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Supplier Selection and Business Process Improvement

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Abstract

While prior research provides considerable evidence for the existence of relationship between supplier selection and Business Process Improvement (BPI), it yields little insight into the level of the relationship.

By examining the level of the relationship between supplier selection and BPI practices, the present study contributes to the body of knowledge in both fields through identifying and examining the linkages between two topics based on a developed conceptual model, which explicates the interrelationships between supplier selection and BPI constructs, and providing the results of an empirical test of the model at different divisional levels of large firms operating in different industries in the London (United Kingdom).

In general, the data support the proposed research model. The results of the study show that higher levels of *Quality*, *Service*, *Organization* and *Relationship* as well as lower levels of *Cycle Time* pertinent to the suppliers significantly contribute to the buyers' process *Improvement Initiative* and *Customer Focus*. Additionally, *Relationship* and *Cycle Time* have more relations to *Improvement Initiative* and *Organization* and *Cycle Time* have more impacts on *Customer Focus* than other supplier selection constructs.

We begin by reviewing the relevant literature and developing the conceptual research model. We describe key supplier selection and BPI constructs, elaborate on the interrelationships among these variables and pose a series of testable hypotheses regarding the linkages between supplier selection and BPI constructs. Next, we discuss methodological issues related to developing and validating the measures of constructs as well as data collection and analysis procedures. Thereafter, we present and discuss the

results of our substantive tests that involve linear regression models. We conclude by considering the implications for both research and practice and provide recommendations for broadening the scope of future research of supplier selection and BPI.

Table of Contents

List of Figures 5

List of Tables 6

Acknowledgment 7

Introduction 8

Chapter 1: Research Description 12

1.1. Statement of Problem 13

1.2. Literature Review 15

1.3. Theoretical Framework 22

1.3.1. Transaction Cost Approach 23

1.3.2. Core Competence Approach 27

1.3.3. Outsourcing 31

1.3.4. Supplier Selection 41

1.3.5. Business Process Improvement 54

1.3.6. Research Conceptual Framework 72

1.4. Purpose of Study, Research Question and Hypotheses 76

1.5. Unit and Level of Analysis 78

1.6. Limitations of Study 80

1.7. Significance of Study 82

Chapter 2: Research Methodology 83

2.1. Research Strategy and Design 84

2.2. Definition and Operationalization of Variables 88

2.3. Source of Information 95

2.4. Methods of Data Collection 96

2.5. Methods of Data Analysis and Interpretation 101

Chapter 3: Results 109

3.1. Sample Statistics and Non-response Bias Assessment 110

3.2. Validity 124

3.3. Substantive Analyses 136

3.3.1. Mean Analyses 136

3.3.2. Test of Hypotheses 147

Chapter 4: Discussion and Conclusions 152

4.1. Discussion of Findings 153

4.2. Conclusions and Implications 164

4.3. Directions for Future Research 173

References 177

Appendices 197

Appendix 1: Sampling Frame 198

Appendix 2: Cover Letter 233

Appendix 3: Questionnaire 235

List of Figures

Figure 1: Conceptual and Hypothesized Research Model 74

Figure 2: Industry Profile 113

Figure 3: Total Sales Profile in Year 2003 114

Figure 4: Number of Employees Profile in Year 2003 115

Figure 5: Respondent Profile 117

Figure 6: Business Process Profile 119

List of Tables

Table 1: Supplier Selection Factors and Criteria 52

Table 2: Business Process Improvement Factors and Criteria 69

Table 3: UK Standard Industrial Classification of Economic Activities 2003 93

Table 4: Process Classification Framework 94

Table 5: Industry Profile 112

Table 6: Total Sales Profile in Year 2003 113

Table 7: Number of Employees Profile in Year 2003 115

Table 8: Respondent Profile 116

Table 9: Business Process Profile 118

Table 10: Normality Test of Population and Sample Values 120

Table 11: Goodness of Fit Test 121

Table 12: Summary Statistics of Supplier Selection and BPI Criteria 122

Table 13: KMO and Bartlett's Tests for Supplier Selection and BPI Criteria 127

Table 14: Supplier Selection Factor Analysis 129

Table 15: BPI Factor Analysis 132

Table 16: Reliability and Scale Statistics 134

Table 17: Paired-samples T Test for Supplier Selection Criteria 137

Table 18: Paired-samples T Test for BPI Criteria 141

Table 19: Relative Importance of Supplier Selection Criteria 144

Table 20: Relative Importance of BPI Criteria 146

Table 21: Regression Analyses for *Improvement Initiative* 148

Table 22: Regression Analyses for *Customer Focus* 149

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Introduction

In today's global economy, organizations are faced with a variety of changes in the business environment (Edwards, Braganza & Lambert 2000; Tracey & Tan 2001; Lockamy & McCormack 2004). The dynamics of present day competitive environment also places increasing pressures on organizations to reinvent themselves almost continuously (McAdam & McCormack 2001), adopt the supply chain management philosophy (Tracey & Tan 2001), develop long-term strategic partnerships with a few competent and innovative suppliers and collaborate with them in non-core process outsourcing in order to maintain or improve overall organizational performance and generate sustainable competitive advantage. This structured approach to the design of supply chain will result in an organization that is an appropriate mix of the firm's own capabilities with those of partners or suppliers in a relationship that is consistent with the business strategy. For this reason, suppliers should be selected based on how their actions will impact all the performance and competitive elements of the supply chain. It indicates that one of the competencies essential to the supply chain success is an effective supplier selection decision.

Almost everywhere organizations are undergoing rapid and significant changes driven by environmental pressures. In order to survive in such environment, practitioners are forced to continually revise their business processes to respond quickly to changes. As a result, many business processes within organizations are dynamic and constantly changing. Operations management has traditionally dealt with optimizing some or all of a firm's internal processes. However, academics and practitioners alike have recently shown interest in optimizing the entire set of processes, both internal and external to the firm, which provides value to the end customer. This perspective is a potentially powerful way for the firms to ensure customer satisfaction. However, such high level of

customer orientation, which results in better products or services, no longer ensures sustainable competitive advantage (Mertins et al. 1996, cited in Lee & Chuah 2001). Researchers like Hiatt (1996) and Zairi (1997) are well aware that improving business processes is also paramount for businesses to stay competitive in today's marketplace. The traditional view of quality and performance has been reassessed and Business Process Improvement (BPI) has been introduced to provide an effective and comprehensive means to improve an organization's performance (Zairi 1997).

To meet the challenges imposed by turbulent economic conditions and severe competition, firms look towards investment in new technology and skills to enhance their competitive position. However, improvement solely on the firm's capability is not enough to address the needs of the flexible supply chain. Upstream activities of the supply chain will play a vital role in determining the flexibility of the chain as well. Therefore, in order to keep the promises to customers, an effective supplier selection system becomes necessary beside the improved production methods and technology.

The lack of empirical research examining the relationships between supplier's attributes and buyer's process improvement reveals some crucial gap in the literature on this subject, which should be filled in. Mohammady Garfamy (2004) through an exploratory multiple-case study has found what qualifications and characteristics of suppliers and their relationships with buying firms are considered important in relation to BPI and how and why they improve firms' processes. His study is a case-based description of the phenomenon and its results are thus limited for the purpose of generalization. It is now academically and managerially imperative and interesting to determine what relationship exists between the levels of suppliers' attributes and buyers' BPI dimensions. In this research we try to find the answer of this question.

The present explanatory study expands on the previously developed theory and proposed original model by Mohammady Garfamy (2004) to investigate and determine their accuracy and applicability in a sourcing context and provides a means of evaluating the contribution of buyer and supplier to the process. Hence, by examining the relationships among all the factors relevant to supplier selection and BPI in a multiple criteria environment, an explanation is developed on how and why these dimensions should be considered in the formulation of sourcing strategy and decision. The developed explanation is useful for successfully implementing BPI via Business Process Outsourcing (BPO) and making sure that outsourcing satisfies the requirements of core processes in order to improve performance and generate competitive advantage for the buying organization.

Chapter 1:

Research Description

1.1. Statement of Problem

Today, organizations worldwide have to cope with very keen competition and a dynamic environment as market conditions are changing rapidly and customers are demanding better and better products and services (AQCL 1997). In response to the increasingly stringent demands and to maintain or improve the competitive advantage, firms that excel must implement strategies to achieve cost reduction, continual quality improvement, increased customer service, delivery improvement and reduced concept-to-market product cycle time. In fact, many companies nowadays have come to realize the importance of constantly strengthening and improving themselves to win or survive in the global competitive market.

It is apparent that companies have to manage in an era of global competition, which is forcing many firms to rethink their operations strategy. True sourcing represents one method that can be used to obtain the world-class performance levels that are needed to meet future challenges. The pursuit of competitive advantage requires the development of global processes and strategies that become an integral part of a firm's supply chain efforts. For many, this means pursuing global sourcing strategies and approaches that integrate engineering, purchasing, operations, logistics and even marketing. Global sourcing may well be one of the last untapped areas, which offers the kinds of performance breakthroughs required to remain successful in highly competitive markets (Trent & Monczka 2003).

However, a successful sourcing program cannot be carried out unless cooperative buyer-supplier relationships are maintained. As companies adopt new manufacturing strategies, such as Just-In-Time, it is necessary to consider those factors that influence

buyer-supplier relationships. When management adopts BPI philosophy throughout the organization, organizations begin to make comprehensive changes to their policy towards suppliers (Hanan 1991, cited in Bhatt 2000). In the other words, once a supplier becomes part of a well-managed and established supply chain, it will have a lasting effect on the competitiveness of the entire supply chain. As part of this process, it is important to establish appropriate criteria for assessing supplier performance. Similarly, buyer attributes need to be considered as well, since each party, supplier or buyer, can have a positive or negative effect on the success of the relationship. Consequently, it is important to evaluate suppliers according to the criteria that reflect the buyers' BPI aspect of the sourcing decision.

It has been found that the studies of supplier selection criteria have not adequately incorporated contemporary issues such as BPI capabilities that are now considered to be relevant to outsourcing decisions. Although there are plenty of researches about supplier selection and BPI separately, the study of relationship between them, which accounts for the multi-dimensionality of both BPI and supplier selection, has received very little scrutiny from scholars and practitioners. As a result, there are some crucial gaps in the literature on this subject. One of the most critical of these gaps is the lack of empirical research examining the relationship between attributes of supplier and buyer's process improvement. Although the research conducted by Mohammady Garfamy (2004) has explored this relationship, the study is a case-based description of the phenomenon so that its results are not generalizable beyond the specific case study for which the results have been obtained. Case studies are strong in realism, internal validity and parts of construct validity, but they suffer from statistical conclusion validity, statistical generalizability external validity and conceptual replication (Mentzer & Flint 1997).

Case studies of the best practice are extremely valuable, but they must be supplemented with other methods to strengthen the theoretical support. However, our understanding of the underlying process of the phenomenon is still not fully developed.

This study aims to fill this gap and empirically examine the relationship between supplier selection and BPI in a broader context.

1.2. Literature Review

This section reviews the relevant published literature in the fields of supplier selection and BPI as well as a number of supporting areas based on an extensive search in the academic literature, revealing a minimal overlap in the research. The literature review provides a grounding of the research and focus as well as establishing a basis for developing the research instrument. The identified key components in supplier selection and BPI represented the structural elements that make up the questionnaire survey. The examination of literature concludes that a need exists to further the understanding of research topic.

Supplier selection has been the subject of extensive conceptual and empirical work in business management literature and is widely considered to be one of the most fundamental responsibilities of the purchasing function of management. For example, Carr and Pearson (1999) observed that firms with a strategic approach to purchasing were more involved in supplier evaluation than other firms. It was also shown that this strategic approach had a positive impact on buyer-seller relationships and finally, supplier evaluation systems had a positive effect on the buying firm's financial performance and may benefit various departments of the buying company.

Vonderembse and Tracey (1999) also observed that supplier selection tactics positively impact on a buying firm's manufacturing performance. They demonstrated that high performing companies attach greater importance to key supplier selection criteria such as quality and delivery performance than low performing companies. Increased reliance on supplier capabilities and technologies, however, increases the impact that supplier selection and assessment can have on the buying firm and in particular, its performance. Thus, previous writings have clearly articulated that attending to the organizational buying activity can provide a basis for securing a competitive advantage. This part of the literature review indicates that some of the researches are prescriptive, emphasizing models that should be used and some are descriptive, emphasizing models that are in use. However, there is a branch of research, particularly relevant to this study, which examines the use, the relative importance and prevalence of various supplier selection factors or criteria for different purchase and product scenarios. A number of variables have been selected, which constitute the basis of such studies. These are generally grouped in accordance with whether they relate to the supplier, the product or the purchasing organization. Wagner, Ettenson and Parrish (1989) in their study about retail buyers found that a hierarchy of effects dominated by selling history, markup and delivery was established. Merchandise quality and fashionability were of secondary importance, while reputation, service and country of origin had little. In industrial buying research, explicit criteria such as quality, service, delivery and price have been found to dominate supplier selection (Bhutta & Huq 2002). Implicit criteria such as reputation and location have also been found to be important, but their relative importance is the subject of debate. Ghodsypour and O'Brien (1998) agreed that cost, quality and service are the three main categories when deciding on supplier selection

parameters. It reveals that the supplier selection process usually made on the basis of cost, quality and service has been recognized as a major decision making process. Ellram (1990) found that quality, on-time delivery and uninterrupted supply become critical source selection criteria because supplier failures on these dimensions have more serious adverse effects on the buyer's operations. Tracey and Tan (2001) show that evaluating and selecting suppliers grounded in the criteria of quality, delivery reliability and product performance enhances the four dimensions of customer satisfaction (i.e. price, quality, variety and delivery) and firm performance. Petroni and Braglia (2000) evaluated the relative performance of suppliers based on capabilities relating to management, production facilities, technology, price, quality and delivery compliance and argue that managers perceive quality to be the most important supplier attribute. Pearson and Ellram (1995) argue that quality, cost, current technology and design capabilities are the most important selection criteria and the focus on these criteria supports the trend toward an increasing emphasis on strategic flexibility for the firm. Lamming et al. (2000) suggested that the management of suppliers for functional products must focus on cost and quality issues, whereas for unique innovative products, the emphasis is on speed and flexibility. Kotabe and Murray (2001) in their study found that supplier's competency, service quality control, transaction-cost drivers, supplier's brand image and supplier's country characteristics are more important than others. Some studies found gender differences in using supplier selection criteria, where female purchasing managers place a higher level of importance on support (breadth of product line, geographical proximity and warranty availability) and dependability (ability to keep delivery promises, technical support availability and service response) than do male purchasing managers (Stoddard & Fern 1999; Swift & Gruben 2000). Verma and

Pullman (1998), on the other hand, point out that although managers say that quality is the most important attribute for a supplier, their actual supplier choice is based largely on cost and delivery performance. Furthermore, the importance placed on the different attributes was found to vary largely in accordance with the differing cultural aspects of a society. The study by Shahadat (2003) in developing countries found that executing agencies' buying decisions are primarily influenced by economic criteria, with most emphasis on price and timely delivery. The reliability of the supplier and the quality of products are the next most important aspects. Results of research by Kannan and Tan (2003) illustrate that while both American and European managers consider objective selection and assessment criteria such as cost and price to be more important than subjective criteria such as supplier commitment, it is the more subjective criteria that have a greater impact on firm performance.

However, Briggs (1994) (cited in Choy & Lee 2003) states that joint development, culture, forward engineering, trust, supply chain management, quality and communication are the key requirements of a supplier partnership, apart from optimum cost. Choi and Hartley (1996) found that price is one of the least important selection items, regardless of the position on the supply chain. Empirical tests using data from the automotive and computer industries also indicated that the performance gains from supplier partnerships practices are contingent on extensive use of non-price selection criteria, frequent meetings and interactions with suppliers along with supplier certification. In contrast, these selection and monitoring practices appeared to have little effect on the performance of organizations following arms-length supplier relations (Ittner et al. 1999). Goetsch and Davis (1997) contend that an adversarial activity such as a low-bid process more than likely will have an adverse effect on product quality.

They assert that firms producing high-quality products give far greater attention to developing partnerships with exceptional suppliers than on reducing piece price. As long-term relationships between firms develop, criteria used to select suppliers may be subject to change. Swift (1995) reported that the differences are found between the single and multiple sourcing on the importance of price, reliability of the product, technical support available and total cost of the product in supplier selection.

The insight gained into the perceived importance of different supplier attributes is controversial. The findings of previous researches indicate that while price, quality, delivery reliability and service are typical determinants of supplier selection, the specific criteria used and their relative importance are highly dependent on the type of product, the type of purchase being made and the circumstances surrounding the purchase. Moreover, while there may be a tendency to focus on measurable selection criteria such as price, soft or intangible criteria such as management compatibility can and should play an important role in selection decisions and in turn, there is no common list of criteria used across supplier selection studies (Pearson & Ellram 1995). To conclude, the supplier selection process should not only consider price, but also a wide range of factors such as quality, organization and relationship (Verma & Pullman 1998; Petroni & Braglia 2000) with a view to decision making by considering the whole supplier capability in a long-term and strategic way.

The BPI literature, on the other hand, is replete with advice on how to improve business processes and performance. For example, Flynn, Sakakibara and Schroeder (1995) have examined the positive effect of BPI on cycle time, lot size reduction and setup reduction time. However, what is lacking is a holistic approach that encompasses the most important facets for long-term success (Paper 1998). There are some methodologies and

tools available to help businesses improve their processes, however, none of these adequately support the practitioner through all stages in the BPI activity (Adesola & Baines 2005). Much of the development of methods, guidelines and best practice in this rapidly changing field is originating from inspirational gurus and management consultants, working with pioneering organizations. The lack of a structured step-by-step approach and associated guidelines has been noted by many researchers (Harrington 1991; Kaplan & Murdoch 1991; Childe, Maull & Bennett 1994). This has led to the call for an effective, systematic and planned methodology to guide the successful implementation process (Davenport 1993; Vakola & Rezgui 2000). The evaluation of BPI methodology application is critical and yet understudied. There is also an important need to expand the capability of existing BPI methodologies to include structured and procedural aspects (Adesola & Baines 2005).

While the supplier selection literature is rich in terms of conceptual and empirical work and decision support methods for supply managers, none of the references cited above has studied the relationship of supplier selection and BPI. Most of the research in the field of business process focused management and supply chain management has been by empirical observation and case study. However, the integration of research and practice in the supply chain and business process management has not been evident (McAdam & McCormack 2001). In the research literature, the two fields are generally treated separately. The exception is the work of Li and Fan (2000) who proposed a three-stage approach to the integration of Business Process Reengineering and outsourcing.

Organizations have already utilized suppliers' strengths and technologies to support their product as well as process development efforts. Watts, Kim and Hahn (1990)

emphasized that an organization's ability to produce a quality product at a reasonable cost and in a timely manner is heavily influenced by its suppliers' capabilities. Suppliers have also a large and direct impact on the cost, quality, technology and time-to-market of new products (Handfield et al. 1999). Empirical researches (Goffin, Szwejczewski & New 1997; Vonderembse & Tracey 1999; Ndubisi et al. 2005) provide evidence that supplier involvement in product and process design teams and continuous improvement programs is a source of meaningful competitive advantage and performance because it enhances the manufacturer's quality, responsiveness, product, launch and volume flexibility, delivery service, cost and time-saving capabilities. Tracey and Vonderembse (2000) also found that such involvement significantly enhances manufacturing performance, but it is occurring at a fairly low level, perhaps due to a general perception that it is risky to involve outsiders in the inner working of the organization.

And finally, Mohammady Garfamy (2004) in his seminal work has clarified the missing link between supplier selection practices and BPI practices by highlighting the important role of supplier evaluation and selection in improving the firm’s processes. The findings have emphasized the influence that the supplier selection factors can have on the BPI factors. The case studies showed that how and why BPI through outsourcing only achieved when the organizations were able to select suppliers based on related factors to BPI and not just based on traditional factors such as cost. Furthermore, *Quality*, *Service* and *Organization* profile have been clearly identified as the most important factors for the evaluation and selection of suppliers from both purchasing and BPI perspectives, while the cost factor has not been considered to have any relation to BPI factors. The study also supported the relative importance of other factors such as *Relationship* and *Cycle Time* and exhibited their relations to BPI factors. He contents

that the focus upon all these factors supports the trend toward an increasing emphasis on BPI for the firms. Thus, suppliers should be chosen and retained based heavily on their capabilities to support BPI for the buying organization.

In summary, despite a general understanding of the useful roles of supplier selection on BPI, empirical studies examining the relationship between supplier selection and BPI are scarce in the literature. Additional references to the supplier selection and BPI literatures are integrated into the discussion of the topical areas within this report.

1.3. Theoretical Framework

During recent years new theories on supply chain management, outsourcing, etc. have emerged. Each theory has its own specific basis seeking to give solutions to problems concerning how to use and cooperate with suppliers. All theories, however, seek to solve a well-known problem within economic theory, i.e. the issue on division of labor and specialization.

Reasons for outsourcing vary and the conceptual frameworks, which have been used to explain the practice and degree of success obtained, include Transaction Cost Approach, Core Competence Approach, Resource-based Theory, Resource-dependent Theory, etc. As might be expected, none of these approaches explains all the behavior observed in practice in outsourcing contracts, although most explain some of the behavior and help predict the likely success of some outsourcing arrangements (Urquhart 2002).

The recommendations of Transaction Cost Approach and Core Competence Approach for outsourcing design and management resemble and complement each other perfectly. On the one hand, Transaction Cost Approach is a very short-term, only cost-based

approach. On the other hand, with implementing 'strategic importance' as a quality of transactions, a long-term perspective is added. This strategic importance can be defined very clearly by the degree of competitive contribution, which has been formulated in the Core Competence Approach. In this combination, operative cost aspects and long-term strategic aspects are brought together and as a result, the managerial applications of both approaches are compatible (Arnold 2000).

Among these conceptual frameworks, the study focuses on the combination of Transaction Cost Approach and Core Competence Approach as the most important theories considering outsourcing to suppliers. Afterwards, the research framework is elaborated based on these approaches as well as issues of outsourcing, supplier selection and BPI.

1.3.1. Transaction Cost Approach

Unlike the frictionless economic system implied by neoclassical theory, Transaction Cost Approach recognizes that transactions do not occur without friction and labels the costs, which arise from the interaction between and within firms, as transaction costs. Transaction costs arise wherever there is any form of economic organization, i.e. within a vertically integrated firm, in a market or in a command economy and are divided into market, managerial and political transaction costs. It would seem, then, that social morality, confidence, trust and the institutional framework are all interrelated. It is noteworthy that minimizing absolute or relative transaction costs is not an economically reasonable aim. Rather, what matters for the judgment of the economic quality

(efficiency) of an economic entity is its total economic results not its level of transaction costs (Furubotn & Richter 2000).

Williamson (1979) outlines the cost-determining attributes of individual transactions (dimensions of transaction) as their frequency (i.e. volume/number of transactions per time period), the environmental political, social or economic risk surrounding them (uncertainty or ambiguity as to transaction definition and performance) and the level to which the inputs required to achieve them are dedicated (asset specificity) to the transactions concerned. Asset specificity can arise in any of three ways: site specificity (resource immobility), physical asset specificity (technology advantages) and human asset specificity (know-how advantages) (Williamson 1981). In a world where individuals are subject to bounded rationality (limited judgment) and to opportunistic behavior (guile and self-interest) and therefore, small numbers bargaining (many bargaining situations are infrequent or involve small quantities where the cost of obtaining full information is prohibitive, i.e. as in an oligopoly) and information impactedness (asymmetrical distribution of information among the exchanging parties that means that one party might have more knowledge than another), these characteristics have a major influence on the efficiency of alternative transaction modes (Williamson 1985). Exchange relations are not always cooperative and therefore the notion of rationalizing and economizing on transaction costs in the comparison of the different modes of organization becomes crucial.

For efficient governance, three main structures emerge, with reference in particular to the volume/number of transactions and the characteristics of the investments required for consummating. Market governance implies that alternatives are available, which protect each party against opportunistic self-interest by the opposing party to the

contract, trilateral governance implies arbitration in resolving disputes and evaluating performance, bilateral governance implies continuing contractual contact, but with the autonomy of the parties maintained and finally unified governance implies internalization of the contracting process.

Transaction Cost Approach emphasizes that is through transactions rather than technology that determines the efficacy and efficiency of exchange by one mode of organization as compared with other (market or internal organization) and in this respect Transaction Cost Approach logic can be envisaged when a firm is faced with the following three possibilities:

(1) The ownership of certain assets (e.g. those that comprise the firm's core competence) sufficiently makes it obvious that a careful, comparative assessment is unnecessary (e.g. site specificity) and the hierarchy is the obvious choice. Hierarchy is based on the centralization of property rights by management and the administrative control mechanisms within a company facilitate the orientation on one target.

(2) In the case where self supply is clearly uneconomical, the market supply is the obvious choice (e.g. raw materials). Market steers transactions by the price mechanism and there are direct incentives for all transaction partners. If a supplier cannot meet customers' requirements, that supplier will not be able to participate in the economic exchanges any longer.

(3) For certain assets, a make or buy decision can only be made after assessing the transformation and transaction cost consequences of alternative modes.

The crucial issue is how the choice between firm and market governance structures is made for decisions related to the third point above.

The conceptual basis and basic design alternatives for the outsourcing decision are based theoretically on Williamson's Institutional Economics. In this respect, hierarchy is directly linked with insourcing and all governance structures with market elements are relevant for the outsourcing design.

Williamson (1985) pays greater attention to relational contracts between firms, but construes them as features of 'hybrid' forms of organization, lying on a continuum between markets and hierarchies. In between the two extremes of spot market transactions and vertically integrated firms lie a myriad alternative ways of coordinating economic activity, which are neither clear market nor clear hierarchy, from Strategic Alliances and formal written contracts to Quasi-vertical integration (Joint Ventures, Franchises and Licenses), Tapered and Full vertical integration. According to Transaction Cost Approach, one of the determinants of vertical coordination is the nature and level of transaction costs, wherein a change in the transaction costs arising from the exchange may lead to a change in the management of that supply chain. As uncertainty and asset specificity increase and frequency of transaction decreases, we move along the spectrum of vertical coordination from spot market towards the extreme of vertical integration (David & Han 2004).

Williamson (1993) argues that Transaction Cost Approach deals predominantly with dyadic contractual relations. Viewing the firm as a nexus of contracts, the object is to prescribe the best transaction/governance structure between the firm and its intermediate product market suppliers. Transaction cost economists argue that nonstandard forms of contracting have the purpose and effect of economizing on transaction costs (Williamson 1985). Considering the hazards of the spot market and contractual incompleteness, transaction costs economists predict the parties will adopt

appropriate contractual (governance) structures to prevent ex post opportunism and thus promote an efficient level of investment.

While providing a number of important insights regarding the most efficient means to govern a particular transaction, Transaction Cost Approach has been developed and tested under a set of restrictive assumptions that ignore the potential influence that an extant governance form, a firm's existing portfolio of transactions or other firm-specific asset and capability stocks may have on a focal transaction. The resulting implication is an untenable proposition that, in equilibrium, all firms facing a given set of transactional attributes will reach similar conclusions regarding which activities to execute internally and which activities to outsource (Leiblein & Miller 2003).

1.3.2. Core Competence Approach

During the past decade the core competence concept (Prahalad & Hamel 1990) has evoked great response in theory and practice. The core competence concept is a tool developed to help define the organization's role in the division of labor in a vertical and horizontal production–marketing network based on a managerial approach. This concept is frequently linked with outsourcing and value chain perspective. The upsurge in outsourcing over the last years has been fuelled by arguments from management gurus and leading academics that an organization's competitive advantage stems from its ability to identify, concentrate on and develop its core competencies and outsource anything, which is non-core (Prahalad & Hamel 1990). It includes those areas that are unique to the organization and make it competitive in the marketplace. As competition motivates firms to exploit their core competencies, outsourcing takes on greater

significance (Kannan & Tan 2003). Prahalad and Hamel (1990) contend that the real sources of competitive advantage are to be found in management's ability to consolidate corporate-wide technologies and production skills into competencies that empower individual businesses to adapt rapidly to changing business opportunities. They argue that core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies. Hence, competencies are the skills, knowledge and technologies that an organization possesses on which its success depends. These embedded skills that give rise to the next generation of competitive products cannot be 'rented-in' by outsourcing. These core competencies underpin the ability of the organization to outperform and excel the competition and therefore must be defended and nurtured. Instead of developing a strategy based on thinking only of dominating markets, it is more beneficial to think in terms of core competencies, which will segment the organization in a totally different way (McIvor 2003).

Core competence is what the customer perceives as being special, unique or especially valuable, which contributes to the exchange relationships with a given organization. Thus, a core competence may be a special company competence or interaction between more competences that combined offers the customer value (Freytag & Kirk 2003). Through its core competencies a firm can gain both efficiency and stability and reduce costs by focusing its resources on what it does best. The growing realization is that an understanding of core business process flows is essential if increased productivity and genuine cost savings are to be achieved (Johansson et al. 1993; Hammer & Champy 1994). Recently, firms have begun to realize that outsourcing of activities is no longer a tactical approach to reducing costs. Rather, strategic sourcing involves focusing on a

firm's core competence and outsourcing the remaining non-core activities in order to reap the benefits of its suppliers' economies of scale and scope (Kotabe & Murray 2001). In the make or buy decision, the core competences and capabilities of the organization must not be jeopardized by outsourcing key processes or product elements, thereby losing that skill (McIvor, Humphreys & McAleer 1997b). They should be kept under the full responsibility and control of a company or insourcing.

However, how core competencies are defined is unclear, but the essence of the idea is that core competencies should be kept in-house, but that other things that the organization does, which are not deemed critical to its mission should be considered for outsourcing. The perspective of core and non-core competencies starts to look less useful when the mission and main functions of the buying organization are changing along with the skills required of its staff. The core competence perspective is useful in prompting serious consideration about the functions, which are truly cost-effectively done in-house and those which could be outsourced without any loss to future requirements in expertise. It is less useful when some of the functions are core, but some or most of the tasks involved could be outsourced as it would be cheaper to do that.

The Core Competence Approach is also based on the single organization and on what management should consider in identifying its own core competences and the tasks that the organization should concentrate on solving itself. However, the core competence concept takes only a limited view of the close interaction (mutual product development, information exchange, long term commitment, etc.) that organizations in the markets have with their suppliers and customers. In this connection, it has been pointed out that competences are not necessarily attached to the individual organization. They are also

closely related to the interaction between firms and the fact that the interaction between firms may be grounds for developing new competences (Freytag & Kirk 2003). From a company and network point of view, a firm's competences are thus closely linked to the company's own capacity and interaction with its surroundings, which represent both possibilities and constraints. Hence, in many situations it is appropriate to look at both the intra-organizational factors that are at work and the inter-organizational factors that are in force in a given situation. It means that the interaction with suppliers is also a strategic activity, which must be developed continuously.

Together, Transaction Cost Approach and Core Competence Approach help develop a general model for outsourcing decisions. They help decide which of the institutional economics' based design alternatives is optimal. Distinguishing between core and non-core activities in the make or buy decision involves assessing the long-term strategic implications of each activity for the overall business. Therefore, management has to answer three questions on the outsourcing object:

(1) Is the activity highly specific? If so, normally very high market transaction costs for communication and agreement exist. Economically, it makes no sense to outsource such an activity.

(2) Is the activity strategically important? Sometimes it is not helpful to outsource activities with low specificity because they are extremely important for a company's ability to survive. To get a concrete idea of this 'strategic importance', the following question has to be answered.

(3) Is the activity a core competence, a central part of competitive advantage? Does it help to be competitive in a general way or does it not contribute to competitiveness in any way? Activities with no competitive contribution at all are typical outsourcing

candidates. With a higher degree of contribution they move step by step from external outsourcing to internal outsourcing to insourcing. Together, the answers on these three questions help get an optimal outsourcing design (Arnold 2000).

1.3.3. Outsourcing

Intense competitive pressure to improve delivery performance, quality and responsiveness, while simultaneously reducing cost, have forced many organizations to reexamine their strategic priorities, change their operating models much more frequently than ever before and continually seek new sources of sustainable advantage to survive. Competitive advantage no longer resides with a company's own innate capabilities, but rather with the relationships and linkages that the firm can forge with external organizations. Influenced by core competency thinking, many companies have been attempting to reorganize their value chains and focus on a number of core activities, where they can achieve and maintain a long-term competitive advantage and outsource all other activities where they do not have world-class status (Leenders, Nollet & Ellram 1994; Goffin, Szwejczewski & New 1997; Sislian & Satir 2000). Not only does this allow firms to downsize and utilize resources more effectively, it allows them to take advantage of the capabilities and technologies of suppliers. In doing so, they can enhance the product development process, improve product or service quality by adding measurable value to them, reduce product development times and more rapidly integrate technological breakthroughs of their suppliers into their own products. Through outsourcing, firms continuously gain access to new ideas, fresh perspectives and flexibility as well as increased productivity to remain competitive.

Therefore, the ability of a firm to find a strategic partner to provide the needed supplementary services and maintain the relationship is a source of competitive advantage. It involves the buyer organization attempting to develop and manage a competence-based supplier network and in turn, increases the dependence on the supply base and makes supply management a key success factor and an organizational imperative (Prahalad & Hamel 1990). For some companies, this has meant reducing and streamlining the supplier base so they can better manage relationships with strategic suppliers. For others, it has meant developing cooperative relationships with suppliers.

The literature and practice have seen the growth of buyer and supplier relationships from a focus on operational purchasing relationships to strategic partnerships and boundary evaporation based on long-term contracts, mutual support, non-adversarial negotiations and information and risk sharing (Min 1994; Choy & Lee 2003). Numerous companies have been downsizing, concentrating on their core competencies, moving away from vertical integration and outsourcing more extensively (Leenders, Nollet & Ellram 1994; Goffin, Szwejczewski & New 1997). According to Leenders, Nollet and Ellram (1994), in this process, the need to gain a competitive edge on the supply side has increased substantially. The old habits of instigating supplier competition to maintain low prices and dumping suppliers that do not meet expectations are changing, as downsized buying firms shift more responsibility to their supply bases and recognize the high cost of switching suppliers (Krause & Ellram 1997). Competitive tender/bidding is considered adversarial, undermining collaborative partnerships or relationships, with the focus being usually on price. The overall increase in the importance of quality and service and the decline in importance of price may be

indicative of the changes occurring in the relationships between buyers and their suppliers.

In today's global economy, enterprises are increasingly striving to develop long-term strategic partnerships with a few competent and innovative suppliers and collaborate with them in non-core process outsourcing to acquire resources, develop technology, access markets and respond to changing business needs. Companies are now pursuing more intensive and interactive relationships with their suppliers, collaborating in new product development, integrating key business processes and sharing cross-functional information on a range of issues (McIvor, Humphreys & McAleer 1997a; Wu et al. 2004). These partnerships are strategic in nature and involve a commitment over an extended time period in joint problem-solving efforts to develop mutual responses to changes in the marketplace and a sharing of information and risks and rewards of the relationships. In essence, supply chain partnering is an arrangement by which separate companies share administrative authority, form social links and accept joint ownership of operating policies. Looser, more open-ended arrangements replace highly specific, arms-length contracts to remove firm's boundaries and permit easier exchange of knowledge. Thus, the traditional pattern of the large, vertically integrated business is being replaced by one consisting of complex networks of collaborating organizations and chains of buyers and suppliers (Roy & Potter 1996).

