

Service Provider Selection in Open Standard Interorganizational Linkages - Case Electronic Invoicing

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Abstract

The objective of this thesis is to identify the relative importance of criteria in an open standard Interorganizational Linkages (IOL) service provider selection decision in the context of electronic invoicing. Within this framework, the adoption and benefits have been widely studied. However, the step falling between these two, service provider selection, has received no attention.

To fill this gap, an iterative research approach is taken. First, an extensive literature review is performed on a vendor selection body of literature expanding over five decades. Interdependencies and context dependant aspects of criteria are explored and criteria relevant in electronic invoicing service provider selection extracted. These criteria are subsequently validated through six interviews with practitioners in charge of their companies' electronic invoicing implementation projects. Once finalized, the criteria are subjected to relative importance analysis, carried out in the form of a Discrete Choice Experiment (DCE).

Data for this analysis is gathered via an Internet survey from over 300 respondents. The respondents, representing a variety of small, medium and large sized companies, were selected from persons in charge of their respective companies' electronic invoicing functions. DCE is a well established method with its roots ranging back to the early 20th century. By having respondents make tradeoffs between complete profiles of potential service providers, rather than individual criteria, it allows the computation of utilities that underlie these criteria.

The findings of this study suggest that companies regard criteria related to either present or future aspects of business as most important. These include the criteria of End-user Usability, Reach, Economic Viability and Service Development. According to the findings, the criteria that are bound to a single point in time are considered less important. Criteria such as Flexibility in Technology Consolidation, Customer References, Relationship and Project Management fall into this category. The importance of Price lands between these two extremes.

Keywords: Interorganizational Linkages, Electronic Invoicing, Service Provider Selection, Criteria, Discrete Choice Experiment.

Tiivistelmä

Tämän tutkielman tarkoituksena on selvittää organisaatioidenvälisten linkkien palveluntarjoajavalinnan kriteerien suhteellinen painoarvo avointen standardien ja sähköisen laskutuksen kontekstissa. Käyttöönotto ja hyödyt näissä puitteissa ovat jo laajalti tutkittuja, mutta näiden kahden väliin jäävä askel, palveluntarjoajavalinta, on pitkälti jäänyt tutkimatta.

Jotta tämä aukko voitaisiin täyttää, hyväksikäytän tässä tutkimuksessa iteratiivista lähestymistapaa. Ensiksi, teen kattavan kirjallisuuskatsauksen yli viiden vuosikymmenen palveluntarjoajavalintakirjallisuuteen. Tutkin kriteerien keskinäisiä riippuvuussuhteita sekä kontekstisidonnaisia näkökulmia ja poimin kontekstin kannalta merkitykselliset kriteerit kirjallisuudesta. Seuraavaksi haastattelen kuusi sähköisen laskutuksen implementoinnista yrityksissään vastannutta henkilöä vahvistaakseni näiden kriteerien validiteetin. Tämän varmistuttua analysoin kriteerien suhteellisen painoarvon Discrete Choice Experimentin (DCE) avulla.

Data tähän analyysiin kerättiin Internet-kyselyn avulla, jolla saatiin yli 300 vastausta. Vastajat, jotka olivat sähköisestä laskutuksesta yrityksessään vastaavia henkilöitä, edustivat monipuolisesti sekä pieniä, keskikokoisia että suuria yrityksiä. DCE on tunnustettu tutkimusmetodi, jonka juuret juontavat 1900-luvun alkupuolelle. Se mahdollistaa kriteerien taustalla olevien hyötyjen mittaamisen saamalla vastaajat tekemään kompromisseja kokonaisten palveluntarjoajaprofiilien kesken, yksittäisten kriteerien sijaan.

Tämän tutkimuksen löydökset viittaavat, että yritykset pitävät kriteereitä, jotka ovat sidonnaisia nykyisyyteen tai tulevaisuuteen, tärkeimpinä. Näihin kuuluu Loppukäyttäjäratkaisun Helppokäyttöisyys, Laskutuskumppaneiden Saavutettavuus Operaattorin Kautta, Liiketoiminnan Jatkuvuus ja Palvelun Kehittäminen. Tulokset myös ehdottavat, että kriteerit, jotka ovat sidoksissa yksittäiseen ajankohtaan, ovat vähemmän tärkeitä. Näitä ovat Joustavuus Teknologisten Ratkaisujen Yhteensovittamisessa, Asiakasreferenssit, Asiakassuhde ja Projektiosaaaminen. Hinnan tärkeys on näiden kahden ääripään välissä.

Avainsanat: Organisaatioidenväliset linkit, Sähköinen laskutus, Palveluntarjoajavalinta, Kriteerit, Discrete Choice Experiment.

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1 Introduction

Electronic Interorganizational Systems (IOS) are becoming more commonplace in today's rapidly developing business environment. While previously only available to large businesses, the expansion of Information Technology (IT) into all areas of business has enabled the wider adoption of electronic collaboration with suppliers and trading partners. The reduction of cost and complexity of Interorganizational Linkages (IOL) brings the potential of competitive advantage into the reach of all enterprises (Premkumar and Ramamurthy 1995). Benefits arise when businesses are able to shift from highly partner-specific legacy IOL models into less partner-specific, network models based on open standards (Zhu et al. 2006).

As a result of these trends, electronic invoicing is on the verge of breakthrough. An increasing number of consumers and businesses of all sizes are adopting IOL to send and receive invoices in electronic form. Businesses are not only endorsing the electronic invoice but some are also refusing to accept paper invoices. The benefits of electronic invoicing are well recognized and documented, including substantial gains in efficiency and considerable cost savings, not to mention the environmental aspects.

Still, despite its growing importance, electronic invoicing is a phenomenon upon which a large amount of research is yet to be conducted. A gap in the electronic invoicing body of knowledge exists especially in vendor selection. With the number of European service providers growing from 160 to over 400 in three years (Billentis 2010), vendor selection is one of the core issues of electronic invoicing. At the heart of vendor selection is the topic of selection criteria.

Vendor selection criteria is a research topic that originates from the 1960's. Since then, the topic has been studied with increasing interest that owes to the rising of such now dominant concepts as Supply Base Reduction, Just-In-Time, Total Quality Management and Supply Chain Management (Olhager & Selldin 2004; Pearson & Ellram 1995; Swift 1995; Verma & Pullman 1998; Weber et al. 1991). Researchers agree that over the course of the last few decades the purchasing function of the enterprise has increased in strategic importance and has become a potential source of competitive advantage. A consensus among the researchers also exists that accepts vendor selection

as the single most important responsibility of the purchasing function (Bharadwaj 2004; Krause et al. 2000; Monczka et al. 1992; Weber et al. 1991; Wu & Weng 2010). As a result, using the right vendor selection criteria is paramount.

Due to the existence of various selection criteria, the vendor selection problem is inherently a multi-criteria decision making (MCDM) one. In order to select the most apt vendor, tradeoffs that reflect values and preferences must be made between attributes that are not directly comparable, such as price and vendor reputation (Keeney & Raiffa 1993). This thesis attempts to discover what these tradeoffs are: how much weight electronic invoicing adopters are placing on individual criteria in comparison to other criteria.

One of the earliest studies on vendor or supplier selection criteria, the work that most contemporary research on the topic is built on, was conducted by G.W. Dickson in 1966. His findings, widely quoted in the literature, observe Quality, Delivery and Performance history as the three most important sourcing criteria. Since then, the top criteria, according to research, have varied little. For example, Dempsey (1978) found that Net price, Delivery and Quality were the three most important criteria in supplier selection. These were also the three criteria mentioned in over half of 74 articles related to supplier selection in a study by Weber et al. (1991). However, these studies have mostly attempted to discover a *universal* set of important criteria, regardless of industry.

As a result, the knowledge gained by the research in the field of criteria selection is not directly applicable to the electronic invoicing context. The vast majority of the literature has been focused on sourcing tangible goods, not intangible services. Electronic invoicing is a service that allows for the abandonment of tangible matter – paper invoices. The core of the value proposition is to save time and money by fully or partly automating these purchase-to-pay or order-to-cash processes. Furthermore, it has been generally accepted among researchers that a criteria study is required for each industry, some even advocating different studies between product classes (Choffray & Lilien 1978).

These facts call for a separate investigation of the electronic invoicing industry vendor selection process. Another differentiator from the body of criteria literature is that this

study focuses on the *relative* importance of criteria. As noted by Verma & Pullman (1998) the majority of the literature has sought out the *perceived* significances of these criteria. Results from these studies do not reflect an actual decision situation and are therefore less valid. By seeking out the relative importance it is possible to more accurately portray the interdependencies involved.

Therefore this study employs a Discrete Choice Experiment (DCE) to specifically analyze that relative importance. The method was developed by Louviere and Woodworth (1983) by integrating the concepts in conjoint analysis and discrete choice theory. At the core of these methods and theories is the imposition of tradeoffs. When respondents consciously evaluate and select discrete choices from predetermined options, it becomes possible to discover the utility they gain from specific attributes and levels. Furthermore, Crouch and Louviere (2004) have developed a method that allows the uncovering of the relative importance of the attributes, or criteria in this case, used in the DCE. This method will be used in this thesis. The rest of the methodology including the now apparent research question is presented in the next section.

1.1 Aim and methods of the study

The goal of this thesis is to explore the IOL vendor selection problem in the context of electronic invoicing by answering the following question: *What is the relative importance of electronic invoicing service provider selection criteria?* To reach this goal, three steps are taken.

First, the inherent aspects of electronic invoicing that affect vendor selection are identified. This is done by examining the field of electronic invoicing. The invoice and its electronic counterpart are defined and reflected to the trade processes of businesses. Standards and business models are scrutinized and the electronic invoicing market is examined.

Second, the criteria used in the selections are discovered. This is achieved by an extensive literature review of supplier and vendor selection literature. Since the literature is not directly applicable to electronic invoicing, this is taken into account by validating the resulting criteria via interviews of practitioners.

Third, the criteria identified in the previous steps are examined through DCE, which is carried out via a web survey. This will result in the revealing of their relative importance in an electronic invoicing service provider selection decision.

1.2 Structure of the thesis

This thesis is organized into 6 chapters. This introductory chapter has touched upon the surface of the topics covered in the study. The issues are discussed in further detail in the following chapters. Chapter 2 establishes the basis of the study by introducing electronic invoicing in greater depth to allow understanding of the underlying interdependencies and to lay the ground for the rest of the study. Chapter 3 investigates the literature of vendor selection criteria in order to identify a set of applicable criteria for electronic invoicing vendor selection purposes. Chapter 4 validates this set of criteria through interviews of managers who have selected electronic invoicing vendors. Chapter 5 moves on to outline the DCE that was used to uncover the relative importance of the identified criteria. The conclusions chapter, chapter 6, returns to the aims of the study and discusses the findings and their implications, along with limitations and possible future areas of research.

1.3 Terminology

Three notes are in order about the terminology used in this thesis. First, terms such as vendor, supplier, operator, contractor and service provider are used interchangeably. Depending on context, they all attempt to convey the same meaning: a party that provides goods or services a business is looking to acquire. Second, the same interchangeability applies to the terms criterion, attribute and factor. They indicate the qualities of the goods or services of a service provider or the qualities of the service provider itself. Third, to facilitate reading, the criteria that are taken into importance analysis in this thesis are capitalized. This is done to separate them from other criteria or concepts.

2 Electronic invoicing

This chapter covers the concept of a specific form of IOL – electronic invoicing, or e-invoicing. The chapter is divided into five sections. Section 2.1 defines the traditional invoice. Section 2.2 moves on to describing its electronic counterpart. Section 2.3 outlines the benefits of electronic invoicing. Section 2.4 goes into more detail about how electronic invoicing functions. Finally, section 2.5 describes the electronic invoicing market.

2.1 Invoice

This section defines the invoice, describes legal requirements that are imposed on it and how it relates to the trade processes of businesses. The traditional invoice's shortcomings are also covered.

The Oxford English dictionary defines the invoice as “A list of the particular items of goods shipped or sent to a factor, consignee, or purchaser, with their value or prices, and charges”. However, an invoice is frequently more than only a list of goods and values. According to EBA & Innopay (2010) it can be generally described as a commercial document used by buyers and sellers of goods or services. The custom of invoicing has grown through time and practice. In addition to the general usefulness of an invoice, there are frequently legal requirements imposed on it. For example in Europe, there are numerous tax requirements, the most important of those being value added tax. The mandatory information encompasses more than only tax details, however. For example Finnish Tax Administration (2011) states that in Finland it is required by law for the invoice to contain as a minimum the following elements:

- issue date
- identification number
- VAT id of the seller
- buyer's VAT id in cases of reversed tax liability and community trading

- names and addresses of the buyer and seller
- amount and nature of goods and the extent and nature of services
- delivery date of goods or services or date of advance payment
- tax bases and unit prices without tax and compensations and discounts
- amount of payable tax
- grounds for exemption from taxation or reversed tax liability
- information of new means of transport
- note of the marginal taxation of used goods, art, antique or collectors' items and travel agencies
- note of selling taxable investment gold
- reference to earlier invoice in case of adjustment invoice

As a result, the invoice conveys an abundance of useful information. It must be noted that the invoice is not an isolated document but linked to trade processes: the purchase-to-pay process from the buyer's point of view and order-to-payment process from the seller's point of view. These processes, in addition to invoicing, include contracting, ordering, delivering, payment and taxation in the financial supply chain. The processes are depicted in Figure 2.1. On the physical supply chain side related processes involve ordering, fulfilment and delivery. The invoice can be seen as a crucial link between the physical and financial supply chains. (EBA and Innopay 2010)

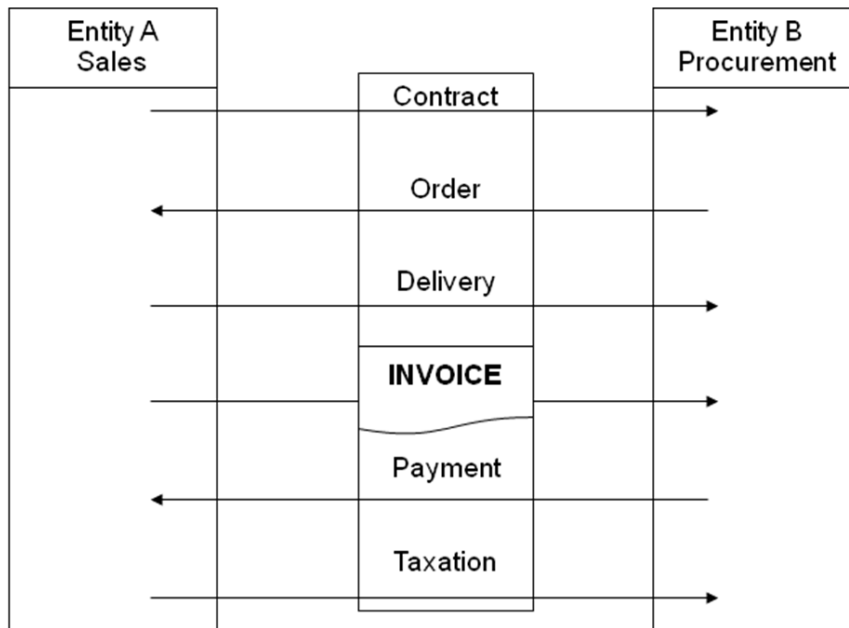


Figure 2.1 Trade processes (EBA & Innopay 2010)

For the invoice to reach the buyer there needs to be an exchange between the two parties. This exchange can occur in various ways, the most common three of which are exemplified in Figure 2.2. First, frequently the case with larger purchases, the invoice can be received upon delivery of goods. Second, the most common method is to exchange the invoice by mail. Third, an exchange can also occur simply face-to-face.

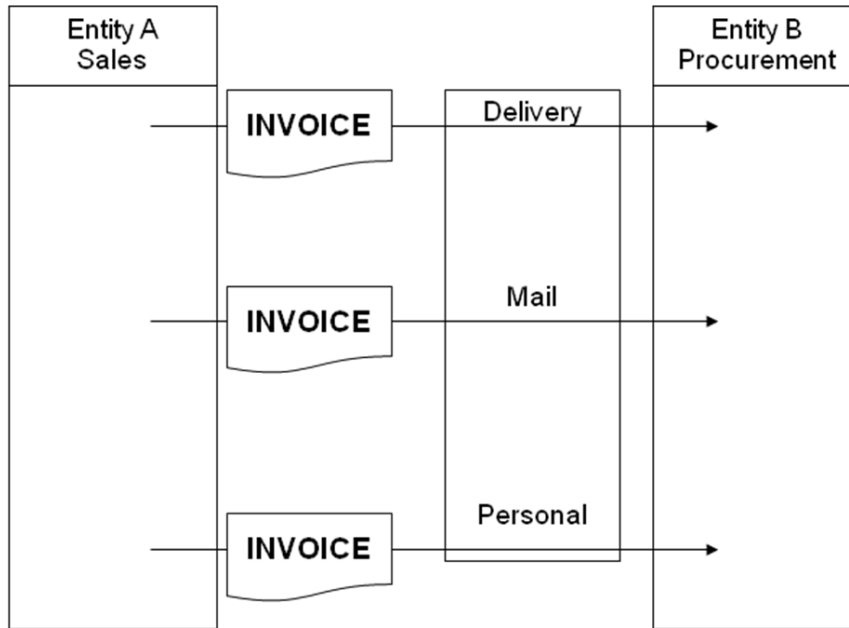


Figure 2.2 Delivery methods (EBA & Innopay 2010)

Using these traditional exchange methods leads to a number of problems for both the buyer and seller. Firstly, delivering the invoice via mail, which as reported is the most common method, takes a considerable amount of time, usually a number of days. Secondly, upon receiving the invoice, it must further be allocated to the correct handler. Finally, the handling itself is human capital intensive and prone to errors. What renders contemporary invoicing particularly irrational is that invoices are generated by information systems, then printed on paper, and sent to the recipient who inputs the invoice in their information systems manually. This is depicted in Figure 2.3.

