measures including more objective measures could indeed be achieved, then it is possible that quantity of flow could nonetheless be tested separately to assess whether inter-relationship dynamics as proposed (e.g. replacement of staff who have left, recruitment quality subsequently affecting turnover rates and quality) are in fact those perceived by customer managers. These issues could also be teased out in qualitative methodologies. Quality of flow could also be tested independent of quantity.

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modelling opportunities also arise out of this research. These could include the following, among others:

1. The development of a set of models featuring EF as a major integrative variable or system. Antecedents of such a system should be theorised *in toto*, including possible environmental, organisational, task and other variables. Extant turnover research lends itself to much of this type of modelling, however because turnover research is limited to only one of the EF aspects, models would require alteration;
2. In addition, a broader set of outcomes and co-variations of EF should be theorised. Internal organisational development, external financial, community and other effects could be included. Co-varying factors could include any of the major service profit chain variables (such as employee and customer satisfaction and loyalty), as well as broader industry, economy and social factors (such as the effect of employee flows in a black economic empowerment framework);
3. As stated earlier, utility theories integrating EF with customer valuations could lead to useful models. Currently UA models of EF only scale performance changes due to EF by a global link to value, rather than a more complex one that could isolate and examine customer versus other outcomes;
4. A managerial 'toolbox' might be developed in terms of which an EF system, linked to customer outcomes by replicated empirical results, could be used as a predictor of future effects of any combination of ongoing flow changes. For example, employee turnover and replacement figures could be entered into a system matrix to predict whether various customer outcomes might be affected. Obviously this would require stabaility of contexts and results.

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Overall, it is felt that this thesis has helped to build new theoretical linkages between and within a hitherto undeveloped predictor (EF) and a hardly tested and useful outcomes framework for B2B customer service.

This research should help to encourage further investigation of the impact of EFs seen as a whole, especially within the burgeoning B2B services sector for which some strong results were discovered. B2B relationships are crucial to companies: they are of large value and volume, involve specific relationships of great depth and complexity, and in an increasingly crowded supplier and service environment can all too easily be undermined by simple actions or perceptions based on fairly few observations or impressions. Any competitive edge that companies can garner in improving their B2B customers' impressions of their potential to give good quality, and therefore the actual processes and outcomes perceived, is valuable and necessary to pursue.

The phenomenon of EF in the staffing of organisations continues to excite much research and industry interest. This thesis has attempted to add integrative complexity to the literature in developing a broader, integrative, systematic, and qualitative rather than only quantitative perspective on EF. This is an endeavour which it is hoped may be extended to several areas of study previously limited only to inflow- or outflow-type EF issues such as turnover.

In addition, the relationships between EF, notably the quality of employee outflows, and softer process quality in the provision of service is another area that may bear much fruit when set within the greater process of service delivery. Possibilities for more finely tuned management metrics, for instance, present themselves.

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nderstand staffing as a whole system may help rgeted management solutions, hopefully help to target the potential pitfalls in otherwise seemingly helpful management interventions, and eventually lead to greater understanding of productivity and profitability.

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FURTHER DETAILS ON DECISION THEORETIC UTILITY ANALYSIS

This section owes a lot to material compiled by Junaid Petker. Thanks go to him.

A1. EARLY SELECTION UTILITY MODELS

The following were the two initial utility models developed to estimate the utility of selection.

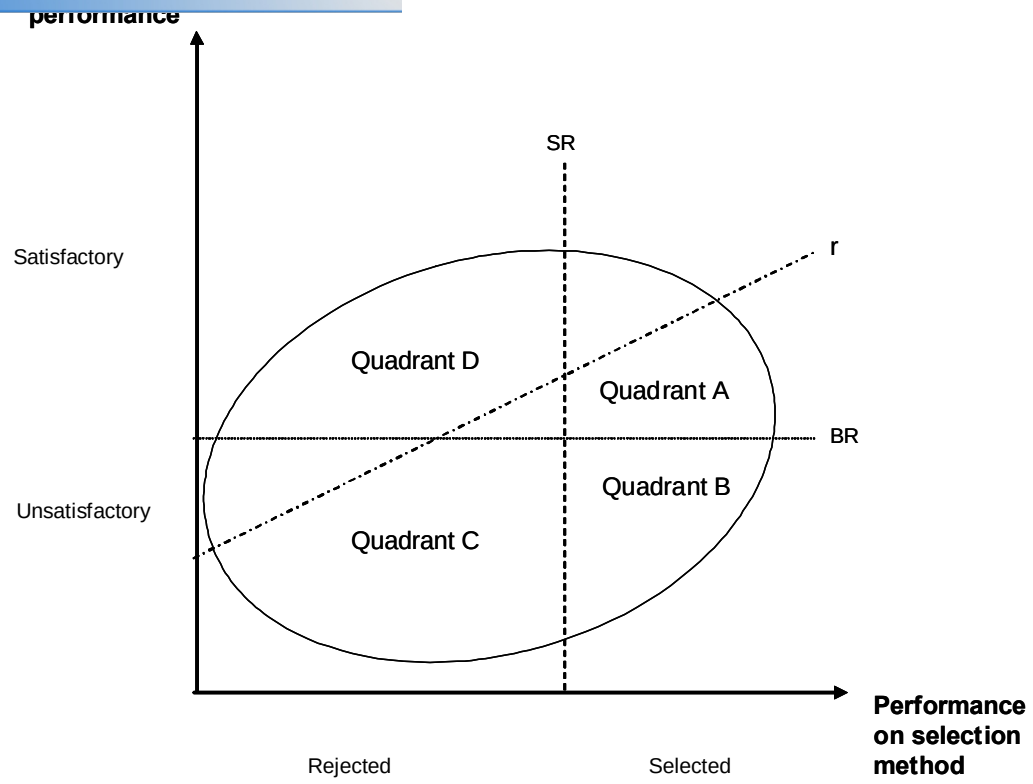
A1.1. EARLY SELECTION MODEL A: THE TAYLOR-RUSSELL MODEL

The Taylor-Russell (1939) model was one of the earliest used in UA. The decision criterion it uses is essentially the proportion of selectees who fall into those who would be 'successful' on the job vs. 'unsuccessful'.

The Taylor-Russell model draws on three important concepts as graphically shown in Figure A1 (Taylor & Russell, 1939:567):

1. *The base rate (BR)*: The proportion of selectees who would be successful if selection were made randomly – this ratio naturally lies between 0 and 1 and is shown by the horizontal line cutting the y-axis;
2. *The selection ratio (SR)*: As discussed in Chapter Two, the SR is the proportion of applicants who will need to be accepted into jobs based on the selection test – also lies between 0 and 1 and is shown by the vertical line cutting the x-axis;
3. *The validity ratio* (r_{xq}): As discussed in Chapter Two, r_{xq} expresses the correlation between selection test scores and job performance, it is expressed by the diagonal regression line in the graph drawn from the data which is assumed to lie within the ellipsis;

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If selection is random then the proportion of successful candidates would be the base rate (BR), which is defined by the quadrants as follows: (A+D)/(A+B+C+D). The Taylor-Russell model defines utility as the improvement in the successful selectee ratio when, with the use of a selection device, the proportion of satisfactory employees becomes *(A)/(A+B)*. This is termed the Success Ratio (Taylor & Russell, 1939). Utility is therefore the improvement from the BR to the Success Ratio, i.e. Utility = Success Ratio – Base Rate.