The real productivity, design and quality improvements are not obtainable unless the suppliers in the collaborative relationship innovate to the best of their abilities, in conjunction with the buyer organization (Humphreys, Mak & Yeung 1998). The factors, which determine how close buyer-supplier relationships will become, are the degree of mutual dependence, the length of the cooperation, the extent of joint projects and

technological links as well as the degree of economic satisfaction with the cooperation (Monczka, Callahan & Nichols 1995).

Developing relationships however takes considerable effort and requires participants to assume a level of trust and reliance in their partners that may reflect a significant departure from established norms. Open and honest environment, key management, coherent and effective internal measurement systems, mutual respect and empathy, commitment to investment as well as financial and commercial arrangements are of particular importance in this aspect (Razzaque & Sheng 1998).

There is a tendency for large firms to evolve into loosely tied and decentralized federations or business units seeking alliances both within and outside the 'consortium' to serve customers' demands to their best ability (Fan 2000). Outsourcing has become an increasingly popular option for many organizations, but they vary in terms of activities being outsourced, reasons for and benefits from outsourcing and how the decision was made.

Companies with outstanding sourcing strategies appear to share two characteristics. They typically enjoy executive level commitment to building the organization's sourcing capabilities, viewing sourcing as a cross functional capability that is linked to the strategic and operational objectives while focusing on people and process. These organizations also relentlessly deploy these capabilities across the entire enterprise by creating and implementing an infrastructure of organization, measures and technology that supports the mentioned tenets (Spekman, Kamauff & Spear 1999).

The idea of forming an outsource system is meant to establish a dynamic organization through the synergetic combination of dissimilar companies with different core competencies to perform a given business project to achieve maximum degree of

customer satisfaction (Choy & Lee 2003). Outsourcing is a form of supply base management where the outsourcing organization deliberately rids itself of the organization's assets, infrastructure and people it had used previously or will use in the future to perform the particular process by contracting out or selling some or all of them to a third-party supplier, who in return, provides and manages the services for a certain time and monetary fee. Outsourcing is thus a specifically defined contractual relationship that is dependent on the supplier meeting the buyer's defined performance goals (Razzaque & Sheng 1998). An increased level of outsourcing places a premium on the skills needed to identify and distinguish between core and non-core processes, to select and develop suppliers, to structure long-term supplier relationships and to manage suppliers across a range of service and manufacturing processes. It is also crucial to approach the outsourcing decision from an 'activity' perspective within the company's value chain. When an organization is viewed from the perspective of activity, it is much easier to recognize the value adding activities, which contribute to the organization's competitive position.

Outsourcing is rapidly evolving beyond the simple reengineering of support processes. For many companies, outsourcing partnerships are being used to achieve rapid, sustainable improvement in enterprise-level performance (Linder, Cole & Jacobson 2002). The effect of the sourcing decision on competitiveness is not limited to cost control alone, but also influences the performance of the conversion system along the other competitive dimensions of quality, dependability, flexibility and innovation (Hayes, Wheelwright & Clark 1988). The trend towards the company outsourcing activities in the value chain can be attributed to the following reasons: (1) most competent source, (2) increased flexibility, (3) reduced risk exposure, (4) cost reduction

and (5) supplier management (McIvor 2003). The research by Quayle (2002) demonstrated that sourcing decisions are highly contingent situations and the variable is policy. Nevertheless, there are eight broad groups of variables identified in the literature review, which it is hypothesized, may affect the sourcing decision. These are individual, organization, product, market, power, social, risk and economics (Quayle 2002). Rothery and Robertson (1995) (cited in Burnes & Anastasiadis 2003) found that organizations are most likely to outsource operations that are labor-intensive, show considerable peaks and troughs of activity or activities which are perceived to be commonplace and not unique to the organization and listed the following types of activities as ones which could more easily be outsourced: (1) those which are resource-intensive either in running costs or capital investment, relatively discrete areas, specialist and other support services, (2) those with fluctuating work patterns in loading and throughput, (3) those subject to a quickly-changing market especially where it is costly to recruit, train and retain staff and (4) those with a rapidly-changing technology requiring expensive investment. Morris and Imrie (1992) (cited in Burnes & Anastasiadis 2003) also found that companies use outsourcing to extend their product range, to test the market for new products, to supply short demand products and avoid having to produce small batches of products themselves, which could disrupt long-run production schedules. Other factors, which influence the international sourcing decision include: (1) introduction of competition to the domestic supply base, (2) establishing a presence in a foreign market, (3) satisfying offset requirements, (4) increasing the number of available sources and (5) reacting to the offshore sourcing practices of competitors (Humphreys, Mak & Yeung 1998). In reviewing outsourcing in the United Kingdom, Croom (2000) reported that the main benefits were direct cost reduction,

conversion of fixed cost to variable cost, suppliers' investment in innovation and improvement in time to market for new products and services. Based on the experiences of business transformation outsourcing pioneers, Linder, Cole and Jacobson (2002) reported the following certain typical benefits of outsourcing: (1) radical improvement in enterprise-level performance, (2) reduced time to market, (3) increased innovation through access to world-class skills, resources and industry knowledge, (4) enhanced core capabilities, (5) strengthened competitive positioning and (6) shared risk.

These researches have indicated that a firm will source outside its home borders if it expects to achieve dramatic and immediate improvement in four critical areas including cost, quality, cycle time and service.

As the above shows, there are many benefits organizations can achieve through contracting out activities. Given the complexity of many of the activities that organizations outsource, it is not surprising that some organizations experience problems. According to McIvor (2000), three key problems encountered by companies in their efforts to formulate an effective outsourcing decision are: (1) lack of strategic view of outsourcing decisions, (2) no formal outsourcing process and (3) limited cost analysis. Lysons (1996) (cited in Burnes & Anastasiadis 2003) showed that the main problems companies found in contracting out the activities were: (1) quality of service, (2) communication with suppliers, (3) redundancy costs, (4) coordinating different suppliers, (5) reduced flexibility and (6) dependence on and communication with a few suppliers. In a similar vein, Minoli (1995) (cited in Burnes & Anastasiadis 2003) and Lonsdale (1999) found the following disadvantages of outsourcing: (1) loss of control, (2) difficult to reverse decision, (3) long-term contracts can lead to a lack of flexibility, (4) requires management of organization/outsourcee alliance, (5) outsourcers can put

themselves at risk from lack of responsiveness, poor service, etc., (6) subject to new costs if changes are required, (7) difficult to quantify advantages and assessing savings, (8) possibility of being locked into older technology, (9) supplier opportunism, (10) rising costs of supply, (11) declining quality and (12) of an inability to influence the terms of the relationship. Recurring problems such as cultural and communication barriers, increased lead times, increased transportation costs, employee travel costs and perceived risks associated with sharing new technologies are also problems often encountered by companies, which are new to overseas sourcing. In addition, firms which are attempting to develop Just-In-Time purchasing systems, which require smaller and more frequent deliveries and the reduction of inventories (Ansari & Modarress 1988), face longer lead times and logistics difficulties when confronted by the decision to use a foreign source (Handfield 1994).

Many of the above problems experienced by firms are avoidable because they have been caused by poor management decision making. In planning for a far-reaching program of outsourcing, those involved in decision making will need to consider the future strategic position of the organization and what resources or activities will be required to achieve it since the outsourcing of selected organizational activities is an integral part of corporate strategic arsenal to build shareholder value. Furthermore, they will need to have precise and high level understanding of supply markets, dynamics of purchasing and supply issues and how to deal with internal implications of the transference of a range of business activities (Razzaque & Sheng 1998; Lonsdale 1999). An assessment of the nature of competitive forces, customer requirements, worldwide market opportunities and supply base location is the first step in determining a firm's strategic posture, leading to an adaptive restructuring of its global sourcing networks

(Handfield 1994). In addition, the evaluation of whether an activity should be outsourced by a firm or not affects both the firm's suppliers and customers. Hence, the examination of strategic sourcing involves how sourcing influences the entire value chain, creating competitive advantage to the firm through a combination of internal core competencies and outside suppliers' strengths.

Although in the past, outsourcing was often seen as a practice used to offload the routine day-to-day operations of a firm to a third party to manage, recent emergence of the Business Process Outsourcing (BPO) model has added a new dimension to outsourcing for managing corporate growth and adding value. BPO involves the assumption of a responsibility by a service provider for a series of tasks that, performed together, achieves a specific business outcome (Currie et al. 2003). It is the long-term contracting out of non-core business processes to a specialist outsource partner in order to streamline processes and help build shareholder value. In this scenario, access to best-in-class business processes precisely tailored to the needs and requirements of a firm ensures that it directly impacts on the process management environment in the outsourcing firm. BPO facilitates continuity and incremental change through outsourcing of selected processes to a outsource partner, who continuously improves and encapsulates industry best practice to its business processes. By entrusting the processes to specialist outsource partners, companies are better able to control costs and achieve greater efficiency and productivity.

The arguments presented are further supported by the findings of a study by PriceWaterhouseCoopers (PWC) in 1999, of 304 large corporations in 14 countries, which found that 63 percent of the firms studied had outsourced one or more business processes and they believe that outsourcing has helped improve their competitive

stance, profitability and ultimately, shareholder value. More significantly, PWC (1999) found that many of the firms achieved 76 percent greater efficiency without having to invest in people and technology and 66 percent increase in profitability leading to improvements in shareholder value. This study also concludes that BPO is becoming recognized by savvy executives as a strategy for helping companies focus on their core capabilities and providing bottom-line benefits. The findings clearly indicate strong growth in BPO worldwide.

BPO is paving the way for businesses worldwide to compete globally and increase profitability into the new millennium. The practice is gaining widespread acceptance throughout the world as an important new management tool to promote: (1) increased shareholder value through higher revenues brought about by increased focus the resources on core competencies, (2) greater competitive advantage in the global marketplace from better and faster services, (3) increased margin from lower operating costs, reduced fixed capital costs through asset reduction, reduced working capital costs from better and more timely management information and cost savings related to process reengineering and business transformation and (4) enhanced management performance (PWC 1999; Columbus 2000; Linder et al. 2001; Kern, Kreijger & Willcocks 2002; Currie et al. 2003). BPO, because of its focus on end-to-end seamless functionality, can assist greatly in creating much-needed expanded and linked processes. It is therefore a powerful strategic tool for companies facing the challenges of growth at this stage in the development of global business.

The outsourcing trend shows no signs of abating, either in terms of the percentage of firms using the practice or in terms of the range of business processes that the practice is encompassing. There is a clear consensus in the literature of the importance of

outsourcing decision and some general guidance on the factors that should be considered including cost analysis, associated risks, supplier influences and a strategic perspective (McIvor 2000).

1.3.4. Supplier Selection

With the emergence of global competitive challenges and resulting shifts in business paradigms, academics and practitioners alike have identified the growing importance of purchasing as a strategic issue in corporate profitability (Goffin, Szwejczewski & New 1997). Improvement of profitability, margin and earnings per share growth has been the number one organizational priority for purchasing. By locking on to this business driver, purchasing can demonstrate real, tangible, measurable contribution and build credibility (MAI 2002). Purchase decision process of organizational buyers has become increasingly a complex, multidimensional and multifunctional activity as the traditional, adversarial role of the purchasing has significantly changed over the past few years as organizations increasingly globalize their sourcing activities (McIvor, Humphreys & McAleer 1997b). Purchasing is not a purely tactical exercise anymore, instead it is now recognized as a strategic function because external suppliers now exert a major influence on a company's success or failure and competitive position (Goffin, Szwejczewski & New 1997; McIvor, Humphreys & McAleer 1997b; Bhutta & Huq 2002). With the increasing importance of the purchasing function, supplier management decisions have become more strategic. In this connection, supplier relationship management appears to be a statistical barometer for purchasing professionalism, effectiveness and contribution (MAI 2002). The management of supplier relationship is

also a vital task for the firms as it can contribute to both competitiveness and profitability of a company (Lemke, Goffin & Szwejczewski 2000). Therefore, a key and strategic issue that purchasing must address is effective management of the supplier network for achieving competitive advantage including identification of supplier selection criteria, supplier selection decisions and monitoring of supplier performance (Karpak, Kasuganti & Kumcu 1999). In this respect, the effective selection of suppliers is very important to the success of a firm in achieving high quality products and customer satisfaction (Humphreys, Mak & Yeung 1998; Weber, Current & Desai 2000a).

The purpose of supplier selection is to determine the optimal supplier who offers the best all-around package of products and services for the customer (Swift & Gruben 2000) and greater use of advanced supplier selection and monitoring practices tends to increase profitability and product quality (Ittner et al. 1999). The overall objective of supplier selection is to identify suppliers with the highest potential for meeting a firm's needs consistently and at an acceptable cost. However, under partnership sourcing, it becomes not a task of supplier selection but rather a question of identifying the best partner for a long-term relationship. With partnership sourcing, the buyer recognizes the supplier as an integral member of the organization, thus requiring the implementation of a supplier selection strategy that provides a measure of overall supplier performance along with supplier accountability. Selection is a broad comparison of suppliers using a common set of criteria and measures. It involves the determination of quantitative and qualitative factors so as to select the best possible suppliers. However, the level of detail used for examining potential suppliers may vary depending on a firm's needs.

As reported by Boer, Labro and Morlacchi (2001), a supplier selection problem typically consists of four phases, namely problem definition, formulation of criteria, qualification of suitable suppliers and final selection of the ultimate supplier(s).

The involvement of a large number of closely interrelated decisions regarding financing, negotiations, distribution, procurement and product quality assurance at the source implies the significance and long-lasting impact of supplier selection on sourcing (Min 1994). There are a number of reasons why the selection of suppliers is more important today than it was in the recent past:

(1) The increasing adoption of Just-In-Time manufacturing practices has placed a new emphasis on supply base reduction (streamlining sometimes to single source) (Pearson & Ellram 1995) that, due to resource scarcity, brings greater interaction and long-term relationships between buyer and supplier, which may lead to a sharing of resources (Karpak, Kasuganti & Kumcu 1999) to improve quality, reduce costs and emphasize on continuous improvement in all areas of interaction and, as Pagell and Sheu (2001) state, eliminate the mistrust between buyer and supplier. A small number of supply sources have resulted in some important advantages such as long-term relationships, consistent quality, resources savings, lower costs, special attention and savings on tooling to the firms (Ansari & Modarress 1988).

(2) The strategy of involving suppliers early in the product design process (referred to as concurrent engineering) is recognized as a significant contributor to reducing costs and improving quality in the production cycle (Trent & Monczka 1998).

(3) The development of advanced communication in information systems through Electronic Data Interchange (EDI) is also facilitating the closer coordination and interaction between buyers and suppliers.

(4) A growing importance of team involvement in the selection and evaluation of suppliers from various functional areas plays a significant role in overall performance of the buying firm (Pearson & Ellram 1995). It is very noticeable that considerable numbers of stakeholders make significant purchasing and supplier selection decisions. Therefore, the ability to manage the supplier selection process effectively should have a major impact on organizational competitiveness and profitability.

Companies in order to attain the goals of low cost, consistent high quality, flexibility and quick response have increasingly considered better supplier selection approaches. These approaches require cooperation in sharing costs, benefits, expertise and in attempting to understand one another's strengths and weaknesses, which in turn leads to single sourcing and long-term partnerships (Bhutta & Huq 2002).

Supplier selection is sometimes very complicated, owing to a variety of uncontrollable and unpredictable factors, which affect the decision. Several factors have been identified by Dzever, Merdji and Saives (2001), which impact on supplier selection decisions of organizational buyers. These factors (which are both of a firm-specific nature as well as environmentally determined) include: (1) the composition and functional specialization of members of the decision making unit, (2) the patterns of buyer-seller interaction and relationship, (3) the role of intermediaries in the decision process and (4) the impact of environmental factors such as market structure, technology, economic and culture on these decisions. Moreover, purchase decisions are also influenced by three dimensions of buyer behavior identified as technical, commercial and social (Dzever, Merdji & Saives 2001). It is thus by having a correct understanding of these factors that one can fully appreciate the decision process of organizational buyers in a wider perspective.

The source selection decision is highly complex and purchase's most difficult responsibility. First, such a decision involves more than one selection criterion when choosing among the available suppliers. It is well established that supplier selection decisions are often driven by multiple criteria and there is also a very large number of options (Weber, Current & Desai 2000b). Additionally, members of purchasing teams bring diverse views of reality and criteria to the purchasing decisions driven by their departmental interests such as cost, quality and delivery reliability. Hence, in practice, purchasing teams' decisions may be influenced by multiple decision criteria that are context specific (Goffin, Szwejczewski & New 1997). The relative importance places on evaluative criteria varies largely in accordance with the nature of the selection situation and is complicated further by the fact that some criteria are quantitative (price, quality, etc.), while others are qualitative (service, flexibility, etc.). Also, establishment of proper weights for each evaluation criterion increases the level of uncertainty inherent in the selection process and decision making becomes difficult when the available information is incomplete or imprecise (Weber & Current 1993). In the other words, there may not be a generalized consensus on how to weight the relative relevance of the different criteria since these are highly firm and situation-specific. In a similar vein, Weber, Current and Desai (2000a) stated that strategic decision making influences the relative importance of different criteria. Nevertheless, a critical part of the overall supplier selection process consists in the determination of the relative importance of each of the criteria (Ellram 1990).

Second, criteria included in the supplier selection process may frequently contradict each other. Therefore, the purchasing team must take into consideration and manage the trade-offs among the criteria. It requires substantial judgment to assess the wide range

of trade-offs present, to recognize all the alternatives available and to make a decision, which balances both the short- and long-term needs of an organization. In multi-criterion supplier selection problems, there is generally no supplier, or combination of suppliers, that has the best performance on all the criteria. For example, a high quality supplier might not be the one with lowest cost components. It is also possible that the components delivered by a particular supplier excel in a few quality dimensions (reliability or features) while some other supplier might be superior in other quality dimensions (durability or aesthetics). Another complicating factor results from the fact that suppliers may be able to alter their performance on the relevant criteria (Weber, Current & Desai 2000b). Furthermore, as organizational requirements and market conditions change, the importance of the analysis of tradeoffs among the selection criteria may be increased. This analysis may necessitate the addition of new criteria and a reordering of existing ones. The set of relevant supplier selection criteria is believed to change over time, reflecting business and competitive environments (Lemke, Goffin & Szwejczewski 2000). Ellram (1990) suggested that buyers involved in strategic partnership supplement traditional selection criteria with a new set of selection criteria and termed those criteria 'soft' factors. Soft factors cover issues including management compatibility, goal congruence, design capabilities, company culture and the strategic direction of supplier firm (Ellram 1990; Krause 1999).

A third complication surrounding the supplier selection decision arises from internal policy constraints and externally imposed system constraints placed on the buying process. Internal policy constraints exist either implicitly or explicitly in the buying process for such matters as the number of suppliers to employ, minimum and maximum order quantities and so on. Similarly, suppliers may impose constraints on the buying

process such as their own minimum order quantities or a maximum order quantity based on their production capacity or their willingness to do business with a particular firm (Weber, Current & Desai 2000a). Moreover, the involvement of organizations external to a buying or supplying company is important for the decision process. These companies may also require interaction with monitoring or regulatory bodies.

Fourth, basically in supplier selection decision, there are two decision rules: (1) compensatory decision rules leading to an optimal solution and (2) non-compensatory rules in which a bad score of an alternative on a particular criterion can be compensated by high scores on other criteria. In purchasing both compensatory as well as non-compensatory rules are used. Factors that influence the type of rules are, for example, time pressure, the extent to which the situation is perceived as new, the number of criteria and the number of suppliers to choose from (Boer, Wegen & Telgen 1998). Applying these rules may also complicate the selection process.

From the foregoing we can conclude that supplier selection may involve several and different types of criteria, interrelated decision structures, combinations of different decision rules, group decision making and various forms of uncertainty. Put together, this would plead for serious attention for the way these decisions are reached and justified and therefore suggests (among other things) the use of decision models in support of purchasing decision making.

In order to counter the procedural aspects, numerous formal techniques have been developed in the literature based on particular conceptual approaches. These techniques differ in their ease of use, level of decision subjectivity, required resources to use the technique and implementation costs.

Each of these techniques has its own advantages and drawbacks. While some are more effective at providing an answer to the multi-criterion nature of the supplier selection problem, others are more satisfying when dealing with the heterogeneity of evaluation criteria (quantitative versus qualitative attributes) and some are specifically suggested for handling trade-offs between criteria. Some are best suited for the problem definition and criteria formulation phases, while others are expressly designed for pre-qualification (sorting methods) and the others are used for the final choice (ranking methods). Regardless of their strengths, none of these approaches can systematically measure both qualitative and quantitative criteria and structure complex problems with a large number of criteria, attributes and alternatives. Furthermore, none of these methods can measure the degree to which a purchasing manager's judgments are consistent in evaluating suppliers (Min 1994). Other criticisms of these methods include complexity, situation-specific application, over-reliance on some criteria and insufficient consideration of others (Bhutta & Huq 2002), suffering primarily from a lack of potential objectivity or excessive data requirements (Weber, Current & Desai 2000b). Additionally, most of the methods proposed in the literature deal with the imprecision of the rating mechanism itself, that is, the difficulty of determining the score of a supplier on different criteria or the relative importance of criteria with a high degree of precision. Often it is assumed, explicitly or implicitly, that the methods are applicable in all purchasing contexts. At most, a reference is made to a particular industry in which a method has been empirically tested or the need to change the criteria considered when applying the method to another type of product. However, neither the specific industry nor the particular criteria at hand determine the usefulness of certain method (Boer, Labro & Morlacchi 2001). It leads to suggest that using decision models in supplier

selection, provided that they are carefully selected and given certain conditions, may prove useful in various ways throughout the whole supplier selection process in fundamentally different purchasing situations (Boer & Wegen 2003). Any one approach is thus unlikely to be applicable in general term or equally to all possible purchasing situations (Ellram 1990).

Since the supplier selection process encompasses different functions (such as purchasing, quality, production, etc.) within the company, it is inherently a multi-objective problem in nature, entailing typically many tangible and intangible criteria and factors (e.g. price, quality, delivery performance) in a hierarchical manner (Karpak, Kasuganti & Kumcu 1999; Weber, Current & Desai 2000b; Bhutta & Huq 2002; Talluri & Sarkis 2002). When evaluating sources, the single most important task for buyers is assessing the key competitive factors in their industry and translating these dimensions into supplier evaluation criteria. An evaluation of best-in-class performance in product and process technology, quality, delivery and design flexibility is a key determinant in this decision (Handfield 1994). To compete in their respective markets, buying firms must ensure that their suppliers' performance, capabilities and responsiveness equal or surpass that experienced by the buying firm's competitors. A strategic approach towards purchasing may further emphasize the need to consider multiple criteria. Therefore, a buyer should analyze and evaluate the potential threats when selecting suitable supplier resulting from a systematic selection process and its corresponding attributes. In the selection process, criteria and measures are developed to be applicable to all the suppliers being considered and to reflect the firm's needs and its supply and technology strategy. The firm can set measures while it is developing selection criteria to ensure that the criteria will be practical to use. Often, developing criteria and measures

overlaps with the next step, gathering information. Gathering information may offer insight into the number and type of criteria that will be required for the evaluation and the type of data that is available. However, gathering information without specific criteria and measures in place can lead to extraneous effort. There should be consensus within the team or organization on the measures, standards and methods used to rate or compare suppliers. A firm needs to develop effective measures for each of its selection criteria. A firm can evaluate the effectiveness of a measure by determining the degree to which it is related to customer requirements, developed with inputs from and consensus with work groups, easy to understand, practical to implement and able to drive desired behavior.

Although choice factors used in supplier evaluation and selection vary across products (and services) and purchase situations, previous researches have identified similarities in purchase decisions. Preferences are generally considered to be a function of case-specific evaluations of quality, price, delivery and service. The relative importance of these selection factors has been examined over various purchasing situations (Bevilacqua & Petroni 2002; Kahraman, Cebeci & Ulukan 2003).

The literature review reveals that multiple dimensions and criteria must be used in the evaluation of supplier performance during supplier selection. The most common measurements including cost, delivery and product quality, focus on the output of the supplier. When companies have long-term relationships with suppliers though, output criteria need to be complemented with processual criteria and structural criteria (Ellram 1990). Evaluation with regard to processual criteria addresses what the supplier does, rather than achieves and typically includes whether employees adhere to standard operating procedures or not. Structural criteria relate to the potential performance and

reflect what could be done by the supplier in consideration of the resource body available, thereby including criteria such as equipment capability. The supplier selection strategy in terms of technology, quality, cost and delivery performance is an important strategy in overcoming the upstream uncertainties, such as supplier defaults on delivery and performance, high cost production and quality rejects as well as downstream uncertainties due to demand volatility and changes in product mix, price and competition action, which requires flexibility in the production processes.

With the view of enhancing supplier selection with regard to BPI, as shown in Table 1, the proposed supplier attributes, integrated with literature studies and recent research by Mohammady Garfamy (2004) are grouped into five main categories: (1) *Quality*, (2) *Service*, (3) *Organization*, (4) *Relationship* and (5) *Cycle Time* to form a backbone of a generic supplier selection mechanism.

It is important to note that these criteria are interrelated and some of factors are traditional dimensions used in previous studies, but others are longer term and more subjective or judgmental in nature. Each factor is related to BPI factors and contains a specific set of criteria that are important for supplier evaluation at different phases of the decision process (Mohammady Garfamy 2004).

Because of the significant advantages that buying firms realize through outsourcing non-core processes, potential suppliers of the outsourced processes should know what factors potential buyers think are important in supplier selection. This will give supplying firms insight into how to tailor their strategies to gain customers (Kotabe & Murray 2001). Dzever, Merdji and Saives (2001) confirmed the need for suppliers to understand in greater details factors that buyers regard as decisive in their choice of a supplier as well as those that are pivotal in the development of long-term relationships.

Table 1: Supplier Selection Factors and Criteria

Factor	Criterion	Author(s)
Quality	Durability (i.e. Lifespan)	Larson 1994; Tracey & Tan 2001; Dzever, Merdji & Saives 2001
	Ergonomic Quality	Dzever, Merdji & Saives 2001
	Flexibility of Operation	Dzever, Merdji & Saives 2001
	Simplicity of Operation	Dzever, Merdji & Saives 2001
	Reliability (e.g. Quality over a given period of time, Consistency)	Larson 1994; Choi & Hartley 1996; Tracey & Tan 2001; Kotabe & Murray 2001; Shahadat 2003
Service	Reaction to Demand	Humphreys, Mak & Yeung 1998; Dzever, Merdji & Saives 2001; Kannan & Tan 2003
	Ability to Modify Product/Service	Handfield 1994; Kannan & Tan 2003
	Technical Support	Handfield 1994; Min 1994; Dzever, Merdji & Saives 2001
	After Sales Services (e.g. Warranties and Claims policies)	Choi & Hartley 1996; Dzever, Merdji & Saives 2001; Bevilacqua & Petroni 2002; Bharadwaj 2004
Organization	Quality Performance (e.g. ISO 9000 accreditation)	Goffin, Szwejczewski & New 1997; Humphreys, Mak & Yeung 1998; Kannan & Tan 2003
	Current Technology (Product and Process)	Handfield 1994; Pearson & Ellram 1995; Dzever, Merdji & Saives 2001; Kannan & Tan 2003

	Geographical Location	Noordewier, John & Nevin 1990; Pearson & Ellram 1995; Dzever, Merdji & Saives 2001; Bhutta & Huq 2002; Bevilacqua & Petroni 2002; Kannan & Tan 2003
	Production Facilities and Capacity	Ellram 1990
	Technological Capability	Choi & Hartley 1996; Dzever, Merdji & Saives 2001; Bevilacqua & Petroni 2002; Shahadat 2003; Kannan & Tan 2003
	Innovativeness	Goffin, Szwejczewski & New 1997; Dzever, Merdji & Saives 2001
Relationship	EDI Capability	Min 1994; Humphreys, Mak & Yeung 1998; Kannan & Tan 2003
	Compatibility with Levels and Functions of Buyer Firm	Ellram 1990
	Customer Base	Ellram 1990
	Flexibility (Payment, Freight, Price reduction, Order frequency and amount)	Noordewier, John & Nevin 1990; Verma & Pullman 1998; Dzever, Merdji & Saives 2001; Bevilacqua & Petroni 2002; Kannan & Tan 2003
	Ability to Identify Need	Dzever, Merdji & Saives 2001
	Ability to Maintain Commercial Relations	Dzever, Merdji & Saives 2001
	Availability	Dzever, Merdji & Saives 2001
Cycle Time	Delivery Lead Time	Handfield 1994; Choi & Hartley 1996; Verma & Pullman 1998; Bharadwaj 2004
	Development Speed	Ellram 1990

* Adopted from Mohammady Garfamy 2004

If suppliers understand either selection or evaluation criteria, they will be in a better position to focus their efforts appropriately. In addition, supplier performance is driven by the amount buyers outsource as well as their selection criteria (Pagell & Sheu 2001). An effective sourcing strategy improves the quality of the supplier's service in terms of product, delivery, response times and customer service as well as price (Thompson 1996). Enhanced interaction between buyer and supplier concerning what corrective actions to take on the basis of the evaluation would reduce the problems related to complementary, overlapping and contradictory procedures and outcomes (Fredriksson & Gadde 2002). Involving various departments from both sides would make it possible to better understand the multiple consequences of different improvement proposals. In the same vein, Araujo, Dubois and Gadde (1999) recommend buying firms to stimulate the development of interactive interfaces with suppliers. This type of customer-supplier interface enables firms to consider productivity and innovation consequences for both parties as well as the benefits that can be jointly developed with specific third parties, such as the buyer's customer and the supplier's supplier. Thus, through supplier development many buying firms based on supplier evaluation actively facilitate supplier performance and capability improvements.

1.3.5. Business Process Improvement

The rapidly increasing global competition that many sectors worldwide have been facing over the past decade, associated with rapid technological changes and product variety proliferation have led to a new scenario in which industries, in order to remain competitive, must continuously implement best practice management principles,

strategies and technologies. In this sense, many theoretical works have been published emphasizing the importance of a strategic management of operations and the management of quality in order to gain competitive advantage. The competitiveness of a company is mostly dependent on its ability to perform well in dimensions such as cost, quality, delivery dependability and speed, innovation and flexibility to adapt itself to variations in demand. A number of operation's innovative strategies such as agile manufacturing, lean manufacturing, synchronous manufacturing, product customization and time-based competition have been introduced to improve the flexibility of the firm. While alignment of operations with strategic priorities is core to competitiveness, the improvement of business processes plays a very important complementary role in quest of competitiveness in the long run (Carpinetti, Buosi & Gerolamo 2003).

Much of management's difficulty in understanding BPI centers on the inherent difficulty in defining the constituents of a ‘business process’. The term ‘process’ is an important concept and has received much attention and many interpretations from different perspectives. A popular definition is:

A process is any activity or group of activities that takes an input, adds value to it and provides an output to an internal or external customer. The inputs can be resources or requirements, whilst the outputs can be products or results. The outputs may or may not add value and could be an input to another process (Harrington 1991).

In a similar vein, Ljungberg (2002) states that a process is a repetitively used network of orderly-linked activities using information and resources for transforming inputs into outputs, extending from the point of identification to that of the satisfaction of the customer's needs.

When this concept is applied to a commercial organization, the term ‘business process’ is used. A business process is described by Davenport and Short (1990) as a set of logically related tasks performed to achieve a defined business outcome. It is generally recognized that business processes have two important characteristics. They have internal or external customers and cross-functional and organizational boundaries. Tinnila (1995) also summarizes a business process as a group of logically related tasks that use the resources of the organization to provide defined results in support of the organization's objectives.

At its most generic, business process can be thought of as any set of activities performed by a business that is initiated by an event, transforms information, materials or business commitments and produces an output. Value chains and large-scale business processes produce outputs that are valued by customers. Other processes generate outputs that are valued by other processes. Processes are generally independent of formal organizational structure because it is the processes that have cost, time, output quality and customer satisfaction, not the hierarchical structure that can hardly be measured in an absolute sense. Processes must be defined as extending from the supplier's supplier to the customer's customer and acknowledge the flow of information from customer interest to final delivery of a solution (McAdam & McCormack 2001).

The literature is replete with the definitions of business process. A number of specific definitions have become widely adopted on the design and management of business processes. For the purposes of research reported here, the term has been defined as follows:

A ‘business process’ is the execution of a group of logically related value-adding or value-creating tasks that use measurable organizational resources to provide measurable

value (a product or service) to internal or external customers in support of the business objectives.

Business processes are generally cross-functional, horizontal in nature, lie outside the usual vertical, hierarchical company structure and no single person has responsibility for the entire process. Business processes are portions of streams of activity that contribute to business results. Some business processes are transformational and the others are transactional. Transformational business processes are concerned with converting organizational inputs into organizational outputs, while transactional business processes are concerned with exchanging outputs for new inputs to continue the cycle of events of which any given process is a part (Nickols 1998). Porter (1991) argues that business processes are the source of competitive advantage. Resource-based logic suggests that business processes that exploit valuable but common resources can only be a source of competitive parity, business processes that exploit valuable and rare resources can be a source of temporary competitive advantage and business processes that exploit valuable, rare and costly-to-imitate resources can be a source of sustained competitive advantage (Barney 1991). In addition, to realize the full competitive potential of its resources and capabilities, a firm must organize its business processes efficiently and effectively (Barney & Wright 1998).

Seeking to improve product and service quality provides the motivation for organizations to improve coordination among networks of interdependent tasks, groups and organizations. This requires that they possess a thorough understanding of input, output and transformation processes when assessing business performance since performance problems can arise in any and all of these stages. By focusing on business

processes, an organization is better able to meet or exceed its customers' expectations in a number of ways including:

(1) Establishing programs that emphasize preventing errors from occurring in the first place.

(2) Setting standards that embody a commitment to upgrading processes to improve their efficiency, effectiveness and adaptability.

(3) Employing joint problem solving to manage interrelated activities.

(4) Facilitating workers' participation in the redesign of complex work activities to simplify the business processes.

The business activities should be seen as more than a collection of individual or even functional tasks by taking a process view. By taking a broader view of business processes (interrelated activities, procedures and behaviors), organizations ensure that business processes provide maximum benefit to the organization. Value analysis offers abundant opportunities for product and process simplifications through a detailed scrutiny of the sources of non value-added components, steps or even entire processes. Some of the benefits of process-oriented work, as suggested by Kaplan and Murdoch (1991) are outlined as follows:

(1) Helps to focus the entire firm's improvement efforts on a targeted set of high-leverage performance goals and links improvement efforts to the overarching strategic objectives that drive competitive success.

(2) Incorporates the entire chain of related activities across the firm's boundaries, functions and geographies as well as incorporating suppliers and customers.

(3) Emphasizes cross-functional measures and optimizes performance across functions, rather than within functions.

(4) Encourages result-oriented view of the business such as total delivered cost and end-to-end cycle times and develops an external view of the business based on the perspective of customers and suppliers and awareness of competitors.