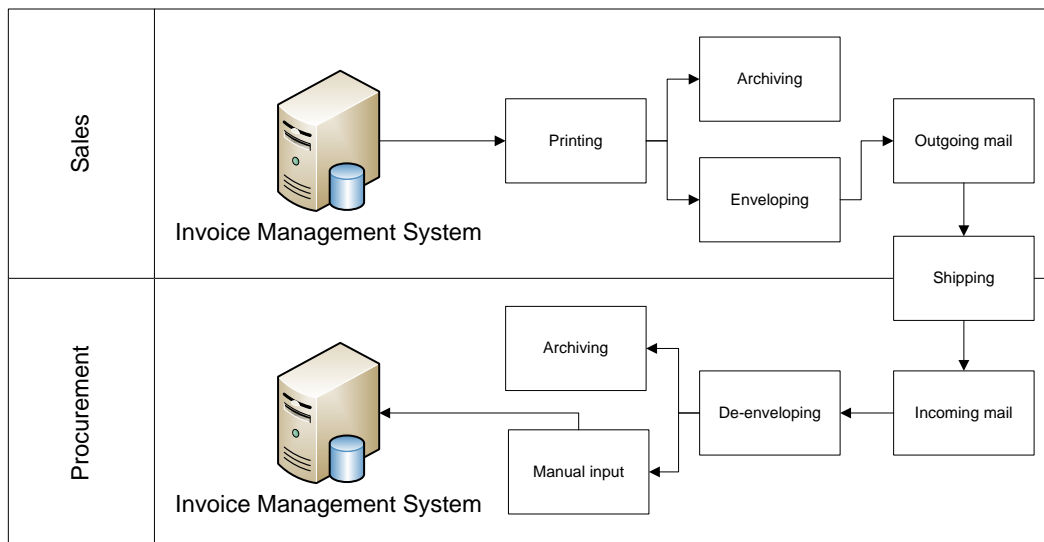


Figure 2.3 Traditional invoicing process (Tieto 2011)

The electronic invoice, as discussed in the next section, eliminates many of these unnecessary steps.

2.2 Electronic invoice

This section first defines the electronic invoice. The history of the electronic invoice will be reviewed, followed by its benefits compared to the paper invoice. The section will conclude with electronic invoicing standards and exchange models.

An electronic invoice is the electronic equivalent of a paper invoice. According to Suomen Yrittäjät (2010) an electronic invoice is an invoice that flows from seller to buyer electronically and can be processed automatically, without manual labour, in financial management software. The invoice must therefore be in structured format, as opposed to free format, to render it machine readable. In this thesis invoices that have been exchanged electronically but are in unstructured format, such as Portable Document Format (PDF), are not considered electronic invoices. It is frequently possible, however, to display an electronic invoice that is in structured form as an image resembling a traditional paper invoice.

IOS for data transfer have been in use since the end of the 1960's. The first standards were developed in the 1970's. David and Greenstein (1990) define a standard as a set of technical specifications adhered to by a producer, either tacitly or as a result of a formal

agreement. These Electronic Data Interchange (EDI) standards became a popular method of exchanging invoices between large businesses and this is where electronic invoicing has its roots in. EDI is defined by European Commission Recommendation 1994/820 as the electronic transfer, from computer to computer, of commercial and administrative data using an agreed standard to structure an EDI message. Even though modern electronic invoicing also qualifies as EDI, in this thesis EDI is considered in the context of legacy IOS not capable of many-to-many transmissions. EDI systems were cumbersome to install and required large investments in time and money. In addition, they had to be established point-to-point, making it necessary to create new individual connections to each EDI trading partner. In order to render EDI investments worthwhile, a large amount of data exchange was required, thus making it an unsuitable solution for Small or Medium Sized Enterprises (SMEs). Furthermore, a paper copy was frequently required in addition to the EDI transmission due to legislation. For example in Finland the legislation has allowed for a paperless office only from 1997. These characteristics of EDI render it inappropriate for today's needs and possibilities: the rise of new open standards IOL technologies such as XML (eXtensible Markup Language) and HTML (HyperText Markup Language) opens new doors for enterprises. Nearly all businesses including SMEs have access to the internet. In the easiest case, all that is required to start using electronic invoicing is a browser. In addition to low or no initial capital investments, there are numerous other benefits to electronic invoicing. These are covered in the next section.

2.3 Benefits of electronic invoicing

There are numerous benefits to electronic invoicing. The traditional invoicing process was depicted in Figure 2.3. Figure 2.4 shows this process when electronic invoicing has been adopted.

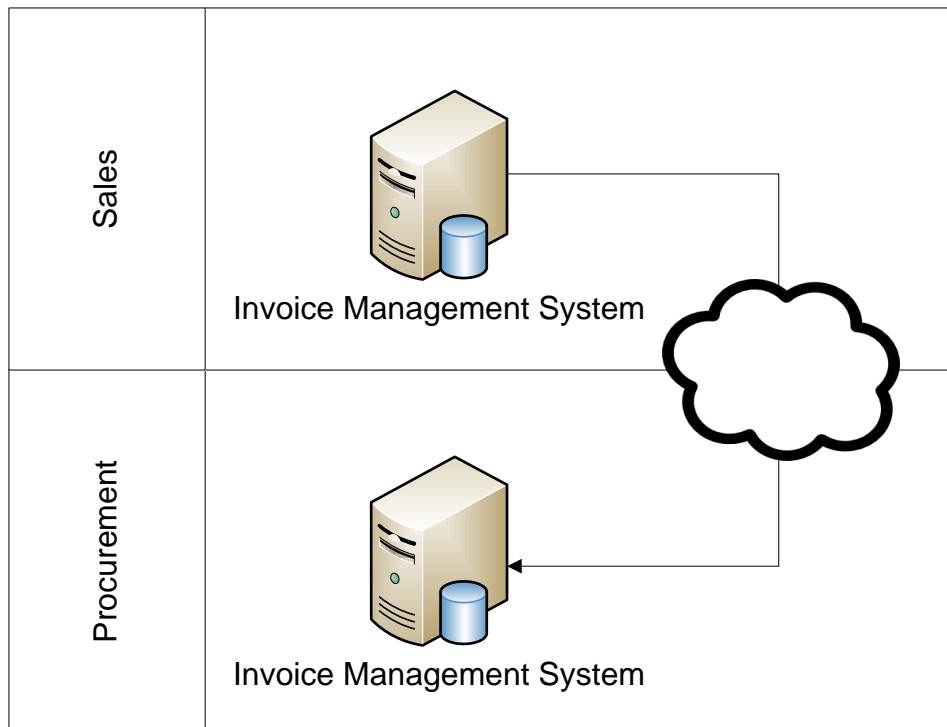


Figure 2.4 Electronic invoicing process (Tieto 2011)

The manual processes of printing, enveloping, mailing, shipping, retrieval, de-enveloping and inputting have been removed. The invoices move through networks and are archived electronically. This simplification of the process results in various benefits. The Final Report of the Expert Group on e-Invoicing by Harald (2009) lists six of these benefits that arise from switching from paper invoices to electronic ones:

- Competitiveness is increased due to digitalization of business processes. This is due to improved productivity and customer satisfaction that come with the elimination of error prone manual processes.
- Major cost savings are achieved owing to the decrease of required manual work, material and transport services. According to Billentis (2011) this can amount to 1-2 per cent of total turnover and 60-80 per cent of cost per invoice processed. In addition, electronic invoicing is a key driver for the full automation of financial processes, which brings about further savings. Savings are also brought in by the lessened need for auditing costs and fraud and loss prevention.

- Electronic invoicing improves cash flow by enabling accelerated payments and reducing credit losses. The length of trade processes can be substantially reduced. As noted electronic invoicing leads to further levels of automation that in turn can spread to SMEs from larger enterprises that frequently represent the initial adopters.
- Employees in the invoicing process can be transitioned to more productive labour, which is especially important today when the total working age population is in decline. In addition, the adoption can be seen as an organisational learning process and lead to further automation of business processes.
- Adoption will facilitate greater integration and harmonization of standards and practices between European countries.
- Carbon emissions from paper production and consumption are lowered thus directly contributing to the cause of protecting the environment.

Due to these numerous and substantial benefits it becomes clear that the adoption of electronic invoicing should be facilitated globally. To do this, we must first understand how electronic invoicing functions. This is the topic of the next section.

2.4 Electronic invoicing standards and models

This section reviews the methods and standards to transmit electronic invoices and the business logic of electronic invoicing service providers.

Electronic invoices are generally not sent from seller to buyer directly. Rather, they are routed through an intermediary – a service provider. What is important to note is that the transmission of electronic invoices between service providers is based on standards. There is a colourful array of various standards across Europe and worldwide. However, the co-existence of numerous diverse standards is troublesome due to incompatibilities and conversion tasks from one standard to another. In Finland, on the other hand, there are only a small number of standards in general use. These are Finvoice, developed by the Finnish Bankers Association, TEAPPSXML developed by Tieto, eInvoice, developed by the Nordic e-invoicing Consortium and PostiXML by Itella. Operators can send and receive invoices in multiple standards. In addition, they also have the

ability to send and receive invoice data in a company in-house, non-standard, format. This is beneficial when the company's financial management system is not able to produce or read standard invoices. However, Finvoice is the only standard used in invoice transmission between Finnish banks that also act as operators. The interrelationships between various formats and actors in Finland are pictured in Figure 2.5.

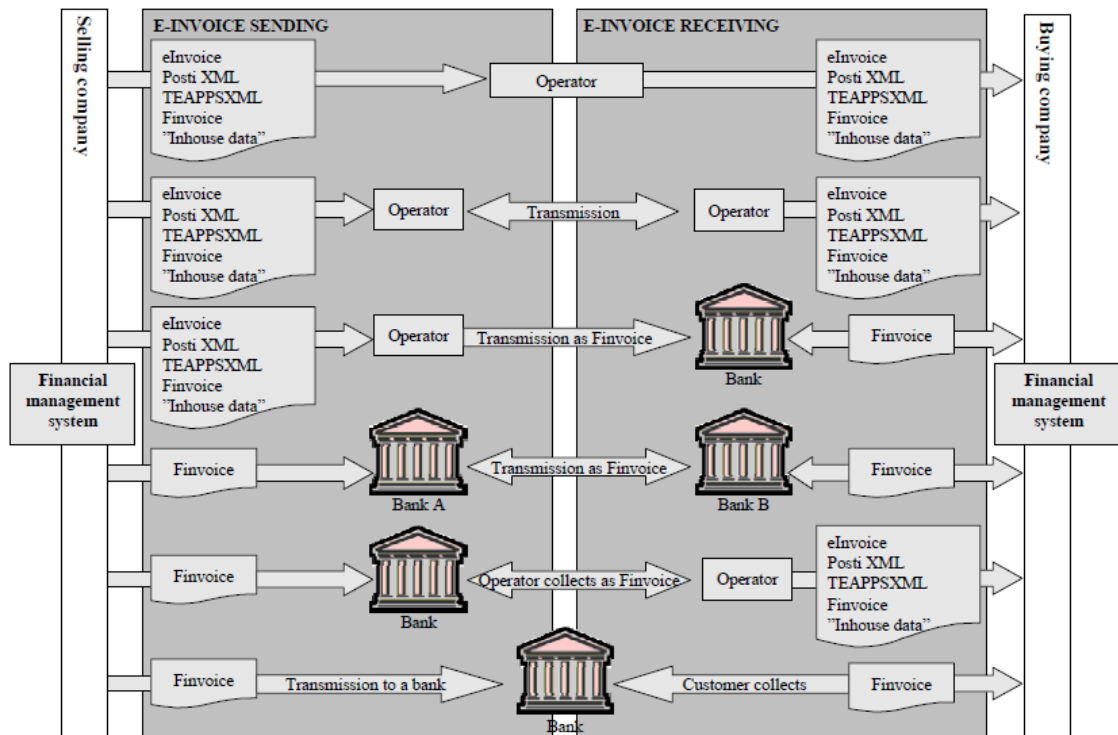


Figure 2.5 Electronic invoice transmission methods in Finland (Tieke 2005)

There are three models for exchanging electronic invoices between the buyer and seller, two of which include using a service provider. These are the two-corner, three-corner and four-corner models, discussed in further detail in the following.

2.4.1 Direct two-corner

In the direct two-corner or bilateral model, the exchange of the invoice is done exclusively between the buyer and the seller, point-to-point. There are no intermediators in between. A typical example is a legacy EDI connection. As discussed, the two-corner model is falling into obsolescence. This model is depicted in Figure 2.6.



Figure 2.6 Direct two-corned model (Harald 2009)

2.4.2 Three-corner

In this model an invoicing process is set up where businesses have separate contractual relationships with the same service provider, to whom they transfer to or receive invoices from. The provider then forwards these invoices, possibly converting them from standard to standard. This enables businesses to reach several trading partners by being connected to a single service provider. However, it is only possible to reach businesses contracted with the same service provider. To increase reach connections with multiple providers have to be established. According to Basware (2009), these models are most common in the US. This model is depicted in Figure 2.7.

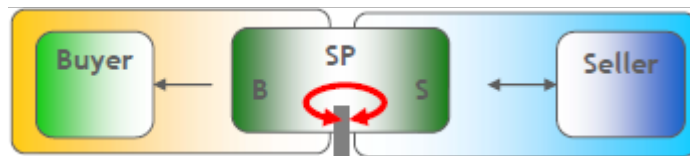


Figure 2.7 Three-corner model (Harald 2009)

2.4.3 Four-corner

In this model businesses are able to exchange invoices with invoicing partners contracted with a variety of service providers. This is possible due to service providers' interoperability agreements. The senders and receivers of invoices need only one service provider as their point of contact: the operator is the one contracting multiple operators, who in turn forward the invoices to their customers. This concept originates from the banking sector and Finvoice is a prime example (EBA and Innopay 2010). This model is depicted in Figure 2.8.

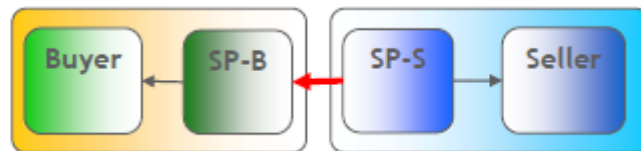


Figure 2.8 Four-corner model (Harald 2009)

Electronic invoicing service providers aim to add value to businesses or consumers who deal with invoices, in effect involving nearly all businesses and consumers. These services can be as modest as taking care of the exchange of invoices but can also encompass the complete sourcing of accounts payable or accounts receivable. On a European scale there is a myriad of various service offerings, owing to numerous countries, languages, commercial practices, service concepts, legal environments and implementations of relevant EU directives. For example, EBA and Innopay (2010) have identified a variety of 13 models for service provision. However, there are many operators using combined models; they are not mutually exclusive. Since this thesis does not exclusively focus on any specific service provision model, they are not covered in detail. The next section outlines the market electronic invoicing providers are facing, both in Europe and in Finland.

2.5 Electronic invoicing market

In this section the European market for electronic invoices is taken into examination. A review of the total amount of invoices and service providers is followed by adoption rates in European countries. The section will conclude with introducing the issue of fragmentation now prevalent in Europe. The global and Finnish markets are also examined.

It was expected that 2.2 billion electronic invoices were exchanged by 2.8 million businesses and 56 million consumers in Europe in 2010. It was estimated that 2,800 businesses and 40,000 consumers became new electronic invoicing users every day. The amount of service provision contesters of the total electronic invoicing pie had grown from 160 in 2006 to 440 in 2010, which demonstrates the lucrativeness of the growing market. However, the growth rate has been declining: it was 10 per cent in 2009 to 2010. Consolidation in the market is expected. There are 15 service providers in Europe

exchanging more than 20 million invoices, of which Logica, Itella, Tieto and Nordea are also in the Finnish invoice market. The combined turnover of European providers has grown over 2 billion Euros. (Billentis 2010)

Still, according to EBA and Innopay (2010), less than 10 per cent of invoicing volumes in Europe are in electronic format. This is a surprising figure since electronic invoicing has been in development for more than 20 years but is still considered to be in its early stages. However, adoption rates vary substantially from country to country. The Nordic countries are considered most advanced in terms of electronic invoicing with adoption rates over 12 per cent but some western countries, such as Ireland and Spain are also seeing growth with adoption rates of 6 to 12 per cent. The rest of Western Europe is at 1 to 6 per cent. These percentages are pictured in Figure 2.9. EBA and Innopay (2010) estimates that over €200 billion can still be made in savings in the public and private sector across Europe by adopting. Globally, SWIFT (2008) estimates that Europe accounts for 56 per cent, North America for 35 per cent and Asia-Pacific for 7 per cent of the total electronic invoicing market. Adoption rates in these regions were 4 to 15 per cent, 3 to 10 per cent and unknown, respectively. Electronic invoicing adoption has been studied extensively, frequently with the aid of diffusion of innovation theory by (Rogers, 1983). Examples of these studies include (Penttinen et al., 2008). Adoption is, however, not the primary focus of this thesis.

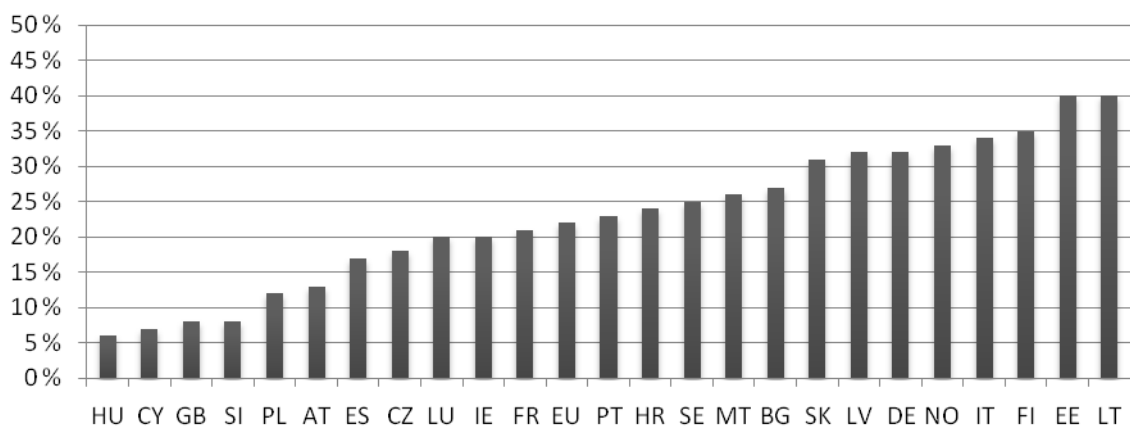


Figure 2.9 Electronic invoicing adoption in the EU (DB Research 2010)

Electronic invoicing continues to be a very domestic activity: Cross-border electronic invoices are uncommon. According to EBA and Innopay (2010), they amount to only 5 per cent of total electronic invoice transactions. Reasons for this lie in legal uncertainties, cost of compliance and geographic reach of existing service providers (SWIFT 2008). Larger businesses and public administrations account for the vast majority of e-invoices, while mass-consumer e-invoicing is on the rise. SMEs which account to 99 per cent of Europe's businesses are still lagging behind. There are over 20 million SMEs and 200.000 large businesses in Europe (European Commission 2011).

