

LAPPEENRANTA UNIVERSITY OF TECHNOLOGY  
Department of Industrial Engineering and Management

## **FACTORS AFFECTING THE ADOPTION OF ELECTRONIC INVOICING**

The subject of this thesis was approved by the council of the Department of Industrial Engineering and Management in the meeting of June 15<sup>th</sup> 2005 in Lappeenranta University of Technology.

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## ABSTRACT

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<p>The main objective of the study was to explore the factors that affect the adoption of electronic invoicing and to find out the current penetration level of e-invoicing in South Karelian small and medium sized companies. Especially the barriers which complicate and delay the adoption of e-invoicing were observed. The study consists of the theoretical and the empirical part. The theoretical part presents briefly the concept of innovation diffusion; the particular emphasis is on the literature that presents the different measures that may have effect on innovation diffusion. Based on the literature, 16 hypotheses were formed.</p> <p>The empirical part of this study explored the adoption of electronic invoicing in South Karelian SMEs. A mail survey was conducted to these companies. Respondents were divided to adopters and non-adopters. 25.3 % had adopted electronic invoicing, 7.5 % of them were using electronic invoicing and 17.8 % were still experimenting. The majority of the respondents had not made decision about the adoption of this innovation. Seven of the hypotheses were approved and nine were rejected. In addition to the hypotheses, two main factors that may affect the e-invoicing adoption were found among the answers: respondent companies need more pressure outside the company before they start to use electronic invoicing. Secondly, companies think that information concerning electronic invoicing is inadequate. Finally the study makes some proposals for future actions which could accelerate the adoption of e-invoicing.</p>		

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<p>Tämän diplomityön tarkoituksena oli selvittää tekijät, jotka vaikuttavat verkkolaskutuksen leviämiseen yrityksissä sekä selvittää verkkolaskutuksen levinneisyys Etelä-Karjalassa. Erityisesti haluttiin selvittää tekijät, jotka hidastavat diffuusiota. Työn teoreettinen osuus esittelee lyhyesti diffuusion käsitettä; pääpaino on kirjallisuudesta löytyvillä innovaatioiden omaksumiseen vaikuttavilla tekijöillä. Teorian pohjalta muodostettiin 16 hypoteesia, jotka testattiin empiirisessä osassa.</p> <p>Empiirinen aineisto kerättiin eteläkarjalaisilta pk-yrityksiltä postikyselyn avulla. Vastanneet yritykset jaettiin verkkolaskutuksen omaksuneisiin ja ei-omaksuneisiin yrityksiin. Vastanneista yrityksistä 7.5 % käytti verkkolaskutusta. 17.8 % vasta testasi verkkolaskujen lähetystä ja/tai vastaanottamista. Näin ollen 25.3 % yrityksistä oli verkkolaskuominaisuudet tietojärjestelmissään. Suurin osa vastaajista ei ollut tehnyt päätöstä verkkolaskutukseen siirtymisen suhteen. Seitsemän hypoteesia jäi voimaan ja yhdeksän hylättiin. Hypoteesien ulkopuolelta löydettiin lisäksi kaksi tärkeää tekijää, joilla on mahdollisesti vaikutusta verkkolaskutuksen omaksumiseen yrityksissä. Yritykset kokivat, että suurempi painostus yrityksen ulkopuolelta nopeuttaisi penetraatiota, ja toisaalta verkkolaskutusta koskevan informaation määrä on koettu liian alhaiseksi. Työn lopussa esitellään toimenpide-ehdotuksia verkkolaskutuksen leviämisen nopeuttamiseksi.</p>		