It is noteworthy that utility as defined above relies on all of the above variables (*SR*, *BR* and r_{xq}) as follows:

- The utility relies on the Base Rate (BR) because "To be of any use in selection, a measure must demonstrate incremental validity by improving

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93). A high BR implies that there is little room
lection test and vice versa;

- Success ratio relies on the Selection Ratio (SR) because it indicates the extent to which employees who would have been selected randomly can be 'swapped out' by a proper selection method. In other words, the lower the selection ratio the more the organisation is able to pick and choose selectees from the applicant group;
- Success ratio relies on validity (r_{xq}) because higher validities yield more successful employees and in doing so represents stronger linear relationships. This produces 'tighter' distributions (a more compact ellipsis in Figure A1), that is, more employees in quadrants A and C, and fewer in quadrants B and D. The validity coefficient value also interacts with the SR. If the SR is low, and the predictor validity is also low, the model may still show significant improvement through the use of the selection measure because region A may still be 'large' enough to yield utility; the converse also applies (Taylor & Russell, 1939; Boudreau, 1991; Cascio, 1999).

The model practically requires the following steps for the decision analyst:

1. Pick a base rate (BR) that the decision analyst believes applies to the population of applicants and the job at hand;
2. Calculate a selection ratio (SR) as discussed in Chapter Two (which is calculable);
3. Calculate or apply a previously calculated validity coefficient (rxq) that applies to the selection method;

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d the applicable Success Ratio in a set of tables
;

5. Calculate Utility = Success Ratio – Base Rate.

There are several problems with the Taylor-Russell model: a) Schmidt *et al.* (1979: 610) point out that the *BR* is generally arbitrarily set since there is rarely objective information to guide the cut-off. This impacts the validity of the method; b) Perhaps most importantly, the utility score is in a form that managers and practitioners may find relatively hard to relate to business outcomes such as profitability; c) The model assumes that once an individual is placed into a group, (s)he cannot move to another group, e.g. it precludes transfers (Cascio, 1999: 196). Practically this is probably not always the case; d) All individuals are assumed to make an equal contribution. We cannot say *how much more* successful the successful group will be, just that they have a higher proportion of success. Therefore TR may underestimate total utility gained (Cascio, 1999: 197).

Given the above, the Taylor-Russell model becomes appropriate only under certain limited conditions[34]. As such, later UA theory built on it to develop more widely applicable and less restrictive models[35]. Another of these is discussed next, namely the Naylor-Shine model.

---

[33] The Taylor-Russell tales were based on Pearson's (1931) "Tables for finding the volumes of the Normal Bivariate Surface"

[34] Cascio (1999) list these as 1) Any difference in performance of a job above a required minimum does not yield differences in benefit - for example, clerical work, 2) Individuals are placed in two (or more) groups based on a predictor, and groups are exclusive; 3) Extreme difficulties exist in measuring performance differences between individuals – for example, nursing care.

[35] The Taylor-Russell model had some further explication in Sands' (1973) CAPER (Cost of Attaining Personnel Requirements) model, which given a set staff number minimises the cost of recruiting, selection, induction, and training,. Importantly, this differs from the Taylor-Russell model which does not take cost into account. CAPER given utility in monetary terms, which improves managerial

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MODEL B: THE NAYLOR-SHINE MODEL

Naylor and Shine (1965) posited a selection utility model which utilises the validity coefficient (r_{xq}) itself for the major decision criterion utilised. This was a crucial step in the evolution of UA and formed the basis for the models used today.

The Naylor-Shine model relies on the logical finding that, when predictor scores (i.e. selection scores) are standardised, the selection ratio (SR) directly predicts the standardised cut-off selection score (i.e. the score of the lowest scoring applicant to be selected) as well as the average predictor score of the selected group (Kelly, 1923). Where a validity coefficient exists, which linearly relates predictor and criterion (employee performance) scores, using just *SR* and r_{xq} one can calculate an expected average criterion score for a selected group, where the criterion is percentage of successful staff. This selected group's average score will be higher than the average score of the total group.

The Naylor-Shine model therefore estimates the incremental validity over current methods, and assuming that validity is linearly related to utility, incremental utility is calculated. This approach provides a continuous nett utility scale, a step up from the dichotomous utility of the Taylor-Russell model, and in doing so it allows for variations in performance between individuals (Cascio, 1999; Boudreau, 1991).

The assumptions of the Naylor-Shine model are that 1) Predictor and criterion are related in a bivariate, normal, linear, and homoscedastic way, 2) Validity is 'concurrent', i.e. estimated by giving the selection device to current employees previously assessed using other methods, whose selection scores

---

assimilation and encourages an integrated understanding of HR systems. CAPER does, however, make the same limiting assumptions as Taylor-Russell. As shown later, UA theory developed some of the CAPER evolutions, without having to meet the restrictions.

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en correlated with their performance[36]. (This idea that applicants and current employees are similarly in nature).

Mathematically the Naylor-Shine model is expressed in Equation A1. The steps in calculating Naylor-Shine utility are as follows:

1. Estimate or substitute a concurrent validity coefficient (r_{xq}) for the selection test;
2. Estimate the selection ratio (ϕ_i), which should be known from the size of the applicant pool and number of vacancies;
3. Using the selection ratio, read off the corresponding value of λ_i and therefore also λ_i/ϕ_i from the tables provided by Naylor-Shine;
4. Multiply this value by r_{xy} to provide the criterion score, which is interpreted as the number of Z-score (standard score) units of performance by which the selectees are estimated to be better than the average, random applicant. Using the tables for the area under a normal curve, this Z-score difference can be read as a percentage amount by which the selectees are expected to be better than the applicants.

Equation A1: Naylor-Shine utility model

$$\overline{Z}_{y_i} = r_{xq} \frac{\lambda_i}{\phi_i}$$

where $\overline{Z}_{y_i}$ = the mean standardised criterion score of all individuals above the predictor cut-off, r_{xq} = validity between criterion and predictor, λ_i = the ordinate of the normal distribution at the standardised predictor cut off Z_{y_i} and ϕ_i = the selection ratio.

[36] As is usual practise, concurrent validity scores may need to be adjusted for range correlation (Schmidt et al, 1979: 612).

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ature of these concepts, an example by Cascio

Example A1: Naylor-Shine Utility Calculation

Assume a given validity $r_{xq} = 0.35$ and a given SR = 0.10. From tables given by Naylor-Shine, $(\lambda_i/\phi_i) = 1.75$. Then

$\overline{Z}_{yi} = r_{xq}(\lambda_i/\phi_i) = (0.35)(1.75) = 0.613$

So one can expect the selected group to be approximately 0.613 Z-units better than the unselected group. This author proposes that by using the area under the curve of a normal distribution, one can translate a Z-unit score into a percentage. Thus in this example, 0.613 Z-units occupies 0.2291(approx) of the area under the curve in the positive half of the distribution. Hence the average increase in performance of the selected group will be approximately 23% better than the unselected group.

Problems with the Naylor-Shine model include a) As with the Taylor-Russell model, cost is not considered, b) also as with the Taylor-Russell model, utility is defined in terms difficult for managers to assimilate (Cascio, 1999).

Thus, NS's general applicability is best suited to those instances where performance cannot be expressed in monetary terms, and where the dimensions underlying the estimation of utility are continuous and assumed to be linearly related (Cascio, 1999).

A2. INTERMEDIATE REFINEMENTS OF EF MODELS

A2.1. SELECTION UTILITY OVER TIME

Utility returns are not only a function of the basic variables discussed in Section 3.2.1A, but also a function of how long they can be sustained. Therefore time can and should also be included as a variable.