A key issue on the European level concerning electronic invoicing is fragmentation. Fragmentation in this context indicates that two users of electronic invoicing are unable to exchange invoices in electronic format due to various service providers that have no interoperability agreement between their networks. In other words they are using the three-corner business model described in section 2.4.2. Since there are over 400 operators in Europe, this one of the largest problems holding back adoption. However, interoperability agreements, or the four-corner business model as described in section 2.4.3, are a growing trend among operators trying to gather more reach. According to The Final Report of the Expert Group on e-Invoicing (2009), an increasing number of these operators are signing interoperability agreements to reach more businesses. A role is also played by banks that have been key in reaching both SMEs and consumers, due to their experience in payment networks, ability to provide supply chain financing and the trust they enjoy. SWIFT (2008) found that all banks are already offering electronic invoicing services. Half of them support or intend to support interoperability models. (EBA and Innopay 2010)

This research focuses mainly on the Finnish market and the businesses interviewed and surveyed for this thesis are Finnish businesses. According to The Ubiquitous Information Society Advisory Board (2009), there are some 500 million invoices sent and received in Finland annually. Of these, about 200 million are Business-to-Business invoices. Roughly 35 per cent or 80 million of these were electronic invoices. 30 per cent of consumer invoices were electronic as opposed to 10 per cent in 2008; it was expected that the number will grow over 50 per cent in a small number of years (Itella 2010). Tieke, The Finnish Information Society Development Centre, has taken an active

role in developing electronic invoicing in Finland. It hosts a list of electronic invoicing operators that fulfil Tieke's criteria of being an operator. As of April 2011 this list encompasses 24 operators, including nine banks. Tieke also hosts an eInvoicing Registry, which contains the contact information and eInvoicing addresses of Finnish companies capable of electronic invoicing. This list was utilized to identify respondents for this thesis, which will be covered in more detail in chapter 5. The next chapter discusses the service provider selection criteria literature review undertaken for this study.

3 Review of service provider selection criteria literature

This chapter covers vendor selection criteria research that is relevant to IOL service provider selection in an electronic invoicing context. The chapter is divided into five sections. Section 3.1 takes an overview of the research in the field of supplier selection. Section 3.2 clarifies what are the implications of looking at the literature from an electronic invoicing point of view. Section 3.3 proceeds into further detail about criteria themselves. Section 3.4 moves on to investigate the relative importance of these criteria. Finally, section 3.5 covers the selection of applicable criteria to be used in determining how managers choose electronic invoicing providers.

3.1 Overview of literature

This section reviews vendor selection in general. First, a history of vendor selection research is provided and it is explained why the topic is of high importance to both sellers and buyers. Second, the section looks at how this thesis relates to the phases of supplier selection.

Vendor selection criteria literature dates back to the 1960's when G.W. Dickson published his influential work titled "An analysis of vendor selection systems and decisions" in the journal of purchasing. Since then the interest in selection criteria has increased with a growing number of research publications each decade (Sen et al. 2008; Weber et al. 1991). This increased interest can be explained by the rising of concepts such as Supply Base Reduction, Just-In-Time, Total Quality Management and Supply Chain Management (Olhager & Selldin 2004; Pearson & Ellram 1995; Sen et al. 2008; Swift 1995; Verma & Pullman 1998; Weber et al. 1991). There is an agreement among the researchers that purchasing has increased in importance in companies. It has become a strategic asset and a potential source of competitive advantage. The agreement extends to the level of accepting vendor selection as the most essential task of the purchasing function (Bharadwaj 2004; Krause et al. 2000; Monczka et al. 1992; Weber et al. 1991; Wu & Weng 2010). As a result, using the correct vendor selection criteria is imperative.

Knowledge about vendor selection preferences is not only important for decision makers but also for vendors. Knowing which criteria are valued the most helps service providers position themselves according to their business strategy. They can focus on improving the aspects they find themselves most lacking in or shift focus from an area they have perceived as being more important than it actually is from the customer viewpoint.

There are four phases to selecting a supplier, as noted by de Boer et al. (2001): problem definition, formulation of criteria, qualification of suitable suppliers and the final selection of the ultimate supplier(s). This chapter focuses on the second and probably most crucial phase: formulation of criteria. The aim of this part of the research is descriptive: to find criteria that managers use when making vendor selection decisions and what are the interdependencies and relationships between these criteria. Watt et al. (2009) have noted that frequently the goal of this type of research is to find universal criteria that can or should be applied when making any sourcing decisions. However, this study focuses on a specific sourcing situation: electronic invoicing. The findings of this literature review are used to form a set of base criteria to expand upon later in this thesis.

3.2 E-invoicing point-of-view

This section clarifies what implications the electronic invoicing perspective has on criteria research. First, a comparison between universalistic and industry specific research is made. Second, it is clarified why single sourcing is dominant in electronic invoicing. Third, the industry specifics of electronic invoicing are mirrored into manufacturing context to illuminate ensuing contradictions.

As noted, most research on supplier selection attempts to identify a universal set of criteria that applies to all sourcing situations (Watt et al. 2009). However, researchers agree that vendor selection criteria vary between industries (Sen et al. 2008). This thesis attempts to be that piece of research in the area of electronic invoicing. Some suggest that criteria vary even between parallel product classes within the same industry (Choffray & Lilien, 1978). However, according to Sen et al. (2008) this is not the case: differences do not exist within the buying criteria across an array of similar products.

Further strengthening this statement is Bharadwaj's (2004) study of electronics parts procurement: no significant differences in relative importance were found. Also, according to a study by Choi and Hartley (1996), supplier selection preferences do not significantly vary across the supply chain. More similarities than differences were found from supplier selection preferences in the American auto industry.

An important factor that has to be taken into account when taking vendor selection into electronic invoicing context is single sourcing. Single sourcing denotes choosing only one supplier to supply a given material or provide a service. Pearson & Ellram (1995) found that single sourcing has become more common in the manufacturing business. This is also the case in electronic invoicing. Businesses may have different operators on the outgoing and incoming side but rarely on both sides, operator interoperability permitting. The companies interviewed for this thesis saw that abandoning single sourcing would lead to unnecessary labour in the form of contracting and systems integration in addition to increased costs, without reaching real benefits. Having a single contact point for all outgoing or incoming invoices was seen as the best alternative, even though it meant increased dependency on one provider. This was a risk each interviewed business was willing to take.

There are a number of implications to looking at the criteria from an electronic invoicing point-of-view regarding individual criteria. The majority of the literature is written with manufacturing in mind. As a result such criteria as lead time rise to high importance. However, lead time is not an issue in electronic invoicing context: invoices flow from system to system in an instant. A more important criterion in this example would be circulation time: how much time does it take for an invoice to be handled once it is sent from the supplier to the buyer. Since the transfer of invoices is frequently instantaneous, this time is the same as circulation time in the invoice management system, which is frequently operator independent. Another important criterion ever present in the literature is quality. In a manufacturing environment quality can represent, for example, the deviation from the standard diagonal of a screw head or the durability of a car's suspension. However, in a digital context quality is a troublesome concept. If it is understood in relation to defects in an invoice or details that are missing from an invoice, the service provider rarely has input in such qualities: these aspects are

dependent on the sender of the invoice. Mechanisms that disallow the input of such invalid invoices can hardly be considered as characteristics of quality: they are the results of capabilities in other areas. Therefore it is most convenient to include quality as a factor in other composite criteria, such as dependability or technological capability. I will cover individual criteria more deeply in the following sections.

3.3 Vendor selection criteria

This section will cover the fundamentals of vendor selection criteria. This includes how criteria are found, what are the most common or basic criteria and how they can be categorized. What individual criteria exist in the literature is not covered in great detail. However, individual criteria are used in a later part of this chapter to form the basis of criteria suitable for electronic invoicing.

Generally, there are two ways how authors discover supplier selection criteria: interviewing purchasing managers or through literature reviews of research that had interviewed purchasing managers. Frequently both methods are used. For example Spekman (1988) derived a list of supplier/product attributes buyers considered important. The list items were amassed from past research, trade publication data and interviews with purchasing managers. The list consisted of 31 criteria, which were reduced to 21 after being subjected to a factor analysis. Similarly, in this thesis I use a thorough literature review to find criteria and then validate them by interviews.

In supplier selection literature, there exists a concept of basic criteria, or criteria that are universal and important in every supplier selection decision. These vary from source to source. However, they are generally accepted as being price, quality, delivery and service (Lehmann & O'Shaughnessy 1974; Sen et al. 2008; Weber et al. 1991; Wilson 1994). As noted, from an electronic invoicing point-of-view two of these are problematic: quality and delivery. The same applies to other basic criteria lists discovered by authors. Talluri and Narasimhan (2004) list the basic criteria as cost, quality and delivery and also criticize many works for taking into account only these operational criteria. Weber et al. (1991) found that of 74 articles reviewed, price, delivery and quality were most discussed. Most of the articles have concluded that quality is the most important criterion.

In addition to the basic criteria there is a varying amount of other criteria, frequently qualitative. A great deal of the literature draws from Dickson's 1966 article, among these being Weber et al. (1991), Choi and Hartley (1996) and Sen et al. (2008). Dickson listed 21 individual criteria. Many authors attempt to add to these. For example Choi and Hartley (1996) found that closeness of the relationship and continuous improvement capabilities were largely left unnoticed in earlier studies. A study by Watt et al. (2009) listed new criteria introduced by various authors over the past few decades. These were, among others, health and safety, project approach/methodology, management skills, banking arrangements, current workload and time of year.

Criteria are frequently divided into qualitative and quantitative. Quantitative criteria can be measured in absolute amounts, for example in total cost or hours in lead time. These quantitative criteria are frequently the core of selection criteria: easily measured and accepted as important. Conversely, qualitative criteria cannot be measured easily: for instance there is no generally accepted scale for measuring relationship strength or supplier reputation. This is partly the reason why they vary from study to study and can be thought as excluded from the basic criteria.

Another way to divide individual criteria is to categorize them. Categories are usually very general, for example in Demirtas & Ustun (2008) the category risks contains such criteria as customer complaints, order delays and inability to meet further requirements. Other examples of categories include past performance attitude and organizational culture and strategy issues. Of the 15 articles selected to extract criteria from for this study, 9 had categorized them in some way. This will be covered in more detail in section 3.5.

3.4 Importance of criteria

This section focuses on trends and issues associated with the interdependencies of criteria, the main topic of this thesis. A look is taken at the concept of trade-offs and a view provided of the general ranking of criteria in an isolated context. The relative importance of criteria that varies from situation to situation is covered in more detail.

The reason criteria are essential is that the selection of suppliers is characterized by trade-offs. Rarely one supplier excels or outperforms others on all selection criteria. Frequently suppliers offering the lowest price are lacking in other areas such as project competence or services. This is why the relative importance of criteria is important: the attempt is to select the best overall service provider. A number of studies have been made to uncover these interrelationships.

Studies frequently report that price has diminished in importance while quality and intangible attributes have risen (Bharadwaj 2004). Gustin et al. (1997) found this to be especially true in systems/software selections that can be associated with electronic invoicing. However, the declining importance of price may only be true in the case of perceived, not actual, importance. A study by Verma and Pullman (1998) found that managers state price is not an important criterion while at the same time they place utmost weight on it in an actual selection situation.

Dempsey (1978) found that explicit economically oriented criteria rank the highest. However, among his observations was also that the final decision may depend upon those criteria that are ranked intermediate or even lower. This was the case if the vendors in line for a contract were graded similarly on the most essential criteria. The top ranking criteria could, according to the study, be considered screening factors, upon which the set of plausible vendors is selected for further analysis. At this stage, more emphasis is placed on the low ranking criteria. The implication of this finding was that vendors should not only focus on “hard” criteria but also develop their “soft” attributes. Dempsey came to the conclusion that no criterion was significantly more important than others and that no criteria should be given unique standing.

Among Dempsey’s findings was also that the relative importance of criteria varies with the type of industry in question and also with the type of buying problem. This is widely accepted in the literature, for instance by Lehmann and O’Shaughnessy (1974). Three types of buying problems, also common in the literature, are presented: straight rebuy, modified rebuy or a new task. New task is generally accepted as the most complex of buying situations with the highest amount of uncertainty. This thesis focuses on new task situations, since electronic invoicing is a relatively new phenomenon and buyers

are still in the adoption phase selecting service providers for the first time. Whereas buyers are found to be more sensitive to vendor's technical and financial prowess in a new task problem, they seem to be more sensitive to prices and assured delivery in a modified rebuy situation.

Ellram (1990) found that the supplier selection decision in strategic partnerships differs from the traditional buyer-supplier selection decision. In addition, Choi and Hartley (1996) note that these long-term relationships are becoming more common in supply chains. The managers interviewed for this thesis were more inclined to view the electronic invoicing service provider selection decision as a strategic partnership than a routine supplier selection task, therefore making her findings applicable to this study. Ellram's study observed that earlier literature had had a short term focus and found that a long term view of the supplier-buyer relationship complicates the supplier selection process. One of the main findings of the study was that while supplier selection is the most important task of the purchasing function, a partnership focus makes it even more important. According to Ellram, the introduction of partnerships requires the consideration of additional factors. These were less quantifiable in nature than traditional criteria.

While it has been shown that the number of criteria varies with the experience of the decision maker by Watt et al. (2009), Monczka et al. (1992) found that the overall preferences of decision makers vary over time: In a study performed in 1981 purchasers found profile-type criteria such as financial status most important. In 1989, performance capabilities had taken top priority. This finding is consistent with those of Wilson (1994). Culture also plays a role: Chang and Ding (1995) found some differences in buying behaviour between Chinese and Taiwanese buyers. Differences are in all probability increased when comparing western and eastern buyer behaviour.

Swift's (1995) study, focused on single sourcing, notes that with a reduced number of suppliers, or even with a single supplier, the selection problem becomes even more critical. Her study is one of the numerous studies that quote Spekman's (1988) list of relevant supplier selection criteria.

Weber et al. (1991) found that the relative importance of criteria also vary with the perspective of the study. The authors reviewed 74 articles which address vendor selection criteria that had been published since Dickson's influential work in 1966. Attention was paid to the general topic of the article and on which of the Dickson's 23 criteria the focus was. Those 13 of the 74 articles that were focused on the Just-In-Time philosophy did not address some of the otherwise top ranked criteria. The article has been a source of criteria selection for many subsequent studies that do not primarily focus on criteria identification or the relative importance of criteria. For example, Chaudhry et al. (1993) derived their selection of criteria from Dickson's article through Weber et al. (1991), focusing on the four principal criteria of net price, delivery, quality and capacity. They noted that vendor selection models had not been taking into account the effect of price breaks and centred the study on the subject.

The study of Shaw et al. (1989) focuses on the importance of intangible or qualitative attributes in the context of operating system purchases. The authors found that intangible attributes are more important than product performance attributes. This was because when the buyers looked for a solution, they first screened offerings if they met their minimum technical requirements. If they did, the buyers moved on to examining the vendor: uncertainties such as product development and business continuity received top priority. The technical aspects were seen as given, while the future support and organizational risk factors remained open and dependent on the future. The study's subject resembles the choice of a service provider more than a supplier selection one, so it can be seen as indicative. Vendors must reach beyond technical experience and solidify the intangible elements of their offering.

3.5 Criteria selection

This section will proceed through the identification of suitable criteria from the literature for electronic invoicing utilizing the knowledge uncovered in the previous section. These criteria will then be the subject of a relative importance analysis in the next chapters of this study.

I identified 55 scientific works dealing with vendor selection criteria from the literature. Of these texts, with the aid of the literature review presented here, I found 15 to be

appropriate for criteria extraction (Bharadwaj 2004; Choi & Hartley 1996; Demirtas & Ustun 2008; Dempsey 1978; Ellram 1990; Muralidharan et al. 2002; Pearson & Ellram 1995; Sen et al. 2008; Shaw et al. 1989; Swift 1995; Verma & Pullman 1998; Watt et al. 2009; Watt et al. 2010; Weber et al. 1991; Wu & Weng 2010). Texts that were too industry specific or more focused on forming a mathematical model than reviewing criteria were discarded. Focuses were on identifying universal criteria, noting importance shifts of criteria in various sourcing situations or identifying perceived differences in criteria. In addition, while essential for the remainder of this thesis and the analysis of results, the importance established for the criteria in their respective scientific works were not taken into account.

I collected the individual criteria presented in the texts selected into a single list. The criteria in most of the 15 works were already collected from earlier research. For example Watt et al. (2009) quotes 31 sources as the source of criteria. Therefore the criteria actually represent a large amount of the whole vendor selection criteria literature. In total the review resulted in a list of 255 individual criteria. After careful examination of the whole list I combined overlapping criteria and removed inappropriate criteria in the context of electronic invoicing. Most of the literature screened for criteria extraction had categorized the criteria, the amount of categories varying from 4 to 16. I removed associations of individual criteria from their corresponding initial categories while keeping them contextually intact. This resulted in a list of 114 criteria.

The refined list had to be factored into principal criteria for the purposes of this study: It has been suggested that buyers cannot effectively handle more than seven to nine at once in an evaluation situation (Gustin et al. 1997; Miller 1956). In addition, Shaw et al. (1989) suggest dividing attributes into core attributes that customers see as most important and peripheral attributes that do not need so much attention. Additionally, DCE imposes a limit to the amount of attributes examined: no more than 8 to 12 are frequently suggested. I identified ten principal categories:

- Dependability
- Economic Capability

- Flexibility
- Management and Organization
- Performance History
- Price
- Quality
- Relationship
- Services
- Technology

The list represents the combination of all criteria represented in the literature that can be translated into electronic invoicing context. To validate this list and to identify additional criteria I sought the professional knowledge of business executives who had been responsible for adopting electronic invoicing and selecting an operator. Six interviews were designed on the basis of this list of ten criteria. This will be the topic of the next chapter.

4 Selection criteria in case companies

This chapter first presents the data collection method used in interviews performed for the purposes of this thesis. This will be followed by cases of six interviewed companies. Finally, the results and implications of the interviews are presented.