Implementing a business process perspective has shown to deliver significant performance improvements by enhancing organizational capabilities such as time-based competitive advantage (Stalk, Evans & Shulman 1992). Process management literature also argues that organizations employing functional specialization and structures have too narrow perspectives and are not flexible enough to succeed in the current turbulent business environment. Solution to this problem is to arrange work cross-functionally along the natural flow of work resulting in organizations based on core business processes, shared information and objectives. Owing to this new business approach, many firms are now viewing processes as strategic assets. Process orientation is the activity of moving from a state in which a functional paradigm is the basis for organizational structure, for development of competence, for systems and for structures as well as for attitudes, values and corporate culture towards a state based on a process paradigm. McCormack and Johnson (2000) conducted an empirical study to explore the relationship between business process orientation and enhanced business performance. The research results showed that business process orientation is critical in reducing conflict and encouraging greater connectedness within an organization, while improving business performance. Therefore, the process perspective is increasingly being seen as a mechanism for achieving competitive advantage through performance improvement and in response to market pressures, customer expectations for better and more reliable service and increasing competition (Pritchard & Armistead 1999).

The quest for service excellence and competitive edge and the move from the emphasis of functional to process orientation have encouraged many firms to continually search for effective process management methods (Weerakkody, Currie & Ekanayake 2003). The fast pace of industrialization highlights the need of an effective and flexible improvement approach to tackle the variety of problems generated every day.

BPI is simply a method of improving the way a discrete set of business activities is organized and managed to enhance firms' commitment to their customers. It is a structured approach or the application of a structured methodology to analyze and continually improve fundamental activities of a company's operation by simplifying and streamlining business processes. In the other words, it is a philosophy and practice of looking for incremental or radical ways to improve organizational processes on an ongoing basis, which involves a review of existing processes and procedures within an organization to identify potential improvements through the more effective and productive use of all available resources. According to Harrington (1991), BPI refers to making businesses efficient, effective and flexible to meet customer expectations in products and services. BPI will lead to the efficient and effective use of resources such as facilities, people, equipment, time and capital (Zairi 1997). It involves finding the root causes of problems so that an organization can provide quality goods and services to customers. Thus, BPI is a strategic customer-oriented initiative that involves process-restructuring programs whose chief purpose is to make business processes more efficient, effective and flexible (Hammond 1993). Harrington (1991) further elaborates that making processes more effective means producing the desired results from product or service in comparison to what the customers required (Effectiveness is how well the current process achieves its objectives), while making processes more efficient means

minimizing the resources used such as costs, materials, cycle time and so on from the internal process operation (Efficiency measures the amount of efforts and resources required to achieve the objectives) and making processes adaptable means being able to meet changing customer and business needs (Adaptability measures how quickly and easily the process can be changed to meet different objectives or how a reprioritization of the current objectives can be done). In order to asses the degree of transformation, three key elements, namely individuals, structure and organizational systems are identified from the literature.

Under the big umbrella of BPI, three aspects of process improvement strategies and activities that commonly being adopted by today's organizations are Continuous Process Improvement, Business Process Reengineering and Business Process Benchmarking (Lee & Chuah 2001). They have their own specific purposes and have different impacts and effects on the organization. Continuous Process Improvement incrementally improves the operation efficiency to achieve maximum effectiveness during a short timeframe. It is based on many small evolutionary rather than revolutionary steps. Continuous Process Improvement occurs when the cycle of stabilizing, assessing and improving a given process becomes institutionalized (Davenport & Short 1990). Continuous Process Improvement also serves as the energy that maintains and advances process maturity to new maturity levels (Lockamy & McCormack 2004). Business Process Reengineering is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvement in critical contemporary measures of business performances such as cost, quality, service and speed (Hammer & Champy 1994). Certainly, an important issue in industry is process innovation, which often is viewed as an alternative to Continuous Process Improvement approaches. Business

Process Benchmarking is taken to compare the performance levels of each process with others, especially with the competitor's or the best practices in the same industry to determine performance gaps and improvement goals. Within the production domain, many process analysts striving to improve productivity and efficiency of companies have accepted these three topics.

Today, organizational structures of most companies are so complex and usually involve many different processes. Their needs to improve in performance may be universal. However, how improvement can be achieved may be very different for different companies. Some processes may only need incremental improvement in critical areas, while others may require a sudden change or total revamp through process reengineering or some may even need a combination of both. In the other words, these three topics' usefulness and applicability may not be universal and one or a combination of the two or three may be more appropriate depending on the process, organization and its environment. The current approaches of Continuous Process Improvement, Business Process Reengineering or Business Process Benchmarking are capable of dealing with most business problems, but for some specific processes, extra time may need to be taken for re-adjusting these methodologies for those processes. In order to ensure selection of the appropriate improvement strategy or approach, much time and effort are needed to understand the underlying concept, methodology and impact of each approach. The literature does not seem to show any easy way up the learning curve in BPI.

To decide on which (or small subset of) processes to work on, the following general issues should be considered: (1) customer and/or employee desires, (2) competitor scanning, (3) strategic imperative and (4) processes that represent the tightest

constraints in the organization (Rohleder & Silver 1997). A simple method of identifying processes in need of improvement is compiling a list of processes which: (1) cause most complaints to external/internal customers, (2) cause most errors, (3) take most time to complete, (4) involve most people, (5) involve duplication of effort or (6) incur most costs (Lee & Chuah 2001). In a similar vein, Rohleder and Silver (1997) present a number of possible types of waste: (1) overly complicated or unclear processes, (2) producing defective output (hence causing rejects, inspection, scrap, rework, customer dissatisfaction and other downstream problems such as production stopping and rescheduling), (3) unnecessary transportation/movement of products and people, inspections and waiting, (4) unnecessary record keeping and data collection/processing and finally (5) processing goods/information in large batches.

A key point is clearly that business process management strategies have to be developed to fit the particular organization in question and they have to address the context in which that organization operates. Business strategy and BPI are related in that process problems require long-term solutions to be effective and they must be aligned with business goals and the customers served by the organizations. Reengineering organizational change requires a strategic orientation rather than a tactical or operational one and must be carefully planned, properly financed and strongly reinforced (Paper 1998). Key considerations in the deployment of a business process management approach include the clear articulation of business process management intentions, the link between business process management and strategic programs, the acquisition of process competencies, skills and knowledge and the willingness to address people issues as part of an overall business process management program (Pritchard & Armistead 1999).

The majority of BPI approaches are centered on a cycle of process identification, analysis, redesign and implementation methods. Put simply, a general model of BPI involves the following steps:

(1) Develop the business vision and process objectives: BPI is driven by a business vision, which implies specific business objectives such as cost reduction, time reduction, output quality improvement, quality of work life, learning and empowerment (Davenport & Short 1990).

(2) Identify the critical process to be improved: The purpose of this phase is to investigate and select the problematic processes that are critical to and essential for meeting customers' requirements and enhancing the company's competitive position in the industry (Lee & Chuah 2001). Problem areas and non-value-added activities that need to be changed or eliminated such as excessive hand-offs, reviews, reworks and queuing time should be identified. Most organizations use the High-impact approach, which focuses on the most important processes or those that conflict most with the business vision and process objectives. A lesser number of organizations use the Exhaustive approach that attempts to identify all the processes within an organization and then prioritize them in the order of improvement urgency.

(3) Understand, analyze and measure the existing process: This step is necessary for avoiding the repeating of old mistakes and for providing a baseline for future improvements. Documenting the process to obtain a common understanding of how work flows through the process and the assignment of process ownership in order to establish managerial accountability are essential in this step. The main activity in this phase is to identify and clearly map out the process tasks and sub-tasks as well as their important interrelationship (Lee & Chuah 2001). This step also requires identification

and/or development of appropriate measures on three dimensions: effectiveness, efficiency and adaptability (Harrington 1991). Good measurement schemes should consider customer, internal operations, financial and improvement/learning needs (Kaplan & Norton 1992). Having identified the problem areas and the performance gaps by comparing with the competitors and best practices in the same industry, the organizations themselves should set the desired state(s) for the measurement criteria adopted. These desired states are the final targets to achieve in the improvement program. Understanding exactly what will be changed and who will be affected when moving from the current process to a new process is also should be considered.

(4) Design and build a prototype of the new improved process: This phase seeks to improve the problematic tasks' performance to the level of desired states so that the output of the processes can accomplish the level required or expected by the customers, thereby actually increasing the company's competitive position in the industry. After determining the improvement path(s), a comprehensive action plan should be developed that shows clearly the key implementation steps, dates, costs and accountable staff prior to changing the processes so as to increase the chance of success of the program. The redesign of processes must not only include internal organizational processes but must incorporate the wider business network. An organization is just one entity in a value system carrying out processes that extend beyond the boundaries of the organization into both its customers and suppliers. Optimizing inter-organizational processes remains one of the most difficult aspects given not only the technology issues, but also the strategic, cultural and organizational implications (Humphreys, Huang & Cadden 2005). The actual design should not be viewed as the end of the BPI process. Rather, it should be viewed as a prototype, with successive iterations expected and managed by

addressing equally process, people and equipment. The metaphor of prototype aligns the BPI approach with quick delivery of results and the involvement and satisfaction of customers. BPI is usually narrowly focused and repeated over and over again during the life of each process. In this connection, creative thinking and problem solving have central roles to play in process improvement. The purpose of this phase is also to evaluate the improvement results and ensure whether the operation performance of the problematic processes has achieved the customers' requirements and/or the desired state. The changed processes should be evaluated to judge whether the change is successful. However, business management and process improvement is not a one-off activity, but should be treated as a 'plan, do, check, act' cycle (McAdam & McCormack 2001). The improvement loop will be continued and eventually leads the organization towards the best class in the industry (Lee & Chuah 2001).

Reflecting that the aspects of BPI are both internally and externally oriented, these dimensions, as shown in Table 2, can be characterized by two broad constructs or factors of BPI as below (Harrington 1991; Bhatt 2000; Bhatt 2001a; Bhatt & Stump 2001b):

(1) *Improvement Initiative*: Reflecting an internal perspective, it refers to the extent that work related processes in a business have been thoroughly identified, defined and analyzed with the aim of detecting and resolving process-related problems. More specifically, it embraces a commitment to defect prevention, innovation and enhanced performance in business processes (Davenport 1993).

Typically, the initial emphasis of process restructuring efforts is directed at eliminating or minimizing any kinds of possible waste (attributable to scrap, reworking, returned goods, warranty costs, customer claim settlements), reducing variance among

interdependent activities and eliminating redundancy (Harrington 1991; Hammond 1993). In general, improvement initiatives are grouped under three categories as defect prevention, improvement actions and cost of quality deficiencies. Defect prevention refers to avoiding making mistakes in the first place and its purpose is to create products with zero defects. By defining, identifying and analyzing the potential causes of a problem, organizations can make necessary commitment for defect prevention in business processes (Bhatt 2001a). This emphasis, from error detection to prevention, makes it essential that the firm pays attention to the overall effectiveness of its processes rather than increasing the efficiency of a function. Dynamic evaluations of performance permit the identification of root problems and variables that decrease improvement possibilities to the detriment of quality, cost and productivity. Improvement actions refer to continual upgrading of the quality standard targets in business processes. That means quality conscious organizations over time not only attempt to prevent errors from occurring in the first place, but also try to reach new standards of quality for their business processes by benchmarking, adopting the best practices and upgrading quality and the capabilities of their processes (Cameron, Freeman & Mishra 1993). McNealy (1993) recommends organizations to consider continual process improvement standard as a basic element of their strategies, as an analysis of the effectiveness of each activity based on the agreed target provides an opportunity to reset company process improvement standards comparable to its competitors. Cost of quality deficiencies refers to reducing excess cost in manufacturing a product or offering a service by reducing waste. An organization, which makes its primary goal to streamline and improve its business processes, begins by reducing the number of steps and handoffs in carrying out and completing its tasks. An organization

can simplify its processes by eliminating wasteful redoing, reducing setup time and working on concurrent activities. It is noteworthy that to some researchers, technology has always been viewed as a key driver of improvement initiatives, i.e. advancements in technology are considered to have ripple effects that foster process improvement initiatives.

(2) *Customer Focus*: Reflecting an external perspective, it refers to meeting customers' expectations and demands in products and services. Because of the dynamic expectations of customers, organizations need to continually survey and identify their customers' expectations. This phase in business improvement is vital, as the main aim of process improvement is to meet and often exceed customers' expectations in products and services. The focus on meeting customers' expectations makes it important to understand customers' requirements through different techniques such as survey, field study and direct contact. If a company does not stay close to its customers for finding their expectations in products and services and does not make conscious efforts to meet or exceed those expectations, its quality efforts often do not succeed. Such a view parallels the customer-oriented approach that has long been espoused within the marketing community. A shared understanding among organizational members about the dynamics of product innovation, active anticipation of customers' future needs and resolution of inter-functional problems are important criteria for introducing high quality products to customers (Rosenthal 1992). Furthermore, by acquiring and evaluating customers' requirements thoroughly and disseminating this information within the organization, it helps reduce inter-functional problems. As a result, these organizations gain the advantage of being able to introduce new products sooner than competitors and enjoy higher success rates.

Table 2: Business Process Improvement Factors and Criteria

Factor	Criterion	Author(s)
Improvement Initiative	Defect Prevention	Bhatt 2001a; Bhatt & Stump 2001b
	Problems' Root Causes Elimination	Bhatt 2001a; Bhatt & Stump 2001b
	Standards Improvement	Bhatt 2001a; Bhatt & Stump 2001b
	Improvement Evaluation	Bhatt 2001a
	Simplicity Redesign	Bhatt 2001a; Bhatt & Stump 2001b
	New Process Introduction	Bhatt 2001a; Bhatt & Stump 2001b
Customer Focus	Quality Improvement	Bhatt 2001a; Bhatt & Stump 2001b
	Product/Service Improvement	Bhatt 2001a; Bhatt & Stump 2001b
	Product/Service Innovation	Bhatt 2001a
	Reaction to Demand	Bhatt 2001a; Tracey & Tan 2001
	Requirement Analysis	Bhatt 2001a; Bhatt & Stump 2001b
	Complaint Analysis	Bhatt 2001a; Bhatt & Stump 2001b

* Adopted from Mohammady Garfamy 2004

The general model of BPI described above is heavily design-oriented and gives little advice on how to implement the designed and prototyped process in the organization. There are also other similar decompositions, but very few of them have, so far, tackled the implementation issues. It has been widely recognized that efficient implementation of different types of BPI effort is problematic. Much of the process research has concentrated upon the development of methodologies for undertaking process initiatives. These methodologies tend to be prescriptive and formulaic, consisting of a

series of steps that lead to redesigned processes and hence, theoretically, significant performance improvements. The variety of organizational elements affected, when combined with the breadth of definition of process orientation, makes it very difficult to imagine any single process development methodologies being appropriate (Edwards, Braganza & Lambert 2000) and even the same methods are unlikely to be equally successful in all cases (Pritchard & Armistead 1999). The lack of integrated implementation approach to exploiting BPI is seen as one of the important reasons amongst others, behind BPI failures. Yet, a relative void in the literature remains the scarcity of suitable models and frameworks that address the implementation issues surrounding BPI and especially Business Process Engineering (Al-Mashari, Irani & Zairi 2001). There are obviously many factors that prevent the effective implementation of BPI and hence, restrict the innovation and continuous improvement. These are identified by Irani et al. (2000) to include: (1) loss of nerve, focus and stamina, (2) senior management who are comfortable in their ivory towers, (3) lack of holistic focus and settling for minor improvement gains, (4) human and organizational issues, (5) organizational culture, attitudes and skills, (6) resource restrictions and (7) fear of information technology (IT).

Successful BPI hinges upon top management support, customer satisfaction, cross-functional teamwork and a systematic means of solving problems. The biggest obstacles that BPI faces are: (1) lack of sustained management commitment and leadership, (2) unrealistic scope and expectations and (3) resistance to change (Paper 1998). Based on BPI consultants' interviews, Bashein and Markus (1994) found that senior management commitment and sponsorship, realistic expectations, empowered and collaborative workers, strategic context, shared vision, sound management practices and sufficient

human and financial resources are positive preconditions and wrong sponsor, a ‘do it to me’ attitude, cost cutting objectives, narrow technical focus, unsound financial condition, too many projects underway and fear, lack of optimism or animosity are negative preconditions for BPI success.

It should be noted that almost all people in the organization, not just a few at the top, should be actively solve problems, reduce costs and eliminate wastes. This is part of the perspective of the so-called ‘learning organization’ (Hayes, Wheelwright & Clark 1988). This means that issues of organizational behavior and informal group working also need to be considered. There is a need to overcome complacency and switching to an attitude of preventing rather than reacting to problems. Moreover, the identification of problems (or opportunities for improvement) should not be perceived as an indication of negative performance (Rohleder & Silver 1997).

However, more research is still needed to set out the conditions of applying a particular improvement approach for a specific change imperative. Taking an integrative approach to BPI implementation through combining different change efforts in one strategic improvement program is another important element of the holistic BPI. This involves determining improvement areas and developing synchronized strategies to achieve them at different levels and scopes. There is also a lack of methodological research constructs and variables suitable for conducting BPI research. In the measurement area, for instance, research has difficulties in measuring the success of projects that are semi-completed. Therefore there is a pressing need to develop multi-level measures that could more accurately provide assessment of the efforts. This, in turn, suggests that more research is still needed in the area of BPI measurement and that a generic measurement framework might be worth developing to suit various levels of BPI

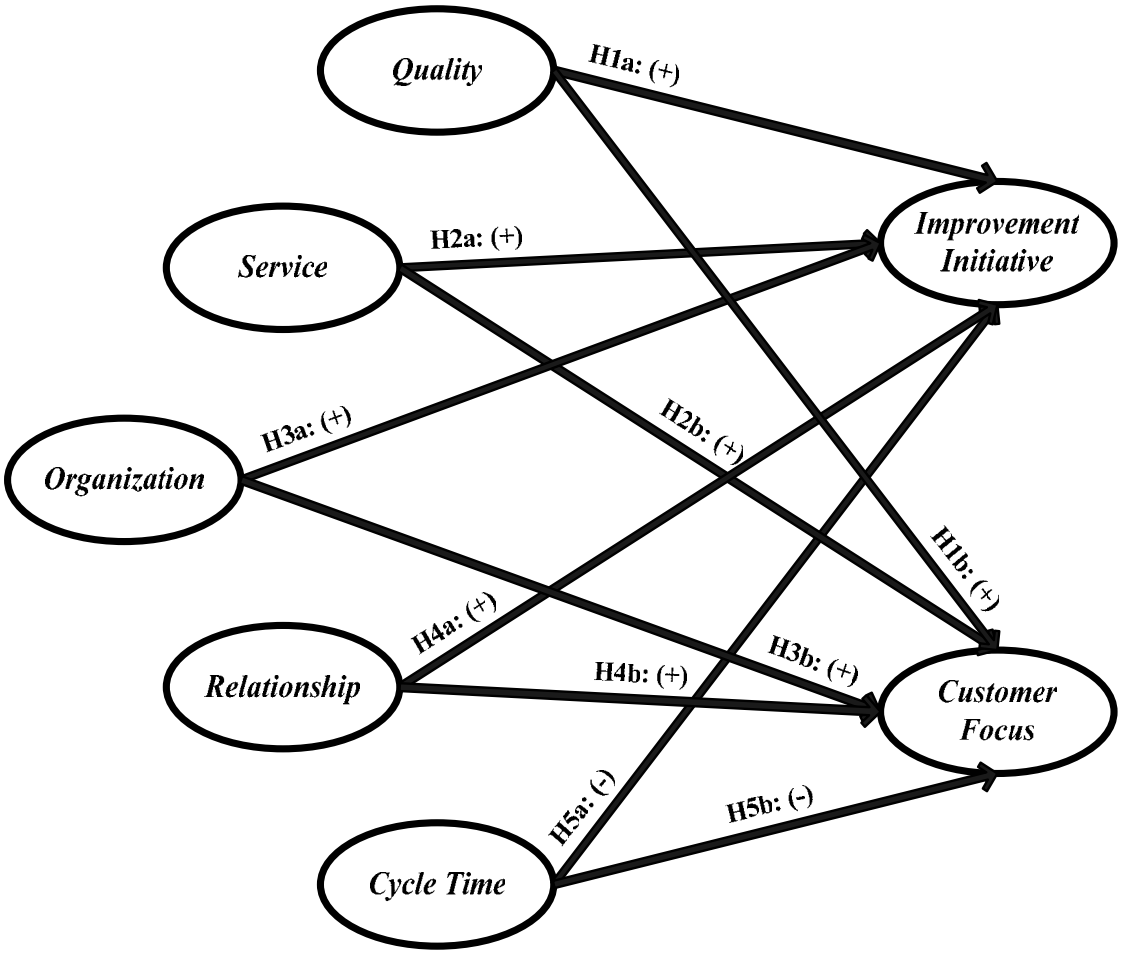
application in terms of business position and level of competition, strategic targets, cultural and organizational beliefs and values and levels of change required.

1.3.6. Research Conceptual Framework

The current competitive marketplace demands operational productivity, administrative efficiency, agility, shorter turnaround times and increased shareholder value. BPI through BPO is the survival key in transforming processes to achieve these end results. The main objective of BPI is to identify and eliminate non-value-added processes and simplify less-value-added or value-added processes of an organization. The close relationship between BPI and customer service and its effects on a firm's competitiveness dictate that companies handle their BPI program prudently so as to achieve its full potential as a source of competitive advantage. An effective way of simplifying non-core less-value-added or value-added processes is BPO, which is to employ outside entities to manage processes of an organization. BPO appears to be an important mechanism to realize that objective and hence, BPO is another approach to BPI (Li & Fan 2000). For executive leaders who are under intense pressure to achieve process improvement, the development of global sourcing processes, approaches and strategies may well offer the next generation of performance breakthroughs (Trent & Monczka 2003). BPI and BPO are closely related because both of them break the traditional ways of doing business and make changes to the business processes. BPO can also support BPI in dealing with complicated process changes. Moreover, BPO helps reduce the number of intermediate steps in the complex processes, allowing necessary tasks to be accomplished more independently and efficiently (Brown &

Eisenhardt 1995) and provides for extra resources that can lead to a reduction in the critical path of the processes (Clark & Fujimoto 1991). In this regard, successful companies pay close attention to the key issues, as the outsourcing program evolves through four stages of crafting the deal, managing the transition, transforming critical processes and leveraging new capabilities. In a business transformation outsourcing relationship, both parties forsake the comfort and security of clearly specified work, defined outputs and structured roles and responsibilities in pursuit of dramatic performance improvements across the entire enterprise (Linder, Cole & Jacobson 2002). The essence of the research framework for this study is that successful BPI implementation through BPO requires supplier management and the supplier selection is a critical element to sustain such management. To successfully implement BPI via BPO and to make sure that BPO satisfies the requirements of core processes, the company should select suppliers carefully and monitor or enhance the supply chain relationship frequently. Because BPI is a process-oriented approach of improvement, it is important for the firm to break its rigid functional structure and work through cross-functional orientations that may involve making long-term alliances with suppliers and customers. To extend this process integration throughout the supply chain, there cannot be a fixed boundary between partners and the supply chain must be managed as a single organization (McAdam & McCormack 2001). We assume that the company consists of discrete business processes, which have clear boundaries. This is to ensure that each process can be measured independently according to BPI criteria. Based on the revised research model proposed by Mohammady Garfamy (2004), the overall conceptual and hypothesized research model, which is used for the study and is tested in this research, is shown in Figure 1.

Figure 1: Conceptual and Hypothesized Research Model



* Adopted from Mohammady Garfamy 2004

Figure 1 shows the schema of the research constructs that contains both dependent and independent factors. The model attempts to incorporate the core aspects of supplier selection and BPI as well. Reviewing the diverse literature discussed earlier, there is a surprising agreement on the basic content domains of supplier selection and BPI. The study theorizes that supplier selection factors are directly associated with BPI factors. More precisely, the model proposes supplier selection as predictor of BPI through BPO. This analytical model indicates the hypothesized associations among only the factors. Arrows in the diagram between the factors represent the researcher's hypothesized

paths, estimating the extent to which the factors vary linearly with other factors in the model. For instance, *Quality* and *Improvement Initiative* are related or associated, but no claim is made about *Quality* causing *Improvement Initiative* or vice versa.

The main reason for using the above model is based on the key premise that BPI is a fact-based management technique in which the supplier performance considerably impacts on the efficiency and effectiveness of the buying firm and is of vital importance. Therefore, it is plausible that effectual evaluation and selection of suppliers and promoting their involvement in critical supply chain activities will result in improved firm performance via developed business processes and enhanced customer satisfaction. The other point of contention is the relative benefits to be gained through the involvement of suppliers on the product development and continuous improvement teams, which significantly enhances firm performance (Tracey & Tan 2001). In this tandem, incorporating suppliers on project teams enhances the information and expertise regarding new ideas and technology (Smith & Reinertsen 1991). In addition, it allows early identification of potential problems, thus improving the quality of the final product, eliminating rework and reducing costs. It also leads to improved communication and information exchanges that reduce delays and ensure that the activity is completed on time. Moreover, it can reduce development costs, provide early availability of prototypes, allow for standardization of components, reduce engineering changes and lead to higher quality with fewer defects (Bonaccorsi & Lipparini 1994).

Ultimately, BPI only advances in companies that are prepared to invest in improvement with the right vision to set appropriate supply strategies and the ability to implement them both internally and with suppliers by evaluating and selecting those suppliers appropriately.

1.4. Purpose of Study, Research Question and Hypotheses

In light of the importance of supplier selection decision, process improvement program and their growing complexity, this study incorporates BPI into the supplier selection decision-support framework. The overall objective of this study can be said to be twofold:

(1) To investigate and produce knowledge about the buyer's supplier selection decision with regard to BPI as well as the assessment of the relative importance of each attribute, which is considered essential for improving business processes.

(2) To contribute to enhancing knowledge about the relationships between supplier selection factors and BPI factors.

In this research by surveying and examining the linkages between supplier selection and BPI, an explanation is given on how and why these dimensions should be considered in the formulation of sourcing strategy and decision by drawing on existing literature and empirical evidence obtained through the conduct of research. Specifically, we examine the perceived importance of supplier selection factors (*Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time*), perceived achievement degree in terms of BPI factors (*Improvement Initiative* and *Customer Focus*) and identify the relative importance of these attributes in actual selection of suppliers and improvement of business processes. Both of these contributions are important, because instead of looking grossly at supplier selection and BPI measures, we empirically validate scales on supplier selection and BPI. We choose to test the effect of supplier selection, instead of BPO, on BPI because supplier selection and BPI often dictate the strategic orientation of the firm towards its

suppliers and customers, respectively. Also, supplier selection, as compared to BPO, can be measured into finer dimensions.

In specific, the current study attempts to address the following research question:

What is the relationship between level of supplier selection factors including *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* and level of BPI factors including *Improvement Initiative* and *Customer Focus*?

For addressing the above research question, we set out the research hypotheses as follows:

Hypothesis 1a: Higher level of *Quality* provided by supplier is positively related to higher level of buyer's *Improvement Initiative*.

Hypothesis 1b: Higher level of *Quality* provided by supplier is positively related to higher level of buyer's *Customer Focus*.

Hypothesis 2a: Higher level of *Service* offered by supplier is positively related to higher level of buyer's *Improvement Initiative*.

Hypothesis 2b: Higher level of *Service* offered by supplier is positively related to higher level of buyer's *Customer Focus*.

Hypothesis 3a: Higher level of supplier's *Organization* is positively related to higher level of buyer's *Improvement Initiative*.

Hypothesis 3b: Higher level of supplier's *Organization* is positively related to higher level of buyer's *Customer Focus*.

Hypothesis 4a: Higher level of buyer-supplier *Relationship* is positively related to higher level of buyer's *Improvement Initiative*.

Hypothesis 4b: Higher level of buyer-supplier *Relationship* is positively related to higher level of buyer's *Customer Focus*.

Hypothesis 5a: Higher level of *Cycle Time* exhibited by supplier is negatively related to higher level of buyer's *Improvement Initiative*.

Hypothesis 5b: Higher level of *Cycle Time* exhibited by supplier is negatively related to higher level of buyer's *Customer Focus*.

Examining the variations and differences in the levels of supplier selection factors and their associations with the levels of BPI factors can be a major contribution of the present research study.

1.5. Unit and Level of Analysis

The unit of analysis for the study is the outsourced process because increasingly firms are taking a broader view of business processes, i.e. the interrelated activities, procedures and behaviors that occur within and between organizational units, seeking to ensure that intra and inter-organizational processes ultimately satisfy the needs of customers and provide maximum benefit to the organization (Davenport 1993). It is

already known that firms, which focus on business processes instead of functions, are in a better position to deliver cost-effective, efficient services to their customers (Hammer & Champy 1994).

The level of analysis for the study is a division rather than a firm or a supply chain. There are five reasons for it. First, it is often found that BPI programs are initiated at the divisional level and only after the success of pilot programs is BPI initiated in other divisions in the firm (Davenport & Stoddard 1994). Second, it is often difficult to categorize a firm as a manufacturing firm or a service firm as, often, some divisions of a firm work with manufacturing and some others work with services. However, a division can be better identified dealing with either service or manufacturing operations. Third, division type is often considered important because in manufacturing divisions, the tangible nature of the processes makes it easier to engage in process improvement activities than service divisions. In the manufacturing division, an organization is in a better position to control and monitor processes, while in the service division, processes cannot be controlled adequately as most of the processes are intangible and take place through interactions with the clients. Moreover, in manufacturing division, customers' demands in products can be well defined and understood. In services, however, it is often difficult to quantify the customers' expectations, as services are difficult to standardize because customers come with their own expectations (Fitzsimmons & Fitzsimmons 1994). Fourth, outsourcing decisions are by and large conducted at divisional or business unit level to consider their effects on the division or business unit (Fan 2000). And fifth, it is argued that any theory that links buyer behaviors, such as supplier selection, to BPI will need to consider the firm’s processes, which are often dealt with inside the boundaries of a firm’s divisions (Mohammady Garfamy 2004).

1.6. Limitations of Study

Despite the usefulness of the results of this study, it does suffer from some limitations of which we should be aware. These limitations are mainly related to the broadness of the topic under investigation, generalizability issues, lack of homogeneous organizational experiences, time constraints and the limited access to information.

The critical business processes of the supply function of an organization include supplier selection, negotiation of supply contracts, monitoring supplier performance and acting as an interface between an organization and its suppliers (Talluri & Sarkis 2002) as well as supplier development. Within these core processes of sourcing, this study narrows its scope to focus upon the supplier selection process, which assists in maintaining effective buyer-supplier linkages. We believe that the results of this study may only reveal a partial picture of the current interaction between firms and their suppliers.

The study is also cross-sectional, i.e. a snap shot of the status of supplier selection and BPI. Seeing that there is a time lag between supplier selection and the time when BPI becomes routinized in the firm, this study lacks the predictive power to determine the long-term effects of such improvements. It does not provide any indication of trends too. Therefore, the results of the study are limited in predicting the success of BPI implementation. Additionally, the causal relationship between two subjects has not been fully developed. The scope of the study is also limited so that it has not examined all the aspects of supplier selection and BPI. Rather, it has focused on the linkages between supplier selection and BPI explored in prior research by Mohammady Garfamy (2004). The present research used five selected general characteristics in creating supplier

profiles, which were evaluated by buyers. Although these attributes were derived from previous research findings and we were careful about making the appropriate choices, other researchers might make somewhat different choices under the same circumstances. The findings of this study may therefore be considered incomplete to the extent that certain potentially interesting supplier characteristics are omitted.

The sample size is another limitation of this study. The sample consists of divisions of well-established large firms in the United Kingdom, which may subject it to regional clustering bias. The results of the study are therefore limited for the purpose of generalization. Samples of small or mid-sized firms might provide different sets of results. However, we believe the results can still offer important guidelines for replicating the study over a larger sample of small and medium sized firms. The responses pertaining to few numbers of divisions do not also provide robust and strong basis to fully revise the theoretical model. The results from a larger and heterogeneous sample might provide a better basis to completely revise the theoretical model. The response rate was also somewhat low, however given the complexity and subject matter, this is considered reasonable. Readers should also be reminded that much of the data reported here is based on management or respondents' perceptions. However, seeing the nature of the questions spanning business processes, the few numbers of divisions and the low response rate are not considered entirely unusual, but the weaknesses must be kept in view while interpreting and applying the results.

Despite these limitations, the research is considered successful in meeting its objectives and remains to be useful in clarifying the relationship between level of supplier selection factors and level of BPI factors.

1.7. Significance of Study

In light of the paucity of the present state of empirical research in the supplier selection and BPI fields, this is one of the first empirical studies to find the relationship between supplier selection and BPI in a larger research base. The study represents a model as a new perspective to supplier selection, BPO and BPI research by improving the discriminatory power of existing variables. Therefore, one of the most important contributions of this study is the construction of a model to understand the relationships between supplier selection factors and BPI factors more deeply. Moreover, it applies a new multi-factor model for supplier selection and BPI by considering various selection and improvement criteria. This research is also intended to increase the awareness of the strategic benefits that arise from BPI through concentration on suppliers.

Supply, logistics and technical practitioners, who are part of companies that expect to coordinate process improvement and supply chain activities across worldwide locations and between functional groups, should benefit from this study. Academics interested in process outsourcing issues will also benefit from the research reported. In short, the aim is to help practitioners more fully understand integrated outsourcing as well as academics interested in pursuing research-related opportunities. The research topic highlighted here, along with the specific question it raises, provide opportunities to further our knowledge about integrated outsourcing incorporating BPI aspects. The results of this investigation provide direction to researchers in developing a theory of buyer behavior as well.

Chapter 2:

Research

Methodology

2.1. Research Strategy and Design

The purpose of this research as mentioned earlier is to explain the relationship between two topics using a previously developed theory. The focus of research question on 'what' question is a justifiable rationale for conducting an explanatory study. As Neuman (1997) states, the goals of an explanatory research as a more systematic and extensive study are: (1) to determine the accuracy of a principle or theory, (2) to find out which competing explanation is better, (3) to advance knowledge about an underlying process, (4) to link different issues or topics under a common general statement, (5) to build and elaborate a theory so it becomes more complete, (6) to extend a theory or principle into new areas or issues and (7) to provide evidence to support or refute an explanation or prediction.

The distinction that is commonly drawn among writers on and practitioners of business research between two types of research strategy, quantitative research and qualitative research, is based on a variety of considerations, which enter into the process of doing business research. These considerations are: (1) the nature of the relationship between theory and research, (2) epistemological issues and (3) ontological aspects (Bryman & Bell 2003).

The most common view of the nature of the relationship between theory and research is represented by deductive theory, which guides the research (known as a deductive approach). The researcher, on the basis of what is known about in a particular domain and of theoretical considerations in relation to that domain, deduces a hypothesis (or hypotheses) that must then be subjected to empirical scrutiny. Embedded within the hypotheses will be the concepts that will need to be translated into researchable entities

and operational terms. This means that the researcher needs to specify how data can be collected in relation to the concepts that make up the hypotheses. Theory and the hypotheses deduced from it drive the process of gathering data, confirming or rejecting the hypotheses and inferring the implications of findings for the theory. The findings are then fed back into the stock of theory and finally the theory will be revised.