One way of achieving this is simply to multiply the expected returns within the utility equation by the average tenure ($\overline{T}$) of the selectees,

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t employee records. Cost is not multiplied by
e beginning selection stage. Therefore utility becomes:

Equation A2: Selection utility inclusive of tenure

$$\Delta U = \overline{T} N_s r_{xy} \sigma_y \frac{\lambda}{\phi} - N_s \frac{c}{\phi}$$

Boudreau (1983a) notes however that future returns should be discounted the further away that they occur, therefore Equation A2 becomes:

Equation A3: Boudreau's (1983a) financial selection utility inclusive of discounting

$$\Delta U = \sum_{k=1}^{T} \frac{N_s \left[\frac{r_{xy}}{\sqrt{r_{qq}}} \sigma_y \frac{\lambda}{\phi} \right]}{(1+i)^t} - N_s \frac{c}{\phi}$$

where T = the expected tenure of selectees, k = treatment period in which effects occur, i = the organisation's effective discount rate for projects of this nature.

This discounting of future revenues is generally utilised in future UA equations, costs are only discounted if incurred later then the first period.

A.2.2. FINANCIAL CONSIDERATIONS IN SELECTION UTILITY

Boudreau (1983a) also included other financial treatments of the utility figures. Given that BCG utility is expressed in increased monetary value, i.e. it is directly related to profitability, the financial considerations of taxation and variable costs should be considered.

For taxation, the treatment is simple. Revenues and costs are assumed to be adjusted by the effective corporate tax rate (*TAX*) such that both, and therefore consequent profits, are reduced as follows:

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$$\Delta U = \left\{ \sum_{k=1}^{T} \frac{N_s \left[\sqrt{r_{qq}} \sigma_y \overline{\phi} \right]}{(1+i)^t} - N_s \frac{c}{\phi} \right\} (1 - TAX)$$

where TAX = the organisation's effective corporate tax rate.

In addition to the above, it is possible that the effect of the intervention under review – in this case the effect of the selection procedure – will impact in turn on variable costs that are not captured in the utility equation. This may alter the utility of the procedure.

A classic example of variable cost effects is that of performance under a contingent compensation contract (Boudreau, 1983a: 557). For example, if a salesforce is compensated via commissions, then improving the quality of salespeople via a better selection method will by definition increase salesperson performance, which should mean higher sales. Higher sales in turn mean higher commissions that have to be paid to the salesforce, which results in a higher wage bill. Such variable costs should be accounted for.

Variable costs involve the concept of *service costs*, i.e. "the stream of present and future sacrifices (e.g. wages, benefits, materials) incurred to maintain, support and induce those services" (Boudreau, 1983a: 555). Making the assumption that service costs and value are congeneric[37] then the equations become:

Equation A5: Boudreau's (1983a) financial selection utility inclusive of variable costs

[37] If service value and cost are not perfectly correlated, then the base equation (not including tax or discounting) is rather $\Delta U = N_s T[r_{xy}(\lambda/\phi)\sigma_y - r_{x,sc}(\lambda/\phi))\sigma_{sc}] - (N_{ac})/\phi$ where T = expected tenure and sc = service costs (Boudreau, 1983a: 555). Practically, it is almost never assumed that $r_{xy} \neq r_{x,sc}$

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$$\Delta U = \left\{ \sum_{k=1} \frac{}{(1+i)^t} - N_s \frac{c}{\phi} \right\} (1 - TAX)$$

where V = the proportion that service costs constitute of service value (y).

This equation clearly requires an extra study or judgemental exercise into the relationship (or at least proportionality) of service value and service costs.

Empirical studies into the values of the added economic variables found the following values: Burke and Frederick (1986) found the discount rate to be 0.18, tax to be 0.49 and variable costs 0.05; Mathieu and Leonard found i = 0.15, tax = 0.46 and variable costs to be 0.07; Rich and Boudreau (1987) found i = 0.15, tax = 0.39 and variable costs to be 0.

A2.3 THE ALTERNATIVE 'RBN' SELECTION UTILITY MODEL

Raju *et al.* (1990) suggested an alternative approach to selection utility, based largely on the proposition that the calculation of σ_y presents difficulties that may be overcome by the new formulation.

They (p4) point out that the traditional BCG model utilises two assumptions:

1. That the predictor x and service value y are linearly related. Raju *et al.* (1990:4) concur due to various evidence that this is tenable; and
2. That $r_{xq} = r_{xy}$, i.e. the correlation of predictor x with employee performance q is the same as with service value y. Raju *et al.* suggest that this is less likely in the case of observed scores – there is no empirical support or theoretical basis.

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conceptual issue, Raju *et al.* (1990: 4) distinguish ores for q and y. They suggest that actual scores are far more likely to be perfectly correlated than observed scores, i.e.:

Equation A6: Congeneric relationship between true service value and performance

$$y_t = \alpha q_t + \beta$$

where the subscript 't' refers to true scores, α and β are constants.

implying:

Equation A7: Equivalencies between population parameters of true and observed scores

$$\mu_{y_t} = \alpha\mu_{q_t} + \beta$$

$$\sigma_{y_t} = \alpha\sigma_{q_t}$$

Raju *et al.* note that this relationship implies that y_t and q_t:

> **…measure the same construct but they are expressed in different units. Conceptually, an employee's *true* worth to an organization is the same whether it is measured in terms of dollars or with a rating scale. Two operational definitions of true worth could differ, however, because of measurement error and units of measurement. If there is no measurement error, the two definitions could only differ because of the units of measurement used. That is, when there is no measurement error, any two operational definitions of true worth would differ only by a linear transformation**
>
> **Raju *et al.* (1990:4, italics mine)**

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ssical test theory (Lord & Novick, 1968: 37 as cited in Raju *et al.*, 1990:5) the population mean of true scores is equal to the population mean of observed scores:

Equation A8: Relationships between service value and performance in true and observed scores

$$\mu_{y_t} = \alpha\mu_{q_t} + \beta = \mu_y = \alpha\mu_q + \beta$$

Raju *et al.* (1990) show that these results allow selection utility to be written as:

Equation A9: Raju et al. (1990) model of selection utility

$$\Delta U = N_s \alpha\sigma_q r_{xy} \frac{\lambda}{\phi} - N_s \frac{c}{\phi}$$

where σ_q = the standard deviation of actual (transformed) job performance ratings, α = a constant of proportionality representing the slope of the regression line when y is regressed on q[38], other variables as before.

Raju *et al.* (1990: 5-6) maintain that this formulation is superior primarily because it removes the need to estimate σ_y, substituting instead the known σ_q and estimation of α which they suggest is an easier parameter to conceptualise and estimate. More is said later on the estimation of α.

With regard to estimation of σ_q, Raju *et al.* (1990: 9-10) noted that the standard deviation of raw job performance scores should not be used as the scale used (e.g. five versus seven point Likert scoring) affects this value. Accordingly, they suggested a transformation, although based on criticisms of their method by Judiesch *et al.* (1993), Law and Myors (1999) have given a further amended equations (also see Burke *et al.*, 1993).

[38] Note that Raju, Burke & Normand (1990) utilise the notation *A* for this variable

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Raju, Carera and Lezotte (1996) also developed a utility model for cases in which supervisors are only able to measure employee performance on a categorical scale, notably a binary 'successful' versus 'unsuccessful' scale (i.e. q = 0,1). Similar to the conditions of the Taylor-Russell model, the difference here is translation to monetary selection value. The base model (without the obvious additions for issues such as number) is derived from logistic regression, and will only briefly be mentioned here. It is:

Equation A10: Raju, Cabrera and Lezotte (1996) selection utility for binary performance

$$\Delta\overline{U} / selectee = (q_1 - q_0)(\overline{p}_{(n)_1} - \overline{p}_{(o)_1})$$

where q_1 and q_0 = estimated monetary values of an average successful and unsuccessful employee respectively, both determined by supervisor judgement. $\overline{p}_{(n)_1}$ and $\overline{p}_{(o)_1}$ = ave. probabilities of success in the job after selection, for the new and old selection measures respectively.