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## TERMS AND ABBREVIATIONS

<b>ASP</b>	Application Service Provider
<b>B2B (B to B)</b>	Actions performed between enterprises
<b>e-adoption</b>	Organizational adoption of electronic solutions into different business areas
<b>ebXML</b>	Electronic Business eXtensible Markup Language. It intends to develop technical framework that will enable XML to be utilized in a consistent manner for the exchange of all electronic business data.
<b>EDI</b>	Electronic Data Interchange
<b>EDIFACT</b>	Electronic Data Interchange For Administration, Commerce and Transport
<b>E-invoicing</b>	An electronic invoice is a modern method of handling and processing invoicing. The invoice information is conveyed from the invoicing system of the issuer directly to the recipient's financial administration IT system. Sending, receiving, recycling and transferring the invoice to finance systems happens electronically. These definitions exclude e-mail invoices or traditional EDI-invoices.
<b>ERP-system</b>	Enterprise Resource Planning System. ERP refers to fully integrated software applications with modules that support several activities from order processing to manufacturing and financial administration
<b>Extranet</b>	An extranet is an Intranet open to those who do not belong to the organization that owns the Intranet (customers, suppliers or distributors) that provides security and confidentiality warranties. Only those members collaborating with the company owning the Intranet can access the shared information.
<b>Diffusion of innovations</b>	The process by which an innovation is communicated through certain channels over time among the members of a social system. Dissemination of new ideas, products etc.
<b>XML</b>	eXtensible Markup Language

# **1 INTRODUCTION**

Over the years organizations and other institutions have aimed to increase the efficiency of their business processes. Organizations have invested heavily in different kinds of technologies hoping to improve organizational performance. The rapidly emerging business environment is yielding an entirely new set of processes and players into the electronized business domain. Financial management processes are not always the greatest interest of managers, especially in small and medium sized companies, but the benefits gained through the adoption of such technological innovation can be massive.

Organizations send over 200 million B2B invoices in Finland per year. According to the study conducted by IRO Research, 4 % (about seven million invoices) of the invoices Finnish companies received last year (2004) were electronic invoices. 66 % of invoices were in paper format and 30 per cent were EDI (Electronic Data Interchange) invoices. In 2003, expectations for e-invoicing penetration for the year 2005 were 20 %, and 50 % of companies believed to use electronic invoicing in 2007 (Siltala 2003).

The use of electronic invoicing is split: large organizations that send and receive a great amount of invoices use electronic invoicing more often than smaller companies. Public organizations and other institutions are now beginning to understand that invoicing is an important part of the order-delivery process. In other words, it is part of the information logistics between business partners. This in mind it is easy to understand that e-invoicing increases the effectiveness of the whole business process.

## **1.1 Background of the Study**

This thesis got its start from the e-business venture that is one of the Technology Center Kareltek's many projectes run by Mr. Kari Korpela. The main task of Kareltek is to promote new business activities in Southeast Finland. Kareltek operates in close

cooperation with Lappeenranta University of Technology and other education and research units in the region (Kareltek www-pages).

Kareltek has been conducting a special eBusiness on-line 2004-2006 venture that is directed to all South Karelian small and medium-sized enterprises (SMEs). According to the Recommendation 2003/361/EC, a company is categorized as SME if it employs fewer than 250 employees, and if its turnover is less than 50 million euro. Along the venture, Kareltek introduces new electronic business solutions to SMEs and aims to improve the competitive position of the whole business network in South Karelia. The venture is funded by ESR (European Social Fund) and TE-Centre (Employment and Economic Development Centre) and it lasts until the end of the year 2006 (Kareltek www-pages).

The electronization of financial management has proceeded slower than it was expected in the late 1990ies (Nikunen 2002). The research problem of this study is that there is a new technology available for invoicing but we do not know the reasons for its slow adoption among enterprises. This is an important point to solve when aiming to raise the penetration level of this innovation.

## **1.2 Objectives and Scope of the Study**

This study attempts to clarify the factors that facilitate or delay the adoption of electronic invoicing. The purpose of this study is to empirically examine the ability of different measures to explain user acceptance of e-invoicing, that is a technology innovation. This eBusiness adoption is studied from innovation diffusion viewpoint because the acceptance of a new technology in a market is often referred to as diffusion (Rogers 1995). This study is interested in the role of three kinds of measures: innovation characteristics, organizational (structure, managerial, information processing) characteristics and environmental characteristics. The approach is quite comprehensive because many measures are used to observe the adoption of electronic invoicing. This study observes the subject from the viewpoint of the South Karelian small and medium sized companies. The purpose is to clarify if the factors found in previous diffusion studies are the same in

electronic invoicing. As a result, it should be possible to understand how the penetration level could be raised, for example what kinds of actions should be taken and what kinds of information sources are considered as the most important among the target SMEs.