Positivism is an epistemological position that entails the principle of deductivism. According to this principle, the purpose of theory is to generate hypotheses that can be tested and that will thereby allow explanations of laws to be assessed. Hence, the role of research is to test theories and to provide material for the development of laws (Bryman & Bell 2003).

Objectivism is an ontological position that implies that social phenomena and their meanings confront us as external facts that are independent or separate from social actors (Bryman & Bell 2003). The organization is a social entity, which comes across as something external to the actor and as having an almost tangible reality of its own. It has the characteristics of an object and hence of having an objective reality.

If we take the areas that have been the focus of the above three subjects (the connection between theory and research, epistemological issues and ontological considerations), quantitative research can be constructed as a research strategy, a general orientation to the conduct of research, that: (1) emphasizes quantification in the collection and analysis of data, (2) entails a deductive approach to the relationship between theory and research in which the accent is placed on the testing of theories, (3) has incorporated the practices and norms of the natural scientific model and of positivism in particular and (4) embodies a view of social reality as an external objective reality (Bryman & Bell 2003).

A cross-sectional design as a framework for the collection and analysis of data is the preferred design for this study because it entails the collection of data on quite a lot more than one case and at a single point in time or during a brief interval of time called the observation period in order to gather a body of quantitative or quantifiable data in connection with two or more variables, which are then examined to detect patterns of association. Survey research is the most common form of cross-sectional design in which data are collected predominantly by questionnaire or by structured interview. The data from a survey are basically intended to be informative about the characteristics of a population during the observation period (Cryer & Miller 1994). Surveys give the researcher a picture of what many people think or report doing. It is noteworthy that survey techniques are often used in descriptive or explanatory research (Neuman 1997). The use of survey methods offers many advantages over anecdotal experiences and case studies. First, a survey study is replicable, testable and thus allows researchers opportunities to extend the scope of the initial models. Second, the study allows researchers to test the validity of the data for different sets of sample, thus allows generalizability and cross study comparability. Due to the research question, this type of 'what' question is actually a form of a 'how many' or 'how much' line of inquiry. Identifying such effect is more likely to favor survey design than others because a survey can be readily designed to enumerate the 'what' (Yin 2003). The logic of a traditional survey is strictly positivistic and the assumption of positivism is ultimately concerned with answering the questions of 'how many' or 'how much' (Remenyi et al. 1998).

Analytic or explanatory surveys attempt to test a theory by taking the logic of the experiment out of the laboratory and into the field (Gill & Johnson 2002) but in survey,

the researcher manipulates no situation or condition. Surveys usually involve a (random) sample or a smaller group of selected objects but generalize the results to a larger group from which the smaller group was chosen. However, the inferences and generalization or extrapolation cannot be made beyond the confines of the particular context or target population in which the research is conducted and from which the sample is selected.

The intent of surveys is also to determine whether the relationships exist among specific variables measured by survey instrument. These often result in measures of correlation or association between variables, allowing some predictions to be made in the form of tendencies, but do not determine causality. Relationships can be ones of association, where the two variables change together, though there is not a direct cause and effect relationship (Black 2002). The surveys are sometimes referred to as correlational studies because of the frequent use of correlations to show relationships among variables. The presence of a correlation gives little indication of the direction of causation between independent and dependent variables unless some temporal ordering is evident (Gill & Johnson 2002). Therefore, the presence of a correlation is a necessary but not sufficient proof of a causal relationship.

In this research by surveying the relationship of supplier selection and BPI, an explanation is given on how and why these dimensions should be considered in the formulation of sourcing strategy and decision by drawing on existing literature and empirical evidence obtained through the questionnaires, which are completed by respondents.

The current study goes beyond the previous literature not only by considering all the qualitative and quantitative factors relevant to supplier selection and BPI, but also by

analyzing the relationships among these factors in a multiple criteria environment. Issues addressed during the survey include the following:

(1) Identify the business process outsourced and its characteristics.

(2) Elicit preference information concerning the attributes of suppliers and achievement information concerning the attributes of BPI from the well-informed respondent(s) and determine the relative importance of attributes.

(3) Identify the role of suppliers in the process and the influences of supplier selection on BPI.

However, the aim of the present research is not to study suppliers and BPI attributes in-depth, rather is to survey the relationship between supplier selection and BPI.

2.2. Definition and Operationalization of Variables

The explanatory study, outlined above, expands on the proposed original model to investigate its applicability in a sourcing context and provides a means of evaluating the contribution of buyer and supplier to the process. Since factors related to both supplier selection and BPI need to be considered in this research, based on our theoretical arguments and reviewing the literature, we use a list of supplier selection factors (as independent variables or constructs), BPI factors (as dependent variables or constructs) and their corresponding specific set of criteria, shown in Tables 1 and 2 respectively, with the possibility of revising during the study.

However, we do not include performance measures as a part of discussion for the present study. The main reasons are the following. First, the focus of the present study is towards BPI, which in the literature has largely been defined and operationalized in

process terms (McNealy 1993). Second, the study does not aim at operationalizing structural performance measures such as revenue, stock turnover and profitability per se, because some of these measures vary greatly from service divisions to manufacturing ones. In some cases, managers in the service divisions show their dislike for these measures, as they are more interested in customer oriented measures, which cut across the boundary of the organization (Bhatt 2000). Moreover, no consensus exists on how to assess business performance in cross industry studies (Tan, Kannan & Handfield 1998). Therefore, instead of devising separate measures for the service and the manufacturing divisions in structural terms, we use a set of measures in process terms, which deemed to fit both of these divisions. In doing so, we base our theoretical argument behind Bhatt (2000) and Bhatt and Stump (2001b) (primarily based on Crosby (1979), Deming (1982) and Juran (1992), who emphatically recommend focusing on business processes rather than the results and argue that by meeting or exceeding customer demands, organizations are most likely to benefit from performance measures). Therefore, instead of accounting for end results, businesses should analyze and improve their processes. Third, as Ray, Barney and Muhanna (2004) content, adopting the effectiveness of business processes as a dependent variable may be more appropriate than adopting overall firm performance as a dependent variable. Results of their study are consistent with resource-based expectations and show that distinctive advantages observable at the process level are not necessarily reflected in the firm level performance. A firm's overall performance actually depends on, among other things, the net effect of its business processes on its position in the marketplace. Fourth, it is possible for a firm's stakeholders to appropriate the economic profits that can be generated by a firm's business processes before those profits are reflected in a firm's

overall profitability. Shifting attention from explaining a firm's overall performance to explaining the existence of competitive advantages at the level of business processes within a firm helps avoid this difficult appropriation problem.

On the other hand, identifying and weighting of supplier selection attributes are needed to assess the relative importance among them with regard to BPI, considering that different attributes have different importance (Choy & Lee 2002). This basically relies on the human expert to identify attributes and assign important values into the hierarchy structure, while this structure in the form of a case-base is being built, the expert is expected to have the experience and knowledge to decide what the weighting value of each attribute should be. Unfortunately, the results of studies in which buyers are asked to list the criteria they use and/or their relative importance provide little information on the psychological tradeoffs buyers make among those criteria. What's more, there is a substantial body of research that indicates such self-reports are often less-than-reliable surrogates for decision process even for experienced decision makers (Wagner, Ettenson & Parrish 1989). However, in light of the possibility that the decision criteria used by firms in evaluating their suppliers may vary by industry, it is necessary to select a homogenous setting so as to reduce the unnecessary noise that may arise from situational idiosyncrasies.

Additionally, the heterogeneity of evaluation criteria (quantitative versus qualitative attributes) as well as the lack of sufficient potential objectivity, the excessive data requirements and the imprecision of the rating mechanism itself are other difficulties in determining the relative importance of criteria with a high degree of precision. However, the measurement process in quantitative research entails the search for indicators and the measurement of variables. The best approach, which is thus likely to

be applicable in general term or equally to all possible situations, will be to rank order the measured items in terms of which has less and which has more of the quality represented by the criterion, but still they do not allow us to say 'how much more'. This approach introduces all the factors and criteria as ordinal variables, which can be measured effectively. Observations on an ordinal variable represent responses to a set of ordered categories such as a Likert scale so that this variable does not have origin or unit of measurement (Joreskog 2004). Another reason for using ordinal variables for the factors and criteria is based on the fact that the review of literature has revealed different operationalized measures of the above factors and criteria so that some of them are not useful for this research.

Therefore, the measures for factors and criteria in the theoretical research model are either developed specifically for this study or consulted and adopted from the prior literature. Attitudes or factors are also measured through the use of multiple item rating scale, which are applied when two or more questions are used to measure the construct of interest. These constructs or factors entail variables concerning the criteria used to select supplier and the criteria used to evaluate BPI. The only unusual or unfamiliar terms in this study are pertinent to BPI factors whose definitions have been provided in the related section of previous chapter. Their criteria and supplier selection factors and criteria are self-explanatory and do not need further clarification here.

At the level of the firm, other variables including the type of industry in which the firm operates, the name and type of process outsourced and the position of respondents in each firm are considered as nominal variables and the number of employees and the annual total sales of each firm are regarded as interval variables.

In identifying the large firms, we consider those firms as large firms, which employ more than 250 persons and have an annual turnover exceeding EUR 50 millions. This category definition of large firms is based on the definition of micro, small and medium-sized enterprises (SMEs) adopted by the Commission of the European Communities (2003) where the category of micro, small and medium-sized enterprises is made up of enterprises, which employ fewer than 250 persons and have an annual turnover not exceeding EUR 50 millions and/or an annual balance sheet total not exceeding EUR 43 millions.

The classification codes pertinent to the type of industry in which the firms operate are based on the UK Standard Industrial Classification of Economic Activities 2003 of the Office for National Statistics of the United Kingdom (2003) as shown in Table 3.

Since an organization can appear to be a seamless web of interconnected processes, understanding and classifying the different types of processes are very important. The Process Classification Framework (PCF) of American Productivity and Quality Center (APQC) (2004) serves as a high-level industry-neutral enterprise model that allows organizations to see their activities from a cross-industry process viewpoint. The PCF represents a series of interrelated processes that are socio-technical in nature, are business critical and represent six major dimensions of the organization: (1) knowledge communities/functions, (2) processes, (3) content, (4) marketplaces, (5) culture and (6) organizational structure. The PCF enables organizations to understand their inner workings from a horizontal process viewpoint, rather than a vertical functional viewpoint. While the PCF does not list all processes within a specific organization, every process listed in the framework is not present in every organization.

Table 3: UK Standard Industrial Classification of Economic Activities 2003

Industry
Agriculture, Hunting and Forestry
Fishing
Mining and Quarrying
Manufacturing
Electricity, Gas and Water Supply
Construction
Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods
Hotels and Restaurants
Transport, Storage and Communication
Financial Intermediation
Real Estate, Renting and Business Activities
Public Administration and Defence; Compulsory Social Security
Education
Health and Social Work
Other Community, Social and Personal Service Activities
Private Households Employing Domestic Staff and Undifferentiated Production Activities of Households for Own Use
Extra - Territorial Organizations and Bodies

* Adopted from Office for National Statistics of the United Kingdom 2003

In this classification, there are two kinds of processes: (1) Operating processes and (2) Management and Support processes. Operating processes involve the day-to-day carrying out of the organization's basic business purpose and Management and Support processes help plan, organize, control or provide resources for operating processes. These processes, which have been incorporated into this study, are categorized in 12 categories as shown in Table 4.

Table 4: Process Classification Framework

Type	**Process**
Operating	Develop Vision and Strategy
	Design and Develop Products and Services
	Market and Sell Products and Services
	Deliver Products and Services
	Manage Customer Service
Management and Support	Develop and Manage Human Capital
	Manage Information Technology and Knowledge
	Manage Financial Resources
	Acquire, Construct and Manage Property
	Manage Environmental Health and Safety
	Manage External Relationships
	Manage Improvement and Change

* Adopted from APQC 2004

2.3. Source of Information

All surveys are concerned with identifying the research population, which will provide all the information necessary for answering the original research question(s). In this process and in the use of a sample, one of the first considerations is to obtain a working definition of the population to be studied, which constitutes the sampling frame, a comprehensive list of members (individuals or objects) of the research population from which a (random) sample is to be drawn. To test the research hypotheses, we need a context where the processes are outsourced frequently and improved continuously. Large firms therefore due to the diversity of their divisions and processes are considered as an appropriate context for this research. For the purpose of study, the London city in the United Kingdom is strategically selected as the limited geographical area for collecting data because the London city as the center of the United Kingdom encompasses a considerable number of large firms, which are suitable for the intents of present research. Also, the official language of the country is English by which we can communicate well and this country is in the European Union as well so that it is more likely to collaborate with the researcher in providing the required data during the study.

The organizations selected for the analysis in this survey are from a range of business sectors. The common factor is that they have all implemented some degree of process-focused change initiative and quality management system in the effort to improve business processes.

The list of these large firms is obtained through LexisNexis Group (http://web.lexis-nexis.com/professional/), a division of Reed Elsevier (UK) Ltd., which is one of the best available sources for these kinds of information. Archival data about these firms such as

the number of employees and the annual total sales are also collected from the related web site. The final sampling frame for the study, which is included in the Appendix 1 of this report, consisted of the 719 firms in terms of annual total sales and number of employees in year 2003 because total sales and number of employees are measures of firm size.

We then attempted to identify appropriate respondent in each of these firms to whom the self-completion questionnaire is to be mailed or emailed through visiting the web sites of these companies in advance. The questionnaires are administered through asking the well-informed respondents such as managers or directors of logistics, purchase, materials, contracts or commercial divisions of the firms about the most important outsourced process. In all, respondents are competent and qualified to furnish reliable information for the research. The present survey study is based on this essential source of evidence, which provides the needed data related to each outsourced process that considered as the unit of analysis.

2.4. Methods of Data Collection

The data collection process for this study was performed through self-administered questionnaire to address the research question. Questionnaires allow evidence to be gathered concerning ‘how much’ or ‘how many’. In business and management research, questionnaires are often used to collect evidence concerning management opinions (Remenyi et al. 1998). The design of the questionnaire is derived from the issues and question raised in the past study by Mohammady Garfamy (2004).

In questionnaire two types of questions, background questions or questions of fact and attitudinal questions or questions of opinion, are posed. Background questions provide demographic and socio-economic information on the individual or firm. At the level of the firm these include evidence on the industry in which the firm operates, the name and type of process outsourced, the number of the staff employed, its annual total sales and the position of respondent in the company. Attitudinal questions provide information on the strength of feeling or opinion about objects, issues and activities. Questions of opinion for variables or criteria of supplier selection and BPI are constructed as closed questions in the form of five-category or five-point Likert scale bounded from 'Not at All' to 'Very High'. The strength of closed questions is that they are quick to complete and analyze. In the instrument both components underlying the theoretical model, including 36 criteria or items representing 7 factors or constructs, are operationalized. Respondents were asked to judge the extent to which they think about the supplier selection and BPI components of the outsourced process. In each organization one outsourced process, which is considered the most important by that organization due to the cost, quality, cycle time, service and so on, was selected to enable the examination of relationship between supplier selection and BPI for that process. We believed that by reflecting on a specific BPO rather than general practices, respondents would be more likely to report actual rather than projected or socially desirable practices. In summary, the survey is divided into two sections and included questions on attitude towards suppliers and achieved BPI in respondent's organization as well as organizational demographics.

The four-page self-administered research questionnaire, prepared to collect data and accompanied by an informational cover letter, was primarily mailed or emailed to the

respondents of all firms included in the sampling frame. Even when the contact person was wrong, some respondents provided the researcher new contact information on the more well-informed person. Participation was on a voluntary basis, no monetary reward was provided to complete the survey and the respondents were guaranteed anonymity in the process. They were only promised an executive summary. The cover letter, which is included in the Appendix 2 of this report, stated the purpose of the research and respondents were also instructed to complete the survey. To enable all respondents to have a common understanding of the business process, it was defined in the questionnaire. Additionally, one open-ended question was used to gain further understanding of certain issues, since responses were unprompted, it does provide insight that cannot be captured by structured questions. The respondents were given the open-ended question to state their perceptions of the areas of concern regarding the relationship between supplier selection and BPI in their organizations. The questionnaire is also included in the Appendix 3 of this report.

The researcher had a methodological versatility necessarily required for using survey design and followed certain formal procedures to assure quality control during the data collection process. In this tandem, for developing a reliable and valid research, the instrument development and validation procedures recommended by Nunnally (1988) were followed. In the first phase, a review of the scientific literature was carried out to find the theoretical base and candidate operationalized measures of the criteria and factors. If adequate operationalized measures were not found, a list of items derived from the literature was instead generated. In the second phase, the initial survey instrument was assessed and revised to satisfy the face/content validity to ensure its readability, clarity, completeness, relevance, applicability, appropriateness and

comprehensiveness of items included. In the third phase, the instrument was pilot tested in cooperation with two firms, which were known to have implemented BPI programs. In essence, pilot research is a trial run-through to test the realism of the research design with a sub-sample of respondents who have characteristics similar to those identifiable in the main sample to be surveyed. Piloting is necessary as it is very difficult to predict how respondents will interpret and react to questions. Considering that the primary aim of surveys is to be able to generalize beyond the sample to a larger population, as much care must be taken to ensure the representativeness of the respondents as is taken to ensure the realism of the survey items themselves and the theory upon which they are based. Conducting a pilot before the main survey allows any unrealistic components and potential problems in the proforma of the questionnaire to be identified and corrected. When the pilot study is completed, it is then possible to conclude the design of the questionnaire and finalize any arrangement for its administration (Gill & Johnson 2002). By using highly structured questionnaire to gather data in a form that is quantitatively analyzable, survey-based research is usually regarded as easily replicable and hence reliable.

When the population is not large, as the case in this research, it is customary to send the questionnaire to all members. This 100 percent sample is known as a census (Easterby-Smith, Thorpe & Lowe 2002), which is a non-probability sampling and entails the enumeration and inclusion of an entire population where data are collected in relation to all units in the population. Hence, sampling error as the difference between a sample and the population from which it is selected is not relevant in this study. This method is more appropriate than the random sampling method because only specific targets that

deemed to have BPO practices are in the best position to provide the desired information for this study.

However, non-response is a source of non-sampling errors, the differences between the population and the sample except those that arise due to sampling method and size, which is particularly likely to happen when individuals or firms are being sampled. It occurs whenever some members of the sample refuse to cooperate, cannot be contacted despite repeated attempts or for some reason cannot supply the required data (Saunders, Lewis & Thornhill 2000).

A primary concern with direct mail surveys is non-response bias, which arises when the characteristics of the respondents are systematically different from the characteristics of the non-respondents. This arises when non-responses to the survey are patterned according to specific respondent characteristics, which can range from personality variables through to specific attitudes towards a survey's topic and group norms, for example, when the response rate from one income group is significantly different than response rates in other income groups. Therefore, non-response bias leads to the results that misrepresent the targeted population. Non-response bias can exist with survey research, even with relatively high response rates. Although there appears to be no standard minimal response rate for mail surveys, it is important that the response rate be as high as possible. The most common protection against non-response bias is to attempt to increase the response rate by using many methods including telephone calls, hand-stamped return envelopes, assurance of confidentiality for sensitive issues, noncommercial sponsorship, incorporation of the cover letter into the questionnaire and follow-up questionnaires/letters, which were used in this investigation to increase response rates and mitigate non-response bias.

2.5. Methods of Data Analysis and Interpretation

Every investigation should start with a general analytic strategy, yielding priorities for what to analyze and why. Relying on theoretical proposition that suppliers can contribute to BPI, as the preferred analytic strategy in this investigation, yields priority to analyze the relationships between supplier selection factors and BPI factors. This strategy is used in practicing the 'Linear regression' technique for analyzing the data of survey study. In every investigation sound scientific methods must be employed to insure the rigor and generalizability of the results to the greatest extent possible.

Linear regression is a very general, very powerful statistical modeling and analysis technique. The goal in building a linear regression model is to find a model that fits the data well enough to serve as a useful representation of reality and explanation of the data. When the research model has a sound theoretical base, its overall objective is theory testing. For this reason, it is also suited for confirmatory research.

Linear regression is used to model the value of a dependent scale variable based on its linear relationship to one or more scale independent variables as predictors. Linear regression estimates the coefficients of the linear equation, involving one or more independent variables that best predict the value of the dependent variable. The dependent and independent variables should be quantitative and the categorical variables need to be recoded to binary (dummy) variables or other types of contrast variables.

There are many statistics available for each variable including number of valid cases, mean and standard deviation. There are also many statistics available for each model including regression coefficients, correlation matrix, part and partial correlations,

multiple R, R^2, adjusted R^2, change in R^2, standard error of the estimate, analysis-of-variance table, predicted values and residuals.

Like other mathematical modeling, the linear regression has some assumptions. For each value of the independent variable, the distribution of the dependent variable must be normal. The variance of the distribution of the dependent variable should also be constant for all values of the independent variable. The relationship between the dependent variable and each independent variable should be linear and all observations should be independent. This relationship is described in the following formula:

$$y_i=b_0+b_1x_{i1}+...+b_px_{ip}+e_i$$

where

y_i is the value of the i^{th} case of the dependent scale variable

p is the number of predictors

b_j is the value of the j^{th} coefficient, $j=0,...,p$

x_{ij} is the value of the i^{th} case of the j^{th} predictor

e_i is the error in the observed value for the i^{th} case

The model is linear because increasing the value of the j^{th} predictor by 1 unit increases the value of the dependent variable by b_j units. Note that b_0 is the intercept, the model-predicted value of the dependent variable when the value of every predictor is equal to 0.

For the purpose of testing hypotheses about the values of model parameters, the linear regression model also assumes the following:

(1) The error term has a normal distribution with a mean of 0.

(2) The variance of the error term is constant across cases and independent of the variables in the model. An error term with non-constant variance is said to be heteroscedastic.

(3) The value of the error term for a given case is independent of the values of the variables in the model and of the values of the error term for other cases.

Inferring support for the hypotheses is a one-step process through using linear regression. The method is to examine the statistical significance of each of the hypothesized paths to infer direct support for each expectation.

Since linear regression cannot magically transform correlational data into causal conclusions, cause and effect can be established only through the proper research design and no amount of statistical hand waving can turn correlations into conclusions about causation. Nonetheless, correlation analysis including linear regression can be used to show that the correlations found in the data are in accordance with the causation predicted by an established theory base.

Before doing more elaborate analysis of the data, it is important to do a careful data screening to check for coding errors and other mistakes in the data. Such a data screening will also reveal outliers and other anomalies and detect if there are specific patterns of missing values in the data. Hence, data screening gives a general idea of the character and quality of the data. Following the recommendations of Joreskog (2004), the data were screened for missing values and to test the assumptions of linearity and absence of outliers for attitudinal questions. If something had been wrong in the data, it would have been detected by this kind of data screening. Standard quality control procedures were conducted to ensure there were no errors in the data entry as well. Data entry was done as and when each completed questionnaire arrived. In the sample, data

were not missing and with regard to the additional analyses, the test revealed no univariate outliers and that all items were reasonably linearly distributed. Data coding was done in accordance with the criteria established by the researcher. In the survey, responses to demographic and process information questions were coded numerically starting from 1. The responses 'Not at All', 'Very Low', 'Low', 'High' and 'Very High' to the survey items related to supplier selection and BPI criteria were coded 0, 1, 2, 3 and 4 respectively. The exception is for criteria related to *Cycle Time* factor, which were reversely coded to indicate the importance of their time aspects. For each ordinal variable, it is assumed that there is an underlying continuous variable. This continuous variable represents the attitude underlying the ordered responses to ordinal variable (Joreskog 2004). Open-ended question was only reviewed by the researcher and was not coded. However, not every respondent chose to answer this open-ended question.

Non-response bias is also assessed using the comparison to known population values method. When we want to test for differences between two groups, the independent-samples T test comes naturally to mind. However, despite its simplicity, power and robustness, the independent-samples T test is invalid when certain critical assumptions are not met. These assumptions center on the parameters of the test variable (in this case, the mean and variance) and the distribution of the variable itself. Most important, the T test assumes that the sample mean is a valid measure of center. Finally, even if the mean is a valid measure of center, the distribution of the test variable may be so non-normal that it makes us suspicious of any test that assumes normality. If any of these circumstances is true for the analysis, we should consider using the nonparametric procedures designed to test for the significance of the difference between two groups. They are called nonparametric because they make no assumptions about the parameters

of a distribution nor do they assume that any particular distribution is being used. The nonparametric tests for two independent samples are useful for determining whether or not the values of a particular variable differ between two groups. The popular nonparametric test of location and shape, the two-sample Kolmogorov-Smirnov test, is used, which is sensitive to differences in both location and shape. In this test, the test variable is assumed to be continuous, however, its cumulative distribution function (CDF) can assume any shape at all. To test for non-response bias, after testing the normality of known population and sample values, the two-sample Kolmogorov-Smirnov test is conducted to assess whether the sample frequencies are representative of the underlying population rates with regard to the annual total sales and number of employees. Prior to this test, however, as a check of normality in the underlying distributions of population and sample values, the one-sample Kolmogorov-Smirnov test is applied, which is a nonparametric test as well.

Afterwards, the remaining subcomponents of construct validity are tested from a statistical perspective using exploratory factor analysis as well as reliability analysis. This process is based on the premise that we must know what we are measuring first before we can test any substantive hypothesis among the constructs represented through the measures.

Factor analysis attempts to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables. Factor analysis can also be used to generate hypotheses regarding causal mechanisms or to screen variables for

subsequent analysis (for example, to identify collinearity prior to performing a linear regression analysis).

There are some statistics available for each variable including number of valid cases, mean and standard deviation and for each factor analysis including correlation matrix of variables, reproduced correlation matrix, initial solution, Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity, unrotated solution, rotated solution, factor score coefficient matrix and factor covariance matrix.

The variables should be quantitative at the interval or ratio level. Data for which Pearson correlation coefficients can sensibly be calculated should be suitable for factor analysis and observations should be independent. The factor analysis model specifies that variables are determined by common factors (the factors estimated by the model) and unique factors (which do not overlap between observed variables). The computed estimates are based on the assumption that all unique factors are uncorrelated with each other and with the common factors.

The factor analysis procedure has several extraction methods for constructing a solution for data reduction and structure detection.

For data reduction, the principal components method of extraction begins by finding a linear combination of variables (a component) that accounts for as much variation in the original variables as possible. It then finds another component that accounts for as much of the remaining variation as possible and is uncorrelated with the previous component, continuing in this way until there are as many components as original variables. Usually, a few components will account for most of the variation and these components can be used to replace the original variables. This method is most often used to reduce the number of variables in the data file.

For structure detection, other factor analysis extraction methods go one step further by adding the assumption that some of the variability in the data cannot be explained by the components (factors). As a result, the total variance explained by the solution is smaller. However, the addition of this structure to the factor model makes these methods ideal for examining relationships between the variables.

Reliability analysis allows study the properties of measurement constructs and the items that make them up. The reliability analysis procedure calculates a number of commonly used measures of construct reliability and also provides information about the relationships between individual items in the construct. Intra-class correlation coefficients can be used to compute inter-rater reliability estimates. There are some statistics available such as descriptive for each variable and for the construct, summary statistics across items, inter-item correlations and covariances, reliability estimates, ANOVA table and intra-class correlation coefficients. Data can be dichotomous, ordinal or interval, but they should be coded numerically. Observations should be independent and errors should be uncorrelated between items. Constructs should be additive so that each item is linearly related to the total score.

As mentioned earlier, one of the objectives of this study is the assessment of the relative importance of each attribute for supplier selection and BPI. To determine the relative importance of criteria related to supplier selection and BPI, the paired-samples T test is conducted. The paired-samples T test procedure compares the means of two variables for a single group. It computes the differences between values of the two variables for each case and tests whether the average differs from 0. The data may consist of two measurements taken on the same subject or one measurement taken on a matched pair of subjects. However, observations for each pair should be made under the same

conditions. There are many statistics available for each variable including mean, sample size, standard deviation and standard error of the mean and for each pair of variables including correlation, average difference in means, t test, confidence interval, standard deviation and standard error of the mean difference. The paired-samples T test also has some assumptions. The mean differences should be normally distributed and the variances of each variable can be equal or unequal.

In summary, using SPSS 13.0 for Windows, the statistical analyses, which were performed in this research include: (1) One-sample Kolmogorov-Smirnov test, (2) Two-sample Kolmogorov-Smirnov test, (3) Frequency and Mean analysis, (4) Exploratory factor analysis, (5) Reliability analysis, (6) Paired-samples T test and (7) Linear regression. In all cases, we treat the evidence fairly to produce analytic conclusions answering the original 'what' research question.

Chapter 3:

Results

3.1. Sample Statistics and Non-response Bias Assessment

Moving on to the real world, this chapter aims to corroborate the arguments presented in the previous chapters in the context of empirical evidence gathered from a survey investigation in the London (United Kingdom) large companies. The study is a snap shot of the situation, as it existed in the first quarter of 2005, hence, it does not reveal any long-term trend.

The first mailing of the questionnaire was done during the month of January 2005 and the respondents were given two weeks to respond to the survey. Thirty-nine firms responded to the first mailing for a response rate of 5.42%. It was decided to continue using the mail survey instrument for data collection from the non-response group, rather than switch to personal or telephone interview. The literature indicates that respondents may answer differently in a mail survey than they would in an interview when questions concern sensitive issues (Lambert & Harrington 1990). We believe the technique has considerable merit for this research. It is also an excellent way to address the non-response bias problem, while recognizing pressures caused by budget and time constraints. After one month, a second mailing accompanied by follow-up letter to the remaining 680 firms, giving the respondents another two weeks to respond to the survey resulted in another 29 replies, which increased the response rate to 9.46%. After another month, a third mailing to the non-respondents brought 14 replies and resulted in a total of 82 responses for a cumulative response rate of 11.40%. Time and budget pressures precluded an additional mailing to the remaining total population of non-respondents, but there was still concern about non-response bias. In addition, a number of companies reported policies prohibiting participation in the study, lack of experience of BPO or

BPI or inconvenient timing and thus declined to respond, including 47 companies. Moreover, at the time of this study other researchers were using the same database to conduct other research projects, which raises the possibility that respondents received several time-consuming surveys at the same time. Four responses could not be used as respondents did not provide answers to more than half of the questions asked in the questionnaires and in some other cases, all the demographic variables were not answered. Therefore, only 78 responses were found useful for the data analysis and consequently, the effective response rate was 10.85%. This is in the range of typical 10-12% response rate most mail surveys achieve. While the researcher had hoped for a higher response rate, however, given the relatively complex nature of the questions, spanning from supplier selection to BPI areas, this kind of low response rate was considered satisfactory. The sample size does also provide the necessary statistical power required to conduct statistical tests and draw meaningful conclusions.

The analysis of the data collected from the questionnaires follows a number of basic statistical techniques to identify and interpret the respondents' ratings. The analysis in this section is based on the six statements in sections 1 and 2 of the questionnaire. The first step was to study the sample characteristics of organizations that participated in this research.

Table 5 and Figure 2 show by industry the profiles of the respondent firms. Eight different industry sectors participated in this study. A majority of firms was from manufacturing industry (about 69%). Responses representing industries from Wholesale and Retail Trade, Repair of Motor Vehicles, Motorcycles and Personal and Household Goods, Electricity, Gas and Water Supply, Other Community, Social and Personal

Service Activities, Agriculture, Hunting and Forestry, Education, Construction and Health and Social Work industries ranged from 1.28% to 11.54% of the sample.

Table 6 and Figure 3 represent by total sales the profiles of the firms participated in the study. The vast majority about 53% of the organizations came from less than £100 million range in terms of annual sales revenues. Less than £100 million annual revenue was the modal figure. Almost 15% of companies responding had organizational revenues between £100-£200 million and 13% had revenues of £1 billion or more. A total of 20 percent of the respondents had sales of £200 million to £1 billion annually.

Table 5: Industry Profile

Industry	**Frequency**	**Percent**	**Cumulative Percent**
Manufacturing	54	69.23	69.23
Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods	9	11.54	80.77
Electricity, Gas and Water Supply	5	6.41	87.18
Other Community, Social and Personal Service Activities	4	5.13	92.31
Agriculture, Hunting and Forestry	2	2.56	94.87
Education	2	2.56	97.44
Construction	1	1.28	98.72
Health and Social Work	1	1.28	100

Figure 2: Industry Profile

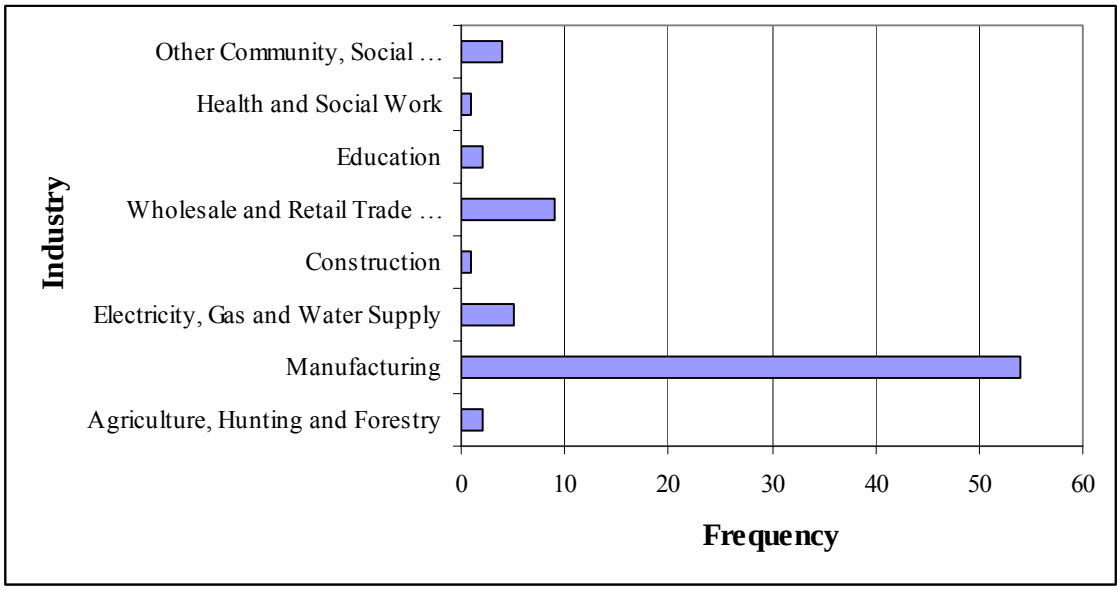


Table 6: Total Sales Profile in Year 2003

Total Sales (in Millions GBP)	Frequency	Percent	Cumulative Percent
<100	41	52.56	52.56
100-200	12	15.39	67.95
>1000	10	12.83	80.78
200-300	6	7.69	88.47
300-400	4	5.13	93.60
400-500	2	2.56	96.16
600-700	2	2.56	98.72
800-900	1	1.28	100

The range of organizations participating went from less than £100 million to greater than £1 billion, suggesting a very good cross-sectional representation of large business.