Nothing further will be said on the RCL model, since it does not apply directly to the research at hand. The following sections will track progressions from the single cohort selection utility models reported above to more inclusive EF models.

A2.5 EXTENDING THE BCG MODEL TO MULTIPLE COHORTS

The above models are fairly easily adjusted to multiple cohorts (i.e. multiple different inflows, intra-flows and outflows over time). Simply, the utility of each inflow cohort is added, with earlier cohorts time-adjusted if necessary via a standard discounting factor (see below).

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Martin and Raju (1992) also highlight the need to include recruitment costs into the utility function. Recruitment costs are determined using a continuous polynomial function, however, Law and Myors (1993) provide a better method of including recruitment costs by using a step recruitment-cost function. The interested reader is guided to the above references for more detail on how to include recruitment costs into the BCG model.

A2.7 MULTIPLE SELECTION DEVICES AND MULTIPLE OUTCOMES

Sturman (2001) critiqued BCG-type utility selection models for not reflecting realistic selection practises (which typically involve multiple selection assessments from interviews to psychometric testing to reference checks). Also, selection is designed to improve not just performance on the job but often multiple other criteria, including but not limited to turnover, wage issues and information flow. He also prefers the incremental utility of a set of selection procedures over existing ones, not just random selection.

Sturman (2001) therefore argues that utility must be based on the cumulative effects of criterion variables and their predictive *power*. Instead of conceiving validity of selection as correlation of one predictor (selection assessment) on a single criterion (performance), or even multiple predictor on a single criterion (using a regression R^2 as discussed by Cascio, 1999) he develops a multivariate procedure using the following assumptions and developments:

1. Let **P** represent a column vector of predictors, and **C** a column vector of criteria;

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ghted to ensure maximum potential predictive

x **A**. Also, let weights be given to criteria via diagonal matrix **B**;

3. Let there be a vector **U** representing **P** multiplied by its weights **A**, and vector **V** be **C** weighted by **B**;

A is derived mathematically, however **B** is predetermined by the organisation according to its own preferences between different criteria (e.g. via job descriptions). The correlation coefficient is thus the linear relationship between the **U** and **V**. Sturman (2001) showed ultimately that:

Equation A11: Sturman's (2001) multi-criteria multi-predictor equations

$$\mathbf{A} = \frac{\sum_{11}^{-1} \sum_{12} \mathbf{B}}{\sqrt{\mathbf{B}' \sum_{22} \mathbf{B}}}$$

and

$$r_{xy} = \frac{\mathbf{A}' \sum_{12} \mathbf{B}}{\sqrt{\mathbf{A}' \sum_{11} \mathbf{A}} \sqrt{\mathbf{B}' \sum_{22} \mathbf{B}}}$$

For more detail regarding the derivation of r_{xy} see the original Sturman (2001) article.

In order to determine the validity of the new selection device, the overall utility is calculated, and then this new value is compared to the previous estimate. The value of the correlation coefficient used to determine the incremental increase caused by the device is the difference between the new and old correlations.

Sturman (2001) assessed what the inclusion of multiple selection devices might have made in prior research, finding utility to be higher than that gained singly, albeit lower than adding the effects of two or more selection devices together. He suggests therefore that single selection-test calculations

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went on test a situation where both multiple listed, and where refinements to the utility equation such as economic considerations were also taken into account, finding lower utility estimates when his process was used.

The Sturman model remains largely unevaluated in utility research. It may hold significant promise, although limited to selection. The needs of this thesis for EF including intra-organisation and outward movement is not served by the Sturman model, however, and as such it is not evaluated further or used in this research.

The discussion will now turn to the 'Achilles heel' of decision theoretic utility research, namely the estimation of the service value of performance. This is discussed in some detail next.

A5. ESTIMATING THE SERVICE VALUE OF PERFORMANCE

The BCG and RBN models above are reliant on the scaling variable that transforms improvements in performance (in standard score units) into economic value – these are σ_y and α respectively. The estimation of these variables is by far the thorniest issue in the field of decision theoretic utility analysis (e.g. Judiesch, Schmidt & Hunter, 1993; Schmidt *et al.*, 1979). Considerable theory and empirical effort has gone into understanding how best the scaling variable might be estimated (e.g. Boudreau, 1991; Chapter 9 of Cascio, 1999 for reviews; Law & Myors, 1999; Raju *et al.*, 1990; Raju, Burke, Normand & Lezotte, 1993; Schmidt *et al.*, 1979).

As stated in Chapter Three, however, this focus is not actually relevent for this thesis, which seeks to use the model attributes in a statistical way that obviates any scaling considerations. Since this entire issue is about scaling the variables, it is essentially irrelevant. The issue is however pursued below for the interested reader.

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iscuss the σ_y variable, which forms the basis of and researched BCG model. The α variable which is from the RBN model is also briefly discussed below.

A5.1 THE COST-ACCOUNTING APPROACH

Cost accounting methods were originally thought by Cronbach and Gleser (1965:121) to be the only method for calculation of σ_y – a state that these authors characterised as the 'Achilles heel' of utility analysis because of the complication and cost of such methods.

Brogden and Taylor (1950: 146) posited that in the cost accounting method, σ_y could be estimated through a lengthy process wherein the following elements are taken into consideration:

- Average value of production or service units.
- Quality of objects produced or services rendered.
- Overhead costs such as rent, electricity, depreciation of assets or machine rent.
- Errors, accidents, spoilage, wastage, damage to machinery over and above wear and tear.
- 'Soft factors' like appearance, friendliness, poise, and general social effectiveness in public relations (these factors are determined subjectively by individuals with the required background and responsibility).
- The cost of the time of other personnel (supervisors and other workers) involved in production or service.

The method is based on giving production or service units monetary values with respect to the level of contribution to organisational profit. At an employee level, a sample of units produced is drawn over a period of time.

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multiplied by contribution to profit, giving a for each employee in the sample. The standard deviation of these values is used as a proxy for σ_y. See Roche (1961) for an example.

The cost accounting method is problematic for several reasons: 1) It is complex and costly, 2) Roche (1961) in Cronbach and Gleser (1965:263) notes that "many estimates and arbitrary allocations entered into the cost accounting" therefore objectivity is not as strong as might be thought (also see Greer & Cascio, 1987).

Accordingly cost accounting is generally thought not to be a feasible technique. The following more recently developed methods, however, are more promising.

A5.2 THE SCHMIDT *ET AL.* (1979) GLOBAL ESTIMATION TECHNIQUE

Schmidt *et al.* (1979) suggested a global estimation approach to estimating σ_y which, in solving for the apparent impossibility of cost accounting, served to revitalise decision theoretic utility analysis. Their approach utilises the extremely simple statistical finding that, if service value y is distributed normally, then by the properties of that distribution the difference between the service value to the organisation of the 50th percentile employee (i.e. the average performer) and the 85th percentile is equivalent to one standard deviation, therefore σ_y.

Similarly, the difference between the 50th percentile employee and the 15th as well as the average between the three mentioned hypothetical employees is also equal to σ_y.

The Schmidt *et al.* (1979) method utilises expert judgements made by supervisors or other informed individuals who are both able to understand the position for which service value is being assessed as well as the financial

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of the three hypothetical staff members is re asked to estimate their value relative to one another[39].

Advantages of this method include its speed, low cost, comparability and the fact that reliability can be assessed and improved when several judges give opinions (Schmidt *et al.*, 1979:619). Well known decision aids, such as the Delphi technique can also aid in this process.