### **1.3 Research Methods and Structure of the Study**

The study consists of two parts: theoretical and empirical. First in the theoretical part the study presents electronic invoicing. The information sources of e-invoicing are mostly Finnish trade journals. This is because there is not any studies about e-invoicing available, due to the newness of the subject. The theoretical part presents also the literature of innovation diffusion and adoption of innovations; especially the factors that affect the innovation adoption are tried to find. Based on the literature of innovation adoption hypotheses are formed. The empirical part of the study discusses the adoption of electronic invoicing in South Karelian small and medium-sized enterprises. The hypotheses were tested with quantitative survey method; data was collected in March and April 2005 with a mail survey targeted to South Karelian SMEs. In the beginning of this project, there were action-oriented research approach, that used case-study to achieve empirical data. The results of this approach are presented in Chapter 1.4 to observe the current state of electronic invoicing in South Karelia.

The data collection process had two parts, in the first part the target companies were contacted by telephone in order to find the right person to answer the questions. The second part was the mailing and data was collected when answers were received. The collected data was encoded into SPSS-statistical analysis program and hypotheses were then analyzed with statistical tests.

This thesis consists of five chapters (see Fig. 1). After the first introduction chapter, chapter 2 introduces the field of e-invoicing, for example the situation today, benefits, standards and other issues related to e-invoicing are presented. Also the wider picture is formed by explaining the role of invoicing in order-delivery chain and in financial management.

Chapter 3 introduces the commonly found factors that affect the innovation adoption in organizations. First the definitions of innovation diffusion are presented. Rogers' book *Innovation Diffusion* has an important role in this chapter. The factors are divided into six categories: innovation characteristics, organization characteristics, managerial characteristics, environmental characteristics, information behavior and voluntariness.

Chapter 4 includes the empirical part of the study. The issues related to research methodology and the phases of the data collection process in the study are presented. The chapter contains descriptive information about the respondent companies and presents the usage of electronic invoicing in South Karelia. Also the hypotheses are tested in chapter four. Chapter 5 is the conclusion chapter. It summarizes the results gained from the survey and makes some proposals for future studies concerning electronic invoicing.

<p style="text-align: center;"><b>Chapter 1</b> Introduction, objectives and research methods</p> <p style="text-align: center;"><b>Chapter 2</b> Electronic invoicing</p> <p style="text-align: center;"><b>Chapter 3</b> Innovation diffusion and commonly found factors that affect diffusion of innovations, hypotheses formation</p>
<p style="text-align: center;"><b>Chapter 4</b> Empirical part of the study: data collection process, descriptive information about respondent companies, hypotheses testing with SPSS-analyses</p> <p style="text-align: center;"><b>Chapter 5</b> Conclusion chapter that summarizes the results of the study</p>

**Figure 1 Structure of the Study**

## 1.4 Current Situation of E-invoicing in South Karelia

In this section, the study presents the current situation of electronic invoicing connections in South Karelia. The whole e-invoicing project coordinated by Kareltek started in the 27<sup>th</sup> of May in 2004. Some minimum requirements were then defined so that the project could start. Two tests were conducted to detect the interoperability between e-invoicing operators and banks.

Before an organization starts to use electronic invoicing, it is recommended to test the connections for sending and receiving e-invoices with the company's operator. First it is better to test the connections with company's own operator and after that with some reliable invoicing company and finally with other operators' customers. Companies should test different e-invoices and different cases to make sure the connections are functioning. (Tietoyhteiskunnan kehittämiskeskus ry 2004)

The eBusiness developing unit in Technology Center Kareltek performed two e-invoicing LivingLab tests to find out the current connections of organizations and operators/banks in sending and receiving electronic invoices in South Karelia. LivingLab is an environment that studies the future technology and needs by combining the perspectives of research, technology development and usage. The objective of LivingLab is to develop a multi-disciplinary research and testing platform concentrating on the immediate environment from the user point of view. LivingLab binds the inhabitants, organizations and public sector to develop the area and to strengthen the collaboration.