Figure 3: Total Sales Profile in Year 2003

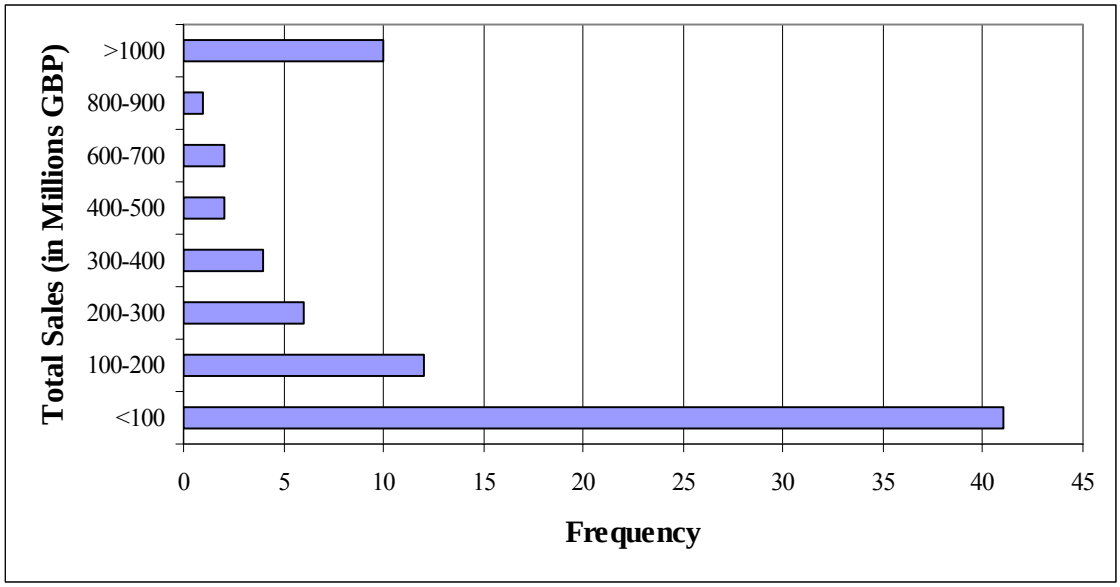


Table 7 and Figure 4 outline by number of employees the profiles of the companies studied. We again see a wide range from less than 500 employees all the way to over 5,000 employees. The vast majority about 32% of companies fell in the 500-1000 category. Almost 27% of companies surveyed have less than 500 employees and 22% have between 1000 to 2000 employees.

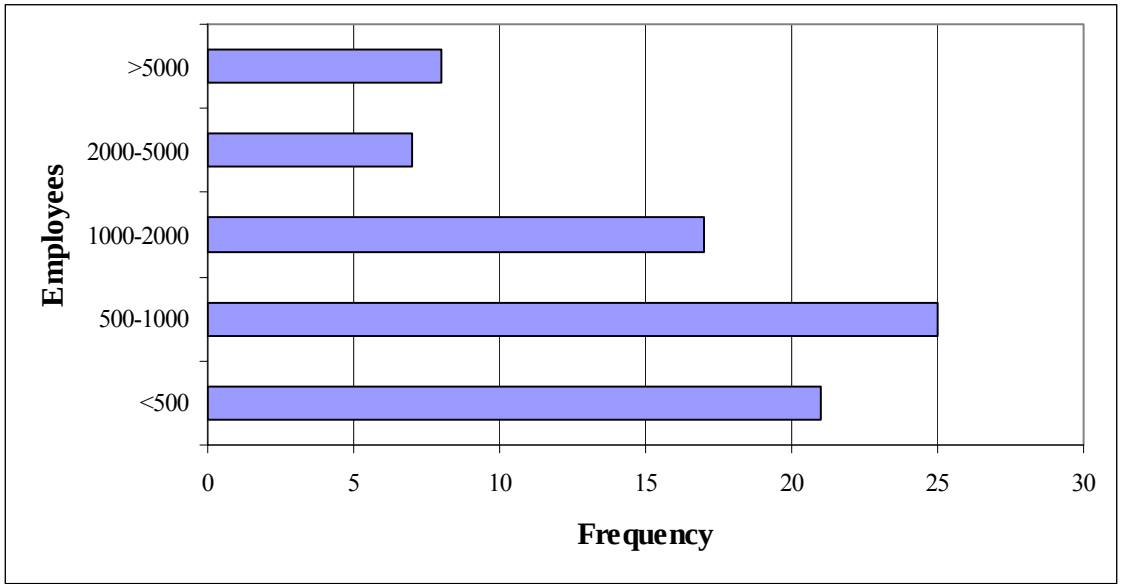
Table 8 and Figure 5 show respondent profiles in the sample. A majority of respondents was commercial, other and contracts managers/directors (about 77%). The rest were purchase, materials and logistics managers/directors. In almost all cases, all respondents were managers who provided essentially managerial perspectives.

Therefore, it seems that collected data were provided by respondents who were knowledgeable about the nature of the items asked in the questionnaire. Seeing the nature of the items in the questionnaire, it could be that receivers passed the questionnaires to those people who were probably involved in supplier selection and BPI areas.

Table 7: Number of Employees Profile in Year 2003

Employees	Frequency	Percent	Cumulative Percent
500-1000	25	32.06	32.06
<500	21	26.92	58.98
1000-2000	17	21.79	80.77
>5000	8	10.26	91.03
2000-5000	7	8.97	100

Figure 4: Number of Employees Profile in Year 2003



Thus, the individuals targeted by this survey had the knowledge and the qualifications to answer very specific questions. The participants also held high positions in the purchasing area. Manager/director of commercial, contracts, purchasing, materials and logistics were totally the most common titles mentioned. The high expertise level of the participants in the sourcing related functions was important to ensure thorough and

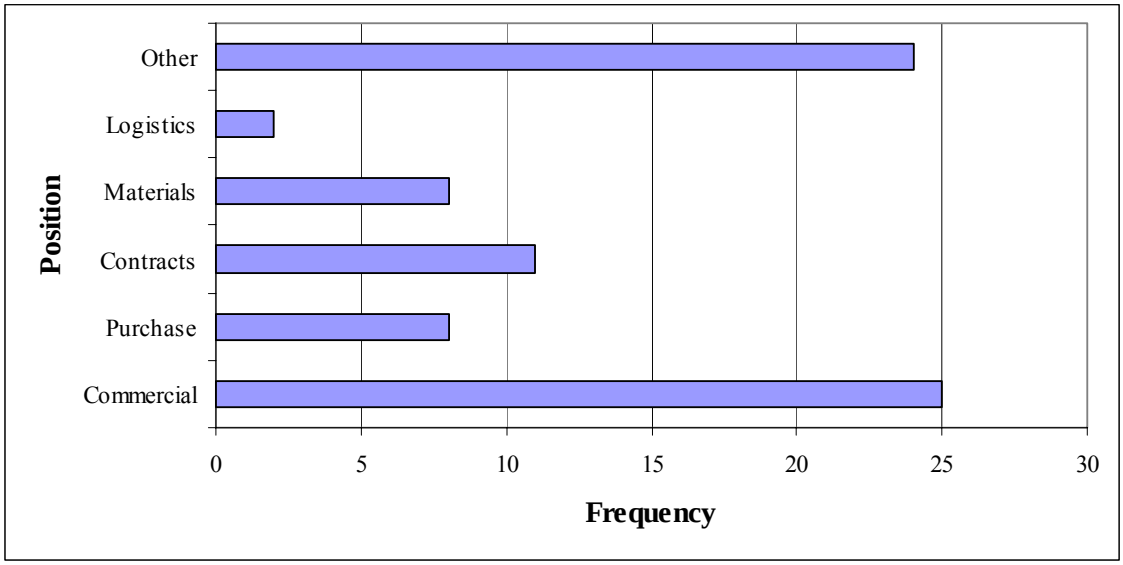
complete answers to the questions in the questionnaire. The job titles of participants do give some assurance that they have understood and known the issues raised in the questionnaire intimately.

Table 9 and Figure 6 outline the type of business processes outsourced by the firms surveyed. A majority of business processes in the sample was Deliver Products and Services processes and Market and Sell Products and Services processes (about 68%). The rest of the processes ranged from 1.28% to 8.97% of the sample. However, Develop Vision and Strategy processes were not outsourced by any company.

Table 8: Respondent Profile

Position	**Frequency**	**Percent**	**Cumulative Percent**
Commercial Manager/Director	25	32.05	32.05
Other: Managing Director, Management Representative, Quality/ Quality Assurance Manager, Scheduling Manager, Project Manager, Production Manager, Health and Safety Director, Systems Design Manager, Administration Manager, Controller, Owner	24	30.77	62.82
Contracts Manager/Director	11	14.10	76.92
Purchase Manager/Director	8	10.26	87.18
Materials Manager/Director	8	10.26	97.44
Logistics Manager/Director	2	2.56	100

Figure 5: Respondent Profile



Grouping the processes into Operating processes and Management and Support processes reveals that 79.48% of business processes outsourced are Operating and 20.52% of them are Management and Support processes.

The diversity of industries and processes is a positive sign, which facilitates the drawing of a good cross-sectional picture of the status of relationship between supplier selection and BPI.

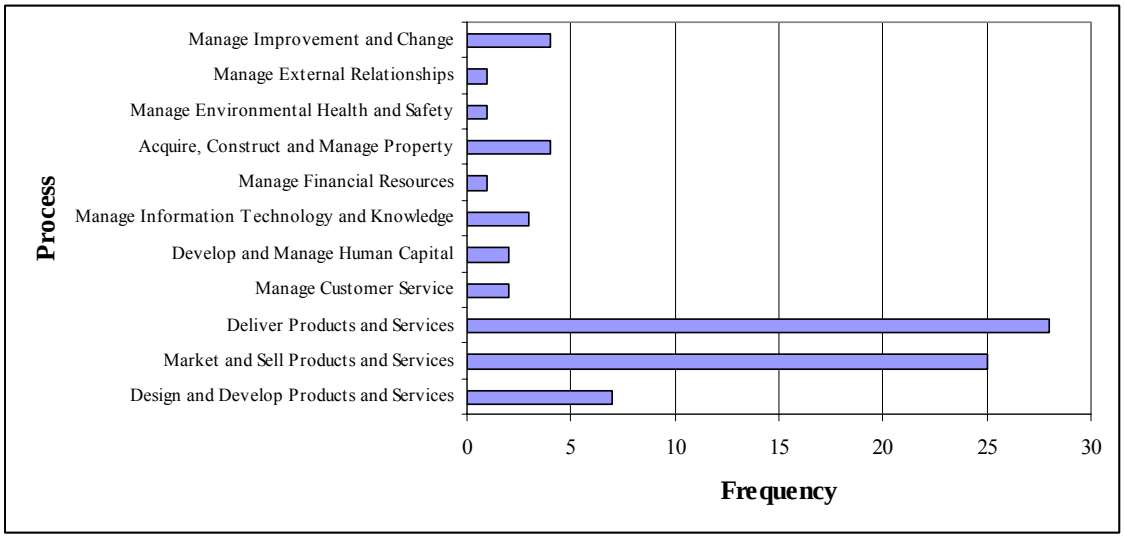
The assessment of non-response bias primarily necessitates check the normality in the underlying distributions of population and sample with regard to total sales and number of employees. In doing so, the one-sample Kolmogorov-Smirnov test was applied as a check of normality.

The one-sample Kolmogorov-Smirnov procedure is used to test the null hypothesis that a sample comes from a particular distribution. It does this by finding the largest difference (in absolute value) between two cumulative distribution functions (CDFs), one computed directly from the data and the other from mathematical theory.

Table 9: Business Process Profile

Process	Frequency	Percent	Cumulative Percent
Deliver Products and Services: Materials Providing, Hardware Procurement, Transport, Delivering, Outsourcing	28	35.90	35.90
Market and Sell Products and Services: Marketing and/or Selling	25	32.05	67.95
Design and Develop Products and Services: Garment Manufacturing (Orient), Products/Parts Design	7	8.97	76.92
Acquire, Construct and Manage Property: Maintenance, Calibration, Catering	4	5.13	82.05
Manage Improvement and Change: Upgrading, Metal Sheet Forming, Assembling	4	5.13	87.18
Manage Information Technology and Knowledge: Information Systems, Programming, Networking	3	3.86	91.04
Manage Customer Service: Servicing, Domestic Manufacturing of Parts	2	2.56	93.60
Develop and Manage Human Capital: Security Management, Medical Testing	2	2.56	96.16
Manage Financial Resources: Manage Financial Resources	1	1.28	97.44
Manage Environmental Health and Safety: Energy Systems Consulting and Auditing	1	1.28	98.72
Manage External Relationships: Publicity	1	1.28	100

Figure 6: Business Process Profile



The population and sample size figure into the test statistics shown in Table 10. The annual total sales and number of employees of population and sample firms in year 2003 averaged about £621887462, 4055, £489617692, 3937, respectively.

The Z test statistic is the product of the square root of the population or sample size and the largest absolute difference between the empirical and theoretical CDFs. Unlike much statistical testing, a significant result here is bad news. The probabilities of the Z statistics for all the four values are below 0.05, meaning that the Normal distribution with two parameters (the mean and standard deviation) is not a good fit for the amounts of total sales and number of employees in year 2003 in the population and sample of firms. Above table shows that neither population nor sample has normal distribution with regard to annual total sales and number of employees.

Because the normality in the underlying distributions of input variables as one of the assumptions of the T test is not met, investigator turned to apply nonparametric test to assess the non-response bias or the overall fit of the model to the data.

Table 10: Normality Test of Population and Sample Values

One-Sample Kolmogorov-Smirnov Test		**Population**		**Sample**	
		Total Sales	**Employees**	**Total Sales**	**Employees**
N		719	719	78	78
Normal Parameters (a,b)	Mean	621887461.75	4054.62	489617692.31	3937.21
	Std. Deviation	2239199335	16084.292	1634263100	16645.428
Most Extreme Differences	Absolute	.396	.407	.390	.413
	Positive	.357	.367	.347	.390
	Negative	-.396	-.407	-.390	-.413
Kolmogorov-Smirnov Z		10.627	10.901	3.447	3.646
Asymp. Sig. (2-tailed)		.000	.000	.000	.000

a Test distribution is Normal

b Calculated from data

Non-response bias was assessed using the comparison to known population values method. To test for non-response bias, two-sample Kolmogorov-Smirnov test was conducted to assess whether the sample frequencies were representative of the underlying population rates with regard to the firm size. The two-sample Kolmogorov-Smirnov test tests the null hypothesis that two samples have the same distribution. We used this test to determine whether the distribution of annual total sales and number of employees differs significantly between the population and sample of firms. The results are summarized in Table 11.

Table 11: Goodness of Fit Test

Two-Sample Kolmogorov-Smirnov Test		**Total Sales**	**Employees**
Most Extreme Differences	Absolute	.081	.102
	Positive	.054	.036
	Negative	-.081	-.102
Kolmogorov-Smirnov Z		.676	.858
Asymp. Sig. (2-tailed)		.751	.454

The Z test statistic is a function of the combined sample size and the largest absolute difference between the two CDFs. The probabilities of the Kolmogorov-Smirnov Z statistics fall well over 0.05. It means that the null hypothesis that the firms in the sample and the general population have the same distribution cannot be rejected at the 0.05 level. By that standard, the distributions of the population and sample are not significantly different from each other. The test results yielded no statistically significant differences suggesting that non-response bias did not significantly impact the study. Therefore, it appears that this sample is representative of the population, i.e. London (United Kingdom) large companies. This finding of no non-response bias from the characteristics comparison method supports the findings for the research model with respect to supplier selection and BPI factors.

The independent measures, as mentioned earlier, are a set of supplier attributes that are considered important during the selection phase of the decision process. Although previous research indicates that even though suppliers are evaluated on a variety of attributes, the key ones that dominate the selection process with regard to BPI have been included in this study. The dependent measures are also a set of BPI attributes so that

the respondents were asked the degree to which their supply chain partners contribute to these attributes. In the other words, some questions examined the extent to which these measures were used as part of the evaluation of BPI performance. Note that these are proxy measures of BPI performance and this approach has been employed elsewhere (e.g. Bhatt 2000). Although objective measures of BPI performance are preferable to perceived measures, they are difficult to obtain and empirical research has demonstrated the latter to be legitimate representatives of objective data. In the questionnaire there were included 24 supplier evaluation criteria that fall into five broad categories: (1) *Quality*, (2) *Service*, (3) *Organization*, (4) *Relationship* and (5) *Cycle Time* and 12 BPI evaluation criteria that fall into two broad categories: (1) *Improvement Initiative* and (2) *Customer Focus*. Descriptive statistics for each of the independent and dependent variables included in the study, divided into specific headings are presented in Table 12.

Table 12: Summary Statistics of Supplier Selection and BPI Criteria

Factor	**Criterion**	**Percent**					**Mean**	**Median**	**Std. Dev.**
		Not At All	**Very Low**	**Low**	**High**	**Very High**			
Quality	1	12.82	5.13	14.10	32.05	35.90	2.73	3.00	1.35
	2	8.97	6.41	15.38	33.33	35.90	2.81	3.00	1.25
	3	10.26	5.13	16.67	34.62	33.33	2.76	3.00	1.26
	4	6.41	8.97	16.67	32.05	35.90	2.82	3.00	1.20
	5	8.97	6.41	17.95	37.18	29.49	2.72	3.00	1.22
Service	1	3.85	5.13	15.38	56.41	19.23	2.82	3.00	0.94
	2	5.13	2.56	16.67	56.41	19.23	2.82	3.00	0.95
	3	5.13	0.00	19.23	56.41	19.23	2.85	3.00	0.91
	4	5.13	2.56	16.67	56.41	19.23	2.82	3.00	0.95

Organization	1	16.67	14.10	5.13	29.49	34.62	2.51	3.00	1.50
	2	12.82	7.69	25.64	24.36	29.49	2.50	3.00	1.34
	3	15.38	2.56	17.95	43.59	20.51	2.51	3.00	1.29
	4	15.38	6.41	33.33	28.21	16.67	2.24	2.00	1.26
	5	14.10	6.41	34.62	28.21	16.67	2.27	2.00	1.23
	6	12.82	3.85	34.62	33.33	15.38	2.35	2.00	1.18
Relationship	1	11.54	1.28	3.85	41.03	42.31	3.01	3.00	1.25
	2	10.26	3.85	12.82	52.56	20.51	2.69	3.00	1.15
	3	11.54	1.28	24.36	34.62	28.21	2.67	3.00	1.23
	4	15.38	2.56	5.13	41.03	35.90	2.79	3.00	1.37
	5	16.67	0.00	20.51	24.36	38.46	2.68	3.00	1.42
	6	7.69	2.56	20.51	39.74	29.49	2.81	3.00	1.13
	7	11.54	2.56	3.85	39.74	42.31	2.99	3.00	1.27
Cycle Time	1	53.85	15.38	17.95	3.85	8.97	0.99	0.00	1.30
	2	53.85	24.36	11.54	5.13	5.13	0.83	0.00	1.14
Improvement Initiative	1	5.13	5.13	7.69	47.44	34.62	3.01	3.00	1.05
	2	6.41	7.69	14.10	39.74	32.05	2.83	3.00	1.16
	3	2.56	5.13	30.77	39.74	21.79	2.73	3.00	0.95
	4	6.41	7.69	29.49	41.03	15.38	2.51	3.00	1.05
	5	5.13	5.13	12.82	62.82	14.10	2.76	3.00	0.94
	6	6.41	3.85	16.67	55.13	17.95	2.74	3.00	1.01
Customer Focus	1	20.51	14.10	26.92	32.05	6.41	1.90	2.00	1.24
	2	12.82	11.54	32.05	39.74	3.85	2.10	2.00	1.09
	3	12.82	17.95	19.23	32.05	17.95	2.24	2.50	1.30
	4	8.97	11.54	16.67	43.59	19.23	2.53	3.00	1.19
	5	8.97	8.97	20.51	44.87	16.67	2.51	3.00	1.15
	6	7.69	14.10	29.49	29.49	19.23	2.38	2.00	1.18

3.2. Validity

Validity in research is actually a hierarchy of procedures to ensure that what we conclude from a research study can be stated with some confidence (i.e. the conclusion is valid) (Mentzer & Flint 1997). In particular, the term validity is composed of four components, some of which has additional subcomponents: (1) internal validity, (2) external validity, (3) construct validity and (4) statistical conclusion validity.

Internal validity refers to whether the relationship between two phenomena is plausibly causal (Mentzer & Flint 1997). With cross-sectional designs of the kind used in most survey research, there is ambiguity about the direction of causal influence in that data concerning variables are simultaneously collected (Bryman & Bell 2003). Surveys in general including this investigation are strong in the fact that a great deal of respondents is reachable, the most part of validity can be testable and the result can be ready to replicate, but they suffer from internal validity (making the leap from correlation to causation), realism and control of background factors.

External validity is defined as the degree to which the research findings can be statistically generalized to the broader population. While steps taken within a single research study can improve external validity, external validity can only be achieved over a variety of research studies conducted within varying contexts. Therefore, no single study, like this research, can ensure external validity. Within any one study, we can only address statistical generalizability by not drawing any conclusions beyond the scope of the sample. As studies, conducted under varying conditions of time, place and persons, demonstrate empirical support for the theory, external validity is enhanced (Mentzer & Flint 1997).

Construct validity examines the degree to which a scale measures what it intends to measure. Construct validity is a complex concept composed of several forms of supporting validity. It addresses concerns at the entire study level as well as the detailed measurement level and embodies the process of theory development and testing (Mentzer & Flint 1997). From a measurement concern, the components of construct validity are nomological validity, face/content validity and trait validity issues.

Nomological validity is the degree to which the constructs fit within the logical network of the theory. In the other words, it is a measure of the theoretical correspondence between the theory and the constructs within the theory. Thus, there is no statistical test of nomological validity and its relevance transcends the use of surveys, interviews, case studies or computer models. It is a qualitative assessment of the tightness of the theory building (its logical consistency and its consistency with previous research and the real world) and the definition of the constructs. Failing to properly and singularly define terms and their relationship to one another within the theory development of a research study is a threat to nomological validity (Mentzer & Flint 1997). Since this study is primarily based on prior research by Mohammady Garfamy (2004) in which the theoretical correspondence between the theory and the constructs within the theory has been determined, nomological validity seems to be satisfactory.

Face/content validity refers to the theoretical linkage between the construct and its items and to the degree that the content of construct is captured and represented by items that cover the domain of meaning for the construct. Since there is no formal statistical test for face/content validity, the researcher's judgment and insight must be applied (Garver & Mentzer 1999). In a questionnaire it literally can be seen as an assessment of the degree to which the questions asked for the purpose of tapping a certain construct, on

the face of the questions, seems to ask about all aspects of the construct (Mentzer & Flint 1997).

Testing for face/content validity is mostly subjective, yet requires extensive knowledge and insight into the conceptual nature of the construct within a given context (i.e. theory). Determination of face/content validity is determined based on two criteria: (1) determine whether an instrument contains a representative collection of items and (2) determine whether a satisfactory method to test the instrument is used.

To meet the first criterion, the variables and measures used for this study were drown on themes identified in previous research. Through an extensive review of the past literature in the prior research by Mohammady Garfamy (2004), an elaborate list of the items for each of the variables was generated. It was also done based on the inputs and feedbacks obtained from a panel of academics and practitioners so that some of them assisted in the pilot testing of the survey instrument. To meet the second criterion, the questionnaire was pilot tested with two firms, one manufacturing and one service firm in Barcelona, to ensure that the instrument contains a representative collection of items. It resulted in minor modifications in wording and refinement of measures to produce the final version. Overall it appeared that respondents had no difficulty in understanding the items or the instructions provided to complete and return the questionnaire.

Trait validity consists of four issues that must be addressed in developing the construct validity. They are unidimensionality, reliability, convergent validity and discriminant validity, which need to be tested from a statistical perspective.

The instrument measured 7 independent and dependent constructs underlying the two domains of the model. As the associations of variables into sets have not been explicitly investigated, they were tentatively proposed in the form of research suppositions. In

order to understand the underlying dimensions of the constructs, items representing each construct were grouped together and these associations were analyzed using exploratory factor analysis with principal component analysis extraction method and varimax rotation method. This exploratory factor analysis permitted the identification of items with poor loadings on the respective factors (<0.50) and/or those loadings on multiple factors, that is, cross loading. Factor loading is the weighting, which reflects the correlation between the original variables and derived factors.

Table 13 shows two tests that indicate the suitability of the data related to supplier selection and BPI criteria for structure detection.

Table 13: KMO and Bartlett's Tests for Supplier Selection and BPI Criteria

Test		**Supplier Selection**	**BPI**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.907	.836
Bartlett's Test of Sphericity	Approx. Chi-Square	3024.535	719.115
	Df	231	66
	Sig.	.000	.000

The Kaiser-Meyer-Olkin measure of sampling adequacy is a statistic that indicates the proportion of variance in variables that might be caused by underlying factors. High values (close to 1.0) generally indicate that a factor analysis may be useful with the available data. Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that variables are unrelated and therefore

unsuitable for structure detection. Small values (less than 0.05) of the significance level indicate that a factor analysis may be useful with the available data.

Having determined that factor analysis maybe useful with the available data of supplier selection and BPI criteria, Tables 14 and 15 were constructed to get a feel for the associations among items with supplier selection and BPI factors, respectively. The rotated component matrices help us to determine what the components or factors represent.

The first component, *Quality*, is highly correlated with Durability to Reliability. The second, *Service*, corresponds most strongly to Reaction to Demand to After Sales Services. The third factor, *Organization*, is associated with Quality Performance to Innovativeness. The fourth factor, *Relationship*, is most correlated with EDI Capability to Availability. And the fifth factor, *Cycle Time*, corresponds most strongly to Delivery Lead Time and Development Speed. Because of the moderately large correlations of Durability and Ergonomic Quality with both *Quality* and *Relationship* factors, they bridge the *Quality* and *Relationship* factors.

In sum, all items exhibit sufficient loadings and no significant cross loadings so that were not noted for potential elimination. This suggests that we can use component or factor scores in further analyses. For each case and each component, the component score is computed by multiplying the case's original variable values by the component's score coefficients or factor loadings.

The resulting 5 component score variables are representative and can be used in place of the 24 original variables or criteria and the components are also not linearly correlated with each other.

Table 14: Supplier Selection Factor Analysis

Rotated Component Matrix(a)	**Component**				
Criterion	***Quality***	***Service***	***Organization***	***Relationship***	***Cycle Time***
Durability	.653	.203	.425	.522	.203
Ergonomic Quality	.677	.176	.404	.526	.176
Flexibility of Operation	.695	.229	.448	.471	.229
Simplicity of Operation	.693	.282	.466	.384	.282
Reliability	.644	.255	.480	.392	.255
Reaction to Demand	.142	.924	.189	.248	.142
Ability to Modify Product/Service	.149	.946	.199	.166	.149
Technical Support	.144	.963	.167	.119	.119
After Sales Services	.138	.941	.203	.157	.138
Quality Performance	.382	.212	.630	.317	.212
Current Technology	.134	-.020	.678	.500	.134
Geographical Location	.194	.255	.705	.353	.194
Production Facilities and Capacity	.338	.396	.706	.282	.282

Technological Capability	.334	.375	.723	.282	.282
Innovativeness	.367	.190	.683	.226	.190
EDI Capability	.203	.273	.430	.776	.273
Compatibility with Levels and Functions	.338	.187	.222	.742	.222
Customer Base	.362	.095	.464	.671	.095
Flexibility	.450	.182	.423	.624	.182
Ability to Identify Need	.284	.162	.367	.719	.162
Ability to Maintain Commercial Relations	.377	.460	.028	.609	.028
Availability	.202	.265	.416	.778	.202
Delivery Lead Time	.134	.095	.028	.119	.976
Development Speed	.138	-.020	.203	.157	.976

Extraction method: Principal component analysis

Rotation method: Varimax with Kaiser Normalization

a Rotation converged in 6 iterations

In Table 15, the first component, *Improvement Initiative*, is associated with Defect Prevention to New Process Introduction and the second factor, *Customer Focus*, is most correlated with Quality Improvement to Complaint Analysis. Because of the moderately

large correlations of Simplicity Redesign, New Process Introduction and Product/Service Improvement with both the first and second factors, they bridge the *Improvement Initiative* and *Customer Focus* factors.

In sum, all items have sufficient loadings and without significant cross loadings so that were not considered for potential elimination as well.

The resulting 2 component score variables are representative and can be used in place of the 12 original variables and the components are also not linearly correlated with each other.

The first step in trait validation process is to test constructs in the model for unidimensionality. Unidimensionality is the degree to which items load only on their respective constructs without having parallel correlational pattern(s). A unidimensional construct is one in which the set of items has only one underlying trait or concept in common (Gefen, Straub & Boudreau 2000). In factor analysis terms, unidimensionality means that the items reflecting a single factor have only that one shared underlying factor among them. Accordingly, there should be no significant correlational patterns among measures within a set of measures (presumed to be making up the same construct) except for the correlation associated with the construct itself. Unidimensionality testing can uncover such cases (Garver & Mentzer 1999; Gefen, Straub & Boudreau 2000). By this definition, as shown in Tables 14 and 15, all the constructs are unidimensional.

In the next step of trait validation process, for the items measuring each factor, the reliability analysis was performed. Reliability can be defined as how consistently the measures yield the same results through multiple applications (Mentzer & Flint 1997) or

the extent to which a variable or set of variables is consistent in what it is intended to measure (Gefen, Straub & Boudreau 2000).

Table 15: BPI Factor Analysis

Rotated Component Matrix(a)	**Component**	
Criterion	***Improvement Initiative***	***Customer Focus***
Defect Prevention	.728	.280
Problems' Root Causes Elimination	.808	.356
Standards Improvement	.795	.113
Improvement Evaluation	.885	-.006
Simplicity Redesign	.651	.588
New Process Introduction	.535	.510
Quality Improvement	-.119	.884
Product/Service Improvement	.520	.527
Product/Service Innovation	.148	.887
Reaction to Demand	.419	.696
Requirement Analysis	.478	.715
Complaint Analysis	.359	.736

Extraction method: Principal component analysis

Rotation method: Varimax with Kaiser Normalization

a Rotation converged in 3 iterations

Scale reliability thus refers to the internal consistency of a scale to measure a construct and reliable scales possess items that measure the same unidimensional construct and vary together statistically. A reliable questionnaire is one in which the results remain stable. In general, this reliability increases with an increase in the number of questions. Reliability analysis provides a measure of the ability of a survey instrument to produce consistent results from one administration to the next or the degree to which measures are free from random error. The intent is to measure how consistently the questions in the questionnaire actually measure something. The most common measure of reliability used in survey based business research is internal consistency and its most common measurement statistic is called Cronbach's alpha. More specifically, alpha is a lower bound for the true reliability of the survey. Mathematically, reliability is defined as the proportion of the variability in the responses to the survey that is the result of differences in the respondents. That is, answers to a reliable survey will differ because respondents have different opinions, not because the survey is confusing or has multiple interpretations. The computation of Cronbach's alpha is based on the number of items on the survey and the ratio of the average inter-item covariance to the average item variance. Under the assumption that the item variances are all equal, this ratio simplifies to the average inter-item correlation and the result is known as the standardized item alpha (or Spearman-Brown stepped-up reliability coefficient). Table 16 shows the reliability and scale statistics of the research model's constructs.

The coefficient of Cronbach's alpha reported for each factor is an estimate of the true alpha, which in turn is a lower bound for the true reliability. As is shown in Table 16, all these measures have reliabilities well above the generally accepted benchmark level of 0.70 and greater than the minimum recommended (0.60) for newly developed scales

(Nunnally 1988). Taken together, these findings suggest that the scale items used to measure the model's constructs are reliable.

Table 16: Reliability and Scale Statistics

Factor	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	**Mean**	**Std. Dev.**
Quality	.980	.980	13.83	6.040
Service	.994	.994	11.31	3.715
Organization	.922	.924	14.38	6.636
Relationship	.948	.949	19.64	7.744
Cycle Time	.945	.949	1.82	2.389
Improvement Initiative	.889	.890	16.62	4.992
Customer Focus	.893	.893	13.71	5.842

In the third step of trait validation process, convergent validity relates to the extent to which items correlate strongly with other items used to measure the same construct, i.e. they should converge on a common statistical factor. In the other words, convergent validity is the extent to which the construct correlates to items designed to measure that same construct. This is the reason that in survey research it is important to conduct a convergence test (such as factor analysis) on any constructs that have multiple question measures. If all the questions that should be related to the construct according to the theory converge on the same factor, we have some evidence of convergent validity (Mentzer & Flint 1997). Ideally, convergent validity is tested by determining whether

the items in a scale converge or load together on a single construct in the measurement model. To assess convergent validity, the researcher should also assess the magnitude, direction and statistical significance of the estimated parameters between constructs and their items (Garver & Mentzer 1999).

It can be seen from Tables 14 and 15 that there is a high degree of convergence within each factor with factor loadings within a factor, which are most exceeding 0.60. These tables show that average correlation between the scale and scale items is substantially higher than between the scale and non-scale items, thus supporting convergent validity.

In the final step of trait validation process, discriminant validity, conversely to convergent validity, is the extent to which the items representing a construct discriminate that construct from other items representing other construct, i.e. measures of different constructs should load on separate factors and be unique from each other. In a clean factor analysis, all the questions related to a given construct will load on one factor and all the questions of a separate construct will load on a different factor (Mentzer & Flint 1997). For discriminant validity, we need to verify that scales developed to measure different constructs are indeed measuring different constructs.

It can also be seen from Tables 14 and 15 that there is a high degree of divergence across factors as indicated by the lack of high cross-loading of items on more than one factor. These results provide evidence of discriminant validity with all of the measures demonstrating high consistency with their respective dimensions and low scores on alternate dimensions.

Statistical conclusion validity refers to whether there is a statistical relationship between two phenomena (Mentzer & Flint 1997). A related subject to this kind of validity is predictive validity, which estimates whether or not the construct of interest predicts or

covaries with constructs that it is supposed to predict or covary (Garver & Mentzer 1999). Predictive validity can be achieved by correlating constructs to other constructs that they should predict. Thus, the correlations between two constructs should be substantial in magnitude and statistically significant (Garver & Mentzer 1999). Having determined that the construct of interest for one phenomenon predicts or covaries with another constructs for another phenomenon, statistical conclusion validity can be achieved. The substantive analyses in the next section reveal that both the predictive validity and statistical conclusion validity were achieved.

3.3. Substantive Analyses

Having demonstrated that our measures possess adequate validity, we then proceed to test the relative importance of criteria using mean analyses as well as the substantive hypotheses using linear regression modeling.

3.3.1. Mean Analyses

The supplier selection literature asserts that it is imperative to understand the relative importance of the choice criteria. It is also interesting to find the relative importance of the BPI criteria. We used paired-samples T test to determine whether there is a statistically significant difference between each two criteria of the related factor. The paired-samples T test procedure is used to test the hypothesis of no difference between two variables. Tables 17 and 18 outline the results of tests for supplier selection and BPI criteria with 77 degree of freedom and a 0.05 level of significance, respectively.