Notwithstanding this, much debate has subsequently occurred on the reliability and ultimately accuracy of these expert judgements (see below). However the estimation of σ_y should also be seen within the context of the uses of UA. If an exact monetary value is needed then absolute accuracy is relevant, but as discussed above, in many cases UA is used as a decision aid, for example to help choose between options. In such cases it is accepted that utility estimates need not be completely accurate, but rather effective enough to allow for efficient decision making. In such cases, only large errors in σ_y will impact the decision process. This has particular salience to the empirical model later, wherein a very global judgement of impact is made that is based merely on a semantic differential scale.

Boudreau (1991) discussed subsequent research on the Global Estimation Technique, noting several concerns. Most notably, judgements of σ_y may be harder than thought – for example inter-rater variability was sometimes as large or larger than the average σ_y estimate suggesting the inclusion of error - DeSimone *et al.* (1986) for example found inter-rater reliability to be a relatively low 0.56 and stability over time to be low 0.38 (although the difference score nature of σ_y could partially explain this).

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[39] One methodological note is that estimates of σy done on job incumbents rather than on applicants, which is generally the case, are likely to be underestimates due to the range restriction problem (Schmidt et al, 1979).

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ngton (1983) and Burke and Frederick (1984: the inter-rater reliability problem may be overcome through the use of a Delphi procedure to come to a commonly agreed position between all judges on the value of the 50th percentile employee, after which judges could either individually assess the 85th and 15th percentiles or come to a consensus on those too (Burke & Frederick, 1984 found that the former method led to better inter-rater reliability and therefore this is the recommended method)[40]. Some further refinements have been suggested, mostly variants on the above[41].

Cascio (1999) suggests as a critique a possible lack of face validity since the components of each supervisor's estimates are unknown and relatively hard to verify.

A5.3 EFFECT ON PRODUCTIVITY: SD_P

Based on observations of some weaknesses in the actual use of the Global Estimation Technique in real situations, Judiesch *et al.* (1992) suggest a reconceptualisation to SD_p, which is essentially estimates of the impact of

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[40] Boudreau (1991) however is unsure of the value of anchoring to a common average. Anchors 'force' the distribution to take a normal shape and hence affect the reliability of estimates. Further, Burke and Frederick (1984) simply drop inconsistent or outlying values on the basis that these numbers represent error. Unfortunately there is no theoretical base to determine what is an outlier, which presents a methodological challenge.

[41] Bobko et al (1983) suggest using the 97th percentile as in normality the difference between the 97th and 85th percentile also represents one standard deviation. However the ability of supervisors to estimate this level is unknown. On the other hand, it may well be that by using the 97th percentile as an enhancement tool, or other methods that test for normality, researchers have found evidence to dispute the assumption of an underlying normal distribution for performance in dollars, or at least significantly different point estimates (e.g. Bobko et al, 1983; Burke & Frederick, 1984; Rich & Boudreau, 1987; Lezotte et al, 1996).

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l employee output[42]. SD_p is representative of the ed from using an HR intervention, thus using SD_p instead of SD_y allows for utility estimates to yield answers in productivity terms rather than monetary terms. A scaling procedure is available that can produce SD_y estimates from SD_p (see Cascio, 1999 and Judiesch *et al.*, 1992 for theory in this regard, Hunter, Schmidt and Judiesch, 1990 for empirical possibilities in US markets and Lee (2004) for the South African labour market.

A5.4 THE 40% RULE.

The advent of multiple estimates of service value in the 1980s allowed for empirical estimates of the relationship between σ_y and average wages. In a review of early studies, Hunter and Schmidt (1982) found that when accounting for total job impact, σ_y lies in the region of 40% to 70% of average

[42] Most judges seem to infer that the 50th percentile value should equal the average wage. With this being the case, and since average wages are much smaller than the 'revenue' value of output at the 50th percentile, this implies not only the use of the wrong scale, but also a downward bias in estimating the 50th percentile. Secondly, estimates of SDy have been found to be constant percentages of the 50th percentile estimate from which they have been derived. Thirdly, estimates of SDy as a percentage of the 50th percentile value (termed SDp) are quite similar to empirically derived SDp values that have been based on actual employee output. Thus it is inferred that while downward bias in the mean estimate of the 50th percentile can cause the mean estimate of SDy to be downwardly biased as well, a downward bias in the 50th percentile does not bias the estimate of SDp. In other words the coefficient of variation of job performance, or it SD divided by its mean, in this case SDy / Mean y determined from supervisor estimates (i.e. 50th, 85th, & 15th percentiles), is more representative of job performance than the traditional Global Estimation Technique since it is not affected by downward bias. In fact the authors state, "estimates of SDp are the same regardless of the concept of dollar value employed"(p242). However a coefficient of variation score does not have a unit attached to it, thus Judiesch et al (1992) multiply SDp by an 'objective' estimate of the average value of employee output (Y*).

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…ion that in cases where σ_y cannot be empirically …ges be used as a conservative heuristic (Schmidt & Hunter, 1983[44]).

See Boudreau (1991) and Schmidt and Hunter (1983) for further comments in this regard, especially those to do with links between SD_p and the rules of thumb.

A5.5 CREPID: THE CASCIO-RAMOS ESTIMATE OF PERFORMANCE IN DOLLARS

Cascio and Ramos (1986) presented a method to estimate σ_y that they termed the Cascio-Ramos Estimate of Perfomance in Dollars (CREPID). CREPID relies on market pricing as a signal of commodity value, which in human resources implies that "the value of an individual's labour is equivalent to what an organization is willing to pay in order to obtain it" (Cascio & Ramos, 1986: 20).

CREPID accordingly utilises wages as a fundamental anchor in the process of estimating an employee's service value, a process that when average wage over a number of employees is considered smoothes out productivity biases. It also helps to separate out the labour element in the production function of the organisation from the capital and technology

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[43] Hunter & Schmidt (1982) actually found that the average value of σ_y over all studies was 16% of salary. However this referred only to a 'partial measure of value' to the relevant firms. They concluded based on a reduced subset of more complete studies that the 40-70% range was more likely.

[44] In further empirical review, Schmidt & Hunter (1983) determined that σ_p (standard deviation of employee output as a percentage of the mean) was 20% in jobs with non-piece-work incentives and 15% in piece-rate jobs. Beyond using σ_p to demonstrate an increase in output due to selection, Schmidt & Hunter (1983) also interpret σ_p as payroll savings in the form of reduced hiring when output levels are kept constant, both before and after using an HR intervention.

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change due to human resources, at least in the

Raju *et al.* (1990) provide the following equation summarising the calculation of CREPID:

Equation A12: Raju et al.'s (1990) summary equation of CREPID

$$Y_s = \sum_{i=1}^{K} MW_i P_{i_s} = M \sum_{i=1}^{K} W_i P_{i_s}$$

where: $K(1\ldots i)$ = the number of principal activities associated with the job; W_i = the proportional weight of importance that activity i has in the job [such that sum(W_i)= 1]; M = the average salary of job incumbents. P_{is} = the performance rating for incumbent s on principal activity i (such that $0 < P_{is} < 2$).

In practise, estimating CREPID is an eight-step process divided into two phases, namely the job analysis phase and the performance appraisal phase. The steps are: a) Identify the principal activities in the job, b) weight the relative importance of each principal activity[45], c) calculate overall activity weights[46], d) assign values (generally monetary) to each principal activity, e) multiply average (or weighted average) annual wage for all employees involved in the study by each activity weight, f) rate each sample employee's performance on each principal activity on a 0-200 scale[47], g) multiply scaled

[45] See Weekley et al, 1985

[46] . The sub-steps here are a) for each activity, multiply scores for frequency and importance, b) Having calculated each principal activity's score, sum scores together, c) Divide each principal activity score by the total score to reveal a percentage relative weight.