4.1 Collection of data and interview method

The purpose of the interviews was to validate the criteria found in the literature review in parallel to reflecting the context and environment of the business to gain insight into the concept of service provider selection. An additional goal was to uncover criteria that had been left unnoticed. Primary data was collected in six interviews. The businesses selected for interviewing consisted of five large companies in various industries and one small company for contrast. Interviewees were selected from contacts that had been participating in Real Time Economy research earlier. Six companies were interviewed: ALD Automotive, Oriola, S-Group, City of Helsinki, Finnair and Finncontainers.

Since the management and handling of outgoing and incoming invoices at companies is frequently separate, I decided to focus on incoming invoices. Research by Penttinen et al. (2008) indicates that the incoming side is where the real benefits of electronic invoicing are considered to be found. Indeed, the interviewees shared this opinion. However, when the knowledge and experience of the interviewee allowed it, outgoing invoices were also discussed. In addition, in the case of City of Helsinki a joint interview was conducted with two executives: one from both sides.

The interviews followed an outline found in Exhibit I. The interviewees were first asked about their professional background before moving into company specific questions. This was followed by questions about the invoicing situation in the company including questions about selection criteria. The interviews concluded with additional information questions. All of the questions were open ended. In addition, at the end of the interview, interviewees were asked to fill a short questionnaire that evaluated the importance of the criteria identified from the literature in chapter 3. This list was not presented to them before or during the interview. The evaluations were done on a Likert scale from 1 to 7.

The questionnaire acted as a supplement to the open ended questions in the form of further confirmation.

All interviews were recorded and subsequently transcribed, the result of which is presented in the following. Each case will start with details about the interviewee and a short introduction of the company in question, followed by the invoicing situation in the company. The cases conclude with what criteria were considered important in the company.

4.2 Case 1: ALD Automotive

Empirical data was collected from the head of the development division. He has been in the position since 1999 when the division was formed. All in all, his career at ALD Automotive, then WV-Auto, started in 1977.

4.2.1 Company background

ALD Automotive is the market leader in the maintenance leasing business in Finland with a share of 35 per cent. The group does business in 39 countries. In Finland, the company's turnover was 240 million EUR. ALD Automotive operates three retail stores in the country: Vantaa, Tampere and Oulu.

4.2.2 Invoices

ALD Automotive sends about 3,000 invoices per month, 1,500 of which are in electronic format. They have been able to send electronic invoices from as early as 2001. The project was initiated to acquire a customership and has proven a valuable investment.

The volume of ALD Automotive's incoming invoices is 150,000 per annum, translating to about 10,000 – 15,000 a month. 80 per cent of these invoices result from the core business of leasing cars: most invoices are sent by large car dealerships in the Helsinki region. None of the incoming invoices are in electronic format, since the project to transform them into electronic format is ongoing and has been so for four years. However, if the change were to happen now, some 30 per cent of invoices could be

received electronically from the start. In two years' time half of the invoices would "certainly be electronic".

Since the project has been on-going for four years much of the decisions have already been made. Six service providers have been screened for selection and requested for proposals. ALD Automotive is forced to consider another operator than they have on the outgoing side, since the solution their current operator offers is not flexible enough for the company's needs.

The operator selection is not considered to be done for a short time but maybe for as long as ten years. The contract will be made for three years after which another round of bidding will be established to keep the current provider on their toes. Barriers of entry to bidding are not completely fixed, because if they were not much competition would be left. There are no strict guidelines to be followed in the service provider selection but the process still holds a good level of formality.

With time, the criteria of provider selection have changed substantially for ALD Automotive. In 2001, when the outgoing invoice provider was selected, there were not many players to choose from and the most important criterion was to have the invoicing working as soon as possible. Now the market has reached a more mature level. The contract for outgoing invoices was made for three years but is now a continuous one. ALD Automotive has considered the possibility of changing the operator. Now that an operator for incoming invoices is being chosen it is also a convenient time to request proposals for the outgoing side as well. The barrier to switch the operator is miniscule, since the company does not consider itself dependent on the current operator.

4.2.3 Criteria

One criterion ALD Automotive has considered is the pricing logic. One tender used a completely dissimilar pricing logic than others making it difficult to compare the total cost of their solution. Price itself is a very important criterion due to the large amount of invoices. The total cost is looked at in a long time frame such as five years.

Another criterion is flexibility. Some providers did not offer a solution flexible enough for the company's needs so they could not be considered further. On the other hand,

when a provider is flexible it frequently correlates with size. ALD Automotive is worried about the size of one provider in consideration: they might be too small to fully support the amount of invoicing ALD Automotive has.

The business continuity aspect of the provider plays an important part. As mentioned, one of the considered players might be too small a company and their fiscal situation is such that contracting with them is a risk too large. The project is considered a long time investment and could be in use for a good ten years. The service provider should be such a player that it will most likely still be around. Another reason for size considerations is that the parent company does not allow for ALD Automotive to contract providers that are too small in size.

One criterion having to do with a provider's economic status is stability of the product and service portfolio. If ALD Automotive subscribes to a service they want to be reassured that it will be administered by the same company in five years' time. This issue was raised since one software package included in a service provider's solution has changed owners multiple times in a short time frame. It raises the question whether ALD Automotive will receive the same support somewhere else if the product is sold. They have already had this happen on another system, when the provider, having acquired a software package through purchases, seized support for it. Now ALD Automotive is facing discontinued support and the task of changing their systems.

Usability is an important criterion. The pieces of software offered by service providers have been tested by future users and their opinions of the usability are weighed heavily. The opinions of usability by customer references are also valued. ALD Automotive is not interested in the price information references offer, since these are not seen comparable from company to company.

Project management expertise of the service provider is essential, simply because of the size and expense of the project. ALD Automotive must rest assured that the provider has competent staff leading the project and taking into account the company's preferences and wishes. Customer references are seen as the only channel of information regarding this criterion and also the best source of information overall.

Customer references is also a very important criterion by itself. This does not apply only to customer references advertised by the service provider. Since ALD Automotive has been sending electronic invoices since 2001 they have amassed a good deal of references in that aspect. In case there are problems with some provider, they will be made known to the decision makers choosing the provider for the incoming invoices project.

ALD Automotive's relationship to quality as a criterion is mixed. On the one hand, it is a criterion of paramount importance. On the other hand, it is considered the starting point that "the thing just works" and therefore quality is a non-issue. It could be thus considered as a screening factor.

An existing customer relationship is not seen as a criterion in the decision process. Service providers already contracted with ALD Automotive in other areas of business are given the opportunity to present their solution but the existing relationship cannot be allowed to cloud judgement. When considering customer relationships in general, they are still not seen as very important. The product comes before all. Afterwards there can be room for relationships between companies. The same applies to the service provider's management. The project management imperative, all else is secondary.

Reach, the amount of invoicing partners that can be contacted through an operator, has no relevance, since practically all operators in Finland are able to have the invoices transmitted to any electronic invoicing address. They have not come across any domestic customers that have not been able to receive invoices through ALD Automotive's current operator.

As noted, customer references are seen as the best source of information regarding service providers. Another source of information has been electronic invoicing seminars. The internet has not been considered as a reliable source of information. This is because of coloured information online.

4.3 Case 2: Oriola

Empirical data was collected in an interview with an IM Manager who had been in various management accounting and financial accounting development positions until

moving on to a variety of IT undertakings, such as leading ERP projects. He has been working for Oriola over ten years.

4.3.1 Company background

Oriola is a leading Finnish pharmaceuticals wholesaler with its roots dating back over 60 years. Their market share of the Finnish market is about 50 per cent. The parent company's, Oriola-KD's business is geographically concentrated in Finland, Sweden, Russia and the Baltic countries. The group has been growing quickly through acquisitions and now generates revenue worth about two billion EUR annually while employing some 5,300 people.

4.3.2 Invoices

Oriola receives about 30,000 to 50,000 purchase invoices per annum. About 30 per cent of the invoices are electronic. The volume of outgoing invoices is several hundreds of thousands a year. Oriola has been able to send and receive invoices since 2005. However, the implementation projects were separate and also separate operators are used on each side. The contracts with both operators are in effect until further notice.

In 2005 Oriola's focus was on replacing the manual circulation of incoming invoices that was seen as inefficient and costly. A formal process of choosing a service provider was initiated, with screenings and feature surveys. Information about operators was gathered from general market research, consulting firms who evaluate various operators, personal knowledge of data administration staff and marketing material. However, the market was not seen very mature in 2005 and the choices were limited. Were the choice made today, it would be more complicated due to increased maturity of the business and more players in the marketplace. Oriola eventually opted for a service provider that was already supplying Oriola with other business information systems, partly due to easy integration with existing solutions.

A general opinion of the electronic invoicing field was that the lack of standards and cooperation between operators is holding back the real potential growth of the industry. This is seen as the issue that is hindering electronic invoicing the most. In this market, it seems, competition is both the driver and barrier of development and progress.

4.3.3 *Criteria*

Project management expertise was a key criterion for Oriola: the ability to “get the work done” was heavily weighed. Other key criteria included price and customer references. Well performed productization was also viewed in favour of the selected provider.

The financial standing of the service provider was important and considered a basic criterion that is evaluated. They sought to choose a solid provider with potential to grow and develop. These factors came before price in importance, since a small company with a high-quality product was viewed unfeasible if they had no potential to support their services in the long run.

An existing customer relationship played a role in the selection process. First-class project work had been witnessed and going with the same provider that had already supplied systems for various other business process areas was a safe option. Attention was also paid to the services following implementation. Oriola found it important that the deal is not over at the start: support and training should be available. Actually more and more attention is paid to these aspects when initiating new projects. Existing experiences of quality customer service also helped the selection regarding this issue.

Usability was also viewed important. The incoming side the focus was more on usability of the end user – “Anyone should be able to use it”. However, on the outgoing side usability was not so paramount. The focal point was on 100 per cent data integration. The sheer amount of invoices is so high that the slightest error percentages would prove costly.

4.4 **Case 3: S-Group**

Empirical data was collected in an interview with a development manager at S-Group. She was previously working with an electronic invoicing implementation project until joining S-Group in early 2005 to work on an information systems harmonization project.

4.4.1 Company background

The S-Group is a group of companies that specialize in trade and operate utilizing a co-operative organization model. As of the beginning of 2011, it had 1,933,587 co-op members, employed a total of 39,646 people, and made EUR 10,464.9 million in retail sales while holding the leading market share of Finnish grocery sales – over 43 per cent. The group consists of 22 regional customer owned cooperatives.

4.4.2 Invoices

S-Group has been able to receive electronic invoices since 2004 when a pilot programme was carried out. This resulted in wide implementations across the regional cooperatives that were finished in the beginning of 2007. S-Group is also able to send electronic invoices – the projects for sending and receiving invoices in electronic format were run on top of each other. The selection process of the service provider was formal. An internal model for selecting suppliers was used and six operators were sent requests for proposal. This resulted in four operators coming on site to hold presentations of their solutions. These presentations were considered the main source of information about the providers.

After carrying out the projects it was felt that implementing the incoming side was considerably easier. The project for outgoing invoices demanded substantial changes in the invoicing systems. In addition, the repayment period of the investment is longer in the outgoing side. However, being able to send electronic invoices was felt as an image question. Still, there was pressure from customers and some required it before going into business with S-Group.

The invoices discussed in this context are those of expenses and fixed assets. Invoices for goods are in EDI format and process through S-Group's procurement company. However, just the expenses and fixed assets invoices amount to about a million per annum, figuring to about 90,000 a month. Some 40 per cent of these incoming invoices are electronic. There is no large concentration of senders; electronic invoices come from all areas. S-Group holds a supplier base of tens of thousands.

The operator agreement is considered as a partnership that lasts for a long time. S-Group see themselves as being somewhat committed and dependent on the operator with the arrangement they have made and a partnership is preferred for this reason as well. The contracts were still signed for a fixed period, which is the case with all S-Group's contracts.

4.4.3 Criteria

An important criterion for S-Group was flexibility. The service provider had to be able to support the cooperative business model utilized by the group and handle the vast amount of invoices. In addition, the solution also had to be feasibly integrated into their ERP backbone system. Price was a central criterion but not paramount. What was truly important was a proactive grip on developing the service. This meant S-Group did not want to be the one to come forward with every development idea. The operator should be active in presenting those as well.

Reliability and general trust came right on top of the criteria list. This was also seen as a matter of people, not just of customer references and performance history. In fact, customer references were not a critical issue. None of them was for example used for benchmarking. The transmission of invoices was seen as a relatively simple task so there was no need for customer references. S-Group's requirements were viewed as specific to them so comparing others' experiences was not feasible.

In addition, the economic standpoint of the operator was not given much attention. This was, however, partly due to the fact that all entrants were all large service providers. In any case, the fiscal situation of the operator did not play a part in the selection. Smaller operators were considered in the screening phase but they were found less developed than the large entrants. What was given some consideration was the origin of the supplier. S-Group is a very national organization and domestic suppliers are viewed more favourably.

Because the supplier base of S-Group is highly broad, a supplier portal was considered to be important. Moreover, it was not enough that the portal was only between S-Group and the suppliers, since if they wanted to switch operators this would lead into

problems. How the operator engages in activating small suppliers to perform electronic invoicing was also considered.

4.5 Case 4: City of Helsinki

Empirical data was collected from an interview with a services executive at the Helsinki Municipal Centre for Services. She has been working for the city of Helsinki since 1987. An administrative executive was interviewed at the same convenience. He had been with the city from 1997.

4.5.1 Company background

The town of Helsinki was founded on the Gulf of Finland in 1550. It is the capital of Finland and has a population of 588,000. The metropolitan area, consisting of Helsinki and the nearby cities of Vantaa and Espoo generate approximately one third of Finland's GDP. Over four fifths of Finland's largest companies are headquartered in Greater Helsinki.

4.5.2 Invoices

Talpa, the Municipal Centre for Services, covers most of the city's incoming and outgoing invoices but not all of them. The city has 30 bureaux, 29 of which are customers of Talpa. There are some ten public utilities owned by Helsinki. Some of these are completely independent such as Helsinki Energy, which means their invoices do not process through Talpa. Some newer public utilities are customers, however. Altogether the amount of customers is on the rise.

Receiving electronic invoices has been possible since 2005. There are some 605,000 incoming invoices each year. Slightly over 60 per cent of incoming invoices are electronic. A supplier portal is also in use where suppliers can browse and send electronic invoices manually. A driver for implementing electronic invoicing on the incoming side was to eliminate paper and to manage the invoices in a more proper way.

Sending invoices in electronic format has been possible since 2006 for B2B invoices and since 2007 for B2C invoices. Talpa sends some 1.3 million invoices per annum. Customer payments of health centres form the largest group. These amount to 70 per

cent of invoices. The social bureau amounts to 20 per cent of invoices sent. The rest of the invoices are widely distributed. The share of consumer invoices is over 90 per cent on the outgoing side. 95 per cent of outgoing invoices that are sent in electronic form end up printed as paper invoices. However, annually some 55,000 invoices are printed in-house. These are due to legacy systems in dental services that do not support mass invoicing. There are also other issues with harmonization: 98 per cent of invoicing data is received from 17 systems of various sizes used by a variety of bureaux. The rest of the bureaux use paper request forms for invoicing.

The service provider selection process was formal. It was first perceived as somewhat disconcerting, since people were not familiar with these types of projects. On both sides the market was perceived as immature and being in the beginning stages, where confusion was common with operators and customers alike. It was not clear what criteria to look for and RFPs were formulated for several months. A short contract was preferred since there was a concern that the lowest price offer would come from some operator not suitable for them. The reason being that the decision was made solely based on price. Requests for proposal were done with such an approach that every desired feature was described as obligatory. Therefore the only criterion separating the offers would be price. All vendors had to price their offer according to the same template, where the only item to incur costs would be price per invoice. This meant start-up costs or other non-reoccurring costs were not tolerated: they would have to be input in the price of a single invoice.

4.5.3 Criteria

Price, even though the criterion that the choice was ultimately settled upon, was not the ultimate criterion. That was the product. What was required from the product was tightly formulated into the requests that are covered in the following.

Dependability was high on the list; they needed to rest assured that what had been sent to the operator had also been received. Other top priority criteria included ease-of-use: being able to produce an image of the invoice data that resembles a paper invoice was one criterion. In addition, fiscal situation of the service provider, data safety and

customer references were taken into account. However, only references with equal volumes were considered.

Services were important, such as an invoice hotel, meaning a view to invoices that have been sent. This was due to the high percentage of invoices that were printed at the operator. The personnel were to be able to see the invoice in the same form as the customer saw it. They had to be visible for 24 months.

The city of Helsinki had numerous technical criteria. For example all the invoicing material should be possible to be sent in one file in the outgoing side. On the incoming side an important criteria was addressability, for the invoice has to be correctly assigned to the correct bureau. Having the possibility of an invoice that is unknown where to confirm it is problematic. A real consideration of other operators was however not done since it was perceived incompatible with the system.

The ability of the operator to activate suppliers to send electronic invoices was not considered. In addition, treatment among customers was not a criterion.

4.6 Case 5: Finnair

Empirical data was collected in an interview with a development manager at Finnair. He has been working for Finnair since early 2008, after transferring from Nokia and before that KPMG.

4.6.1 Company background

Finnair is one of the oldest airlines in the world. Its operations cover scheduled passenger traffic and leisure traffic, technical and ground handling operations, catering, travel agencies as well as travel information and reservation services. Finnair Group had a turnover of 1.838 million EUR while employing 8,800 people.

4.6.2 Invoicing

Receiving electronic invoices became possible in 2003 when Finnair implemented an ERP system and an invoice processing system. Finnair's priority was on concentrating invoices to one place and a solution was sought for that. The option to receive invoices

electronically existed in the system and in a sense came in the bargain. There was no extra cost to use the option unless invoices came through it.

Finnair receives some 275,000 purchase invoices per annum. 12 per cent of incoming invoices are in electronic form while 30 – 40 per cent of invoices are in a PDF format. All incoming invoices, both paper and electronic, end up in Tartu, Estonia, where Finnair's accounts payable has been transferred to due to labour costs. Costs are not the only benefit, however. The employees are more educated than their former Finnish counterparts: everyone holds a university degree. Still, invoices are not completely handled in Tartu, since they need to be approved by various personnel under Finnair Oyj. This happens electronically.