Table 17: Paired-samples T Test for Supplier Selection Criteria

Pair	Paired Differences			t	Sig. (2-tailed)
	Mean	Std. Dev.	Std. Error Mean		
Durability-Ergonomic Quality	-.077	.529	.060	-1.285	.203
Durability-Flexibility of Operation	-.026	.455	.052	-.498	.620
Durability-Simplicity of Operation	-.090	.628	.071	-1.262	.211
Durability-Reliability	.013	.730	.083	.155	.877
Ergonomic Quality-Flexibility of Operation	.051	.318	.036	1.423	.159
Ergonomic Quality-Simplicity of Operation	-.013	.570	.065	-.199	.843
Ergonomic Quality-Reliability	.090	.628	.071	1.262	.211
Flexibility of Operation-Simplicity of Operation	-.064	.437	.049	-1.297	.199
Flexibility of Operation-Reliability	.038	.545	.062	.623	.535
Simplicity of Operation-Reliability	.103	.472	.053	1.918	.059
Reaction to Demand-Ability to Modify Product/Service	.000	.161	.018	.000	1.000
Reaction to Demand-Technical Support	-.026	.226	.026	-1.000	.320
Reaction to Demand-After Sales Services	.000	.279	.032	.000	1.000
Ability to Modify Product/Service-Technical Support	-.026	.159	.018	-1.423	.159

Ability to Modify Product/Service-After Sales Services	.000	.228	.026	.000	1.000
Technical Support-After Sales Services	.026	.159	.018	1.423	.159
Quality Performance-Current Technology	.013	1.363	.154	.083	.934
Quality Performance-Geographical Location	.000	1.140	.129	.000	1.000
Quality Performance-Production Facilities and Capacity	.269	1.124	.127	2.115	.038
Quality Performance-Technological Capability	.244	1.107	.125	1.943	.056
Quality Performance-Innovativeness	.167	1.133	.128	1.299	.198
Current Technology-Geographical Location	-.013	1.168	.132	-.097	.923
Current Technology-Production Facilities and Capacity	.256	1.156	.131	1.959	.054
Current Technology-Technological Capability	.231	1.139	.129	1.790	.077
Current Technology-Innovativeness	.154	1.129	.128	1.203	.232
Geographical Location-Production Facilities and Capacity	.269	1.015	.115	2.342	.022
Geographical Location-Technological Capability	.244	.983	.111	2.189	.032
Geographical Location-Innovativeness	.167	.999	.113	1.474	.145
Production Facilities and Capacity-	-.026	.159	.018	-1.423	.159

Technological Capability					
Production Facilities and Capacity-Innovativeness	-.103	1.014	.115	-.893	.374
Technological Capability-Innovativeness	-.077	.977	.111	-.695	.489
EDI Capability-Compatibility	.321	.814	.092	3.479	.001
EDI Capability-Customer Base	.346	.850	.096	3.596	.001
EDI Capability-Flexibility	.218	.907	.103	2.123	.037
EDI Capability-Ability to Identify Need	.333	.963	.109	3.059	.003
EDI Capability-Ability to Maintain Commercial Relations	.205	1.061	.120	1.707	.092
EDI Capability-Availability	.026	.159	.018	1.423	.159
Compatibility-Customer Base	.026	.852	.097	.266	.791
Compatibility-Flexibility	-.103	1.001	.113	-.905	.368
Compatibility-Ability to Identify Need	.013	1.063	.120	.107	.915
Compatibility-Ability to Maintain Commercial Relations	-.115	1.032	.117	-.988	.326
Compatibility-Availability	-.295	.839	.095	-3.104	.003
Customer Base-Flexibility	-.128	.903	.102	-1.255	.213
Customer Base-Ability to Identify Need	-.013	.890	.101	-.127	.899
Customer Base-Ability to Maintain Commercial Relations	-.141	1.016	.115	-1.226	.224
Customer Base-Availability	-.321	.875	.099	-3.234	.002
Flexibility-Ability to Identify Need	.115	.993	.112	1.026	.308

Flexibility-Ability to Maintain Commercial Relations	-.013	1.013	.115	-.112	.911
Flexibility-Availability	-.192	.898	.102	-1.891	.062
Ability to Identify Need-Ability to Maintain Commercial Relations	-.128	1.132	.128	-1.000	.320
Ability to Identify Need-Availability	-.308	.984	.111	-2.761	.007
Ability to Maintain Commercial Relations-Availability	-.179	1.078	.122	-1.470	.146
Delivery Lead Time-Development Speed	.154	.560	.063	2.426	.018

The mean column in the paired-samples T test table displays the average difference between two criteria. The std. dev. column displays the standard deviation of the average difference score. The std. error mean column provides an index of the variability one can expect in repeated random samples of 78 responses similar to the ones in this study. The t statistic is obtained by dividing the mean difference by its standard error and the sig. (2-tailed) column displays the probability of obtaining a t statistic whose absolute value is equal to or greater than the obtained t statistic. When the significance value for each pair is less than 0.05, we can conclude that the average difference is not due to chance variation and can be attributed to some reason. For example, the mean difference of Durability and Ergonomic Quality (-.077) is due to chance variation and, therefore, there is not any difference between these criteria.

Based on the means for each of the selection and BPI criteria shown in Table 12 and the mean difference for each pair of criteria shown in Tables 17 and 18, the relative

importance of various attributes of supplier selection and BPI is represented in Tables 19 and 20, respectively.

Table 18: Paired-samples T Test for BPI Criteria

Pair	Paired Differences			t	Sig. (2-tailed)
	Mean	Std. Dev.	Std. Error Mean		
Defect Prevention-Problems' Root Causes Elimination	.179	.752	.085	2.109	.038
Defect Prevention-Standards Improvement	.282	1.005	.114	2.478	.015
Defect Prevention-Improvement Evaluation	.500	1.003	.114	4.402	.000
Defect Prevention-Simplicity Redesign	.244	.983	.111	2.189	.032
Defect Prevention-New Process Introduction	.256	1.189	.135	1.904	.061
Problems' Root Causes Elimination-Standards Improvement	.103	1.014	.115	.893	.374
Problems' Root Causes Elimination-Improvement Evaluation	.321	.960	.109	2.948	.004
Problems' Root Causes Elimination-Simplicity Redesign	.064	.811	.092	.698	.487
Problems' Root Causes Elimination-New	.077	1.066	.121	.637	.526

Process Introduction					
Standards Improvement-Improvement Evaluation	.218	.832	.094	2.314	.023
Standards Improvement-Simplicity Redesign	-.038	.918	.104	-.370	.712
Standards Improvement-New Process Introduction	-.026	.993	.112	-.228	.820
Improvement Evaluation-Simplicity Redesign	-.256	.932	.106	-2.430	.017
Improvement Evaluation-New Process Introduction	-.244	1.095	.124	-1.964	.053
Simplicity Redesign-New Process Introduction	.013	.712	.081	.159	.874
Quality Improvement-Product/Service Improvement	-.192	1.207	.137	-1.408	.163
Quality Improvement-Product/Service Innovation	-.346	.923	.105	-3.311	.001
Quality Improvement-Reaction to Demand	-.628	1.270	.144	-4.368	.000
Quality Improvement-Requirement Analysis	-.603	1.262	.143	-4.216	.000
Quality Improvement-Complaint Analysis	-.474	1.181	.134	-3.546	.001
Product/Service Improvement-	-.154	1.070	.121	-1.270	.208

Product/Service Innovation					
Product/Service Improvement-Reaction to Demand	-.436	1.158	.131	-3.326	.001
Product/Service Improvement-Requirement Analysis	-.410	1.050	.119	-3.451	.001
Product/Service Improvement-Complaint Analysis	-.282	1.268	.144	-1.965	.053
Product/Service Innovation-Reaction to Demand	-.282	1.150	.130	-2.166	.033
Product/Service Innovation-Requirement Analysis	-.256	.959	.109	-2.360	.021
Product/Service Innovation-Complaint Analysis	-.128	1.085	.123	-1.043	.300
Reaction to Demand-Requirement Analysis	.026	.911	.103	.248	.804
Reaction to Demand-Complaint Analysis	.154	1.058	.120	1.285	.203
Requirement Analysis-Complaint Analysis	.128	.858	.097	1.319	.191

Overall mean scores for each of the selection and BPI factors are also ranked in Tables 19 and 20. With regard to supplier selection factors, *Relationship*, *Organization*, *Quality*, *Service* and *Cycle Time*, in the evaluation of suppliers, have rank first to fifth, respectively. Within *Quality* factor and *Service* factor, firms in their evaluation of suppliers surprisingly ranked all the criteria equally first in the order of importance.

Table 19: Relative Importance of Supplier Selection Criteria

Factor	**Factor Mean**	**Factor Rank**	**Criterion**	**Criterion Mean**	**Rank within each Factor**
Quality	13.83	3	Durability	2.73	1
			Ergonomic Quality	2.81	1
			Flexibility of Operation	2.76	1
			Simplicity of Operation	2.82	1
			Reliability	2.72	1
Service	11.31	4	Reaction to Demand	2.82	1
			Ability to Modify Product/Service	2.82	1
			Technical Support	2.85	1
			After Sales Services	2.82	1
Organization	14.38	2	Quality Performance	2.51	1
			Current Technology	2.50	1
			Geographical Location	2.51	1
			Production Facilities and Capacity	2.24	2
			Technological Capability	2.27	2
			Innovativeness	2.35	2
Relationship	19.64	1	EDI Capability	3.01	1

			Compatibility with Levels and Functions	2.69	2
			Customer Base	2.67	2
			Flexibility	2.79	2
			Ability to Identify Need	2.68	2
			Ability to Maintain Commercial Relations	2.81	2
			Availability	2.99	1
Cycle Time	1.82	5	Delivery Lead Time	0.99	1
			Development Speed	0.83	2

Within *Organization* factor, Quality Performance, Current Technology and Geographical Location rank first and Production Facilities and Capacity, Technological Capability and Innovativeness rank second, respectively. In *Relationship*, EDI Capability and Availability rank first and Compatibility with Levels and Functions of Buyer Firm, Customer Base, Flexibility, Ability to Identify Need and Ability to Maintain Commercial Relations rank second. Finally, in *Cycle Time*, Delivery Lead Time and Development Speed rank first and second, respectively. *Cycle Time* factor and its criteria have lower mean values as compared to other factors and their criteria. This indicates that the level of *Cycle Time* is not as high as the level of other dimensions. The supplier selection criteria have mean values between 0.83 and 3.01, which indicates that all these variables are very important in supplier selection. Among them, EDI Capability mean value is the highest, 3.01, which shows that most of the firms have

consistence opinion in EDI Capability measure compared to the other selection variables in the questionnaire.

Table 20: Relative Importance of BPI Criteria

Factor	**Factor Mean**	**Factor Rank**	**Criterion**	**Criterion Mean**	**Rank within each Factor**
Improvement Initiative	16.62	1	Defect Prevention	3.01	1
			Problems' Root Causes Elimination	2.83	2
			Standards Improvement	2.73	2
			Improvement Evaluation	2.51	3
			Simplicity Redesign	2.76	2
			New Process Introduction	2.74	2
Customer Focus	13.71	2	Quality Improvement	1.90	1
			Product/Service Improvement	2.10	1
			Product/Service Innovation	2.24	1
			Reaction to Demand	2.53	2
			Requirement Analysis	2.51	2
			Complaint Analysis	2.38	2

Concerning BPI factors, *Improvement Initiative* and *Customer Focus*, in the evaluation of BPI, have rank first and second, respectively. Within *Improvement Initiative* factor,

firms in their evaluation of achieved BPI ranked Defect Prevention first, Problems' Root Causes Elimination, Standards Improvement, Simplicity Redesign and New Process Introduction second and Improvement Evaluation third in the order of importance. Within *Customer Focus* factor, Quality Improvement, Product/Service Improvement and Product/Service Innovation rank first and Reaction to Demand, Requirement Analysis and Complaint Analysis rank second, respectively. *Customer Focus* factor and its criteria have lower mean values as compared to *Improvement Initiative* factor and it criteria. This indicates that firms view all the variables as important elements of the constructs, however, *Improvement Initiative* has received more emphasis than *Customer Focus*. The BPI criteria have mean values between 1.90 and 3.01, which indicates that all these variables are very important in BPI performance. Among them, Defect Prevention mean value is the highest, 3.01, which shows that most of the firms have consistence opinion in Defect Prevention measure compared to the other improvement variables in the survey.

It can be seen that the means for most criteria are well above the mid point '2' of the anchors, which indicates that the firms studied view all the criteria as important elements of the factors related to supplier selection and BPI domains.

3.3.2. Test of Hypotheses

Following our theoretical discussion, the hypotheses in this study were framed in light of the ability of each supplier choice factor to assist the buying organizations to gain improvement in their business processes outsourced. In this section we analyze the assumed relationship among a set of dependent and independent constructs underlying

the theory. The linear regression modeling was used mainly to confirm the theory by testing hypotheses 1a through 5b. The regression analysis results for each BPI factor as dependent variable are shown in Tables 21 and 22, respectively.

Table 21: Regression Analyses for *Improvement Initiative*

Independent Factor	**Dependent Factor: Improvement Initiative**								
	R^2	**Std. Err.**	**ANOVA**				**Coefficient**			
			Model	**Sum of Squares**	**F**	**Sig.**	**Predictor**	**B**	**t**	**Sig.**
Quality	.075	.968	Reg.	5.751	6.134	.015	Constant	.000	.000	1.000
			Res.	71.249			Factor	.273	2.477	.015
Service	.063	.974	Reg.	4.830	5.086	.027	Constant	.000	.000	1.000
			Res.	72.170			Factor	.250	2.255	.027
Organization	.208	.896	Reg.	15.986	19.912	.000	Constant	.000	.000	1.000
			Res.	61.014			Factor	.456	4.462	.000
Relationship	.262	.864	Reg.	20.209	27.044	.000	Constant	.000	.000	1.000
			Res.	56.791			Factor	.512	5.200	.000
Cycle Time	.381	.792	Reg.	29.308	46.704	.000	Constant	.000	.000	1.000
			Res.	47.692			Factor	-.617	-6.834	.000

In these tables, R^2, the coefficient of determination, is the squared value of the multiple correlation coefficient (the linear correlation between the observed and model-predicted values of the dependent variable). It shows the percentage of variation in dependent variable explained by the model when multiplied by 100. The std. err. indicates the standard error of estimate in the linear regression model. The ANOVA column tests the acceptability of the model from a statistical perspective. The reg. and res. rows display information about the variation accounted (regression) and not accounted (residual) for

by the model. Less than 0.05 significance value of the F statistic means that the variation explained by the model is not due to chance.

The coefficient column shows the unstandardized coefficients of the regression line and associated test statistics. Each unstandardized regression coefficient represents the amount of change in the dependent variable for each one unit change in the variable predicting it. The t values with less than 0.05 significance value indicate that the regression lines that are posited to be significant are significant and those that were not expected to be significant, are, indeed, not significant.

Table 22: Regression Analyses for *Customer Focus*

Independent Factor	**Dependent Factor: Customer Focus**								
	R^2	**Std. Err.**	**ANOVA**				**Coefficient**			
			Model	**Sum of Squares**	**F**	**Sig.**	**Predictor**	**B**	**t**	**Sig.**
Quality	.050	.981	Reg.	3.862	4.013	.049	Constant	.000	.000	1.000
			Res.	73.138			Factor	.224	2.003	.049
Service	.054	.979	Reg.	4.135	4.313	.041	Constant	.000	.000	1.000
			Res.	72.865			Factor	.232	2.077	.041
Organization	.062	.975	Reg.	4.767	5.016	.028	Constant	.000	.000	1.000
			Res.	72.233			Factor	.249	2.240	.028
Relationship	.059	.976	Reg.	4.541	4.763	.032	Constant	.000	.000	1.000
			Res.	72.459			Factor	.243	2.183	.032
Cycle Time	.161	.922	Reg.	12.425	14.624	.000	Constant	.000	.000	1.000
			Res.	64.575			Factor	-.402	-3.824	.000

The regression analysis results show that supplier selection based on *Quality* contributes significantly (F=6.134; p=0.015) and predict 7.5 percent variation in *Improvement Initiative*. Detail results show that there is significant positive relationship between

Quality and *Improvement Initiative* (t=2.477; p=0.015). Consistent with hypothesis 1a, at 5 percent significance level, supplier selection based on *Quality* has significant positive impact on *Improvement Initiative*. On the other hand, hypothesis 1b hypothesizing that *Quality* is positively related to *Customer Focus*, is statistically supported (t=2.003; p=0.049). In prediction of *Customer Focus*, *Quality* contributes to 5 percent of its variation (F=4.013; p=0.049).

With regard to the hypotheses 2a and 2b, as expected, higher levels of *Service* have a significant positive relationship with higher levels of *Improvement Initiative* (t=2.255; p=0.027) and *Customer Focus* (t=2.077; p=0.041).

Noteworthy features of conceptual model include the positive relationship between *Organization* and *Improvement Initiative*, as illustrated by the statistically significant unstandardized regression coefficients (t=4.462; p=0.000). As one would expect, the relationship between *Organization* and *Improvement Initiative* is strong as well, supporting hypothesis 3a. In a similar way, hypothesis 3b hypothesizing that *Organization* is positively related to *Customer Focus*, is statistically supported (t=2.240; p=0.028).

Consistent with our theoretical expectations concerning hypotheses 4a and 4b, higher levels of *Relationship* have a significant positive relationship with higher levels of *Improvement Initiative* (t=5.200; p=0.000) and *Customer Focus* (t=2.183; p=0.032).

Cycle Time is negatively associated with *Improvement Initiative* as hypothesized and the relationship is statistically significant (t=-6.834; p=0.000). Therefore, hypothesis 5a is supported. On the other hand, specific hypothesis 5b stating that *Cycle Time* is negatively related to *Customer Focus*, is also statistically supported (t=-3.824; p=0.000).

Again, the linear regression analyses generated statistics that infer that the hypothesized relationships are supported by the data. As a whole, the regression does a good job of modeling BPI. The t values were all significant for every line from independent factor of supplier selection to dependent factor of BPI, thus supporting predictive validity. The models have ability to predict the actual data and capture the impact of supplier selection factors on BPI factors. A minimalist interpretation is that statistical conclusion validity is in favor of the research model and that the data does not disconfirm the theory. Overall, our results are consistent with the notion that supplier selection fosters BPI. It is important to note that even though these models fit the data well and provide a theoretically consistent set of findings, there may be other equivalent models that fit the data equally well. There may also be non-equivalent alternative models that fit the data better than these models. Researchers can strive to test and rule out likely alternative models whenever possible.

Chapter 4:

Discussion and

Conclusions

4.1. Discussion of Findings

Relying on theoretical proposition that suppliers can contribute to buyer's BPI, as the preferred analytic strategy in this study, yielded priority to analyze the relationships between supplier selection and BPI factors.

In evaluating a source, organizations ideally consider a variety of criteria and the supplier selection process then involves an explicit or implicit ranking of these various criteria. It can also be extended to BPI to consider a variety of criteria and the BPI program evaluation then will involve the ranking of these criteria to assess the outcomes.

The research results specifically indicate that *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* are very important selection factors and confirm previous researches, which support the importance of these factors in the evaluation and selection of suppliers. However, supplier selection is highly firm and situation-specific and the organizations probably use a set of criteria they know and feel are relevant to the situation. The criteria for supplier selection factors used by this study are less comprehensive than the full list, which could be generated from the literature, but it has been shown that all of them, taken together, have significant relationships with BPI factors and their criteria.

Relationship, *Organization* and *Quality* have been clearly identified as the most important factors for the evaluation and selection of suppliers from the outsourcing perspective. The study also supports the relative importance of other factors such as *Service* and *Cycle Time* and exhibits their relations to BPI factors. However, a greater discrepancy existed for the supplier selection criteria within each factor. While the prior

research by Mohammady Garfamy (2004) demonstrated that greater attention should be given to *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* of suppliers, in the order of importance, than on reducing the cost, this research shows that greater attention should be given to *Relationship*, *Organization*, *Quality*, *Service* and *Cycle Time* of suppliers. Here the relative importance of some factors, viewed from the purchasing perspective has been changed.

On the other hand, *Improvement Initiative* and *Customer Focus* have obviously been identified as the first and second BPI factors in the order of importance respectively, but discrepancy existed between the criteria of each factor. It shows the perceptions of buying organizations that by outsourcing their business processes, they have more *Improvement Initiative* than *Customer Focus* achievements.

In the regression analyses, hypotheses 1a through 5b are significant and in the posited directions. Regression coefficients show that the data support the proposed model, but they do not indicate that the selected model is necessarily parsimonious or the best model among a set of theoretically feasible models.

Hypothesis 1a, which states that the level of *Improvement Initiative* would be a positive function of the level of *Quality*, was supported. It is feasible because it has been demonstrated that employing the selection factor of *Quality* fosters improved incoming component quality, which in turn results in enhanced performance of buyers in terms of prevented defects, eliminated root causes of problems, improved standards, evaluated improvements and simplified and new introduced processes.

Considering *Quality* factor, the durability of products/services against any destruction made by suppliers may cause the products/services perform or compete over a long period for the buying firm. The ergonomic qualities of products/services offered by

suppliers may improve the behavior of buyer's staffs through increasing the fitness of products/services for use. The operation flexibility of products/services delivered by suppliers also presents the needed flexibility in operations to the buying firm. The operation simplicity of those products/services may also encourage the staffs of buying firm to use them easily and the reliability of products/services provided by suppliers is required for correct operations in the buying firm as well. These criteria are very important in showing the poor quality of buyer's final products/services or its processing steps and may influence the capacity of buying firm for defect prevention, root causes elimination of problems, performance and quality standard improvement and improvement evaluation as well as simplicity redesign and hence, introduction of new processes.

On the other hand, hypothesis 1b hypothesizing that *Quality* is positively related to *Customer Focus* was statistically supported. It is also feasible because it has been shown that considering the selection factor of *Quality* strengthens improved incoming products/services quality, which in turn improves the quality of buyer's products/services or improves the products/services themselves, enhances the products/services innovation, adds to the ability of buying firm to react to customers' demands and facilitates the customers' requirements and complaints analyses.

In short, *Quality* factor and its criteria (Durability, Ergonomic Quality, Flexibility of Operation, Simplicity of Operation and Reliability) have relations to and impacts on BPI factors (*Improvement Initiative* and *Customer Focus*) and their criteria. This is not surprising, given the growing awareness of the importance of quality in supplier selection. Therefore, it is important to consider and select the supplier based on quality

especially when the manufacturing activities are high volume in nature to avoid any supplier quality problem in the input supply, which might affect output quality.

With regard to hypothesis 2a, as expected, higher levels of *Service* have a significant positive relationship with higher levels of *Improvement Initiative*. It is possible because utilizing this factor has been shown to lead to enhanced performance of buying firms in terms of process *Improvement Initiative* and its criteria.

Regarding *Service* factor, the suppliers' reaction to demands of buying firm for providing required products/services, the suppliers' ability to modify the products/services in the appropriate way based on the needed specifications of buying firm to satisfy its needs, the suppliers' technical support for enhancing the ability of buying firm to find the solutions to the problems, compare alternatives and assess the shortcomings of decisions and finally the better after sales services provided to buying firm by suppliers are very important and contribute to the prevention of defects, elimination of root causes of problems, improvement of performance and quality standards and evaluation of improvement in the processes of the buying firm, which may eventually lead to increase in the ability of buying firm to simplify its existing processes and introduce new ones.

On the other hand, hypothesis 2b stating that *Service* is positively related to *Customer Focus* was statistically supported as well. It is also possible because utilizing this factor has been revealed to lead to enhanced focus of buying firm upon its customers, which in turn improves the quality of its products/services or the products/services themselves, increases its ability to innovate sometimes new products/services, react to customers' demands by meeting their specific requirements and conditions through the enhanced

mutual awareness of both parties before and after sales and analyze the customers' requirements and complaints.

In short, *Service* factor and its criteria (Reaction to Demand, Ability to Modify Product/Service, Technical Support and After Sales Services) have relations to and impacts on BPI factors (*Improvement Initiative* and *Customer Focus*) and their criteria. With rapid technological advances, today's purchased products/services have become more sophisticated. Furthermore, suppliers are more likely to assume greater responsibility for outsourced design, engineering service, prototype development and research and development. Therefore, the supplier's ability to provide the necessary technical assistance and service must be factored into the supplier selection decision (Min 1994).

Since any purchase involves some degree of service, when considering services, a firm needs to clearly define its expectations because there are few uniform established service standards to draw upon. To provide a consistently high quality product or service, promote successful development efforts and ensure future improvements, a firm needs competent technical support from its suppliers. This is particularly important when the firm supply and technology strategy includes development of a new product or technology or access to proprietary technology into the global marketplace. Therefore, some form of global customer service may be required to support project implementation and day-to-day operations (Kahraman, Cebeci & Ulukan 2003).

In a similar way, hypothesis 3a hypothesizing that *Organization* is positively related to *Improvement Initiative* is statistically supported. Selecting suppliers based on their organizational capabilities promotes the level of buyer performance in initiating process improvement and its criteria.

Concerning *Organization* profile factor, the quality performance of suppliers to deliver an acceptable level of quality, the suppliers' current technology to fulfill their commitments to the buying firm as a client, the geographical location and proximity of suppliers to the buyer due to the decreased communication and transportation deferment, the production facilities and capacity of suppliers and their technological capabilities and finally the level of innovativeness of suppliers due to the direct correspondence between the level of innovativeness of suppliers and the level of innovativeness of buyers are perceived by buying firms that playing a significant role in promoting their ability to prevent defects, eliminate root causes of problems, improve quality and performance standards and evaluate the achieved improvements, which may lead to simplify their processes and introduce new processes.

On the other hand, *Organization* is positively associated with *Customer Focus* as hypothesized and the relationship is statistically significant. Selecting suppliers based on their organizational capabilities increases the level of buyer's focus upon its customers in terms of *Customer Focus* factor and its criteria. It may help the level enhancement of the quality and variety of outgoing products/services delivered to ultimate customers, innovativeness of the buying firm to innovate new products/services, reaction to customers' demands appropriately as well as customers' requirements and complaints analyses through necessary corrective actions to satisfy customers.

In short, *Organization* profile factor and its criteria (Quality Performance, Current Technology, Geographical Location, Production Facilities and Capacity, Technological Capability and Innovativeness) have relations to and impacts on BPI factors (*Improvement Initiative* and *Customer Focus*) and their criteria.

In connection to hypothesis 1a, it is noteworthy that the supplier's quality systems and processes that maintain and improve quality and delivery performance are the key factors. Selection criteria may consider the supplier's quality assurance and control procedures, complaint handling procedures, quality manuals, ISO 9000 standard registration status and reporting systems. As a customer, the buying firm may especially want to examine the supplier's programs or processes for assessing and addressing customer needs (Kahraman, Cebeci & Ulukan 2003). Accordingly, the buyer should investigate whether or not potential suppliers are certified for strict quality assurance and have a strong commitment for preventing quality failures (Min 1994). If the product or service is yet to be developed, the firm's supplier criteria need to examine whether the supplier has the basic management, technical and quality support necessary to develop the product or service. Thus, the supplier's resources need to be adequate to support product or service development, production and delivery. In addition, technical criteria may motivate a firm to move into the global marketplace (Kahraman, Cebeci & Ulukan 2003). A firm's sourcing strategy may recognize definite advantages or disadvantages associated with choosing suppliers in a particular region or country. The firm's risk assessment should have identified potential risks, such as currency fluctuations, shifts in political policy and the accompanying domestic or international regulatory and market changes that result. When considering international suppliers, a firm needs to carefully examine the industrial infrastructure that supports the supplier. With international suppliers, a firm also needs to establish appropriate mechanisms to handle financial transactions and product deliveries as well as any related legal and regulatory matters.

Consistent with our theoretical expectations concerning hypothesis 4a, higher levels of *Relationship* have a significant positive relationship with higher levels of *Improvement Initiative*. It is viable because using this factor strengthens the buyers' ability in terms of *Improvement Initiative* factor and its criteria.

Considering *Relationship* factor, the suppliers' EDI capability, the compatibility across levels and functions of the buying firm and supplying firms to facilitate the required collaboration, the suppliers' customer base as one of the main benchmarking source for buying firm to survey what the suppliers offer to other buyers, the supplier flexibility in payment, freight, price reduction, order frequency and amount, the suppliers' ability to identify the needs of buying firm and its customers, the suppliers' ability to maintain commercial relations with it as well as their availability as needed may contribute to buyer's defect prevention, root causes elimination of problems, performance and quality standard improvement and improvement evaluation as well as simplicity redesign and hence, introduction of new processes.

On the other hand, hypothesis 4b stating that *Relationship* is positively related to *Customer Focus* was statistically supported as well. It is also viable because using this factor enhances the buyers' ability in terms of *Customer Focus* factor and its criteria. It may help improve quality and variety of outgoing products/services delivered to ultimate customers, innovativeness of buying firm to innovate new products/services, reaction to customers' demands appropriately as well as customers' requirements and complaints analyses through establishing a stable communication channel required for meeting the customers' expectations and accomplish necessary corrective actions.

In short, *Relationship* factor and its criteria (EDI Capability, Compatibility with Levels and Functions, Customer Base, Flexibility, Need Identification Ability, Ability to

Maintain Commercial Relations and Availability) have relations to and impacts on BPI factors (*Improvement Initiative* and *Customer Focus*) and their criteria.

The development of products and services usually requires a strong R&D base, higher-order learning and experimentation with new ideas and prototypes. These capabilities are developed over time and considered to be path dependent (Powell 1995). A firm's capability in developing innovative products or services may also be directly influenced by the quality of relationship the firm has with its suppliers and customers. By exploiting external links between its suppliers and customers, a firm can exploit complementary knowledge that offers the advantages of streamlining its internal processes and meeting customer demands in products and services. That is one of the reasons that many firms, which develop long-term ties with their suppliers, gain advantages in process improvement and customer intimacy (Mukhopadhyay, Kekre & Kalathur 1995).

The sharing of information between supply chain partners has become increasingly important as companies focus on their core competencies. In this environment, a greater reliance on suppliers and partners becomes inevitable. In many firms, EDI systems have become major information technology (IT) platforms on which they are initiating and implementing business improvement initiatives. IT is now taking significant roles in business processes by creating new needs, causing new product development and commanding new procedures in improving customer relations (Chan 2000). The EDI capability of suppliers has been considered as major enablers to fundamentally change the way many organizations conduct their businesses. EDI is also considered to reduce product development cycle time and costs by improving the accuracy, timeliness and speed of standard document exchange (Mukhopadhyay, Kekre & Kalathur 1995).

Therefore, Information technology is a key enabler of the new sourcing paradigm, particularly in terms of sustaining the inherent advantages of strategic sourcing. On the other hand, customer responsiveness, a derivative of sales and marketing, requires first-order-learning and process flexibility, which can be influenced through EDI systems, as a number of recent studies has shown the positive effect of EDI systems on the first-order-learning (Hammond 1993). EDI systems enable sales and marketing people to handle customer orders, billing and invoicing much more easily and allows them to respond to customer queries efficiently. This framework indicates that IT can also be an initiator, a facilitator and an enabler in a business process paradigm.

To form a good supplier relationship, companies need to have compatible approaches to management, especially for integrated and strategic relationships. The firm should have confidence in its supplier's management's ability to run the company as well. It is also important that the supplier's management be committed to managing its supply base because the supplier's levels of quality, service and cost are directly affected by its suppliers' ability to meet its own needs (Kahraman, Cebeci & Ulukan 2003).

Hypothesis 5a asserting that *Cycle Time* is negatively associated with *Improvement Initiative* was supported and the relationship is statistically significant. It is considerable because selecting suppliers based on this factor to present shorter *Cycle Time* increases the buyers' ability in terms of *Improvement Initiative* factor and its criteria.

Regarding *Cycle Time* factor, the delivery lead time and development speed of suppliers in providing the products/services demanded by buying firm may impact significantly on the buying firm to initiate improvement to promote its processes in an appropriate timeframe.

And finally, hypothesis 5b asserting that *Cycle Time* is inversely related to *Customer Focus* was also statistically supported. Shorter *Cycle Time* helps the buying firm quickens and speeds up the quality and product/service improvement programs timing, products/services innovation achievement as well as reaction to demands of ultimate customers and their requirements and complaints analyses by furthering its ability to act more rapidly. In fact, the shorter the response time to solving problems and providing integral support by suppliers, the better the offer of required products/services to customers by the buying firm.

In short, *Cycle Time* factor and its criteria (Delivery Lead Time and Development Speed) have relations to and impacts on BPI factors (*Improvement Initiative* and *Customer Focus*) and their criteria.

As the product life cycles dramatically decrease, increasing strategic emphasis is being placed on bringing many new products to market as quickly as possible since it provides companies a real competitive advantage. In choosing the most appropriate supplier, the buyer should assess the length of the supply chain as well as the strength of the supplier's commitment for on-time delivery services (Min 1994). To achieve a wider range of products and be able to deliver fast enough to the market are crucial nowadays as the competition is so intense. Only firm with advanced technology as its competitive edge can overcome stiff competition by introducing wide range of products to meet the different market segments and able to deliver quickly to the hands of customer before any of its competitors can do so. By selecting supplier with shorter *Cycle Time*, the buying firm can leverage on its competency to introduce more products and enjoy the first mover advantages.

In summary, all the supplier selection factors including *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* and their criteria have relations to and impacts on BPI factors including *Improvement Initiative* and *Customer Focus* and their criteria. Additionally, *Relationship* and *Cycle Time* have more relations to *Improvement Initiative* and *Organization* and *Cycle Time* have more impacts on *Customer Focus* than other supplier selection factors.

Based on our discussion above, the results demonstrated the relationships between supplier selection practices and BPI practices. The findings appear to confirm the influence that the supplier selection criteria can have on the BPI criteria through a calculative way. The results also provide support for the contention that supplier selection approach facilitates the initiation of improvement and creation of a clear customer focus. The research findings imply that buyers, who concentrate on *Improvement Initiative* and *Customer Focus*, can select suppliers based on *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time*. The focus on all these supplier selection factors supports the trend toward an increasing emphasis on BPI through BPO for the firms. Thus, suppliers should be chosen and retained based heavily on their capabilities to support BPI for the buying organization. These constructs may provide an avenue where BPI implementation becomes a challenge rather than a barrier.

4.2. Conclusions and Implications

While prior research provides considerable evidence for the existence of relationship between supplier selection and BPI, it provides little insight into the level of the relationship. This study filled this void in the literature by organizing a theoretical

schema of constructs and testing the resulting framework to yield important insights. The present study has clarified the link between the level of supplier selection and the level of BPI by highlighting the important role of supplier evaluation and selection in improving the firm's processes. This study has sought to explain this relationship by reviewing the relevant literature and comparing this with the realities experienced in different organizations.

Supplier selection criteria were developed to measure the important aspects of supplier's business including *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* and BPI criteria were developed as well to measure the important aspects of buyer's business including *Improvement Initiative* and *Customer Focus*. The criteria for supplier selection factors used by this study are less comprehensive than the full list, which could be generated from the literature, but it has been shown that all of them, taken together, have significant relationships with BPI factors and their criteria. In summary, the results indicate that *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* are very important selection factors and confirm previous researches, which support the importance of these factors in the evaluation and selection of suppliers. However, supplier selection is highly contextual and the organizations probably use a set of criteria and factors they know and feel are relevant to the situation. Whether they are using the most effective criteria and factors for their situation remains to be seen.

Furthermore, *Relationship*, *Organization* and *Quality* have been clearly identified as the most important factors for the evaluation and selection of suppliers from the outsourcing perspective. The study also supports the relative importance of other factors such as *Service* and *Cycle Time* and exhibits their relations to BPI factors. On the other hand, *Improvement Initiative* and *Customer Focus* have obviously been identified as the

first and second BPI factors in the order of importance, respectively. The results of the study show that higher levels of *Quality*, *Service*, *Organization* and *Relationship* as well as lower levels of *Cycle Time* pertinent to the suppliers significantly contribute to the buyers' process *Improvement Initiative* and *Customer Focus*.