[47] The rating scale used in CREPID is a modified 200-point magnitude estimation procedure which has been found to be effective in capturing complex human judgement, is easy for raters to use, and has attractive psychometric properties (Stevens, 1951; 1966; cited in Cascio & Ramos, 1986). This scale is utilised because Cascio & Ramos (1986: 22) found that in most cases, "the very best first-level manager was typically not more than twice as productive as the average first-level manager." Note that the ratings are based on a rectangular distribution, which Bobko et al (1983) suggested would be more appropriate than that assumed for the Schmidt et al (1979) global estimation.

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h activity by the activity's value[48], h) sum
ıcipal activity to reach overall service value of each employee's job performance, i) compute the mean and SD of the dollar value of performance over all employees, corrected for range restriction if necessary.

For further considerations of this procedure see Cascio (1999), Edwards *et al.* (1988), Judiesch *et al.* (1992) and Lezotte *et al.* (1996). CREPID is less useful than the prior techniques for informing a statistical investigation such as that done later in the thesis, and as such is not pursued further here.

A5.6 ESTIMATION OF THE RBN α VARIABLE

As discussed earlier, the Raju *et al.* (1990) 'RBN' model replaces σ_y with the dual variables $\sigma_q\alpha$. The standard deviation of observed performance σ_q is reasonably simply acquired, and only requires the scaling discussed above (Law & Myors, 1999).

However α, which is defined as 'a constant of proportionality representing the slope of the regression line when *y* is regressed on *q*' remains to be discussed.

Raju *et al.* (1990) posit that determining α first involves the qualitative step of determining which economic construct or valuation base is most appropriate in defining the utility of an intervention (such as monetary sales or market value of staff)

Raju *et al.* (1990) show that when determining α in monetary terms, quantitative issues are raised on theoretical accounting and economic aspects. Firstly, accountants view the individual as enacting the value inherent in the job. Second, when determining monetary value of an improvement in

[48] In doing so, rating points assigned to employees are divided by the anchor (100, in this case) to return performance scores in decimal form.

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…ine *ex ante economic income*, i.e. "expected gross …alue generated by using the asset in its current purpose (Raju *et al.*, 1990:8)" or in this context the worth of the employee in the current job, given the value (s)he is expected to produce for the life of the job. However, the authors note that research indicates the difficulty in determining *ex ante* income, therefore surrogate measures are considered (e.g. current market price). Surrogate measures are *ex post* income measures, and although not equivalent to *ex ante* measures, generally for decision-making purposes, these values are substituted for *ex ante* income. Specifically "*ex post* concepts allow us to indirectly determine the contribution of an entity (i.e. person) or event (i.e. personnel selection practice) to the organization's value by assuming that management's investment in that entity or event reflects its opportunity cost and, hence, its relative value (Raju *et al.*, 1990:9)." From experimentation with CREPID (Cascio & Ramos, 1986) and the 40% and 70% rules (Schmidt & Hunter, 1983), both used to estimate σ_y in BCG, Raju *et al.* (1990) found that *mean annual salary* could be a good direct estimate of α.

Criticisms of α can be found in Judiesch *et al.* (1993) and responses in Raju *et al.* (1993). These are not covered here for lack of space, and since the RBN method is not used further.

A5.7 EATON'S (1985) METHODS FOR VALUING PERFORMANCE

Various other methods have been introduced, including:

1. Eaton *et al.* (1985) provide the 'systems effectiveness method' in cases for which wage is logically a small proportion of the value of performance to the organisation or of the value of performance of equipment operated (they use the example of a tank commander) and where contracting out cannot be utilised as a comparison benchmark; SET works on that logic

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aggregate performance being a number of units
ance of each unit, then increases in performance of current units might be converted to an equivalent increase in number of units with performance held constant.

2. Eaton *et al.* (1985) also suggested a second method, the 'Superior Equivalents Technique (SEQV)' based on the proposition that σy can be determined by first estimating the standard deviation of performance in performance units, then converting this into monetary units. The calculation is essentially very similar to the global estimation technique, however in SEQV the distances are estimated in performance terms (e.g. difference in hits per tank), and then scaled by the monetary value of the average performer calculated in equivalent salary terms.

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...OME FURTHER CUSTOMER LIFETIME VALUE MODELS

Venkatesan and Kumar (2004) concocted the following CLV model for an individual customer over a lifetime's purchases with a single organisation:

Equation B1: Venkatesan and Kumar's (2004) CLV model for individual customers

$$CLV_i = \sum_{y=1}^{Ti} \frac{CM_{i,y}}{(1+r)^{y/frequency_i}} - \sum_{l=1}^{n} \frac{\sum_m c_{i,m,l} \times x_{i,m,l}}{(1+r)^{l-1}} -$$

Note: $CLVi$ = lifetime value of customer i, n = number of years to forecast, $CM_{i,y}$ = predicted contribution margin from customer i (see Venkatesan & Kumar (2004:113) in purchase occasion y, r = discount rate, $c_{i,m,l}$ = unit marketing cost for customer i in channel m in year l, $x_{i,m,l}$ = number of contacts to customer i in channel m in year l, $frequency_i$ = predicted purchase frequency for customer i (see Venkatesan & Kumar (2004:113), T_i = predicted no. of purchases made by customer i until the end of the planning period.

Finally, Bauer and Hammerschmidt (2005) proposed the following model taking onto account all the above mentioned categories:

Equation B2: Bauer and Hammerschmidt's (2005) CLV model

$$CLV_i = -AC_i + \sum_t^T \left(r_i^t \frac{(AR_{ti} + UR_{ti} + CR_{ti} + RV_{ti}) - (SC_{ti} + MC_{ti})}{(1+d)^t} - \left(r_i^{t-1}(1-r_i)\right)\frac{TC_i}{(1+d)^t} \right)$$

Note: AC_i = the acquisition costs of customer i; r_i = the retention rate of customer i; AR_{ti}, UR_{ti}, CR_{ti}, RV_{ti} = respectively, the autonomous, up-selling, cross-selling and reference value (gross contributions from reference activities) revenues of customer i in period t, MC_{ti} and SC_{ti} = respectively, the marketing and sales costs for customer i in period t, and TC_i = the termination costs for customer i, d = the discount rate for marketing investments, T the length in years of the period. Other notation as above.

As stated above, there are a variety of other roughly comparable models (e.g. Blattberg, Getz & Thomas, 2001; Reinatz, Thomas & Kumar, 2005 although the latter is not a formal mathematical model). The above three illustrate more than adequately the type of thinking and models involved.

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C SURVEY QUESTIONS

(Survey cover letter omitted – available on request)

INSTRUCTIONS

1. **This survey will ask questions about the staff of one of your *key suppliers* (of goods or services). If your business does not have any key suppliers then please do not answer the survey, but if possible pass it on to someone who does;**
2. **If your company does deal with key suppliers of goods or services, then please pick *only one of the suppliers* to answer the rest of this questionnaire about.**
3. **If possible, pick the supplier who has the greatest level of service intensity, i.e. one whose employees are *frequently and intensively in contact* with yours;**
4. **Finally, please only answer the survey if you have *personal contact* with the staff of the supplier. If you do not have such personal contact, please pass this survey to the person in your company who has the greatest level of contact with the supplier's staff.**

QUESTIONNAIRE

A. Please indicate what *industry* (sector) your company is in:

_____

B. Please indicate the type of good /service which the supplier provides to your company:

_____

C. About how often does your company use this supplier's services?

_____ times a month OR _____ times a year (answer either one)

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employees of the supplier would you
ompany in some way, or have important
dealings with your account?