Finnair's selection process for the service provider was formal: a scoring card was formed and used to compare proposals requested from vendors. The two best vendors were taken for another round of bidding and the most suitable was selected. Finnair initially had three options: two domestic providers and a foreign company. A domestic service provider won the bidding mainly due to quality and pricing.

The sending of electronic invoices has been possible since 2006. The main motivator for enabling the sending of electronic invoices was reciprocity. The operator for outgoing invoices is the same as for incoming invoices. However, Finnair operates multiple legacy systems, some of which are not able to send electronic invoices. If the outgoing invoice is not purely electronic, another operator is used.

From Finnair's point of view there was no critical difference between outgoing and incoming electronic invoices. It was seen as the easiest and most sensible solution to ship out invoices through the same pipeline used for incoming invoices. An additional benefit of this arrangement was that no separate agreement with someone else was required. The outgoing invoices were simply added to the existing agreement.

Information sources that Finnair used were marketing material, existing strategic partnerships, employees with knowledge of vendors and Google. Contracts with the service providers are in effect for the time being. Finnair does not perceive an advantage in switching operators for insignificant price savings or gains, due to the work required

in the change. They would rather use this energy in more pressing projects that hold more promise. Were Finnair to engage in such an endeavour, they would combine incoming and outgoing and some other service to the same package.

4.6.3 Criteria

The criterion that received top priority from Finnair was ease-of-use of the end user solution. It had to be able to produce a viewable image of the invoice. Another criterion on top of Finnair's list was price. Net present value calculations were done with all proposals.

Another criterion that Finnair viewed as vital was flexibility. The Finnair Group receives very differing invoices, for example overflight charges from countries but also accommodation compensations of individual travellers. The solution needs to be capable of handling both invoices.

Finnair considered customer references from service providers obligatory. This was a considerable change compared to their policy in early 2000 when they were eager to participate in pilot programmes in exchange for lower prices. Earlier showcases had to be presented and preferably consist of customers matching their size.

The services point of view was taken into account. Finnair wanted their service provider to be a company that is bound to expand and develop their solutions. Business continuity was important; the operator must stay on top and be present in the future.

For Finnair, similarly to other businesses that were interviewed, reach was not a criterion. Making contracts with other operators was perceived as positive, however. The customer relationship was also not an important factor in the decision-making. There was no existing relationship with the provider that was selected. However, since Finnair was at the time the provider's largest client they did enjoy some privileges.

4.7 Case 6: Finncontainers

Empirical data was collected from an interview with the CEO and co-founder of Finncontainers. She had been in the container business before founding Finncontainers

along with her brother. She now runs the fiscal side of the business while other employees focus on sales.

4.7.1 Company background

Finncontainers, as opposed to the other businesses interviewed for this thesis, is a small company: it has employed 2 – 5 people since being founded in 1996. The core business of Finncontainers is buying, selling, equipping and renting containers. Annual turnover amounts to 2.3 million EUR.

4.7.2 Invoices

Finncontainers sends about 1,300 and receives about 900 invoices per annum. Of incoming invoices 10 – 15 per cent are electronic. The company was originally able to receive electronic invoices from 2002. However, the service was ended by the service provider in 2004. The receiving of electronic invoices became possible again in 2010 with the signing of a new service provision contract. Of outgoing invoices some 10 per cent are electronic.

There was no formal selection process for the service provider. In fact, Finncontainers did not directly choose an operator. Rather, a financial management system was chosen mainly due to the fact that their old financial management system provider ended their contract when asked about the length of notice. However, it was very important that the solution was in the form of Software-as-a-Service. Contracts are signed for the time being.

Finncontainers has a bank as their operator. This is because the service provider of the financial controlling system has made the call to use the bank in question. It is dictated in the contract and Finncontainers had no say in the matter. This is problematic, since there have been some issues with the banking channel. These problems have dealt with having invoices process through to recipients. Contract with the bank affects both incoming and outgoing sides and therefore Finncontainers cannot send electronic invoices to receivers that have no contract with the same bank. A variety of small businesses are using the banking channel.

Important information sources for Finncontainers about service providers were Federation of Finnish Financial Services and The Finnish Information Society Development Centre. It was also felt by Finncontainers that for small companies their accounting firm is of great importance in this aspect: as long as the accounting firms are old fashioned, so are their customers. On the other hand, if accounting firms are up to date and modern, the customers also know about the possibilities that are in the market. Accounting firms are seen as being responsible for guiding towards a solution. “Small companies should be in contact with their accounting firm.”

4.7.3 Criteria

Since Finncontainers did not directly choose an electronic invoicing service provider but the choice was made by their financial management system provider, this section deals with criteria for selecting the combination of the two entities. The arrangement is fairly common with small firms and while not completely the same as dealing with an operator first hand, it constitutes for a direct relationship reasonably well.

Customer references were important to Finncontainers: a variety of customers had to be showcased. Business continuity was a vital criterion also. However, it was felt the size of the firm is not typically a safe indicator. There was a similar experience to that of ALD Automotive's: support for a product offered by a large telecommunications operator was terminated and moved back to the small company that had developed the software. The small firm did not perform well.

Finncontainers' financial management system service provider has its headquarters in the same building as Finncontainers. However, this is only seen as a plus, not an important factor in deciding on a vendor. Geographical proximity, as with other interviewed companies, was not an important criterion. Nevertheless, it was felt that an appropriate relationship with the service provider is valuable. The feeling of getting one's voice heard is important.

Usability was high on the criteria list. Since Finncontainers operates with thin staff and people are in responsibility of a variety of tasks, there is no time to spend learning difficult features. Intuitive usage is a must. However, services such as training are very

important for Finncontainers. It was felt wasteful to invest on a solution and only use 20 per cent of the features it offers due to lacking better knowledge.

For Finncontainers, price was not an important criterion. This is mainly because they are being billed by the number of users, which is five at maximum. Even doubling the usage fees would not make a difference. Another non-issue was quality. As do many others, they feel that a working product is the starting point. They have not encountered any errors thus far.

4.8 Supplement questionnaire

As discussed earlier in this chapter, a Likert-scale supplement questionnaire of the criteria list formulated for this thesis was filled by the interviewees at the end of the interview. The questionnaire was not provided to the interviewees in advance in order to prevent it from affecting their answers. Filling the questionnaire at the end was convenient since interviewees had had time to structure their views and bring back their experiences more thoroughly. The questionnaire results are displayed in Figure 4.1.

	ALD Automotive	Finncontainers	Oriola	S-Ryhmä	City of Helsinki I	City of Helsinki O	Finnair	Average
Technology	4	7	7	6	7	7	7	6,43
Quality	3	7	7	7	7	7	6	6,29
Flexibility	6	5	6	7	7	7	5	6,14
Performance History	6	7	7	6	6	5	5	6,00
Dependability	5	2	7	7	7	7	5	5,71
Price	6	4	5	7	6	6	6	5,71
Services	4	6	7	5	4	6	6	5,43
Economic Capability	5	6	6	4	6	5	4	5,14
Management and Organization	3	5	6	6	6	7	3	5,14
Relationship	2	2	5	5	6	4	3	3,86
Total (max = 70)	44	51	63	60	62	61	50	5,59

Figure 4.1 Likert scale questionnaire

The questionnaire was considered a supplement to the interviews. It represents the perceived importance of criteria, as discussed earlier in this study, as opposed to relative importance. Therefore no conclusions can be drawn from the numerical data. In addition, since there is a level of ambiguity in a list of plain composite criteria, interviewees were asked to explain their answers. Indeed, some exceptions from general trends are visible in the results. These are, however, explained by the differences in interpretation that will be covered in the next section. Most interviewees expressed some difficulty in filling the questionnaire, the reason being that all the presented criteria “were very important”. One interviewee pointed out that the sheet was surprisingly similar to the scorecard they used internally for evaluating vendors. No one, when asked, could think of additional criteria on top the ones presented in the list. The answers are analysed together with the interview results in the next section.

4.9 Interview results

This section summarizes the results of the interviews. How companies viewed individual criteria is examined along with a look at new criteria that the interviews attempted to uncover.

A criterion all businesses perceived as essential was Technology. Mostly described as ease-of-use, it was vital for every interviewee that the solution functioned with ease of use and intuitiveness, and was efficient and error free. The benefits of being able to provide sufficient technology was time saved either in learning or using software. This is in alignment with the overall benefits of electronic invoicing.

Quality was viewed extremely important by all interviewees. This is also visible in the questionnaire results. The reason Quality received such a low grade from ALD Automotive is that quality was beyond consideration: it was considered as given – deviations from impeccable quality would be given notice. Partly this illustrates the troublesome nature of quality in an intangible service provider selection problem as was discussed in section 3.3.

Price, regardless of studies that had shown its diminishing importance, was still a top criterion. While this did not apply to the smaller firm, larger companies admitted freely

that significant weight was placed on Price. The City of Helsinki even made their choice purely based on Price. The other criteria were, however, dictated in their requests for proposal.

Flexibility, Business Continuity and Dependability were appreciated by all. In the questionnaire, Finncontainers' low grade on Dependability is explained by the CEO's a twinkle-in-the-eyes claim: "Who wants the invoices quickly anyway?" No company was willing to choose a service provider that it considered risky in terms of financial standing. Whether dictated by company policy or personal judgement, no small company was likely to sign a service contract. The same applied to Customer References and Performance History. A large number of customers was preferred and customers with matching size were required in some cases. On the other hand, a standardized offering was not viewed adequate: Flexibility in handling the individual needs of the companies was a top criterion.

Relationship with the service provider was seen as a criterion of lower importance compared to the other criteria. It also received the lowest average in the questionnaire. Two kinds of views were stated. On the one hand interviewees considered developing the customer relationship after the choice of vendor had been made. On the other hand they were not willing to let the existing relationship affect the choice at hand. However, there was a tendency to view the partnership as a strategic one which in turn increased the importance.

Other criteria that were not among the most critical ones were Management and Organization and Services. While project management expertise was a sought after characteristic, how the firm was run or operated received next to no attention. Services, such as training, on the other hand were admittedly among top criteria, yet not quite the most important. This can also be seen in the questionnaire results.

No major new criteria were found in the interviews. Criteria that could be classified under the original list of composite criteria were more common. For example, ALD Automotive and City of Helsinki had pricing logic as one of their criteria. S-Group's solution was to require all proposals in a dictated form. However, for the purposes of this study, these cannot be split into their own criteria due to restrictions in attribute

amounts that will be described in section 5.4. The same applies for various technical criteria that can all be filed under Technology and ease-of-use. Altogether the interviews gave the notion that the criteria list compiled from the literature was sound.

4.10 Implications on criteria

The information gathered from the literature review combined with the information acquired via interviews has a number of implications. It becomes evident that the list of composite criteria established in section 3.5 requires alteration in order to be most beneficial as the basis of a wider preference survey. These implications are presented in the following.

First, for the criteria to be easily interpretable, they needed to be operationalized. The interpretation of the criteria in interviews, although exemplified and eased through verbal communication, was still ambiguous. To eliminate various interpretations for hundreds of respondents, the composite criteria were defined anew. This can be seen as taking a step back from the combination of a comprehensive, almost all-encompassing, set of criteria extracted from literature. This was countered by attempting to keep individual criteria's concepts as wide as possible while at the same time giving them an explicit drift.

Second, a criterion was added to the survey – Reach. This may seem to counter the purpose of this thesis since no interviewee viewed reach as an important criterion. However, from discussions with two members of the European Expert Group on Electronic Invoicing, Jyrki Poteri (personal communication, December 16, 2010) and Martti From (personal communication, January 17, 2011), it became clear that Reach is heavily entangled with network based, open standard IOL concepts and can shed light on moving away from closed EDI systems. Accordingly, globally reach is one of the main issues of electronic invoicing. Not being able to send or receive invoices from all partners is a serious problem in many parts of Europe and hampers the progress of electronic invoicing as a whole. Therefore for this thesis to carry more weight outside the borders of Finland reach was added to determine its importance against other criteria.

Third, the experimental design of the Discrete Choice Experiment holds an upper limit for criteria that are taken into comparison, Less than ten are preferred. In addition, as stated in section 3.5, Gustin (1997) and Miller (1956) suggest no more than nine criteria to be included. Therefore, from the list comprising of the original ten criteria and the now added Reach, two criteria had to be removed.

To select the criteria to be omitted from the survey an approach based on proven importance and overlap was taken. The removal was done so that the least amount of information potentially discoverable from the results would be lost. Therefore Dependability and Quality were removed from the list of composite criteria. There are two reasons for this. Firstly, having these two criteria in the comparison would lower the relative importance of other criteria to the extent they would be difficult to analyse. When combined, according to the literature review and the interviews, these two criteria were important to the extent that including them in the evaluation of relative importance their inclusion would potentially diminish the relative importance of other criteria. Secondly, there is significant overlap between Quality, Dependability and Technology. Since electronic invoicing is a technology intensive industry, these characteristics are most visible in the technology employed. While in manufacturing Dependability can be understood as on time deliveries, in electronic invoicing there are no physical deliveries. The same applies to Quality. Added, given the troublesome nature of quality discussed in section 3.3, its operationalization is problematic. Dependability, on the other hand is not ambiguous to the same extent as quality. Still, it can be excluded on similar grounds: interviewed managers saw it rather as a starting point or even as a given when making a selection decision. Its high importance is undeniable and consequently not as interesting to study. In sum, to gain the most from the survey, Dependability and Quality were left out or considered part of the Technology criterion.

The Technology criterion, however, requires some further thought. Since interviewees mostly saw the functional part of the solution as given, so that invoices were sent and received properly and without error, it was unnecessary to include these Dependability aspects into the operationalized criterion. Dependability was viewed more as a screening factor: solutions with lacking functionality were outside consideration. What the interviewees did not take for granted, however, was that the solution was easy to

learn, use and remember. According to Nielsen (1993), these are all aspects of Usability. Usability relates to all human interactions with systems. For these reasons it was chosen as a criterion in the survey in the place of Technology.

As a result of these implications, the list of criteria was transformed as presented in Figure 4.2.

Original criterion	Operationalized criterion
-	Reach
Dependability	-
Economic Capability	Economic Viability
Flexibility	Flexibility in Tech Consolidation
Management and Organization	Project Management Ability
Performance History	Customer References
Price	Long Term Total Price
Quality	-
Relationship	Relationship
Services	Service Development
Technology	End-user Usability

Figure 4.2 Original and operationalized criteria

The relative importance of these operationalized criteria was subsequently observed with a Discrete Choice Experiment. This is the topic of the next chapter.

5 Relative importance analysis

In previous chapters, electronic invoicing vendor selection criteria were identified by means of literature review and interviews of professionals. This chapter outlines the design and the results of a survey employing a Discrete Choice Experiment that was used to obtain the relative importance of those criteria. In section 5.1, the background of the method is described. Section 5.2 details the gathering of data describes the survey's structure. Section 5.3 presents the respondent demographics. The DCE theory and its application in this study are outlined in section 5.4. This is continued in section 5.5 by presenting utilities for levels of individual criteria. Section 5.6 then presents the relative importance found between the criteria. Finally, findings are discussed in section 5.7.

5.1 Methodology

The purpose of this thesis is to examine how businesses choose their electronic invoicing service providers. Nearly all of the vendor selection studies reviewed for this thesis measured the perceived importance of criteria, rather than the actual relative importance. In these studies, respondents were typically asked to rank order criteria or evaluate them on a Likert-scale. While indicative, these types of studies fail to portray the preferences of the decision makers in an actual decision situation (Verma & Pullman 1998). Therefore, a Discrete Choice Experiment, coined by Louviere and Woodworth (1983), similar to that in Watt et al. (2010) and Crouch and Louviere (2004) was conducted for this study. The Crouch study was concerned about the conventions industry while the Watt study explored supplier selection. The main difference between Watt et al.'s (2010) study and this thesis is that the Watt study sought to determine the universal relative importance of criteria by surveying managers across a wide variety of industries. As noted in the first chapter, the advantage of this study is that it concentrates on one industry, thus increasing the applicability of the results. In addition, while Watt incorporated criteria from a previous study (Watt et al. 2009), this thesis identified criteria through an extensive literature review and interviews crafted for this purpose.

5.2 Gathering of data and survey structure

Respondents for this study were identified from the eInvoicing Registry of the Finnish Information Society Development Centre. It contains the contact information and eInvoicing addresses of Finnish companies capable of electronic invoicing. From this registry 2459 valid email addresses of potential respondents in charge of their respective companies' electronic invoicing tasks were identified. A link to the survey, along with a cover letter including background details of the study and information about who would be qualified to answer, was sent to the addresses.

After being approached by email, 308 respondents responded to the survey, making the response rate 12.5 per cent. The emailing of the survey resulted in 304 automatic responses with details about the absence of the recipient. Nevertheless, these messages had been delivered and were considered as part of the respondent sample. On average, each respondent spent about 11 minutes filling the survey.

The survey itself was created with the aid of Sawtooth Software SSI Web. The software is often used to create Conjoint Analyses (CA) but can be also harnessed for the purpose of DCE. The survey was subsequently piloted which resulted in improvements in readability and study comprehension. The final survey comprised of two parts. In the first part, the respondent demographics were explored. The second part consisted of the Discrete Choice Experiment, which as pointed out imitates an actual decision situation. Before answering to the second part of the survey, the respondents were asked to recall their previous electronic invoicing project. This functioned as a link between the earlier experiences of the respondent and the task at hand. These kinds of information bridges are important in establishing context (Krieger et al. 2003). During the pilot study, it was noted that respondents might not directly have chosen an operator but would have been in a similar situation as Finncontainers that was interviewed for this thesis. Therefore it was pointed out that if the respondent had indirectly chosen an operator, they were to view the selection as a combination of the two entities: the financial service provider and the operator. Results of the first part of the survey are provided in the following section.

5.3 Respondent demographics

In the first part of the survey, respondents were asked background questions about the size of their company, their experience with electronic invoicing, invoice volumes on incoming and outgoing sides and their current electronic invoicing operators.

Micro and small sized companies are well represented in the survey, amounting to well over 60 per cent. However, there is also an ample share of respondents from medium to large companies, representing over one third of the data. These are presented in Figure 5.1.