This research demonstrates that greater attention should be given to *Quality*, *Service*, *Organization*, *Relationship* and *Cycle Time* of suppliers than on reducing the cost. The focus on all these supplier selection factors supports the trend toward an increasing emphasis on BPI through BPO for the firms. Thus, suppliers should be chosen and retained based heavily on their capabilities to support BPI for the buyers.

The results show how and why BPI through BPO only achieved when the organizations were able to select suppliers based on the related factors to BPI and not just based on the traditional factors such as cost and price. The results vary by case or firm's process, confirming that any theory that links buyer behaviors to BPI will need to consider a firm's process. It is also found that the use of the most important factors and their related criteria varies by process.

Notwithstanding research limitations, the findings presented in this study make several distinctive contributions to the normative literature by pointing to the important association between supplier selection and BPI.

One of the most important contributions of this study is the construction of a survey instrument to measure the supplier selection and BPI constructs. Conceptualizing and operationalizing these measures provide better guidance to understand the relationships between them. Through exploratory factor analysis and linear regression modeling, we demonstrated that supplier selection and BPI are separate yet related constructs. Thus, it

is imperative in research to incorporate this distinction with respect to assessing the relationship between these two topics.

Although previous research has supported the association between criteria and factors of supplier selection and BPI, this research is the first to provide empirical support for a model that explains the nature of the relationships among these highly researched constructs. Hence, the study made important contribution in providing important insights on the relationship between supplier selection and BPI by representing a theoretical model, which was supported by empirical results. The proposed model demonstrated significant associations among all of the hypothesized constructs. Owing to the cross-sectional design of the study and the complexity of the interrelationships among the proposed constructs, a cause-effect relationship should not be inferred from the findings. However, this is an important first step to understanding how supplier selection factors impact BPI factors. Even though the cross-sectional design restricts conclusions about the causality, the study clearly supports the critical role that suppliers and their attributes play in the buyers' BPI.

The study has also provided further extension to the research work in the area of BPO by developing a model incorporating the effects of supplier selection role on BPI. More importantly, the study has improved our understanding of the significant role of supplier selection in the firm performance. Such understanding has provided some insight into the process of how and why BPO really works. This has some important implications for the design of an effective supplier selection and BPI systems through BPO.

The results of the study have significant theoretical and managerial implications for both the academic and management communities.

Theoretically, the conceptual research model, which was largely supported by the results of analyses, clarifies the link and bolsters the argument that supplier selection plays a critical role in fostering BPI. For researchers, this model provides an integrated conceptual framework to study the buying organization. As indicated in the literature review, multiple disciplines have contributed to the current state of knowledge on the various dimensions of buying organization, yet not too much cross-fertilization exists among the disciplines. This proposed model was an endeavor to draw the knowledge base of buying organization together and provide an initial test of a more comprehensive model. An interdisciplinary approach to the study of BPO can result in the leaps of knowledge that are necessary to move this field of study forward and keep pace with the constantly changing conditions of work in the supply chain.

The study also provides an avenue to explore the strategic decision in supplier selection with respect to different types of BPI program. Different types of BPI program require different drivers in supplier selection. There is no one single formula that applies to all situations. For example, the findings reveals that the buyer who is focusing on *Improvement Initiative* needs to emphasize more on *Relationship* and *Cycle Time* and organizations that focus on *Customer Focus* may need to emphasize more on *Organization* and *Cycle Time* in supplier selection. Successful implementation of BPI programs in any organization is directly related to understanding the advantages of the identification of problems in the supplier management process. Adequate programs in supplier selection process in addition to adequate control methods related to inventory levels, quality, machining, assembly and finishing activities can help in the development of improvement programs (Gonzalez, Quesada & Monge 2004). Policies, procedures and actions that an organization takes to improve efficiency and

effectiveness of its processes are magnified through the suppliers and reflected in their customers' satisfaction. Hence, any efforts to impact organizational efficiency and effectiveness must include strategies targeted toward suppliers to facilitate the understanding of their attributes.

In addition to the theoretical implications, the findings from this study have some important managerial implications for both sides of the buyer–seller dyad.

To business managers, the study offers several guidelines in understanding the role of supplier selection in BPI. First, management cannot ensure the success of BPI unless management is directly and visibly committed to provide resources and supports for the program. BPI will only advance in companies that are prepared to invest in improvement with the right vision to set appropriate supply strategies and the ability to implement them both internally and with suppliers by evaluating and selecting those suppliers appropriately. The technique requires that buyers must decide on a pre-emptive priority order of their goals, i.e. they must first specify the goals for selected criteria and set priorities for the attainment of these goals. It results in the need for organizations to re-examine their objectives in outsourcing planning. For managers, the findings indicate that organizational action is central to creating or maintaining a BPI program. Policies and procedures reflective of the organization's values and beliefs serve as the foundation for organizational change. The proposed research model can provide a foundation for intervention as well, helping organizations identify problem areas and providing a framework for tackling the issues.

Second, firms should not view or evaluate their supplier or BPI practices independently. Instead, a systems approach should be used, wherein firms recognize for instance, that inbound quality, service and cycle time all impact the firm's outgoing products and

customer services. Knowing how suppliers' capabilities relate to the firm's strategic capabilities could provide an effective advantage to businesses. Increasing information and coordination capabilities with suppliers tends to increase those same capabilities with customers as well. Managers should be cognizant that increasing a firm's external relationship capabilities in one area has a synergistic impact on yet other external capabilities.

Specifically, managers wanting to improve market share, competitiveness, product quality and customer service should begin a process of internal assessment whereby their firm's immediate supplier and customer relationship capabilities are assessed and potentially modified. Following this, firms should consider identifying highly capable supply chain partners, creating better inter-firm cooperation and integration capabilities through information sharing and exchange, reducing response times throughout the supply chain and sharing future strategic plans and requirements. These relationships between supplier and customer strategies, supply chain management strategy and firm performance may well be the key to sustained competitive advantage.

Third, this study attempted to increase the understanding of supply chain management, in order to provide useful insights to managers seeking to improve firm performance. Managers can use this information to effectively create a general supply chain management strategy that will lead to improved firm performance. This is particularly important as competition and customer requirements increase, forcing firms to continually evaluate and improve their capabilities. Business managers that are dissatisfied with suppliers' performance should ensure that their firm is doing its part to facilitate supplier performance improvements. The results of this study suggest that buying firms may be able to raise suppliers' performance significantly by expecting

more from suppliers, communicating those expectations and actively participating in the effort. In this connection, the benefits associated with having a formal supplier selection system in place to identify and continually measure supplier performance are five-fold:

(1) These diagnostics offer buyers a tangible means by which to evaluate suppliers. In light of the heterogeneous capabilities of suppliers, the buying organization can objectively assess each supplier interface and detect when corrective action may be necessary.

(2) The information can be used to derive baseline levels of acceptable supplier operational performance across all product/service categories. Being cognizant of these baseline levels for each critical metric can potentially escalate operational performance across the entire supplier portfolio.

(3) The information captured can be used to identify preferred suppliers. Given that preferred suppliers have graduated to that status through their exemplary efforts, more future business can be allocated to them. The implication is that less time and costs will be required to screen and develop new exchange partners.

(4) Tracking these metrics can provide the information necessary to prune underperforming suppliers from the supplier base. Given that firms are trying to reduce the breadth of their supplier portfolio in an attempt to increase quality and reduce costs, operational metrics provide the means to accomplishing that end.

(5) The firms are interested in being perceived as fair exchange partners or good customers by their suppliers. Promoting clearly stated metrics and basing volume allocation decisions on objective measures of operational performance rather than arbitrarily set standards can yield favorable reputation effects.

In sum, the aforementioned benefits should provide business customers enough of an impetus to track the critical metrics so that quality, time and cost improvements can be realized through world-class outsourcing practices.

This research also has implications for the seller side of the dyad. For one, by understanding the criteria that are being used by their customers, it is possible, in fact, necessary to make sure that a supplier has a properly designed marketing strategy. The organizational procurement literature has established that suppliers should not only match their task-related performance with the levels desired by the customer, but also be cognizant of the criteria having the greatest influence on the buyer decision making. Truly understanding the acceptable levels of operational performance along each task-related performance metric will provide the supplier the necessary insight to improve performance along the most desirable attributes, thereby providing the basis for gaining a competitive advantage over other suppliers. Furthermore, it will prevent overprovision of unwanted goods and services. In terms of a general strategy, the information provided clearly shows that the importance placed on particular factors tends to be much higher for factors such as *Relationship*, *Organization* and *Quality* than on other factors like *Service* and *Cycle Time*. Therefore, suppliers should utilize their resources to assure high levels of satisfaction with the factors receiving the highest importance ratings. Each buyer will undoubtedly have its own specific nuances that must be considered when incorporating these findings into its specific strategy. By identifying supplier selection criteria that are different for business customers who prefer single source and those who prefer multiple sources, marketers may develop alternative strategies for directing efforts to each segment. Thus, marketers should also have the

ability to adopt their presentations to customers according to whether the customer has a preference for BPI.

Second, this research reinforces that an enterprise-wide effort is required to create and deliver value for business customers. Indeed, personnel from all departments must attend to critical activities and processes from the time the order is initiated through post sales assistance. In this tandem, Customer Relationship Management is a term that has entered the popular lexicon, whose central tenet is being information intensive about present and potential customers. This research offers insight into the task-related performance analytics that can be used to better understand customer requirements and in turn, customize the value proposition so that more future business, and perhaps even preferred supplier status, can be achieved.

In this investigation, we have attempted to be provocative, challenge the conventional wisdom and offer a roadmap for those who strive to engage in more effective sourcing and supplier management as well as business process management.

4.3. Directions for Future Research

The research findings, however, naturally lead to future study opportunities and point to several areas that are worthy for future research. As this study covers a broad area of research, there are many directions in which future research is needed. The following identifies eight future research areas related to supplier selection and BPI.

First, from a research perspective, the conceptual research model test in this study was conducted at the divisional level as the level of analysis. However, the underlying conceptual premises of the model could suggest the need to examine the model at the

organizational level. Future research needs to examine the model constructs across multiple organizations in the supply chain.

Second, the survey research methodology allows for the examination of statistical associations at one point in time and the statements about the direction of relationships can only be made in terms of consistency of results with the effects proposed in the theoretical discussion. Therefore, considerable work is remained a head in establishing cause-effect relationships among the proposed constructs of the conceptual research model. Future research can employ different research methods to systematically investigate the theoretical causal relationships proposed in this study.

Third, additional testing and model refinement are an important next step to provide the confidence necessary for extended organizational application. Research that designs its quantitative and qualitative samples to be heterogeneous, representing different sectors, cultures, approaches and management configurations, should enable the emergence of more research findings and facilitates comparative kinds of studies. Also replicating the current study in other industries in other nations is highly suggested. Such future research should include larger sample size to verify the findings and to increase the external validity and the generalizability of the findings.

Fourth, as BPI is a long-term program of change, especially when embraced as a strategic improvement effort, it is more likely that a longitudinal type of research will be most suitable for studying such a phenomenon. Hence, a fruitful avenue for future research is conducting a longitudinal field study of the use and performance consequences of supplier selection practice in organizations that have incorporated suppliers into their strategic BPI efforts. To capture any changes in the performance standards applied to supplier selection and BPI, it would be necessary to repeat the

study at appropriate intervals. In this tandem, it would be informative and worthwhile to conduct an annual tracking study of the status of supplier selection and BPI, attitudes and issues surrounding them. This approach allows for more data to be collected and enables more complete assessment to be made and more rigorous evidence to emerge. Future research into the dynamic (multiple-period) treatment of supplier selection regarding BPI would also contribute greatly to the knowledge base in this area.

Fifth, the conceptual research model should also be tested in various settings with other organizational outcomes of interest. In fact, the model needs to be tested using financial variables as a measure of organizational effectiveness. Demonstrating a relationship between the supplier selection dimensions and the financial success of the organization in process improvement would provide a strong argument to business for investing in BPO.

Sixth, the other fruitful line of research can be to examine the nature of BPI implementation and examine the role of supplier selection in the success of BPI implementation. Examining variations and differences in supplier management and of the roles of supplier selection in BPI implementation can be a major contribution of the future research studies. Further research is also needed to understand the extent of integration between supply chain management and business process management (McAdam & McCormack 2001).

Seventh, like all cross-sectional tests, it is impossible to control for all potential confounding factors. There is a suspicion that supplier management strategies could have some moderating effect on the relationship between supplier selection strategies and BPI performance. Future research in this area should explore the moderators' effects.

Lastly, one of the shortcomings of this research effort is that it looked at only one side of the buyer-supplier dyad, i.e. buying firm respondents' perceptions. A dyadic study of buying firms and their suppliers would provide balance and insight into how suppliers perceive supplier selection and BPI.

Finally, we must end where this report started by concerning ourselves with above future research opportunities.

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Appendices

Appendix 1: Sampling Frame

Item	Company Name	Total Sales (GBP)	Number of Employees
1	3COM EUROPE LTD	224,547,000	648
2	3COM U.K. HOLDINGS LTD	224,556,000	713
3	A J T TRADING LTD	53,331,000	1,109
4	AAH (UK) LTD	119,397,000	863
5	ABN AMRO MANAGEMENT SERVICES LTD	823,455,000	3,007
6	ABN AMRO UK SERVICES LTD	128,894,000	650
7	ACCENTURE HR SERVICES INTERNATIONAL LTD	69,512,000	1,240
8	ACCENTURE HR SERVICES LTD	97,604,000	1,095
9	ACCENTURE SERVICES LTD	468,473,000	6,664
10	ACE INA SERVICES U.K. LTD	71,917,000	698
11	ACROW PLC	163,056,000	5,487
12	AFI HOTELS LTD	38,384,000	719
13	AHL EUROPE LTD	148,180,000	18,711
14	AIB ASSET MANAGEMENT HOLDINGS LTD	993,867,000	292
15	AIG EUROPE (UK) LTD	376,672,000	858
16	AIR EUROPE LTD	224,370,000	1,947
17	ALBERT FISHER GROUP PLC	710,300,000	4,678
18	ALEXANDER FORBES GROUP SERVICES	90,139,000	991

	LTD		
19	ALEXANDER FORBES HOLDINGS LTD	192,724,000	2,065
20	ALEXANDER FORBES INTERNATIONAL LTD	191,042,000	2,112
21	ALLENBUILD LTD	172,860,000	511
22	ALLIED PARTNERSHIP GROUP PLC	104,230,000	1,567
23	AMALGAMATED METAL CORPORATION PLC	432,103,000	1,604
24	AMCOR FLEXIBLES UK LTD	198,554,000	1,416
25	AMDOCS (UK) LTD	633,667,000	3,026
26	AMLIN PLC	684,700,000	585
27	AMVESCAP PLC	1,158,070,000	7,069
28	ANGLISS INTERNATIONAL LTD	372,011,000	701
29	AON LTD	751,882,000	9,304
30	AON RISK SERVICES UK LTD	177,761,000	3,238
31	AON WARRANTY GROUP EUROPE LTD	884,900,000	9,648
32	APPOLD & CO. (SERVICE) LTD	60,657,000	624
33	APRICOT COMPUTERS LTD	82,491,000	578
34	ASHANTI GOLDFIELDS COMPANY LTD	257,728,000	9,504
35	ASHBOURNE LTD	114,180,000	6,163
36	ASHURST BUSINESS SERVICES	61,763,000	1,187
37	ASSOCIATED BRITISH PORTS	336,200,000	2,110
38	ASSOCIATED BRITISH PORTS HOLDINGS	401,300,000	3,336

	PLC		
39	ASTRA HOLDINGS PLC	86,846,000	1,895
40	AUTOLIFTS & ENGINEERING COMPANY LTD	73,600,000	951
41	AUTOMOTIVE GROUP LTD	73,353,000	293
42	AVENANCE PLC	157,390,000	5,959
43	AVIVA EMPLOYMENT SERVICES LTD	884,049,000	32,132
44	AVIVA PLC	28,041,000,000	60,740
45	AXA PPP HEALTHCARE GROUP PLC	58,071,000	1,872
46	AXA PPP HEALTHCARE LTD	700,600,000	1,738
47	AXA SERVICES LTD	306,335,000	5,124
48	AXA SUN LIFE SERVICES PLC	259,864,000	3,466
49	AXA TECHNOLOGY SERVICES UK LTD	127,533,000	452
50	BABCOCK PREBON PLC	107,580,000	1,384
51	BAMBERS STORES PLC	37,068,000	2,191
52	BANK JULIUS BAER & CO LTD	501,033,000	1,475
53	BANK OF NOVA SCOTIA	9,217,095,000	46,804
54	BANKERS TRUST HOLDINGS (U.K.) LTD	78,394,000	482
55	BARCLAYS BANK PLC	18,867,000,000	74,400
56	BARCLAYS BANK TRUST COMPANY LTD	101,114,000	463
57	BARCLAYS CAPITAL SERVICES LTD	1,244,406,000	3,191
58	BARCLAYS FINANCIAL PLANNING LTD	42,116,000	659
59	BARCLAYS FUNDS LTD	979,300,000	379

60	BARCLAYS GLOBAL INVESTORS SERVICES LTD	107,861,000	686
61	BARCLAYS INSURANCE SERVICES COMPANY LTD	35,614,000	288
62	BARCLAYS PLC	18,867,000,000	74,608
63	BARCLAYS PRIVATE BANKING SERVICES LTD	34,443,000	670
64	BARING ASSET MANAGEMENT LTD	51,259,000	274
65	BARINGS PLC	222,604,000	3,087
66	BARKER,ROGERS,SOUGHALL & CO. LTD	33,883,000	377
67	BARKERS GROUP LTD	107,638,000	382
68	BAXTER LIVINGSTON LTD	36,441,000	333
69	BAYLIS (GLOUCESTER) LTD	50,914,000	260
70	BEKHOR HOLDINGS LTD	38,065,000	359
71	BELDEN UK LTD	47,414,000	325
72	BELL GROUP (UK) HOLDINGS LTD	43,387,000	257
73	BELLING & CO. LTD	40,119,000	1,391
74	BELLS STORES LTD	53,322,000	801
75	BENFIELD HOLDINGS LTD	300,468,000	1,683
76	BENFIELD LTD	156,574,000	761
77	BERKERTEX HOLDINGS LTD	41,903,000	1,226
78	BESTWOOD PLC	34,851,000	393
79	BFI GROUP OF COMPANIES LTD	39,026,000	499

80	BGP (UK) LTD	152,180,000	1,526
81	BIRSE GROUP PLC	483,312,000	1,344
82	BISHOPSCOURT (BB & CO.) LTD	400,961,000	2,126
83	BLAC LTD	456,017,000	352
84	BLACK & VEATCH (UK) LTD	74,044,000	441
85	BLACK HORSE LTD	598,674,000	2,237
86	BLAGDEN PLC	138,049,000	880
87	BLYTH HOMESCENTS INTERNATIONAL UK LTD	46,964,000	803
88	BMS ASSOCIATES LTD	35,482,000	286
89	BNB RESOURCES PLC	123,691,000	504
90	BNP PARIBAS FUND SERVICES UK LTD	61,246,000	796
91	BOMBARDIER AEROSPACE EUROPE LTD	454,966,000	6,881
92	BOWDEN FREIGHT INTERNATIONAL LTD	34,452,000	390
93	BOX CLEVER TECHNOLOGY LTD	421,921,000	5,456
94	BREDERO PRICE COATERS LTD	50,897,000	425
95	BREWIN DOLPHIN HOLDINGS PLC	101,045,000	1,231
96	BREWIN DOLPHIN SECURITIES LTD	92,936,000	1,231
97	BRIDON INTERNATIONAL LTD	87,531,000	859
98	BRIT INSURANCE HOLDINGS PLC	671,436,000	667
99	BRIT SYNDICATES LTD	41,806,000	253
100	BRITISH GAS ENERGY CENTRES LTD	180,953,000	1,707
101	BRITISH ISLAND AIRWAYS PLC	52,559,000	394

102	BRITISH POLYTHENE INDUSTRIES PLC	350,700,000	3,173
103	BRITISH POLYTHENE LTD	276,600,000	2,364
104	BRITISH ROPES LTD	137,455,000	2,898
105	BRITISH TELECOMMUNICATIONS PLC	18,519,000,000	103,100
106	BROOKTON LTD	47,160,000	1,195
107	BROOMCO (1984) LTD	188,441,000	434
108	BROTHER HOLDING (EUROPE) LTD	532,058,000	1,246
109	BROWNASH LTD	165,694,000	786
110	BRUSH ELECTRICAL MACHINES LTD	88,713,000	860
111	BT FLEET LTD	135,912,000	711
112	BT LTD	151,886,000	410
113	BTI (UK) PLC	42,812,000	391
114	BUCKLEY INVESTMENTS LTD	42,401,000	653
115	BULLOUGH LTD	82,704,000	1,126
116	BUSINESS OBJECTS (U.K.) LTD	44,163,000	302
117	C H INDUSTRIALS PLC	215,556,000	4,083
118	CABRA ESTATES PLC	54,302,000	289
119	CAMEL HOLDINGS LTD	43,816,000	1,153
120	CANTOR FITZGERALD INTERNATIONAL	73,008,000	465
121	CANUTE HAULAGE GROUP LTD	52,743,000	835
122	CAPPER-NEILL PLC	85,390,000	2,693
123	CARMELITE CAPITAL LTD	328,900,000	2,877
124	CARPENTER (UK) LTD	48,974,000	701

125	CARR SHEPPARDS CROSTHWAITE LTD	37,220,000	403
126	CAVENDISH WOOD HOUSE LTD	114,736,000	2,893
127	CAZENOVE GROUP PLC	213,300,000	1,283
128	CAZENOVE INVESTMENT FUND MANAGEMENT LTD	607,535,000	1,082
129	CAZENOVE SERVICE COMPANY	154,231,000	1,082
130	CB RICHARD ELLIS EUROPE LTD	79,813,000	948
131	CB RICHARD ELLIS LTD	102,796,000	633
132	CBRE LTD	68,954,000	709
133	CBRE STEWARDSHIP COMPANY	217,203,000	3,240
134	CERIDIAN CENTREFILE LTD	50,685,000	787
135	CERIDIAN HOLDINGS UK LTD	52,861,000	848
136	CHARLES STANLEY & CO. LTD	51,051,000	458
137	CHARLES STANLEY GROUP PLC	68,164,000	459
138	CHARMANT UK CO., LTD	60,545,000	1,969
139	CHARTERHALL PLC	104,331,000	3,876
140	CHAUCER HOLDINGS PLC	215,000,000	348
141	CHEMADIN LTD	44,550,000	918
142	CHEQUERS GROUP PLC	48,806,000	550
143	CHESTER STREET EMPLOYERS ASSOCIATION LTD	198,700,000	614
144	CHEVANING MINING COMPANY LTD	47,344,000	899
145	CHRISTIANI & NIELSEN LTD	115,104,000	493

146	CHRISTIE GROUP PLC	62,457,000	1,066
147	CILAG LTD	45,438,000	360
148	CISCO SYSTEMS LTD	287,272,000	1,280
149	CLAIMS MANAGEMENT GROUP LTD	35,868,000	531
150	CLARKSON PLC	58,695,000	290
151	CLERICAL MEDICAL AND GENERAL LIFE ASSURANCE SOCIETY	1,703,400,000	2,472
152	CLERICAL MEDICAL INVESTMENT GROUP LTD	2,035,900,000	3,562
153	CLOSE BROTHERS GROUP PLC	442,308,000	1,917
154	CLOSE BROTHERS LTD	263,843,000	925
155	COLLINS STEWART TULLETT PLC	473,900,000	2,092
156	COLT TELECOM GROUP PLC	1,166,318,000	4,285
157	COLT TELECOMMUNICATIONS	270,413,000	1,320
158	COLUMBUS GROUP PLC	44,395,000	365
159	COMMERCIAL & INDUSTRIAL SECURITIES PLC	56,641,000	1,430
160	COMMUNICATIONS NETWORKING SERVICES (UK)	1,718,059,000	816
161	CONAGRA (U.K.) LTD	222,820,000	375
162	CONSIGNIA (CUSTOMER MANAGEMENT) LTD	177,817,000	3,898
163	COOPER CAMERON (U.K.) LTD	197,570,000	1,144

164	COOPER GAY (HOLDINGS) LTD	49,805,000	430
165	COOPER LIGHTING AND SECURITY LTD	77,105,000	927
166	COPYMORE PLC	39,772,000	389
167	CORPORATE COMMUNICATIONS PLC	42,388,000	383
168	CORPS OF COMMISSIONAIRES MANAGEMENT LTD	51,762,000	3,495
169	COSI (HOLDINGS) LTD	92,317,000	1,868
170	COSI WALES LTD	43,057,000	472
171	CRAWFORD & COMPANY ADJUSTERS (UK) LTD	44,799,000	829
172	CRAWFORD & COMPANY ADJUSTERS LTD	44,799,000	843
173	CREATIVE OUTSOURCING SOLUTIONS INTERNATIONAL LTD	76,716,000	945
174	CREDIT LYONNAIS SECURITIES	59,434,000	271
175	CREDIT SUISSE ASSET MANAGEMENT (UK) HOLDING LTD	62,184,000	313
176	CRESTCO LTD	84,591,000	389
177	CSL UK	92,692,000	304
178	CURRIE & BROWN GROUP LTD	43,232,000	556
179	CURZON HOLDINGS LTD	72,885,000	325
180	D&T CONSULTING HOLDINGS LTD	217,688,000	984
181	DAEWOO CARS LTD	349,938,000	1,407
182	DAILYCER LTD	49,568,000	445

183	DAIWA SECURITIES SMBC EUROPE LTD	152,867,000	435
184	DALKIA PLC	268,379,000	2,840
185	DALKIA UTILITIES SERVICES PLC	88,727,000	620
186	DATAPOINT NEWCO 1 LTD	47,423,000	551
187	DATASTREAM INTERNATIONAL LTD	120,318,000	1,132
188	DATRONTECH GROUP PLC	208,285,000	430
189	DB GROUP SERVICES (UK) LTD	1,238,652,000	7,623
190	DEBONAIR AIRWAYS LTD	43,209,000	337
191	DECLAN KELLY GROUP PLC	62,856,000	252
192	DELOITTE MCS LTD	199,144,000	971
193	DELPHI AUTOMOTIVE SYSTEMS UK LTD	198,237,000	839
194	DELPHI LOCKHEED AUTOMOTIVE LTD	71,698,000	365
195	DENTSU HOLDINGS EUROPE LTD	52,582,000	345
196	DEUTSCHE ANNINGTON CAPITAL LTD	146,267,000	459
197	DEUTSCHE ASSET MANAGEMENT LTD	115,587,000	284
198	DEUTSCHE MORGAN GRENFELL GROUP PLC	509,488,000	1,002
199	DEXTER HOLDINGS	92,497,000	386
200	DIAMOND TRADING COMPANY LTD	33,324,000	968
201	DIMENSION DATA HOLDINGS PLC	1,136,504,000	8,524
202	DIPLOMA PLC	77,700,000	497
203	DIXONS COLOUR LABORATORIES LTD	40,113,000	1,541
204	DOMINIC GROUP LTD	345,982,000	2,856

205	DOVE VALLEY (ASHBOURNE) LTD	82,374,000	609
206	DOVER U.K. HOLDINGS LTD	121,898,000	1,460
207	DRESDNER KLEINWORT WASSERSTEIN GROUP LTD	756,200,000	2,690
208	DRESDNER KLEINWORT WASSERSTEIN LTD	652,940,000	2,650
209	DRESDNER KLEINWORT WASSERSTEIN SECURITIES LTD	150,790,000	439
210	DRIVE MOTOR RETAIL LTD	131,466,000	814
211	DSND SUBSEA LTD	57,787,000	289
212	DUDLEY STATIONERY LTD	189,892,000	1,750
213	DUNNES STORES (UK) LTD	42,028,000	503
214	DV HOLDINGS LTD	82,374,000	607
215	DWS LEGAL SERVICES	55,739,000	1,188
216	EBOOKERS PLC	67,251,000	1,822
217	EBURY GROUP PLC	46,942,000	1,127
218	EGERTON TRUST PLC	145,707,000	799
219	EGG BANKING PLC	1,023,600,000	2,033
220	EGG PLC	1,021,600,000	2,680
221	EHS BRANN LTD	34,862,000	262
222	EMC COMPUTER SYSTEMS (U.K.) LTD	45,690,000	705
223	EMPLOYERS RE CORPORATION (UK)	570,527,000	499
224	EMPRISE LTD	34,180,000	3,070

225	ENERGIS COMMUNICATIONS LTD	742,085,000	1,849
226	ENGLISH WELSH & SCOTTISH RAILWAY HOLDINGS LTD	527,000,000	6,191
227	ENGLISH WELSH & SCOTTISH RAILWAY LTD	494,600,000	5,725
228	ENRON EUROPE LTD	2,313,193,000	1,572
229	ENSCO OFFSHORE U.K. LTD	60,873,000	296
230	EQUITAS MANAGEMENT SERVICES LTD	91,064,000	522
231	ESKDALE SIDINGS LTD	44,681,000	413
232	ESPLEY TRUST PLC	89,612,000	1,250
233	EUNET INTERNATIONAL LTD	46,154,000	446
234	EUROCLEAR PLC	785,258,000	2,413
235	EUROMONEY INSTITUTIONAL INVESTOR PLC	158,942,000	1,478
236	EUROPAY INTERNATIONAL S.A.	203,909,000	535
237	EUROPEAN UNION LEISURE LTD	108,727,000	403
238	EXTEL ADVERTISING GROUP LTD	78,527,000	593
239	F&C MANAGEMENT LTD	78,039,000	361
240	FAMILY HEALTH PLAN LTD	461,147,000	1,954
241	FINSBURY FOOD GROUP PLC	35,249,000	820
242	FIRST CORPORATE SHIPPING LTD	62,210,000	542
243	FIRST LEISURE HOLDINGS LTD	89,339,000	1,487
244	FIRST LEISURE TRADING LTD	89,320,000	1,150

245	FIRST SECURITY (GUARDS) LTD	38,940,000	1,651
246	FIRST SECURITY GROUP LTD	38,940,000	1,651
247	FISHER CHILLED FOODS (METHWOLD) LTD	49,202,000	1,037
248	FISHER FOODS LTD	280,686,000	3,245
249	FISHER SEAFOODS (GOSFORTH) LTD	47,008,000	272
250	FITCH RATINGS LTD	97,561,000	667
251	FITNESS HOLDINGS EUROPE LTD	79,813,000	4,143
252	FKI ENGINEERING LTD	44,900,000	499
253	FKI INDUSTRIES LTD	54,317,000	1,406
254	FKI MINING UK LTD	57,946,000	1,429
255	FKI PLC	1,345,100,000	14,122
256	FLEET HOLDINGS PLC	366,604,000	8,094
257	FORBO UK LTD	48,087,000	440
258	FORBO-NAIRN LTD	41,141,000	390
259	FOSTER REFRIGERATOR (U.K.)	36,078,000	361
260	FOX-PITT, KELTON GROUP LTD	61,005,000	285
261	FRESHFIELDS SERVICE COMPANY	45,578,000	973
262	FT INTERACTIVE DATA (EUROPE) LTD	50,241,000	463
263	FTC HOLDINGS LTD	33,909,000	287
264	FUJITSU MICROELECTRONICS LTD	187,092,000	761
265	FUJITSU SERVICES (PATHWAY) LTD	146,894,000	332
266	FUJITSU SERVICES HOLDINGS PLC	1,859,900,000	14,320
267	FUJITSU SERVICES LTD	987,900,000	7,922

268	G P T REALISATIONS LTD	61,934,000	364
269	GAB ROBINS UK LTD	41,572,000	936
270	GANDS (U.K.)	380,956,000	4,447
271	GARBAN HARLOW UEDA LTD	69,522,000	407
272	GARBAN-INTERCAPITAL MANAGEMENT SERVICES LTD	59,825,000	942
273	GARTMORE INVESTMENT MANAGEMENT PLC	144,259,000	636
274	GBE INTERNATIONAL GROUP PLC	57,947,000	820
275	GC UK HOLDING LTD	320,290,000	1,273
276	GE FRANKONA MANAGEMENT SERVICES (UK) LTD	44,164,000	363
277	GENERAL DYNAMICS LTD	382,328,000	792
278	GENERAL DYNAMICS UNITED KINGDOM LTD	382,328,000	792
279	GENERAL MOTORS HOLDINGS (U.K.)	3,947,200,000	8,760
280	GENRAD HOLDINGS, LTD	51,564,000	485
281	GEORGICA PLC	96,253,000	3,132
282	GERRARD MANAGEMENT SERVICES LTD	116,833,000	1,245
283	GLOBAL AEROSPACE UNDERWRITING MANAGERS LTD	58,564,000	385
284	GLOBAL CROSSING (UK) TELECOMMUNICATIONS LTD	277,427,000	780

285	GLOBAL CROSSING (UK) TELECOMMUNICATIONS NETWORKS LTD	97,895,000	435
286	GM COMMUNICATIONS LTD	241,145,000	700
287	GN GREAT NORDIC LTD AS	371,207,000	3,099
288	GNI LTD	53,482,000	387
289	GOLDMAN SACHS INTERNATIONAL	1,838,600,000	3,275
290	GONZALEZ, BYASS & CO., LTD	113,863,000	496
291	GRAND SERVICES HOLDINGS LTD	112,101,000	2,795
292	GREYHOUND HOLDINGS LTD	62,591,000	438
293	GROUPAMA UK SERVICES LTD	77,454,000	1,026
294	GROVEBELL GROUP PLC	52,210,000	317
295	GUARDIAN ROYAL EXCHANGE PLC	2,739,000,000	8,046
296	HANSARD FINANCIAL TRUST LTD	159,964,000	420
297	HARLAND SIMON GROUP PLC	81,787,000	1,268
298	HARLYFORD HOLDINGS LTD	34,461,000	288
299	HARRY NEAL LTD	66,679,000	1,012
300	HAYMILLS HOLDINGS LTD	64,475,000	602
301	HAYS PERSONNEL SERVICES LTD	878,637,000	3,277
302	HAYS PLC	2,498,400,000	28,418
303	HBS BUSINESS SERVICES GROUP LTD	112,101,000	2,795
304	HCC SPECIALTY INSURANCE HOLDINGS LTD	533,437,000	851
305	HEALTH CLUB INVESTMENTS GROUP LTD	106,844,000	2,223