_____ supplier employees work with us in some way

E. Anywhere on the 7 point scale below, please indicate to what extent you personally deal with the supplier's staff.

Extremely often ①②③④⑤⑥⑦ Not at all
(No contact with the supplier)

F. Please indicate the size of your company:

Our company is approximately _____ employees

G. If possible, please indicate the approximate size of your supplier:

The supplier is approximately _____ employees
(Leave blank if you have no idea, or put 'small', 'medium', 'large' etc.)

Now please think about the *employees* of the supplier who deal with your company or have significant impact on your company's service from the supplier. These can be either supplier staff who have direct contact with your company (frontline staff) or behind-the-scenes staff who have a big impact on the product or service you get from the supplier (e.g. the creative team in an advertising agency who might not work directly with clients a lot but who create the actual offering). Please answer the following questions with regard to these staff:

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here been any changes in the supplier's staff with them, e.g. turnover, new acquisitions?

Tick one option:

Yes there have been changes	❒
No, no changes at all in the contact staff	❒
I don't know	❒

- If you answered yes to the above, please continue with this section
- If you answered no or "I don't know", please go directly to Question 11.

I. Think of supplier staff with whom you used to have dealings but no longer do (i.e. those who are no longer working on your company's account). Please indicate below what % of these staff you think stopped working with your account due to each of the following reasons (your percentages should add up to 100%)

REASON THOSE STAFF NO LONGER DEAL WITH US	PERCENT (%)
Promoted upwards	
Transferred to another account / division	
Left the supplier (i.e. turnover)	
TOTAL:	**100%**

J. Now please think of the 'new faces' you have had to deal with at the supplier over the course of the relationship (i.e. employees dealing with you who you hadn't dealt with before). Again please indicate below what percentage of these staff you think came from the following sources (your percentages should add up to 100%)

REASON STAFF STARTED WORKING WITH US	PERCENT (%)
Transferred /promoted from elsewhere within the supplier	
New hires	
TOTAL:	**100%**

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ng with respect to the *impact of movement* in ty of their offerings. Answer anywhere on the seven point scale provided where the middle would be no impact on your company:

MOVEMENT TYPE:	IMPACT ON YOUR COMPANY (IF ANY):			Not relevant
6. When supplier's staff have left the company …	Extremely beneficial to us	①②③④⑤⑥⑦	Extremely harmful to us	○
7. When supplier's staff have been transferred away …	Extremely beneficial to us	①②③④⑤⑥⑦	Extremely harmful to us	○
8. When supplier's staff have been promoted away …	Extremely beneficial to us	①②③④⑤⑥⑦	Extremely harmful to us	○
9. When new supplier staff have been transferred from somewhere else in the company..	Extremely beneficial to us	①②③④⑤⑥⑦	Extremely harmful to us	○
10. When supplier's staff have been brand new hires…	Extremely beneficial to us	①②③④⑤⑥⑦	Extremely harmful to us	○

L. Please indicate to what extent you agree or disagree with each of these statements:

	Strongly disagree	Disagree	Agree	Strongly agree		Don't know / Not relevant
1. The supplier has the required *management philosophy*	①	②	③	④		○
2. The supplier has *low turnover* among its employees	①	②	③	④		○
3. The supplier meets *deadlines*	①	②	③	④		○
4. The supplier has access to a *network of partners & associates* if necessary to help them service our needs	①	②	③	④		○
5. The supplier keeps to agreed *time schedules*	①	②	③	④		○
6. The production of our supplier's services to us requires *regular discussions* with us	①	②	③	④		○
7. The supplier honours *financial agreements*	①	②	③	④		○
8. The supplier offers *full service* (everything we need) in their offerings	①	②	③	④		○
9. We are *involved* in our supplier's value-creating process right from the start	①	②	③	④		○
10. The supplier has the *required personnel* to offer us the services	①	②	③	④		○
11. The supplier's offerings are consistent with our *strategy*	①	②	③	④		○
12. The supplier has all the *facilities* needed to meet our needs	①	②	③	④		○
13. We often have to deal with *new hires or trainees* at the supplier	①	②	③	④		○

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	Strongly disagree	Disagree	Agree	Strongly agree		Don't know / Not relevant
...ls and business	①	②	③	④		○
15. The supplier really *understands* our needs	①	②	③	④		○
16. We have had problems when the supplier made us *switch to different contact people* in their company	①	②	③	④		○
17. The supplier *accepts assignments / requiurements* enthusiastically	①	②	③	④		○
18. *Our input* strongly influences the production of our supplier's services to us	①	②	③	④		○
19. The supplier's services to us has been *enhanced* by changes in their personnel	①	②	③	④		○
20. The supplier *listens* to our problems	①	②	③	④		○
21. The supplier stays within *budgets*	①	②	③	④		○
22. The supplier is open to our *suggestions / ideas* about their service or product	①	②	③	④		○
23. The supplier's contact employees have pleasant *personalities*	①	②	③	④		○
24. The supplier will *argue* with us if necessary for better service	①	②	③	④		○
25. We often get new people *transferred* to our account from within the supplier	①	②	③	④		○
26. The supplier really *looks after* our interests	①	②	③	④		○
27. The supplier is *enthusiastically accepted* by our staff	①	②	③	④		○
28. The supplier reaches it's *objectives* with regard to provision of services to us	①	②	③	④		○
29. It seems we are often dealing with *new faces* at the supplier	①	②	③	④		○
30. We need to be *integrated into the value creating process* of this supplier in order for them to supply to us	①	②	③	④		○
31. The supplier has a notable, good *effect* on our business	①	②	③	④		○
32. The supplier contributes positively to our *sales or image*	①	②	③	④		○
33. We have had problems dealing with *inexperienced trainees or new hires* at the supplier	①	②	③	④		○
34. The supplier is *creative* in terms of its offering	①	②	③	④		○

(Note: final comments made to respondents – thank yous etc., are omitted)

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EGRESSION ASSUMPTION CHECKS: FURTHER DETAIL

D1 OUTLIER ANALYSIS

Univariate and multivariate outliers for variables, and related diagnostics, were assessed using three methods. Firstly, SAS's UNIVARIATE procedure was used to assess the univariate shape of the measures. Only one variable appeared to have noteworthy univariate outliers, namely Frequency. This is unsurprising since this variable was naturally skewed (seen in the stem and leaf plot), with a few organisations having extremely frequent interactions compared with the norm. Although Frequency is a moderator variable, it was nonetheless decided to transform it to bring in the outliers. Log transformation of the Frequency variable resulted in radical reduction to outliers, with univariate skewness reducing from 2.16 to -0.57.

Secondly two sets of scatterplots were drawn, firstly partial studentized residual plots (using the regression procedure in SAS Enterprise Guide) and secondly bivariate scatterplots between each variable (via the SAS CORR procedure with the experimental ODS Graphics technique). These are useful for further examination of outliers as well as further diagnostics. No particularly prominent outliers could be detected in the raw scatterplots, but residual plots show a clear outlier with a very large studentized residual as well as a few other points which may be mild outliers.