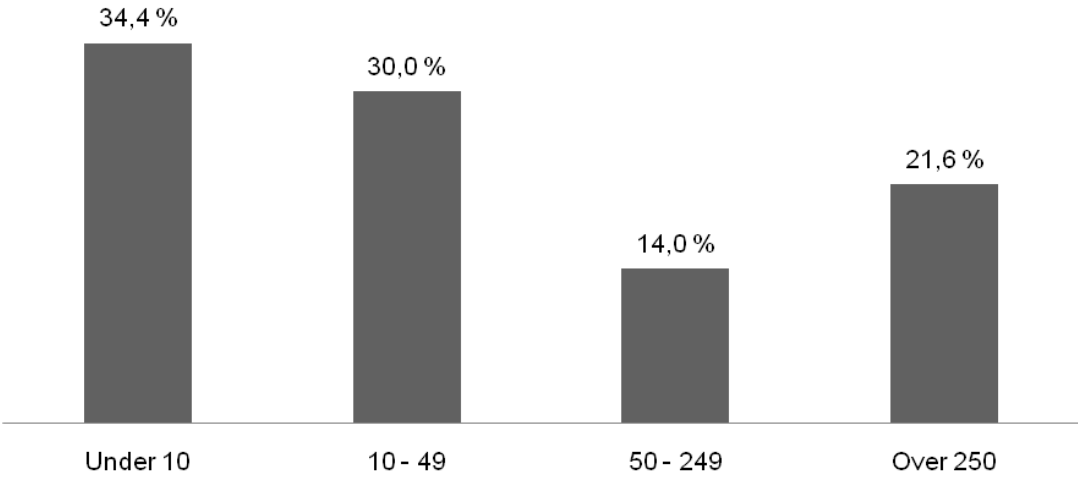


Figure 5.1 Company size by amount of employees

About a quarter of respondents was new to electronic invoicing and had less than one year of experience in the subject. Combined, over half of respondents had been dealing with electronic invoicing for less than two years. Nevertheless, a tenth of respondents had 7 or more years of experience, while people with three to six years of experience represented slightly over one third of the sample. Respondent experience is depicted in Figure 5.2.

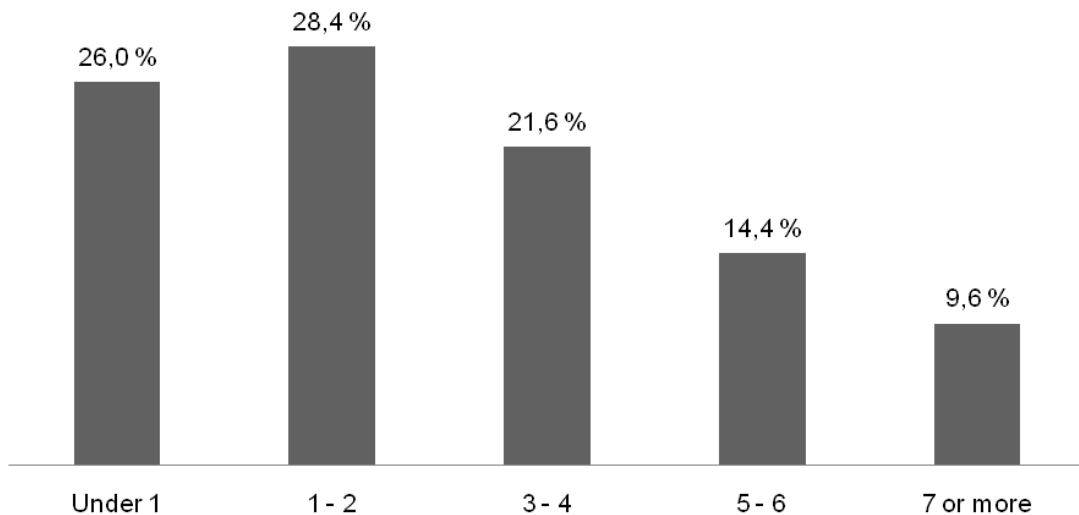


Figure 5.2 Employee experience with electronic invoicing

The volumes of respondent’s purchase invoices vary. 12 per cent of respondents report receiving only 100 or less invoices per annum. However, some respondents receive over 1 million invoices. Approximately half of the volumes reported are between 101 and 100,000. The volumes can be seen in Figure 5.3.

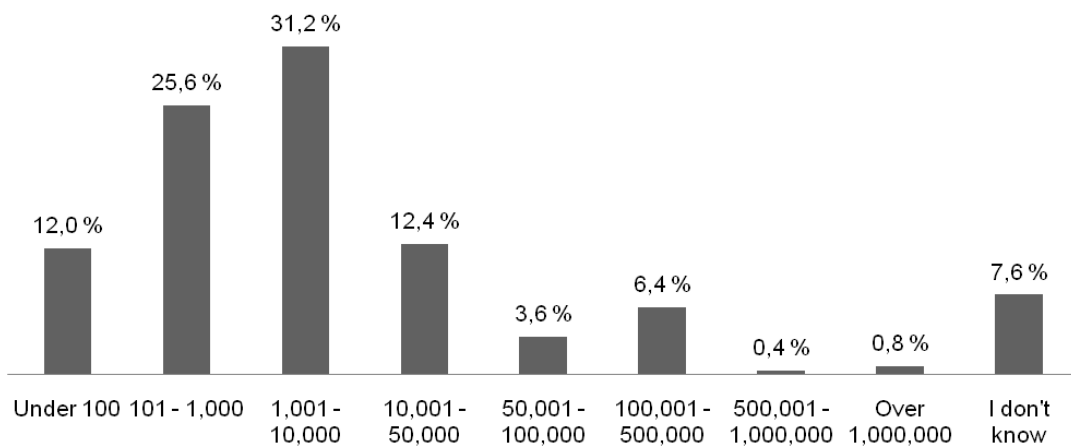


Figure 5.3 Purchase invoices per annum

The distribution of respondent’s sales invoices volumes is similar to those of purchases invoices. However, the higher volumes are somewhat more represented. For example,

over three per cent of respondents send more than 1 million invoices. These are pictured in Figure 5.4.

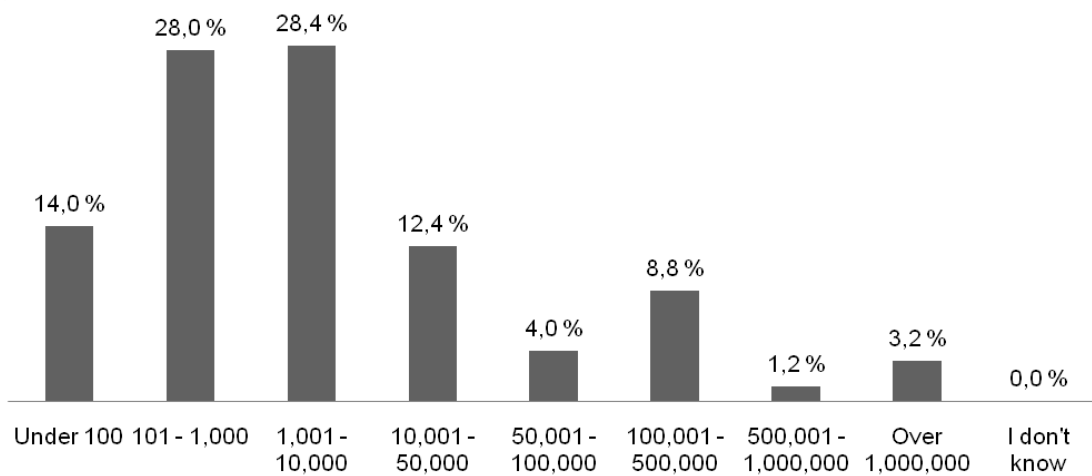


Figure 5.4 Sales invoices per annum

Details were also asked about the current service providers of the respondent's company. Statistics are very similar in sales and purchases invoices. Banks were most represented, combined their share of the respondent's contracts was some 50 per cent. The rest were divided between Basware, Enfo, Logica, Liaison and Itella, with other service providers having few contracts. However, one must keep in mind that these statistics convey information about single contracts between operators and businesses, not the volumes of invoices. Some 16 per cent of respondents indicated they have no operator for either incoming or outgoing electronic invoices. However, no respondent gave this answer to both questions. The purchase invoice operators are presented in Figure 5.5 and sales invoice operators in Figure 5.6.

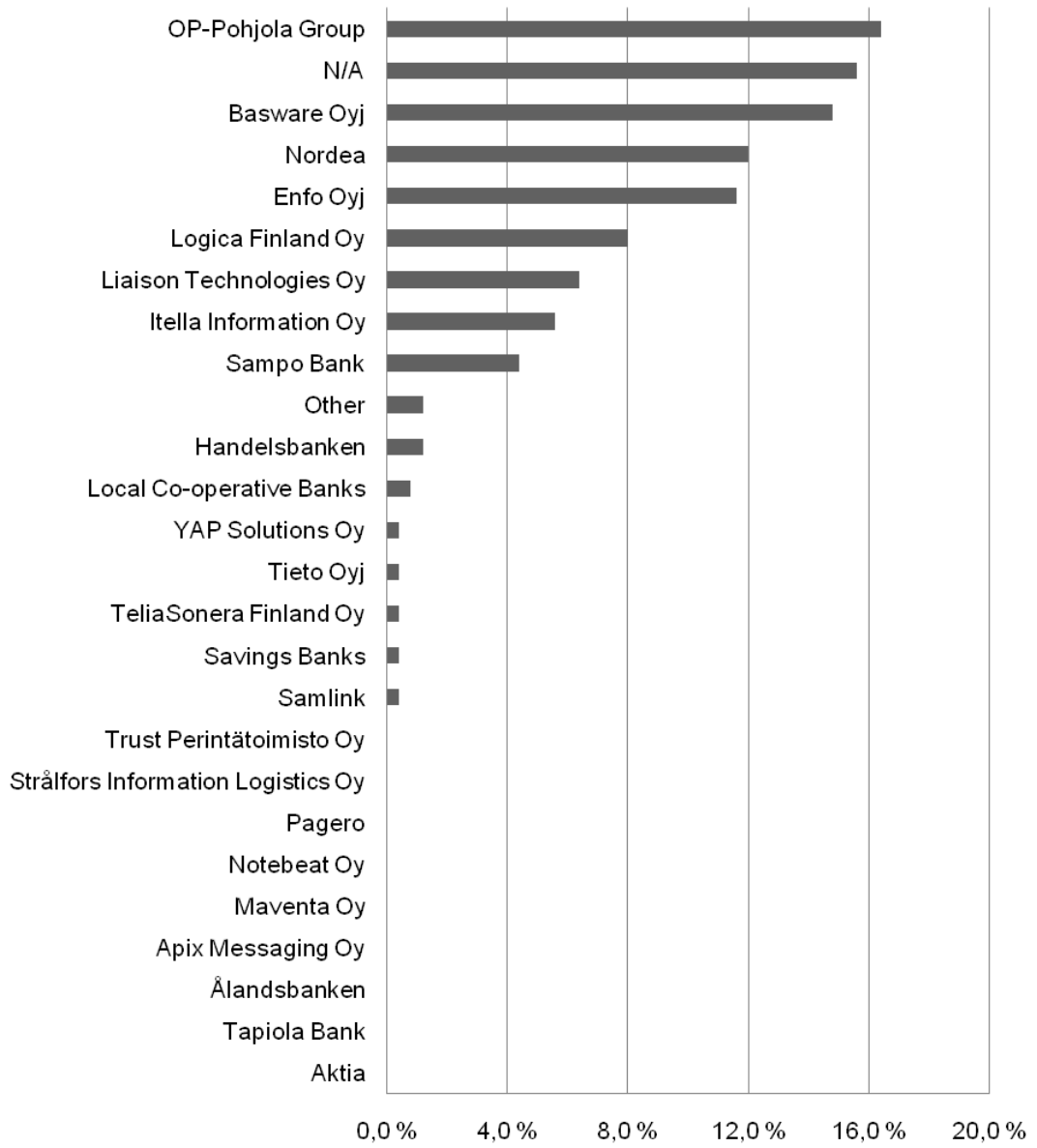


Figure 5.5 Purchase invoices operator

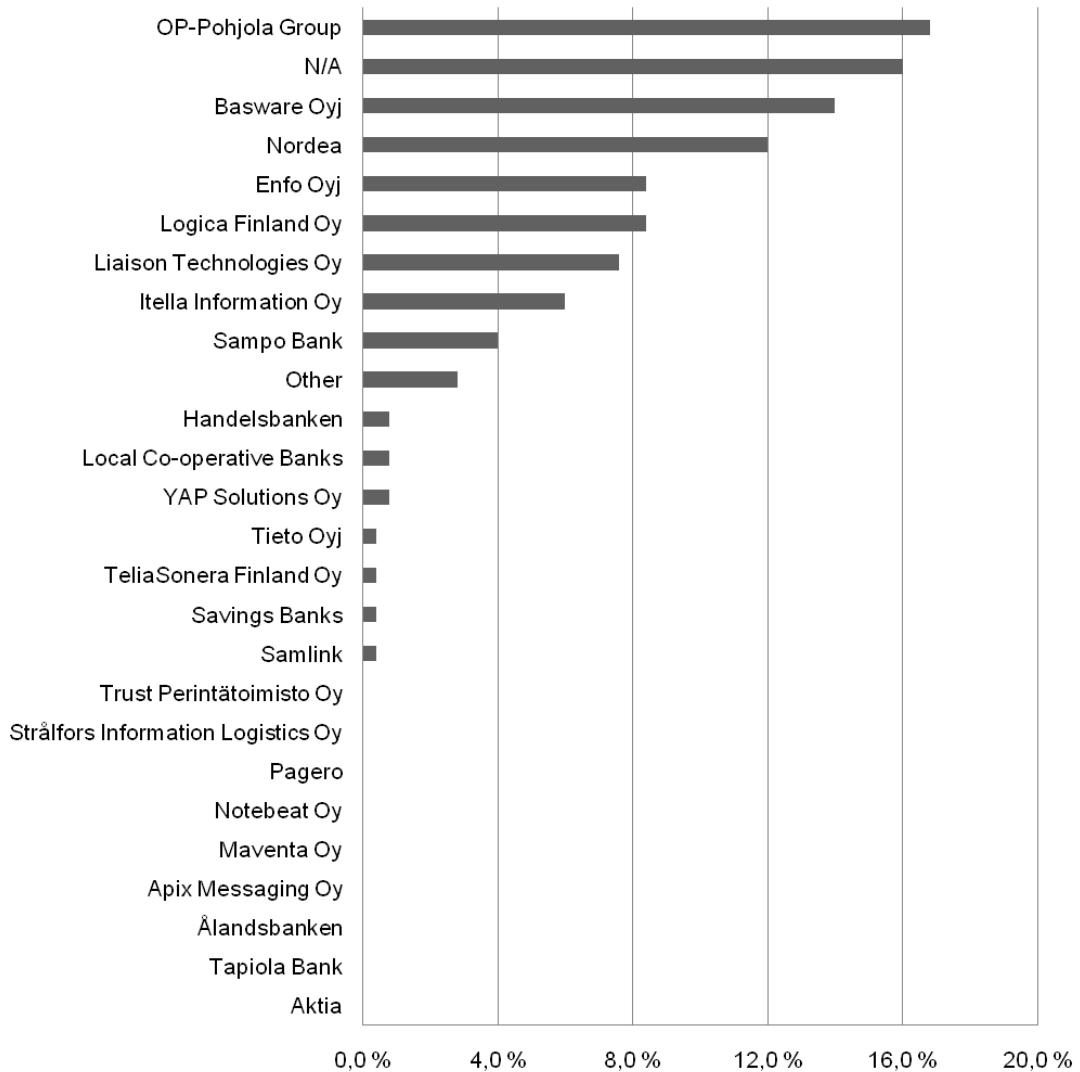


Figure 5.6 Sales invoices operator

To summarize, the first part of the survey shows the respondents represent an even cross-section of Finnish companies. No group of respondents is over-represented or a distinct minority, with the exception of those with over a million invoices per annum.

5.4 Discrete Choice Experiment

The second part of the survey comprised of a DCE. This section explains both the general theory of DCE and how it was applied for the purposes of this study in the design of the survey.

DCE has its roots in Random Utility Theory (RUT), proposed by Thurstone (1927). The principle of RUT implies a latent utility for each person for each choice alternative. These utilities can be described by two components: the explainable, systematic component and the random component which is beyond explanation. DCE takes advantage of this theory by presenting discrete alternatives to respondents. Through computation, the explainable component of the utility for each alternative can then be measured.

The alternatives are constructed from attributes that have varying levels. In this study, the attributes represent the selection criteria and their levels represent their quality. Next, respondents are required to make conscious trade-offs between two or more alternatives. As a result, respondents do not rate individual criteria but rather make choices between complete offerings. While this method, resembling an actual decision situation, has a holistic approach, it still allows the computation of relative importance of individual criteria. This is made possible by introducing a number of Choice sets to the respondent. An example of a choice set used in the survey is visible in Exhibit II.

In their book Hensher et al. (2000) describe choice sets as sets of predetermined offers that vary between levels of criteria. The number of these choice sets included in the design is important. Too few choice sets produce less accurate results. On the other hand, too many choice sets are heavy for respondents. Therefore statistical methods need to be employed to design the sample in order to maximise identification and precision while maintaining realism and avoiding too much complexity. Hensher et al. (2000) point out that a general way to design choice experiments is by combining all the attributes of all choice outcomes into a collective factorial and selecting the smallest main effects design. A main effects design denotes that there are no interactions between attributes: the impact of each attribute on product choice is measured independently of the other attributes. In the case of this thesis, the collective factorial would be 19,683, or 3^9 , resulting from nine three level criteria.

The smallest possible main effects design is determined by degrees of freedom required to estimate all implied main effects (Hensher et al., 2000). This, in turn, is determined by summing separate degrees of freedom in each main effect. The resulting number for

this study is 18 degrees of freedom translating into 18 choice sets, attained by multiplying the amount of levels with the amount of attributes and by deducting the amount of attributes from the resulting figure. However, according to Kuhfeld et al. (1994) this number can be reduced. After testing various designs, a design of 16 choice sets with no interactions was selected. The design was randomized, indicating that respondents received differing versions of the survey. The number of these survey versions generated in this study was 250. Randomization results in a nearly-orthogonal design with the advantage of reducing biases due to order and learning effects, relative to fixed plans. In addition, randomized surveys maintain the possibility of detecting interactions after closing the survey, even if they were not originally in the design.