306	HEATH INSURANCE BROKING LTD	49,888,000	847
307	HEATH LAMBERT MANAGEMENT LTD	138,305,000	2,341
308	HECM CUSTOMER SERVICES LTD	96,825,000	1,308
309	HELENE PLC	139,071,000	333
310	HENDERSON ADMINISTRATION LTD	115,308,000	711
311	HHG PLC	1,658,000,000	4,993
312	HIB LTD	52,484,000	877
313	HIGH TABLE	55,560,000	1,750
314	HISCOX PLC	547,451,000	412
315	HITACHI HOME ELECTRONICS (EUROPE) LTD	225,202,000	383
316	HMG (THAMES) LTD	238,922,000	903
317	HMG HOLDINGS LTD	459,226,000	1,956
318	HOBART MANUFACTURING COMPANY	58,286,000	633
319	HOBBS LTD	39,158,000	522
320	HOLMES PLACE HEALTH CLUBS LTD	98,579,000	2,099
321	HSB ENGINEERING INSURANCE LTD	37,931,000	630
322	HUDSON PLACE INVESTMENTS LTD	721,900,000	4,455
323	HUMPHREYS & GLASGOW LTD	55,179,000	1,019
324	HUNTING AIRCRAFT LTD	36,943,000	1,217
325	ICAP PLC	801,400,000	2,860
326	ICL OUTSOURCING LTD	285,268,000	2,525
327	ICL SORBUS UK LTD	209,723,000	2,977

328	IKEA LTD	882,330,000	6,798
329	IKON OFFICE SOLUTIONS GROUP PLC	245,967,000	2,407
330	IKON OFFICE SOLUTIONS PLC	193,357,000	2,050
331	ILG TRAVEL LTD	564,517,000	2,083
332	INCEPTA GROUP PLC	244,641,000	2,058
333	INDEPENDENT INSURANCE COMPANY LTD	367,000,000	1,336
334	ING BARING SERVICES LTD	171,520,000	2,265
335	INMARSAT LTD	272,846,000	305
336	INMARSAT VENTURES LTD	284,627,000	537
337	INSIGHT INVESTMENT MANAGEMENT LTD	59,991,000	487
338	INTER FORWARD LTD	57,423,000	943
339	INTERIOR SERVICES GROUP PLC	402,017,000	2,090
340	INTERNATIONAL CITY HOLDINGS PLC	88,293,000	1,290
341	INTERNATIONAL POWER PLC	852,000,000	2,416
342	INTIER AUTOMOTIVE HOLDING (U.K.) LTD	223,778,000	1,970
343	INVESCO UK LTD	144,812,000	1,378
344	INVESTEC BANK (UK) LTD	488,572,000	1,028
345	INVESTEC PLC	1,302,122,000	4,874
346	ISG INTERIOREXTERIOR PLC	324,484,000	386
347	ITOCHU EUROPE PLC	708,474,000	1,611
348	ITOUCH PLC	33,614,000	442
349	J SAINSBURY DISTRIBUTION LTD	219,109,000	2,070
350	J SAINSBURY PLC	17,141,000,000	180,200

351	J.D. EDWARDS (U.K.) LTD	43,890,000	382
352	J.M.JONES & SONS(HOLDINGS)LTD	120,031,000	615
353	J.P. MORGAN CAPITAL HOLDINGS LTD	9,217,057,000	2,906
354	J.P. MORGAN INVESTMENT MANAGEMENT LTD	102,739,000	424
355	J.P. MORGAN PLC	430,116,000	994
356	J.P. MORGAN SECURITIES LTD	1,683,414,000	1,865
357	JAEGER COMPANY LTD	49,530,000	540
358	JANE NORMAN LTD	49,679,000	492
359	JARDINE LLOYD THOMPSON GROUP PLC	429,048,000	4,412
360	JARVIS CONSTRUCTION (UK) LTD	318,530,000	664
361	JLT BENEFIT SOLUTIONS LTD	40,781,000	601
362	JLT CORPORATE RISKS LTD	33,989,000	389
363	JLT RISK SOLUTIONS LTD	153,450,000	807
364	JOHN HOWARD GROUP PLC	53,882,000	899
365	JOHNSON MATTHEY CHEMICALS LTD	130,683,000	1,516
366	JOHNSON MATTHEY JEWELLERY LTD	48,943,000	278
367	JONES LANG LASALLE LTD	85,543,000	943
368	JOSEPH CARTWRIGHT LTD	52,777,000	1,251
369	K PAPERS (BLACKBURN) LTD	52,066,000	882
370	K.F. GROUP LTD	139,571,000	941
371	KABA HOLDING (UK) LTD	39,020,000	547
372	KCG 2001 PLC	48,276,000	750

373	KDDI EUROPE LTD	51,462,000	251
374	KELSEY INDUSTRIES	77,152,000	787
375	KESA ELECTRICALS PLC	3,771,100,000	27,821
376	KILMARNOCK ENTERPRISES	276,557,000	3,339
377	KLEINWORT BENSON PRIVATE BANK LTD	76,434,000	267
378	KNOCKIN LTD	71,624,000	273
379	KPMG AUDIT PLC	192,069,000	345
380	KPMG LLP	1,008,000,000	8,146
381	LAKER AIRWAYS (INTERNATIONAL) LTD	111,393,000	1,932
382	LANDMARK RETAIL GROUP LTD	45,790,000	343
383	LATIUM GROUP LTD	233,654,000	2,484
384	LAYTON GROUP LTD	34,294,000	365
385	LCH.CLEARNET GROUP LTD	232,331,000	350
386	LCH.CLEARNET LTD	188,287,000	324
387	LE GRAND CAP LTD	195,387,000	608
388	LEAR CORPORATION UK HOLDINGS LTD	191,293,000	1,784
389	LEAR CORPORATION UK INTERIOR SYSTEMS LTD	38,591,000	439
390	LEGAL & GENERAL ASSURANCE SOCIETY LTD	4,397,600,000	7,425
391	LEGAL & GENERAL GROUP PLC	17,078,000,000	8,547
392	LEGAL & GENERAL INVESTMENT MANAGEMENT (HOLDINGS) LTD	123,115,000	559

393	LEGAL & GENERAL INVESTMENT MANAGEMENT DORMANT (HOLDINGS) LTD	69,402,000	489
394	LEGAL & GENERAL RESOURCES LTD	251,873,000	7,014
395	LESNEY PRODUCTS PLC	90,057,000	4,059
396	LEVI STRAUSS (U.K.) LTD	112,458,000	942
397	LIFFE (HOLDINGS) PLC	217,599,000	560
398	LIFFE ADMINISTRATION AND MANAGEMENT	214,484,000	555
399	LIMIT UNDERWRITING LTD	76,470,000	368
400	LINESET PLC	212,237,000	4,504
401	LLOYDS TSB ASSET FINANCE DIVISION LTD	1,386,600,000	6,088
402	LLOYDS TSB AUTOLEASE (SHREWSBURY) LTD	84,391,000	479
403	LLOYDS TSB AUTOLEASE LTD	235,411,000	590
404	LLOYDS TSB BANK PLC	15,486,000,000	84,102
405	LLOYDS TSB GENERAL INSURANCE LTD	534,449,000	969
406	LLOYDS TSB INSURANCE SERVICES LTD	709,972,000	254
407	LLOYDS UDT LTD	112,900,000	1,261
408	LONDON METROPOLITAN UNIVERSITY	132,442,000	2,460
409	LONDON STOCK EXCHANGE PLC	225,900,000	513
410	LPG HOLDINGS LTD	43,423,000	361

411	M & G LTD	199,017,000	1,104
412	M (2003) PLC	4,310,000,000	45,000
413	M C REALISATIONS (BIRMINGHAM) LTD	48,810,000	726
414	M.& W. MACK LTD	266,413,000	765
415	MACFISH LTD	50,904,000	795
416	MACRO MARKETING HOLDINGS LTD	40,331,000	425
417	MAINLINE FREIGHT LTD	181,666,000	2,450
418	MALBAK U.K. LTD	235,868,000	2,426
419	MALCOLM GROUP PLC	129,062,000	1,569
420	MAN FINANCIAL LTD	212,815,000	328
421	MAN GROUP PLC	1,377,600,000	2,630
422	MAN INVESTMENTS LTD	177,945,000	261
423	MANAGEMENT CONSULTING GROUP PLC	88,649,000	719
424	MARKEL INTERNATIONAL LTD	277,433,000	531
425	MARSH & MCLENNAN COMPANIES UK LTD	1,054,100,000	10,354
426	MARSH LTD	573,019,000	4,797
427	MARSH SERVICES LTD	400,128,000	6,034
428	MARYLEBONE WARWICK BALFOUR GROUP PLC	227,292,000	1,676
429	MAT GROUP LTD	65,877,000	416
430	MAUNSELL CONSULTANTS (HOLDINGS) LTD	34,382,000	501
431	MAYFLOWER CORPORATION PLC	623,100,000	5,599

432	MAYFLOWER VEHICLE SYSTEMS PLC	69,442,000	783
433	MAYNE NICKLESS OPERATIONS LTD	63,174,000	2,307
434	MAYR-MELNHOF PACKAGING UK LTD	54,930,000	440
435	MBA MICHAEL BAILEY ASSOCIATES PLC	42,836,000	251
436	MBL (1991) LTD	94,783,000	1,413
437	MCAFEE INTERNATIONAL LTD	36,034,000	281
438	MEATPAK HAMPSHIRE GROUP LTD	34,556,000	481
439	MEGACOST LTD	63,707,000	1,484
440	MELLON EUROPE LTD	2,035,893,000	839
441	MENZIES DISTRIBUTION LTD	928,800,000	3,822
442	MENZIES WORLD CARGO LTD	47,472,000	907
443	MERRILL LYNCH EUROPE PLC	1,950,000,000	3,997
444	MERRILL LYNCH INTERNATIONAL	1,312,955,000	1,899
445	MERRILL LYNCH INTERNATIONAL BANK LTD	464,631,000	1,168
446	MERRILL LYNCH INVESTMENT MANAGERS HOLDINGS LTD	149,432,000	974
447	MERRILL LYNCH, PIERCE, FENNER & SMITH LTD	375,131,000	639
448	MESCO (UK) LTD	306,212,000	3,869
449	MEUK REALISATIONS LTD	316,547,000	2,107
450	MFI FURNITURE CENTRES LTD	659,015,000	3,596
451	MFM EMPLOYMENT SERVICES LTD	68,670,000	741

452	MICROSOFT LTD	405,356,000	1,629
453	MIDLAND GLOBAL MARKETS LTD	79,953,000	988
454	MIKI TRAVEL LTD	210,493,000	321
455	MILLER 2002 LLP	67,282,000	680
456	MILLER FISHER GROUP PLC	44,988,000	976
457	MILLER INSURANCE INVESTMENTS LTD	67,282,000	669
458	MILLER INSURANCE SERVICES LTD	51,888,000	424
459	MITSUBISHI SECURITIES INTERNATIONAL PLC	87,431,000	298
460	MITSUI & CO. EUROPE PLC	3,090,612,000	750
461	MIZUHO INTERNATIONAL PLC	385,600,000	315
462	ML INVEST HOLDINGS LTD	403,707,000	1,323
463	MOERAKI CORPORATION PLC	79,070,000	325
464	MONOLANCE LTD	140,623,000	1,966
465	MONTPELLIER GROUP PLC	434,056,000	1,841
466	MOODY'S HOLDINGS LTD	92,661,000	253
467	MOSCOW NARODNY BANK LTD	71,186,000	353
468	MOSSLEY HOLDINGS LTD	57,959,000	645
469	MOSTCASH PLC	312,400,000	1,841
470	MOUNTLEIGH GROUP PLC	664,900,000	8,222
471	MSA HOLDINGS LTD	270,009,000	1,627
472	MUSTARD ENTERTAINMENT RESTAURANTS LTD	43,482,000	788

473	N. M. ROTHSCHILD & SONS LTD	375,162,000	787
474	NAKANO UK HOLDING LTD	64,247,000	320
475	NAMPAK HOLDINGS (UK) PLC	282,500,000	3,753
476	NATIONAL AUSTRALIA GROUP EUROPE LTD	2,015,704,000	11,821
477	NATIONAL AUSTRALIA LIFE SERVICES LTD	50,440,000	678
478	NATIONAL AUTISTIC SOCIETY	54,714,000	2,187
479	NATIONAL EMPLOYERS MUTUAL GENERAL INSURANCE ASSOCIATION LTD	109,225,000	848
480	NATIONAL INSURANCE AND GUARANTEE CORPORATION LTD	1,066,757,000	830
481	NATIONAL WESTMINSTER BANK PLC	9,998,000,000	28,800
482	NATIONWIDE ASSET MANAGEMENT HOLDINGS LTD	189,228,000	765
483	NATSIGN LTD	34,461,000	288
484	NELSON HIND CATERING MANAGEMENT	52,202,000	2,356
485	NELSON HIND HOLDINGS LTD	52,202,000	2,356
486	NETTOOLS COMPANY	77,242,000	322
487	NEWGATE CAPITAL LTD	590,405,000	10,333
488	NEWGO 1 LTD	191,006,000	817
489	NEWTON INVESTMENT MANAGEMENT LTD	82,288,000	327

490	NICHOL BEAUTY PRODUCTS LTD	40,122,000	280
491	NIKKO EUROPE PLC	436,332,000	423
492	NOMURA EUROPE HOLDINGS PLC	720,353,000	1,333
493	NOMURA INTERNATIONAL PLC	194,401,000	987
494	NOROSE SERVICE COMPANY	58,504,000	1,124
495	NORTEK (UK) LTD	102,141,000	1,186
496	NORTH ANDERSON CARS LTD	96,686,000	304
497	NORTON (NORTH SEA) LTD	60,671,000	269
498	NRC REFRIGERATION LTD	46,848,000	601
499	OBERTHUR CARD SYSTEMS LTD	76,974,000	508
500	OGEE LTD	42,586,000	510
501	OIS (OCEANEERING INTERNATIONAL SERVICES) LTD	70,666,000	475
502	OIS PLC	48,199,000	892
503	OLD BOND STREET HOLDING COMPANY LTD	69,153,000	1,241
504	OLD MUTUAL FINANCIAL SERVICES (UK) PLC	110,600,000	1,408
505	OLD MUTUAL PLC	7,955,000,000	44,689
506	ONE ACCOUNT LTD	54,015,000	744
507	ORION GROUP LTD	276,538,000	383
508	ORION MEDIA MARKETING LTD	219,707,000	277
509	OTFORD GROUP LTD	43,668,000	406

510	P. S. TURNER (CONSTRUCTIONS) LTD	56,001,000	253
511	PARITY GROUP PLC	175,952,000	926
512	PASMINCO EUROPE (SMELTING) LTD	95,571,000	621
513	PAULS LTD	174,640,000	761
514	PBI GROUP HOLDINGS LTD	157,627,000	839
515	PEACE & QUIET LTD	39,158,000	522
516	PENTOS PLC	240,700,000	4,845
517	PEOPLESOFT UK LTD	50,183,000	255
518	PEPSICO FINANCE (UK) LTD	334,061,000	9,239
519	PHS 280 LTD	56,942,000	1,259
520	POLLY PECK INTERNATIONAL PLC	1,162,300,000	17,227
521	POST OFFICE LTD	1,186,000,000	13,893
522	PP (UK) LTD	535,306,000	17,684
523	PROJECT QUAIL LTD	220,221,000	2,183
524	PRUDENTIAL ASSURANCE COMPANY LTD	4,612,000,000	4,725
525	PRUDENTIAL PLC	13,491,000,000	21,012
526	PRUDENTIAL PROPERTY INVESTMENT MANAGERS LTD	43,494,000	307
527	PRUDENTIAL-BACHE INTERNATIONAL LTD	146,667,000	682
528	PRUTECH LTD	148,623,000	665
529	QBE INTERNATIONAL HOLDINGS (UK) PLC	1,085,615,000	2,725
530	QBE MANAGEMENT (UK) LTD	78,966,000	604

531	QUADREX HOLDINGS LTD	88,052,000	862
532	QUARTIC MOTOR COMPANY LTD	89,497,000	338
533	QUARTIC MOTOR GROUP LTD	244,020,000	751
534	R S L COMMUNICATIONS PLC	425,695,000	2,859
535	RADIANZ GLOBAL LTD	218,340,000	391
536	RADIANZ LTD	300,670,000	922
537	REEVE (DERBY) LTD	185,159,000	366
538	REMAINING MEAT LTD	109,128,000	442
539	RENAULT F1 TEAM LTD	67,012,000	430
540	REUTERS GROUP PLC	3,197,000,000	17,345
541	REUTERS LTD	1,221,000,000	4,106
542	ROBERT BRETT & SONS LTD	148,512,000	878
543	ROBERT FLEMING HOLDINGS LTD	282,782,000	963
544	ROCKLIFF COMPUTERS LTD	57,000,000	444
545	ROSEHAUGH PLC	159,776,000	253
546	ROTHSCHILDS CONTINUATION LTD	405,298,000	962
547	ROYAL LONDON MANAGEMENT SERVICES LTD	173,383,000	3,637
548	ROYAL LONDON MUTUAL INSURANCE SOCIETY LTD	2,338,500,000	3,795
549	ROYAL MAIL GROUP PLC	6,852,000,000	194,606
550	ROYAL MAIL HOLDINGS PLC	8,633,000,000	218,638
551	ROYAL MENCAP SOCIETY	127,186,000	5,139

552	ROYAL NATIONAL INSTITUTE FOR DEAF PEOPLE	44,768,000	997
553	RUSSELL & BRAND LTD	34,986,000	2,306
554	RWM FOOD GROUP LTD	83,940,000	318
555	RYDON GROUP LTD	109,885,000	637
556	RYESEKKS PLC	6,893,100,000	20,370
557	SAINSBURY'S BANK PLC	198,651,000	459
558	SAINSBURY'S SUPERMARKETS LTD	14,021,000,000	144,471
559	SALLY HAIR AND BEAUTY SUPPLIES LTD	42,586,000	510
560	SAVE THE CHILDREN FUND	122,027,000	3,563
561	SCANDINAVIAN INVESTMENTS LTD	98,602,000	299
562	SCHREIBER FURNITURE LTD	46,084,000	357
563	SCHRODER INVESTMENT MANAGEMENT LTD	226,791,000	754
564	SCHRODERS PLC	427,600,000	2,307
565	SCOTT LTD	351,810,000	847
566	SCOTTISH PROVIDENT ASSURANCE LTD	126,813,000	253
567	SCOTTISH SEA FARMS LTD	60,988,000	253
568	SECURIPLAN PLC	62,756,000	3,693
569	SEDGWICK LTD	175,366,000	2,560
570	SENATOR CAPITAL LTD	112,101,000	2,795
571	SERVICE POINT UK LTD	38,636,000	652
572	SETON HEALTHCARE LTD	38,613,000	559

573	SG SECURITIES (LONDON) LTD	47,221,000	540
574	SHELTER, THE NATIONAL CAMPAIGN FOR HOMELESS PEOPLE LTD	34,256,000	860
575	SIEBEL SYSTEMS UK LTD	73,056,000	427
576	SIMOCO EUROPE LTD	43,525,000	660
577	SIMOCO INTERNATIONAL LTD	63,876,000	1,150
578	SINGER & FRIEDLANDER GROUP PLC	176,565,000	653
579	SINGER & FRIEDLANDER LTD	167,009,000	620
580	SLAUGHTER AND MAY SERVICES COMPANY	53,701,000	1,054
581	SODEXHO DEFENCE SERVICES LTD	111,902,000	6,573
582	SODEXHO EDUCATION SERVICES LTD	80,509,000	3,755
583	SODEXHO LTD	687,560,000	32,732
584	SODEXHO PRESTIGE LTD	97,624,000	11,098
585	SOLECTRON UK LTD	95,144,000	481
586	SOLO CUP EUROPE LTD	38,292,000	394
587	SOLUTIONS @ WORK LTD	51,043,000	378
588	SONY ENTERTAINMENT HOLDINGS EUROPE LTD	1,149,299,000	2,587
589	SOTHEBY PARKE BERNET GROUP PLC	56,548,000	1,380
590	SOUND DIFFUSION PLC	35,938,000	726
591	SOUTHERN BUSINESS GROUP LTD	51,626,000	472
592	SPHERION (EUROPE) STAFFING LTD	57,395,000	301

593	SPHERION UK PLC	57,395,000	301
594	SPORTINGBET PLC	1,150,289,000	370
595	SPORTSWORLD MEDIA GROUP PLC	35,640,000	333
596	SPOTLESS PLASTICS (UK) LTD	54,823,000	301
597	SPRING GROUP PLC	360,197,000	1,195
598	SPRING TECHNOLOGY STAFFING SERVICES LTD	199,942,000	288
599	SPRINGFIELD ROAD LTD	36,873,000	696
600	SSI REALISATIONS PLC	44,373,000	505
601	SSL INTERNATIONAL PLC	602,400,000	6,436
602	SSL PRODUCTS LTD	88,845,000	1,107
603	ST. JOHN AMBULANCE	61,718,000	1,280
604	STANBIC AFRICA HOLDINGS LTD	113,094,000	3,507
605	STANDARD BANK LONDON LTD	301,860,000	641
606	STANDARD BANK OF SOUTH AFRICA LTD	2,137,068,000	25,360
607	STANDARD CHARTERED BANK	2,990,696,000	17,930
608	STANSELL LTD	60,252,000	7,555
609	STATE STREET BANK EUROPE LTD	64,980,000	426
610	STEMCOR HOLDINGS LTD	1,535,027,000	322
611	STENOAK ASSOCIATED SERVICES PLC	57,150,000	565
612	STIRLING LTD	243,500,000	8,262
613	STORMONT ENGINEERING COMPANY LTD	52,756,000	306
614	STROUD VALLEY ENGINEERING LTD	51,491,000	510

615	SUBSEA 7 LTD	34,382,000	254
616	SUMITOMO CORPORATION EUROPE HOLDING LTD	1,318,080,000	443
617	SUN HOTELS INTERNATIONAL	982,696,000	12,926
618	SUN MICROSYSTEMS HOLDINGS LTD	248,949,000	2,216
619	SUNGARD HOLDINGS LTD	65,349,000	486
620	SUNGARD SHERWOOD SYSTEMS GROUP LTD	34,122,000	251
621	SUNGARD SHERWOOD SYSTEMS LTD	52,231,000	416
622	SUNGARD SYSTEMS LTD	50,807,000	357
623	SWISS RE GB PLC	642,300,000	1,154
624	SWISS RE SERVICES LTD	212,268,000	819
625	SYMONDS GROUP LTD	54,167,000	805
626	SYNTEGRA (UK) LTD	64,849,000	1,072
627	SYNTEGRA LTD	245,624,000	343
628	T.W.R. GROUP LTD	316,156,000	1,829
629	TAM REALISATIONS LTD	93,559,000	508
630	TATE & LYLE PLC	3,167,000,000	6,646
631	TECHNOLOGY PLC	316,362,000	614
632	TEMPO LTD	141,054,000	833
633	TENNECO-WALKER (U.K.) LTD	67,374,000	518
634	THAI FARMERS BANK PUBLIC COMPANY LTD	616,611,000	13,372

635	THEMES INTERNATIONAL PLC	42,752,000	1,271
636	THG (DORMANT) LTD	34,297,000	749
637	THOMAS MILLER & CO. LTD	50,937,000	550
638	THOMSON FINANCIAL LTD	235,525,000	1,660
639	THORN LIGHTING LTD	115,163,000	1,064
640	THORN LTD	138,100,000	1,073
641	THREADNEEDLE ASSET MANAGEMENT HOLDINGS LTD	121,986,000	901
642	THRESHER WINES ACQUISITIONS LTD	926,109,000	14,170
643	THRESHER WINES CAPITAL LTD	1,055,266,000	15,135
644	THRESHER WINES HOLDINGS LTD	926,109,000	14,168
645	TILHILL FORESTRY LTD	68,686,000	372
646	TK-ECC LTD	52,664,000	762
647	TLG HOLDINGS LTD	89,600,000	1,141
648	TON UP 1 LTD	34,419,000	724
649	TOUCH GROUP PLC	38,447,000	313
650	TOWER AUTOMOTIVE LTD	47,049,000	548
651	TOYS "R" US LTD	535,796,000	4,914
652	TRADITION (UK) LTD	53,073,000	294
653	TRANSBUS INTERNATIONAL LTD	153,260,000	421
654	TRAVELBAG HOLDINGS LTD	198,222,000	707
655	TRAVELBAG LTD	157,437,000	573
656	TRIBAL GROUP PLC	98,364,000	1,174

657	TRIDENT FASHIONS PLC	61,794,000	1,237
658	TRILLIUM PROPERTY SERVICES LTD	76,808,000	719
659	TRINITY ACQUISITION LTD	978,061,000	10,664
660	TROYESS LTD	135,082,000	2,111
661	TSB BANK LTD	2,574,000,000	20,664
662	TTB 100 LTD	40,283,000	584
663	TULLETT LIBERTY LTD	423,598,000	1,840
664	TXU EUROPE LTD	4,681,800,000	4,806
665	TXU FINANCE (NO.2) LTD	4,681,800,000	3,263
666	TYCO HOLDINGS (U.K.) LTD	839,562,000	10,140
667	TYCO PLASTICS LTD	51,946,000	427
668	UBS GLOBAL ASSET MANAGEMENT HOLDING (NO.2) LTD	70,164,000	489
669	UBS GLOBAL ASSET MANAGEMENT HOLDING LTD	82,089,000	489
670	UBS SERVICES LTD	247,822,000	2,423
671	UBS WARBURG LTD	150,143,000	1,741
672	UDO MAYFAIR LTD	53,344,000	813
673	UNILEVER U.K. CENTRAL RESOURCES LTD	185,307,000	3,299
674	UNITED AGRI PRODUCTS LTD	76,922,000	303
675	USI MAYFAIR LTD	182,728,000	2,067
676	USPE HOLDINGS LTD	90,825,000	1,818
677	VEKTRA CORPORATION PLC	135,830,000	1,673

678	VELMORE LTD	52,223,000	293
679	VENTELO UK LTD	78,846,000	275
680	VINCI PARK SERVICES UK LTD	36,308,000	1,166
681	VOP HOLDINGS LTD	503,851,000	3,897
682	VOYAGER INVESTMENTS LTD	424,619,000	2,929
683	W. ROCK & SONS LTD	115,562,000	3,023
684	WALKER LTD	72,722,000	562
685	WAYROL PLC	1,420,632,000	9,114
686	WEIDER NUTRITION (WNI) LTD	71,951,000	414
687	WELLINGTON UNDERWRITING PLC	275,000,000	332
688	WESSEX DAIRIES LTD	74,769,000	916
689	WEST ANGLIA GREAT NORTHERN RAILWAY LTD	248,560,000	1,932
690	WESTERN UNITED INVESTMENT COMPANY LTD	288,500,000	953
691	WHITBREAD GROUP PLC	1,794,100,000	55,315
692	WHITBREAD HOTEL COMPANY LTD	394,200,000	10,232
693	WHITBREAD PLC	1,788,200,000	52,437
694	WILCAS LTD	498,261,000	272
695	WILLAIRE GROUP PLC	35,815,000	531
696	WILLIAMS DE BROE HOLDINGS LTD	44,838,000	325
697	WILLIAMS DE BROE PLC	43,494,000	298
698	WILLIAMS LEA GROUP LTD	193,152,000	1,791

699	WILLIAMS LEA LTD	148,563,000	1,676
700	WILLIS GROUP SERVICES LTD	110,549,000	570
701	WILLIS LTD	343,340,000	2,689
702	WILLIS UK LTD	75,503,000	1,297
703	WILSON JAMES HOLDINGS LTD	36,238,000	1,322
704	WILSON JAMES LTD	35,293,000	1,193
705	WITHERS LLP	50,486,000	325
706	WOODBRIDGE FOAM (UK) LTD	34,102,000	332
707	WSP BUILDINGS LTD	46,784,000	595
708	WSP CIVILS LTD	34,886,000	487
709	WSP GROUP PLC	283,553,000	4,970
710	XL INSURANCE (UK) HOLDINGS LTD	51,813,000	563
711	XL INSURANCE COMPANY LTD	43,675,000	532
712	YARDLEY RECEIVERSHIP REALISATIONS LTD	37,760,000	687
713	YELDUD UK REALISATIONS LTD	93,466,000	895
714	YGR INTERNATIONAL LTD	202,432,000	10,743
715	YJL INFRASTRUCTURE LTD	41,105,000	263
716	YORK TRAILER COMPANY LTD	33,449,000	458
717	YORK TRAILER HOLDINGS PLC	111,343,000	1,594
718	YORKSHIRE FOOD GROUP PLC	159,849,000	1,242
719	YTL UTILITIES (UK) LTD	287,700,000	1,682

Appendix 2: Cover Letter

To: Commercial/Purchase/Contracts/Materials/Logistics Manager/Director

Dear Sir or Madam:

By appreciating your kind attention to this mail/email in advance, it is our pleasure to introduce ourselves as researchers in the field of Business Creation, Strategy and Management in the Autonomous University of Barcelona, Spain. As a scientific research project to contribute to enhancing knowledge, the following survey has been designed to help assess the relationship between Supplier Selection decision and Business Process Improvement in achieving the objectives of outsourcing the processes and activities of organizations in order to improve organizational performance, enhance customer satisfaction and generate sustainable long-term competitive advantage. This survey is also intended to increase the awareness of the strategic benefits that arise from Business Process Improvement through concentration on suppliers. The results of this project, which is executed in some large companies in municipal level, will be presented publicly to provide some knowledge of using this managerial decision support technique.

Your esteemed company as a firm with quality system, where the processes and activities are outsourced frequently and improved continuously, has been selected as an appropriate context for the purpose of present research. We have obtained the name and contact address of your company through LexisNexis Group, a division of Reed Elsevier (UK) Ltd., which is one of the best available sources for this kind of information.

Hence, your participation and cooperation is very important to the success of this research project. You are invited to find out and complete the attached survey questionnaire.

The questionnaire should not take more than 15 minutes to complete. All respondents will be anonymous and all information supplied by respondents will be treated with the utmost confidence. After finishing the research project, a copy of executive summary will be send to you if you wish to know the results of survey and provide us your contact address in the questionnaire.

And finally, in the case that you are not interested in participating in the survey, please simply reply to this mail/email to enable us not to send you any further follow-ups.

Thank you very much for your cooperation and assistance in this research.

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Research Supervisor

Appendix 3: Questionnaire

The Evaluation of Relationship between Supplier Selection and Business Process Improvement

Instructions:

This survey is divided into TWO sections.

Section 1 relates to the demographic details of your company and your position in the company. For questions that ask for facts and figures, please provide actual figures or your best estimates.

Section 2 uses the criteria which relate to the attributes of suppliers and achieved process improvement for the most important business process outsourced in your company due to the cost, quality, cycle time, service and so on.

A Business Process is the execution of a group of logically related value-adding or value-creating tasks that use measurable organizational resources to provide measurable value (a product or service) to internal or external customers in support of the business objectives. Activities such as Assembling and Packing, Information systems, Accounting, Transportation and Training are some examples of a business process.

In this section you are asked to say, by most accurately indicating and reflecting the extent of your opinion, about the type of this process, the criteria in selecting the suppliers for it and the outcomes of outsourcing this process. Please ensure that you respond to all criteria by ticking one and only one number that comes closest to your view, where 0 means 'Not at All', 1 means 'Very Low', 2 means 'Low', 3 means

'High' and 4 means 'Very High'. The questionnaire also contains an opportunity for you to provide optional open-ended comments on this relationship.

If you would like to receive an executive summary of the survey, please provide us your contact information below (optional):

Name: Company name:

Postal address:

Phone: Fax: Email:

After responding to and reviewing the answers of all questions, please submit your completed questionnaire to the survey administrator within two weeks.

Thank you very much for your cooperation and participation in this research.

Section 1: Demographic Information

Type of industry where your company operates: (Please select only one item)

☐ Agriculture, Hunting and Forestry

☐ Fishing

☐ Mining and Quarrying

☐ Manufacturing

☐ Electricity, Gas and Water Supply

☐ Construction

☐ Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods

☐ Hotels and Restaurants

☐ Transport, Storage and Communication

☐ Financial Intermediation

☐ Real Estate, Renting and Business Activities

☐ Public Administration and Defence; Compulsory Social Security

☐ Education

☐ Health and Social Work

☐ Other Community, Social and Personal Service Activities

☐ Private Households Employing Domestic Staff and Undifferentiated Production Activities of Households for Own Use

☐ Extra - Territorial Organizations and Bodies

No. of employees of your company in year 2003:

Total sales of your company in GBP in year 2003:

Your position in the company: (Please select only one item)

☐ Commercial manager/director

☐ Purchase manager/director

☐ Contracts manager/director

☐ Materials manager/director

☐ Logistics manager/director

☐ Other (Please specify):

Section 2: The Most Important Business Process Outsourced Information

Name of business process:

Type of business process: (Please select only one item)

☐ Develop Vision and Strategy

☐ Design and Develop Products and Services

☐ Market and Sell Products and Services

☐ Deliver Products and Services

☐ Manage Customer Service

☐ Develop and Manage Human Capital

☐ Manage Information Technology and Knowledge

☐ Manage Financial Resources

☐ Acquire, Construct and Manage Property

☐ Manage Environmental Health and Safety

☐ Manage External Relationships

☐ Manage Improvement and Change

At what level or to what extent (how important) have you considered the following criteria as required capabilities in selecting the key/preferred supplier for this outsourced business process? (Please select only one number for each criterion)

Durability of supplier's product/service (i.e. Lifespan)	0	1	2	3	4
Ergonomic quality of supplier's product/service	0	1	2	3	4
Flexibility of operation of supplier's product/service	0	1	2	3	4

Simplicity of operation of supplier's product/service	0 1 2 3 4
Reliability of supplier's product/service	0 1 2 3 4
(e.g. Quality over a given period of time, Consistency)	
Supplier's reaction to your demand	0 1 2 3 4
Supplier's ability to modify product/service	0 1 2 3 4
Supplier's technical support	0 1 2 3 4
Supplier's after sales services	0 1 2 3 4
(e.g. Warranties and Claims policies)	
Supplier's quality performance (e.g. ISO 9000 accreditation)	0 1 2 3 4
Supplier's current technology (Product and Process)	0 1 2 3 4
Supplier's geographical location	0 1 2 3 4
Supplier's production facilities and capacity	0 1 2 3 4
Supplier's technological capability	0 1 2 3 4
Supplier's innovativeness	0 1 2 3 4
Supplier's Electronic Data Interchange capability	0 1 2 3 4
Supplier's compatibility with levels and functions of your company	0 1 2 3 4
Supplier's customer base	0 1 2 3 4
Supplier's flexibility	0 1 2 3 4
(in Payment, Freight, Price reduction, Order frequency and amount)	
Supplier's ability to identify need	0 1 2 3 4
Supplier's ability to maintain commercial relations	0 1 2 3 4
Supplier's availability	0 1 2 3 4
Supplier's short delivery lead time	0 1 2 3 4
Supplier's development speed	0 1 2 3 4

At what level or to what extent has the process improvement been achieved in terms of the following criteria in the related division in your company by outsourcing this business process? (Please select only one number for each criterion)

Defect prevention	0 1 2 3 4
Problems' root causes elimination	0 1 2 3 4
Standards improvement (in Quality and Performance)	0 1 2 3 4
Improvement evaluation	0 1 2 3 4
Simplicity redesign	0 1 2 3 4
New process introduction	0 1 2 3 4
Quality improvement	0 1 2 3 4
Product/service improvement	0 1 2 3 4
Product/service innovation	0 1 2 3 4
Reaction to customers' demand	0 1 2 3 4
Customers' requirement analysis	0 1 2 3 4
Customers' complaint analysis	0 1 2 3 4

Please supply any further comments you wish concerning the relationship between supplier selection and process improvement for this business process.