In addition, further diagnostics were assessed via the options offered by the SAS REG procedure with the INFLUENCE option. Raw and studentized residuals, hat scores, DFfits and DFBetas were produced. The recommended cut-offs of Belsey, Kuh, and Welsch (1980) are adopted. Several observations were worthy of examination with regard to univariate outlier scores. One

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residual plots, with very large DFfit and some

The variables were furthermore assessed for efficacy through examination of multivariate outliers, utilising hat scores (h_{ii}) and squared Mahalanobis distances (D_i^2). Both of the latter were estimated using a created PROC IML macro following on from the prior PROC REG output (Mahalanobis distances are not given by the PROC REG procedure and were therefore estimated as an additional consideration). Estimation of both diagnostics together may be superfluous since in large samples they have been shown to be essentially proportional to h_{ii}, (e.g. Stevens, 2002: 132) and in smaller samples there is a sample-adjusted proportional estimation however since the main sample is below 200 cases, which some would consider a marginal 'large' sample - both were printed to allow for possible divergences.

The commonly-utilised cut-off proposed for h_{ii} is 2(p+1)/n (Cohen *et al.*, 2003: 397). For D_i^2 the proportional cut-off could be estimated from this equation. A cut-off of 3(p+1)/n may also be considered based on sample size.

Eight observations were observed for which both the hat and Mahalanobis distance cut offs were exceeded. Note that the reduction to the latter cutoff produced only two multivariate outliers. However these observations did not show evidence of data entry mistakes or systematic answers indicative of lack of respondent care in answering. Deletion was therefore not considered a viable strategy – these data points were legitimate cases in the sample. To delete them would reduce sampling strength. Possibilities for dealing with this issue are discussed below, after further diagnostic tests.

These findings lead to an initial conclusion that outliers may play a part in estimation. This will be addressed shortly.

D2 NORMALITY OF THE RESIDUALS

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diagnostic regression was re-run and residuals First was normality – residuals were examined using the PROC UNIVARIATE procedure. Univariate skewness and kurtosis statistics as well as Shapiro-Wilks statistics and p-values were examined. With regard to assessing these, simulations by Curran, West and Finch (1996) have led to commonly-used recommended cut-offs for univariate skewness and kurtosis of 3 and 10 respectively (Kline, 2005: 50, also see West, Finch & Curran, 1995).

Even with the outliers the residuals were found to be normal, with skewness of -.75 for both, kurtosis of 4.34 (which is still within range) and most normality tests being non-significant (the exception being the Shapiro-Wilks with w=.95, p<.01).

D3 LINEARITY, HOMOSCEDASTICITY AND MULTICOLLINEARITY

These assumptions were assessed as follows. *Linearity* was assessed via the studentized residual scatterplots discussed earlier. No evidence of non-linear relationships was suggested in these plots. Homoscedasticity was also initially assessed via the studentized residual scatterplots discussed earlier. The patterns of residuals displayed satisfactory homoscedasticity. A further test for homoscedasticity was performed using a model specification test with the null hypothesis that the errors are homoscedastic, independent of the regressors and that several technical assumptions about the model specification are valid. The chi-square stat (27) = 25.16, p = .57, so the hypothesis of homoscedasticity could not be rejected.

Multicollinearity was initially examined via correlations, as seen in Table 8-1 above. No correlation was so high as to merit concern about these issues. However collinearity diagnostics including Variance Inflation Factor (VIF) scores, eigenvalues and Condition Indices should also be examined in

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sted cut-offs of Belsey, Kuh, and Welsch (1980) xceeded 10 or was overly high compared to the others. There are condition indices larger than 10, but only one variable had a proportion of variation larger than .5 for two or more other variables, namely Integration. Since this is a moderator not a main effect variable it was not considered necessary to be concerned with this, the moderation analysis will reveal further considerations in this regard. Therefore it is concluded that multicollinearity is sufficiently under control to proceed.

D4 ASSUMPTION CHECKS FOR DISAGGREGATED EF

Multivariate outliers and regression diagnostics were also generated for disaggregated EF. Essentially the same conclusions to the previous regression can be made, namely that some outliers exist but that other issues (muticollinearity[49], heteroscedasticity[50] and normality of residuals[51]) were sufficiently under control to proceed.

D5 DIAGNOSTIC TEST CONCLUSIONS

As stated above, the only potential concern suggested by the above tests is to do with potential outliers. These seemed not to be seriously affecting any of the other diagnostics. However to allow for any effects from multivariate outliers, robust regression techniques (Huber, 1973; Rousseeuw, 1984; Rousseeuw & Van Driessen, 2000; Rousseeuw & Yohai, 1984; Yohai, 1987)

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[49] Again VIF are controlled relative to each other and quite low, condition indices and proportions of variation have similar conclusions to the previous regression

[50] Note again that the test for homoscedascisity is chi (35) = 29.94, p = .71 which is acceptable.

[51] Residuals are sufficiently normal, with skewness = -=78 and kurtosis = 4.44, both of which are under the acceptable cut-offs.

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with standard OLS regression, as discussed in

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APPENDIX D: FINAL ROBUST COVARIANCE MATRIX FOR SEM MODEL

Table 9-3: Further robust covariance matrix with integration and frequency removed

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1. EFIn	2.22	.	.	.	.	.	.	.	.	.	.	.	.	.
2. EFout	1.30	2.33	.	.	.	.	.	.	.	.	.	.	.	.
3. PQ1	-.10	.07	2.23	.	.	.	.	.	.	.	.	.	.	.
4. PQ2	.03	.18	.78	1.23	.	.	.	.	.	.	.	.	.	.
5. PQ3	.19	.29	.58	.52	1.14	.	.	.	.	.	.	.	.	.
6. HPQ1	.13	.45	1.02	.79	.51	1.41	.	.	.	.	.	.	.	.
7. HPQ2	-.01	.26	1.10	.92	.63	1.10	1.60	.	.	.	.	.	.	.
8. HPQ3	.03	.13	.64	.46	.34	.55	.59	.53	.	.	.	.	.	.
9. SPQ1	-.20	.02	.92	.73	.66	.82	1.07	.55	1.44	.	.	.	.	.
10. SPQ2	-.12	-.01	1.07	.86	.61	.86	1.18	.65	1.15	1.76	.	.	.	.
11. SPQ3	-.13	.11	.85	.58	.51	.66	.82	.48	.79	.87	1.13	.	.	.
12. OQ1	.26	.25	.63	.59	.53	.52	.76	.35	.67	.88	.52	1.11	.	.
13. OQ2	.17	.37	1.03	.78	.67	.86	1.09	.64	.87	1.10	.82	.75	1.49	.
14. OQ3	-.12	-.01	.99	.71	.43	.56	.87	.47	.86	.98	.73	.63	.96	1.34

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AL ROBUST COVARIANCE MATRIX FOR SEM MODEL

Table 9-4: Robust covariance matrix for single-item EF model

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.	QualFlow	1.679													.
2.	Frequ	.109	1.446												
3.	PQ1	.024	.047	1.230											
4.	PQ2	.170	.023	.607	1.093										
5.	HPQ1	.228	-.104	.670	.620	1.226									
6.	HPQ2	.139	-.047	.713	.732	.577	1.265								
7.	HPQ3	.049	-.006	1.062	.970	.945	.881	2.189							
8.	SPQ1	-.100	.159	.824	.648	.754	.694	1.073	1.476						
9.	SPQ2	.044	.012	.658	.635	.574	.731	1.099	.746	1.296					
10.	SPQ3	-.091	.056	.771	.718	.769	.694	1.219	1.000	.814	1.329				
11.	OQ1	.121	.215	.900	.876	.905	.940	1.308	1.057	.849	1.000	1.608			
12.	OQ2	.057	.054	.731	.611	.486	.688	1.000	.792	.676	.787	.797	1.144		
13.	Int2	-.310	.147	.194	.324	.036	.398	.359	.334	.239	.372	.405	.482	1.709	
14.	Int1	.026	.089	.608	.457	.442	.557	.972	.893	.425	.569	.732	.629	.429	1.473