While the amount of choice sets is important, the amount of levels of individual criteria is also essential. Hensher et al. (2000) recommend using an equal amount of levels in Discrete Choice Experiments in order to keep a balance. In this study, each criteria or attribute were created three levels. According to Louviere et al. (2010), there is no consensus on how to create the levels themselves. In this study, the attempt was to have one level act as an average. The remaining two levels were then created to act as opposites on both sides of the average level. The attributes, or criteria, and their levels are visible in Figure 5.7. The purpose of the survey was to estimate aggregate data, not individual utilities. Analysing aggregate data can be problematic in labelled, non-generic experiments, since what some perceive as adding utility is perceived decreasing utility by others. A classic example is that of Coca Cola and Pepsi provided in Louviere and Woodworth (1983): If half of the respondents favoured Coca Cola and half favoured Pepsi, the aggregate utility would result in zero. However, even if significant segments existed in the data, this presents a lesser problem in this research since all respondents are bound to agree that for instance reaching more invoicing partners provides more utility and that the lower the price the higher the utility.

	Level 1	Level 2	Level 3
Reach	All	A few are left out	Many are left out
Economic viability	Excellent	Fairly good	Precarious
Flexibility in tech consolidation	Tailors for our needs	We and the operator tailor to compatibility	We tailor for operator's needs
Project management ability	Top class	Good	Lacking
Customer references	Several similar to us	Few	None
Total price	15% below average tender	About average	15% above average tender
Relationship	We receive special treatment	We are one among others	We are left in the shadow of others
Service development	Proactively	If requested	Does not develop the service
End-user usability	Quick and easy to use	Average usability	Slow and difficult to use

Figure 5.7 Attributes and levels

After allowing enough time for potential respondents to answer, the survey was closed. Subsequently, respondent data was screened in order to ensure data validity. Respondents who had spent less than 200 seconds in responding the survey were deleted, resulting in omitting answers from 16 respondents. Furthermore, responses from respondents who had chosen the same choice in all choice sets were deleted, resulting in the removal of six answers. In total, the amount of responses to be analysed was left at 287. However, due to limitations of the academic license of the analysis software, only the first 250 of these answers were used to obtain the results, summing to 4000 observations. The analysis of these observations is outlined in the following sections.

5.5 Individual criteria utilities

While the main goal of this study was to discover the relative importance of criteria, it is also interesting to look at the importance of levels of individual criteria. Consequently, this section goes into detail of utilities, or part worths, for individual criteria. It is divided into two subsections: the computation and interpretation of results and discussion.

5.5.1 Computation of individual utilities

The data gathered with the survey was analysed with the aid of Sawtooth Software SMRT. Again, the software allows for computing DCE as well as CA. A specific pooled, aggregate multinomial logit model was used to find the maximum likelihood solution in order to compute main effects part worth utilities for attribute levels. A part worth utility is a measure of relative desirability or worth. High utilities indicate desirable attribute levels. Levels that have high utilities have a large positive impact on the probability of respondents choosing products. The part worths were scaled to an arbitrary additive constant within each attribute. Consequently, attribute levels sum to 0. Therefore a negative utility or part worth does not necessarily indicate that the level is perceived unattractive. However, it does indicate that levels with higher utilities were perceived better. In addition, part worths cannot be directly compared between various attributes. The part worths with their standard deviations are presented in Figure 5.8.

		Part worth	Std Err	Within Att. Chi-Square	Significance
	<u>Reach</u>			291,28	p < .01
Level 1	All	0,2974	0,02395		
Level 2	Some are left out	0,1908	0,0241		
Level 3	Many are left out	-0,4882	0,02777		
	<u>Economic Viability</u>			149,47	p < .01
Level 1	Excellent	0,16832	0,02417		
Level 2	Fairly good	0,17922	0,02414		
Level 3	Precarious	-0,34754	0,02665		
	<u>Flexibility in Tech Consolidation</u>			28,13	p < .01
Level 1	Tailors for our needs	0,04909	0,0245		
Level 2	Both tailor to compatibility	0,09161	0,02444		
Level 3	We tailor for operator's needs	-0,1407	0,02536		
	<u>Project Management Ability</u>			1,93	not significant
Level 1	Top class	0,01472	0,02468		
Level 2	Good	0,01898	0,02462		
Level 3	Could be improved	-0,0337	0,0249		
	<u>Customer References</u>			22,92	p < .01
Level 1	Several similar to us	0,11512	0,0243		
Level 2	Few	0,01157	0,02472		
Level 3	None	-0,12669	0,02533		
	<u>Long Term Total Price</u>			51,96	p < .01
Level 1	15 per cent below average tender	0,1351	0,02419		
Level 2	About average	0,05222	0,0246		
Level 3	15 per cent above average tender	-0,18732	0,02561		
	<u>Relationship</u>			10,84	p < .01
Level 1	We receive special treatment	0,0041	0,02471		
Level 2	We are one among others	0,08104	0,02446		
Level 3	We are less important than others	-0,08515	0,02507		
	<u>Service Development</u>			138,27	p < .01
Level 1	Proactively	0,16333	0,02423		
Level 2	If requested	0,17183	0,02411		
Level 3	Does not develop the service	-0,33516	0,02663		
	<u>End-user Usability</u>			631,14	p < .01
Level 1	Quick and easy to use	0,49158	0,0237		
Level 2	Average usability	0,23669	0,02444		
Level 3	Slow and difficult to use	-0,72827	0,03055		

Log-likelihood for this model = -3633.80311, Chi Square 1521.29209

Figure 5.8 Resulting part worths of criteria levels

The logit analysis was subjected to Chi Square evaluation, which is widely used in Discrete Choice Experiments. At 18 degrees of freedom, a Chi Square of 34.8 would mark significance at .01 level. The obtained Chi Square, 1521, indicates that respondent choices are indeed significantly influenced by the attribute levels. In addition, significance was tested with each attribute. All attributes but one are statistically significant: Project Management Ability was deemed insignificant at a 0.01 per cent margin. In the case of a main effect count, the Chi Square indicates whether levels of that attribute differ significantly in their frequency of choice.

5.5.2 Individual utilities results and discussion

In the part worths, an increasing trend is visible when moving from level 3 to level 1 in all attributes. Level 3 is negative in all attributes, indicating a low utility – the respondents are less likely to choose a service provider with level 3 attributes. There are four criteria in which both steps, from level 3 to level 2 and from level 2 to level 1 are positive. These are Reach, Customer References, Total Price and End-user Usability. The part worths of these criteria are examined in the following.

Respondents most preferred being able to reach all their invoicing partners through the service provider, as expected. If some were left out, their utility was decreased by a fair amount. However, if many invoicing partners were left out, the utility suffered a significant drop. Not being able to contact all or nearly all invoicing partners through electronic invoicing can be seen as defeating the purpose. Customer references, also, show an ample increase in utility when the level increases. No customer references is the worst option, while several customer references similar to the respondent's company are most preferred. Few customer references is better than none, landing between the two extremes. Total price, expectedly, shows that the lowest price of 15 per cent below average tender is preferred to average or 15 per cent above average tenders. In End-user Usability, respondents dreaded a slow and difficult solution. Utility was increased by a large amount when usability improved to only average. Further, the increase was still sizeable when moving to level 1: quick and easy usability.

In five criteria, the move from level 2 to level 1 is actually negative. However, the decrease in these is marginal, indicating that the priority of the respondents is to acquire

at least the value level 2 represents. The added value level 1 represented was not seen considerable in relation to acquiring a higher level in other attributes of the service provider. These five attributes are Economic Viability, Flexibility in Technology Consolidation, Project Management Ability, Relationship and Service Development. The part worths of these criteria are examined in the following.

In Economic Viability, the respondents saw that a precarious economic status is the worst option. Utility is increased notably when the service provider has at least a fairly good fiscal situation. When it comes to Flexibility in Technology Consolidation, having to tailor the company's solutions to fit the service provider provides the least utility. Respondents were still not put off by having to conduct some work in this field, since utility was maximized when both parties had to work in order to implement the electronic invoicing solution. Good or top class project management ability was preferred over lacking ability. A special relationship with the service provider was not perceived superior to being an equal part of the mass of customers. However, falling behind other customers minimized utility. In service development, respondents wanted the service provider to develop the service at least when asked to. Not developing the service caused a substantial drop in utility.

To summarize, the five criteria of Economic Viability, Flexibility in Technology Consolidation, Project Management Ability, Relationship and Service Development can be viewed as hygiene factors in a vendor selection context, modified from Herzberg's (1968) job motivation factors. In short, hygiene factors cause dissatisfaction when missing but do not provide additional benefit when improved over a certain level. In a similar fashion, the remaining criteria can be perceived as motivation factors.

5.6 Relative importance of criteria

The previous section outlined the importance of levels *inside* criteria. However, to uncover the relationships *between* the criteria, the goal of this thesis, an altered analysis is required. According to Crouch and Louviere (2004) the relative importance of criteria can be measured by calculating the extent to which each attribute contributed to the overall log-likelihood of the choice model. This, in turn is done by removing one attribute at a time from the main effects model. Subsequently, the difference is

calculated by noting the relative change of the model's log-likelihood compared to the complete model. Accordingly, the estimation was repeated 10 times, each time removing one criterion from the model.

As stated in section 5.4, the randomization of the design allowed examining interactions between the attributes after the survey had been carried out. With interactions, the attributes are no longer independently of other attributes, as is the case with a main effects design, but in relation to other attributes. Therefore in conjunction with calculating the relative importance, interactions were studied. However, it was established that interactions did not improve the interpretability of the model or yield significant findings. Therefore they were discarded. The results of the relative importance computations are visible in Figure 5.9 and further discussed in the following.

Excluded attribute	log-likelihood	Chi Square	Difference in log-likelihood	Percentage sum of difference
None	-3633,803	1521,292		
End-user usability	-4014,567	759,763	380,76435	47,36 %
Reach	-3810,768	1167,362	176,96527	22,01 %
Economic viability	-3724,984	1338,931	91,18072	11,34 %
Service development	-3718,451	1351,996	84,64806	10,53 %
Total price	-3663,550	1461,799	29,74678	3,70 %
Flexibility in tech consolidation	-3650,036	1488,826	16,23325	2,02 %
Customer references	-3649,742	1489,414	15,93893	1,98 %
Relationship	-3641,326	1506,245	7,52333	0,94 %
Project management ability	-3634,728	1519,442	0,92492	0,12 %
			803,92561	100 %

Figure 5.9 Relative importance of criteria

The most important criteria are found to be End-user usability, Reach, Economic viability and Service development. Similarly to the results in Crouch and Louviere (2004) and Watt et al. (2010), the importance is not evenly distributed between criteria. Rather, a handful of criteria explain most of the variation. The relative importance percentages from Figure 5.9 are presented in a column chart in Figure 5.10.

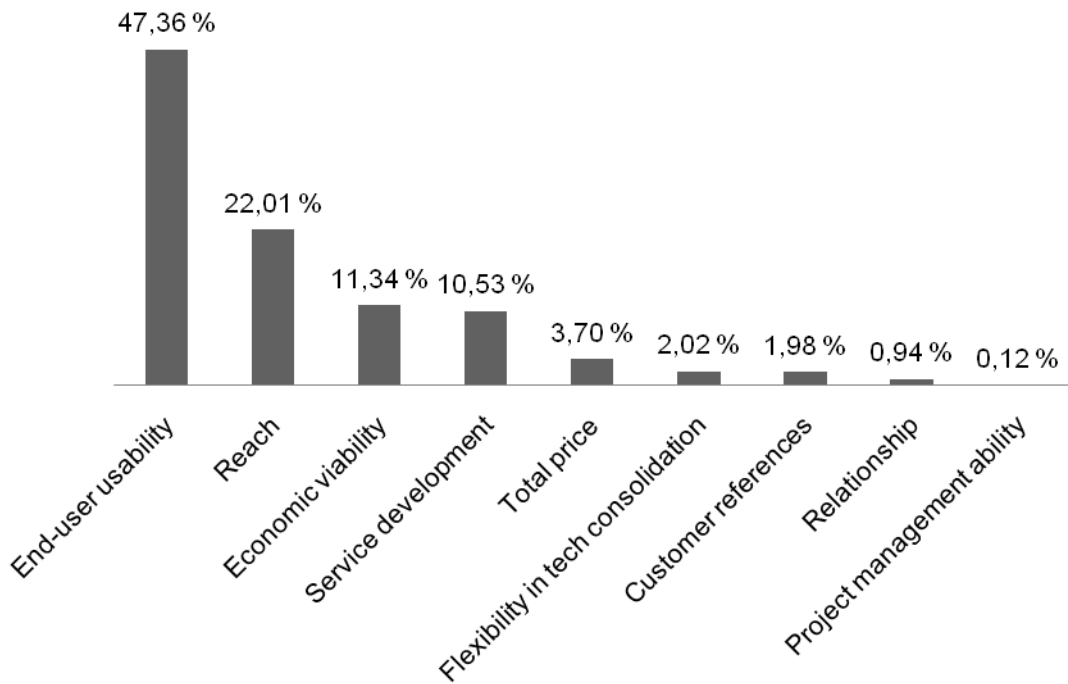


Figure 5.10 Relative importance of criteria by columns

The results indicate that End-user usability is by far the most pressing criterion to the respondents. Its weight in the decision almost amounts to the combined weight of the other criteria. The importance of the next most important criterion is under half of usability's importance. Reach, unsurprisingly, is also highly important, also double to the importance of the next criterion. The third and fourth most important criteria, Economic viability and Service development, respectively, are found to be almost similarly important, slightly over 10 per cent of total relative importance. Criteria found relatively unimportant were Total price, Flexibility in Technology Consolidation, Customer References, Relationship and Project Management Ability. How these results can be interpreted is covered in the following section.

5.7 Discussion of relative importance results

This section discusses the results of the relative importance analysis and how they fit with previous studies. The section is divided into three subsections. The first two subsections discuss the highest and the lowest ranking criteria. The third subsection explicates how these extremities can be viewed in relation to time.

5.7.1 *Highest ranking criteria*

Evidently companies feel strongly regarding the product side of electronic invoicing service provision. This is in line with the results from the interviews, where Technology was seen as the most important criterion. Ease of use was also a top criterion for Gustin et al. (1997) who studied systems and software selection criteria. However, the combination of both “difficult” and “slow” to use in the third level of the attribute, as opposed to both “easy” and “quick” in the first level, may have contributed to most of the explained variation. The levels may have been disproportionate to other attributes thus artificially increasing the importance of End-user usability. On the other hand, this most likely does not contest the attribute’s rank, only the margin by which it differs from other criteria. This observation also applies to other criteria.

Gustin et al. (1997) also found vendor viability/reliability to be highly important. It should be remembered that Dependability and Quality were partly input into the Technology criterion in this study. Indeed, this study too shows that the service provider’s financial standing and the business continuity aspect is a primary concern for decision makers. Another priority criterion was the development of the service offered by the vendor. As the industry is young and yet to mature, it is perceivable that companies view it important for the service to improve on a constant basis. Reach, being the second most important criterion evaluated in this study, plays a significant part in vendor selection. While its role in Finland is not a major one since service providers have established interoperability agreements as noted in section 2.5, companies saw it as a key issue. Therefore service providers with less reach are not likely to gain customers in this marketplace. This is consistent with the concept of network effects.

Interestingly, the results indicate that price is not a highly important criterion. This supports the general view in supplier selection literature that the weight of price is diminishing in decisions and the move is toward strategic partnerships. This goes against the findings of Verma and Pullman (1998), who pointed out that while managers declare price as unimportant they still make decisions based on it. However, the Verma and Pullman (1998) study’s point of interest was supplier selection in the context of supply chains and raw materials, differing substantially from this study. Furthermore,

the strategic relationship aspect of this study, compounded with the fact that price levels fluctuated within reasonable 15 per cent intervals, weaken the argument against the validity of Verma and Pullman's (1998) findings, while still maintaining legitimacy in an electronic invoicing service provider selection context.

5.7.2 Lowest ranking criteria

Flexibility, customer references and relationship explained a minute amount of the variation in the results, some five per cent combined. Companies do not seem averse to modifying their information systems to facilitate electronic invoicing implementation. Some explanation might be found in the move to using Software-as-a-Service (SaaS) which eliminates the need for large scale installations. Perhaps the most surprising find is that customer references are so unimportant. This runs counter to the opinions stated in the interviews done for this thesis, where customer references were not found the most important criterion but were not amongst the least important ones either. To see whether there was a difference between large and small companies, the logit analysis was run separately with only those respondent samples. Indeed, larger firms found customer references to be more than one and a half times more important than smaller companies. The overall trends depicted by the aggregate model are, however, unchanged in the partial models and do not call for a larger investigation. An expected result was, on the other hand, the low importance of relationship. It was not highly regarded in the interviews either.

Another surprising find is that Project management ability was least important, not even receiving statistical importance. Watt et al. (2010) found past project performance to be the fourth most important out of nine criteria. The difference in context and industry can explain some of the change. Typically open standard IOL projects are lighter and require smaller implementations than heavy EDI projects. Numerous projects require little implementation due to acquiring the service via SaaS. Another explanation can be found in the wording of the levels associated. On level 3, intended to be the worst of three options, "could be improved" was provided as the option. Nevertheless, it is interpretable that companies are either used to or are not too troubled with lacking project management ability, given that it is not disastrous, only below standard.

5.7.3 *Criteria importance in relation to time*

To summarize the two previous subsections, Finnish companies seem to place significant weight to concepts that affect day-to-day business. End-user usability, Reach, Economic viability and Service development all affect either the present or the future: history lacks significance. For example, service development reflects the willingness or ability of the vendor to improve the service in relation to its present state and economic viability echoes the business continuity aspect, also heavily centred on a future state of business. To contrast, Flexibility in Technology Consolidation, Customer References and Project Management Ability are all “one-time” criteria. Once the contract has been signed and service implementation is complete, the gravity of these criteria seems to diminish or even cease to exist. For example, the Project Management Ability or Flexibility in Technology Consolidation of the service provider appears to be important only at the time of the implementation of the solution. Similarly, it could be argued that Customer References turn in to a group of peers with no real benefits or insight to gain from. Price seems to act as a divide between these two extremes of criteria, having elements of both polarities: most service providers stipulate both larger up-front implementation costs and overhead costs resulting from sending and receiving invoices.

Consequently, the results suggest companies do not pay very much attention to incidental occurrences that do not repeat themselves. What they do seem to hold in great value, however, are those sides of the service they see on a daily basis. The usability of the end-user solution, reaching all invoicing partners without difficulty, continuing service and advancement are characteristics they likely focus their attention on. In addition, according to the results, a company needs not to excel in all of these aspects. A fairly good economic situation seems to satisfy customers. Therefore, if a service provider has an adequate fiscal situation, it might be unnecessary to divert resources into improving them. Similarly, it can be derived from the results that a vendor should listen to the wishes and requests of customers on how to improve the service and then act upon them. Giving feedback likely should be encouraged and facilitated by technology. Going head first into improving the service without customer input is apparently not perceived as adding value. In addition, if the service provider’s reach is

lacking even a small number of invoicing partners, potential customers might suffer a significant drop in utility thus making the choice of the vendor in question less likely.

Accordingly, this study indicates network effects are highly important and that vendors should strive to move forward towards open standard IOL and establish interoperability contracts with the ultimate goal of all-inclusive coverage. Still, the most pressing concern of service providers very likely should be the usability of their end-user solution. This seems to be a major concern for customers. Vendors arguably should perform their best to improve their software and hardware solutions in order to maximize value for customers and gain competitive advantage. This, most likely, should be done keeping in mind the Dependability aspect, since it also is a criterion having to do with daily operations. Dependability was partly omitted from the survey and partly included in the usability criterion. This was also the case with Quality. Outstanding usability, it could be argued, is nullified if invoices are not delivered successfully.

6 Conclusions

This chapter outlines a summary of the research in section 6.1, followed by the main findings and how they interrelate to previous research in section 6.2. After deriving managerial implications from those findings in section 6.3, the chapter presents limitations of the study in section 6.4 and concludes with suggestions for further research in section 6.5.

6.1 Research summary

The purpose of this thesis was to examine IOL service provider selection in the context of electronic invoicing. The topic is interesting because of the shift from partner-specific IOL into network based IOL. Its materialization can be seen in electronic invoicing, which is a new and quickly growing industry, where business models have yet to mature. As a result, there has been a considerable amount of research on the topic of electronic invoicing adoption and the benefits of electronic invoicing. However, after the adoption decision has been made, there is hardly any or no earlier research on the step between adoption and achieving benefits – service provider selection. This thesis attempts to cover that gap.

Because the service provider selection problem is inherently a multi-criteria decision making one, criteria was taken as the focal point of this thesis. Therefore, to best serve the purpose of examining the selection it was decided to formulate the following research question: *What is the relative importance of electronic invoicing service provider selection criteria?*

To answer the research question, it was first necessary to identify the criteria employed by companies when making an electronic invoicing service provider selection decision. To accomplish this, an extensive literature review was performed. The literature review consisted of identifying scientific works related to supplier, vendor or service provider selection, understanding the findings these works had established related to criteria and their importance, and extracting a list of criteria from relevant works. The list of criteria was subsequently narrowed into composite criteria applicable in the electronic invoicing

context. To validate the resulting composite criteria, and identify additional criteria not found in the literature, the review was accompanied by six interviews of experts in the field: managers who had gone through the electronic invoicing service provider selection process. The product of these steps was a list of nine criteria: Reach, Economic Viability, Flexibility in Technology Consolidation, Project Management Ability, Customer References, Long Term Total Price, Relationship, Service Development and End-user Usability. To find the relative importance of the identified criteria, an empirical study was conducted utilizing Discrete Choice Theory. Accordingly, the list of criteria was subjected to a Discrete Choice Experiment, developed by Louviere and Woodworth (1983).

The Discrete Choice Experiment was created as an online survey that was answered by persons responsible for electronic invoicing in their respective companies. Respondents selected the best service provider's tender from randomised choice sets, each including varying levels of the same nine criteria. Through this design, by having the respondents make trade-offs, it was possible to determine the actual relative importance of the criteria, instead of their perceived importance. The results are outlined in the next section.

6.2 Main findings

This section highlights the main findings established in this study. The section is divided into two subsections, the first of which takes a comparative stance between present or future and one-time oriented criteria. The second subsection of this section compares the findings with earlier IOL and criteria research.

6.2.1 Present and future versus one-time oriented criteria

The main findings of this study indicate that criteria companies consider relatively most important are those that are focused on either on ongoing or future business when choosing an electronic invoicing service provider. These criteria include End-user Usability, Reach, Economic Viability and Service Development. Included also in these criteria are Dependability and Quality, partly overlapping with End-user Usability. Criteria that companies consider relatively unimportant are focused on the past or are concerned with one-time occurrences. These criteria include Flexibility in Technology

Consolidation, Customer References, Relationship and Project Management Ability. The criterion of Long Term Total Price has elements of both extremities. It lands in between and acts as a divide between the two types of criteria: implementation generally results in upfront costs and daily operation incurs overhead costs.

However, even though the results indicate that future oriented criteria are relatively far more important than criteria associated with one-time occurrences, it is not to say those occurrence related criteria are unimportant. It should be remembered that the purpose of this research was to find the *relative* importance. Therefore a seemingly low relative importance does not indicate that a set of criteria is insignificant in a selection decision. The indication is to be interpreted within the confines of this study: all other criteria excluded. For example, while the importance of Project Management Ability is a fraction of the importance of End-user Usability, on the basis of this study it cannot be determined how important it is compared to the Geographical Location of the service provider, since Geographical Location was not among the examined criteria.

Still, the criteria investigated in this thesis do represent the set of supreme criteria employed in companies; all criteria identified in this thesis are essential when making a service provider selection decision. As mentioned, the relative importance indicates differences between these elemental criteria. Therefore the notion that End-user Usability is the paramount or overriding criteria in a selection decision can be drawn. It is also justified to state Reach as the penultimate criterion and to rank Economic Viability of the service provider third in importance – with all criteria included.

6.2.2 *Consistency with earlier research*

A new context specific criterion, Reach, not yet existing in the literature, was introduced in this study. The high importance of Reach supports the network effects theory by Katz and Shapiro (1985) and the findings of Zhu et al. (2006), who studied migration to open standard IOL. Network effects function as a driver for migrating into an internet based IOL, which is why it is important that the network is all-encompassing. Furthermore, Zhu et al. found that IOL adopters are completely insensitive to price, when moving from paper based systems to automated electronic ones, which is also visible in the results of this study.

How the rest of the findings fit with earlier research is contradictory. On the other hand, compared with the most similar study, Watt et al. (2010) found Past Project Performance, Technical Expertise, Tendered Price and Project Management Expertise to be the four most important selection criteria, sharply contrasting this study. The Watt study was, however, concerned with tangible goods, respondents representing a cross-section of industries. Findings are more consistent with the study of Gustin et al. (1997) who examined selection decisions in systems/software purchases. They also found Usability to be a top criterion. In addition, the findings support those of Dempsey (1978) who found buyers are more sensitive to vendor's technical and financial prowess in a new task problem, which was the surveyed situation. Furthermore, buyers were less sensitive to prices and assured delivery in a new task problem, which can also be seen in the results. To add, results are consistent with those of Shaw et al. (1989), who viewed tangible criteria as screening factors and intangible criteria such as business continuity and service development as the factors most affecting decisions.

When compared with earlier studies that identified the perceived as opposed to actual importance of selection criteria, results are less mixed. These studies, (Lehmann & O'Shaughnessy 1974; Sen et al. 2008; Weber et al. 1991; Wilson 1994) for example, most frequently report quality, delivery, price and service as the top three criteria. Still, the context of these studies is industrial products, not directly comparable with electronic invoicing.

Nevertheless, by having uncovered the most important criteria and their relative importance in electronic invoicing service provider selection it is possible to state the managerial implications of these findings. These are covered in the next section.

6.3 Managerial implications

This section presents implications that managers should take into account when making decisions. The section is divided into three subsections: the focus on continuous aspects of business, the importance of price and the importance of the improvement of one-time aspects of business.

6.3.1 Focus on continuous aspects of business

The findings of this study suggest that managers of electronic invoicing service providers should focus their value proposition on maximising customer value in their daily and future operations. It seems companies are placing most weight on the aspects of business that are ongoing and occur on a continuous basis. This has at least four implications.

First, and most importantly, when applicable, vendors most likely should offer an easy-to-use end-user solution that is efficient and dependable. The main promised benefits of electronic invoicing are time savings and the possibility to move labourers into more productive work (Harald 2009). Managers want to see this benefit happen. The results point to a great difference in acquired value between average and high usability. Efficient and effective use of technology, therefore, is key.

Second, customers appear to see great value in being able to reach all invoicing partners through the service provider. With Reach, according to this study, being the second most important criterion, service providers should strive to have their network cover all invoicing partners. Again, the promised benefits of electronic invoicing can be rendered null and void if customers are able to apply the technology to only a fraction of their invoices. Even if few invoicing partners are not reachable, the value may be lost.

Third, service providers evidently should focus on their Economic Viability. Since companies seem to be future oriented and wish to minimise the risk of service abruption, vendors should struggle to improve their fiscal situation. Even though the industry is young and there are numerous new entrants to the market, the findings suggest attracting customers requires solid funding and secure business continuity. However, the results also indicate that economic standing need not be outstanding. A fairly good status will most likely suffice to deliver customer value.

Fourth, the results argue vendors should develop their service. Customers do not apparently believe in ready offerings but in working solutions that are the basis for improvement. Still, according to the results it does not add value to proactively develop the service. Rather, vendors should consult their customers to identify areas of

improvement and encourage and facilitate the giving of feedback. Upon receiving feedback, they should, with haste, improve the service accordingly.

6.3.2 The importance of price

The findings would suggest that price is not a criterion of utmost importance in electronic invoicing. Therefore it could be argued that service providers can price their offerings with relatively high freedom. However, on the other hand price was the fifth most important criterion in this study and results indicated decreasing utility from lowest to average price and from average to lowest price. This in turn implies that price does play an important role in the decision and vendors should not go overboard with pricing. Still, according to this study, price in electronic invoicing is a factor of less importance than in most industries.

6.3.3 The improvement of one-time aspects of business

According to the findings, managers of electronic invoicing service providers can leave the improvement of those parts of their value proposition that focus on one-time occurrences to a lower level. This is not to say they should not abandon those aspects of their business. Rather, it can be drawn from the results that vendors could shift priorities into developing the future and ongoing facets of service. The ongoing criteria override the implementation specific criteria in a selection decision. Therefore, it seems, Flexibility in Technology Consolidation, Customer References, Relationship and Project Management Ability are all criteria that should be improved upon only after having developed the future oriented, ongoing criteria to the levels outlined previously.

Of these four criteria of relatively lower importance, it would seem that only Customer References is one where a high level provides substantially more value than an average level. Several and similar references are felt providing more value than a lower level. Contrastingly, customers do not see a great increase in utility if their relationship with the service provider is better than the average customer's, or that the vendor's project management is exceptional, compared to good.

To summarize, the results advocate that to provide maximum customer value service providers should focus on the day-to-day business components of their value

proposition. After having improved these to a sufficient level they can focus their attention on enhancing those components that are one-time in nature. The results are, however, subject to a number of limitations that will be covered in the next section.

6.4 Limitations of the study

The limitations of this study are twofold: they are associated with the identification of criteria important in electronic invoicing service provider selection or the relative importance analysis of those criteria.

There are at least two limitations related to criteria identification. First, the literature reviewed for this thesis was heavily focused on the topic of supplier selection in the manufacturing environment: the works of research assumed the type of goods or services to be purchased tangible in nature. Since electronic invoicing is a relatively new and upcoming industry, hardly any research was available on the topic. Therefore deciphering the information and criteria uncovered from a setting of tangible goods to a setting of intangible services is subject to error. To counter this, various scientific articles pertaining relevant areas of interest such as information systems selection criteria were examined. These were, however, few in number. Second, the requirement to condense the uncovered criteria into a list of composites posed a predicament. While this made comprehension easier and enabled analysis, a substantial amount of information was lost in the process.

Limitations linked to the relative importance analysis are numerous. First, even though over 300 responses to the survey were received, the academic license of the software used to analyse the results allowed only the inclusion of 250 answers. Furthermore, the design of the Discrete Choice Analysis used 16 choice sets instead of a recommended 18, losing an amount of statistical prowess in the process. Moreover, the wording of the levels associated with individual criteria is critical in achieving the results. The proportion in which the three levels of criteria were in relation to one another was not intensively studied, thus possibly creating distortion. In addition, the model used for the analysis was an aggregate multinomial logit one. As a result individual preferences of respondents were not directly analysed. The possible existence of distinct customer

segments and significantly differing preferences is therefore unknown. This is, however, an interesting topic for further research, which is the topic of the next section.

6.5 Suggestions for further research

IOL and its subcategory electronic invoicing are subject areas of growing importance. As their significance increases rapidly, so do the results of this study. As a result, paths for future research can be derived from the findings. They indicate companies place the highest importance on Usability. Therefore studies on how to improve it in this context are in order. In addition, pointed out by both interviews and the relative importance analysis, Reach continues to be a threshold question for companies. Hence there is a call for research identifying ways to increase the amount of invoicing partners accessible through service providers. As mentioned in the previous section, a step forward from this thesis would be identifying differing segments of companies with differing criteria preferences in electronic invoicing service provider selection.

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Exhibits

Exhibit I: Interview structure in English (translated)

The purpose of the interview is to examine how businesses make electronic invoicing service provider selections.

Interviewee's background questions:

What is your educational background?

How did you arrive to this company?

How did you come to your position in this company?

How long have you been working for this company?

Company's background questions:

What is the monthly volume of your purchase invoices?

What is the percentage of purchase invoices that are electronic?

When did you start receiving electronic invoices?

What is your purchase invoices operator? Is there more than one?

Service provider selection questions:

Could you give a general description of your transfer to receiving electronic invoices?

What did you consider the most important criterion when choosing a purchase invoices operator?

What other criteria did you consider important?

What was the selection process like? Was it formal?

What were your main sources of information when assessing alternative service providers?

Additional questions:

What led you to adopting electronic invoicing for purchase invoices?

Why did you choose a service provision option? Did you consider any alternatives?

Were the electronic equivalents of purchase and sales invoicing adopted at the same time?

Did you sign the service contract for a fixed term or for the time being?

What benefits did you expect when moving to electronic invoicing? Did these benefits become materialized?

How would you judge the success of your selection?

Have you changed operators? If not, have you considered it?

Interview structure in Finnish (original)

Haastattelun tarkoituksena on selvittää miten yritykset tekevät sähköisen laskutuksen palveluntarjoajavalinnan.

Haastateltavan taustakysymykset:

Mikä on koulutustaustanne?

Miten päädyitte tähän yritykseen?

Miten päädyitte asemaanne yrityksessä?

Kuinka kauan olette työskennelleet yrityksessä?

Yrityksen taustakysymykset:

Mikä on ostolaskujenne kuukausivolyyymi?

Kuinka monta prosenttia ostolaskuista on sähköisiä?

Milloin aloititte sähköisten laskujen vastaanottamisen?

Mikä operaattori teillä on ostolaskupuolella? Onko niitä useampia?

Palveluntarjoajavalintakysymykset:

Kertoisitteko yleisesti siirtymisestä sähköisten ostolaskujen vastaanottoon?

Mikä oli mielestänne tärkein kriteeri valitessanne operaattoria ostolaskutukseen?

Mitkä muut kriteerit olivat mielestänne tärkeitä?

Millainen valintaprosessi oli? Oliko se formaali?

Mitkä olivat päätietolähteenne vaihtoehtoisista palveluntarjoajista niitä arvioidessanne?

Taustaa kartoittavat kysymykset:

Mikä johti teidät ottamaan käyttöön sähköisten ostolaskujen vastaanottamisen?

Miksi valitsitte laskutukseen palveluntarjoajavaihtoehdon? Harkitsitteko muita vaihtoehtoja?

Otettiinko samalla osto- ja myyntilaskutukseen elektroninen vaihtoehto?

Sovitteko palvelusopimuksen määräajaksi vai toistaiseksi? Miksi?

Mitä hyötyjä odotitte saavuttavanne sähköiseen laskutukseen siirtymisellä?
Toteutuivatko nämä hyödyt?

Miten arvioisitte valintanne onnistuneisuutta?

Oletteko vaihtaneet operaattoria? Jos ette, oletteko harkinneet operaattorin vaihtamista?

Exhibit II: Survey samples

Finnish (original)

Ole hyvä ja valitse näistä kolmesta vaihtoehdoista mieluisin operaattori:

Laskutuskumppaneiden saavutettavuus operaattorin kautta	Kaikki	Muutama jää ulkopuolelle	Useat jäävät ulkopuolelle
Vakavaraisuus/liiketoiminnan jatkuvuus	Melko hyvä	Epävarma	Erinomainen
Joustavuus teknologisten ratkaisujen yhteensovittamisessa	Räätälöi meille sopivaksi	Me ja operaattori räätälöimme yhteensopiviksi	Joudumme räätälöimään operaattorille sopivaksi
Projektiosaaminen	Parannettavaa	Hyvää	Huippuluokkaa
Asiakasreferenssit	Ei ole	Muutamia	Meitä vastaavia, useita
Kokonaishinta pitkällä aikavälillä	Tarjosten keskiluokkaa	Keskimääräistä tarjousta 15% kalliimpi	Keskimääräistä tarjousta 15% edullisempi
Asiakassuhteemme verrattuna muihin asiakkaisiin	Saamme erityiskohtelua operaattorilta	Olemme yksi muiden joukossa	Jäämme tärkeämpien pimentoon
Palvelun kehittäminen	Pyynnöstämme	Proaktiivisesti	Ei kehitä palvelua
Loppukäyttäjän ratkaisun helppokäyttöisyys	Hidas- ja vaikeakäyttöinen	Nopea- ja helppokäyttöinen	Käytettävyyys on keskitasoa

English (translated)

Please choose the most preferred option of these three options:

Reach	Many are left out	A few are left out	All
Economic Viability	Precarious	Excellent	Fairly good
Flexibility in Technology Consolidation	Both tailor to compatibility	We tailor for operator's needs	Tailors for our needs
Project Management Ability	Could be improved	Good	Top class
Customer References	None	Several similar to us	Few
Long Term Total Price	About average	15 per cent above average tender	15 per cent below average tender
Relationship	We receive special treatment	We are one among others	We are less important than others
Service Development	Does not develop the service	Proactively	If requested
End-user Usability	Average usability	Quick and easy to use	Slow and difficult to use