Invoices in the LivingLab tests were sent by eight SMEs to specific receivers, for example to the city of Lappeenranta and the forest product company UPM. The aim was to see if there are some particular problems that need to be solved. Before the tests, the information needed for sending (addresses etc) was collected into one table and it was delivered to companies involved in the tests.

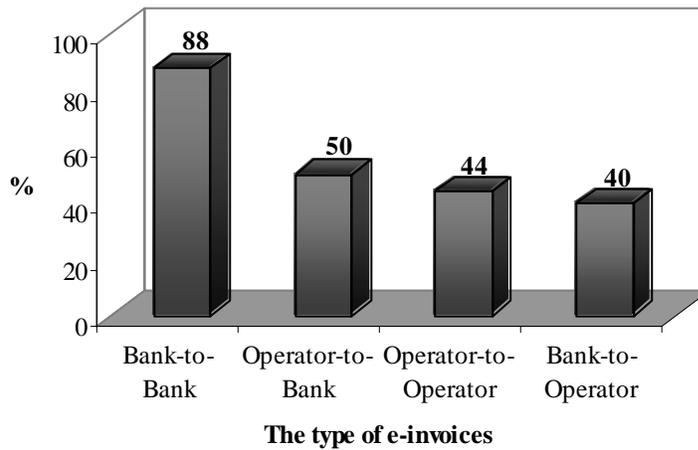
Before the tests in the 13<sup>th</sup> of September in 2004, so called connectivity table was created (see appendix 1). It indicates the existing connections between Finnish e-invoicing operators (Basware, Elma, Enfo, TeliaSonera, WM-Data) and banks (OP bank, Nordea, Sampo). The connectivity table shows if the connections are already operating or if they still are in a testing phase. Also a table concerning the necessary e-invoicing contracts (see appendix 2) was drawn in turn of the years 2004 and 2005. The contract table indicates the type of the contract that is needed between two operators. There are four possible contracts that different operators require.

### **The First E-invoicing Test**

The first e-invoicing test was arranged at the end of January in 2005. The test invoice is presented in appendix 3. A special table was drawn to help the follow-up of the test. For example the dates and times of sending and receiving of e-invoices were updated to this table along the test. Eight companies sent the invoices and ten companies were the receiving parties. The success of the first test was not very promising. Of 52 sent e-invoices only 17 was correctly received, in other words the go-through percent was 33 %. This kind of results did not indicate very high reliability for e-invoices.

### **The Second E-invoicing Test**

The second test appeared to be more successful than the first one. 72 test invoices were sent at the end of April 2005. 44 % of them were operator-to-operator e-invoices, 28 % bank-to-operator e-invoices, 17 % operator-to-bank and 11 % bank-to-bank e-invoices. Figure 2. presents the success ratio of different e-invoices of this test. Bank-to-bank services managed to pass through 88 % of the invoices, the success of other services was quite poor. The overall success ratio should be 100 %. Electronic invoices should not disappear during the transmission: Post Office has almost 100 % guarantee in delivery and e-invoice delivery should be at least at the same level.



**Figure 2 The go-through percent of different e-invoices**

### **Arised problems**

One considerable challenge concerning e-invoicing and its use seemed to be the unclarity of the use of e-invoicing addresses. The companies that were involved in the tests had quite often problems with finding the right e-invoicing address of the receiver. Secondly, the way of generating e-invoice address should be the same for all. This means that some operators or banks would be forced to change their way of generating e-invoice addresses. Also the address book updated by TIEKE revealed to have some flaws; some necessary information needed for sending e-invoices was missing. This is about to get fixed.

Another challenge is to make clearer the contracts needed between a company and its operator. Along the tests it revealed, that one reason why some e-invoices didn't find their way to the receiver was the lack of necessary contracts. This means that the information about these contracts is inadequate. All the problems that arose need to be solved because it can't be expected that small enterprises have resources enough to go through the stages that are too complicated and time consuming for them. Secondly, if the introduction of e-invoicing is too difficult for SMEs there's a danger they refuse to use it and go back to the old routine: paper invoices. Clear instructions should be created and delivered to all possible adopters of electronic invoicing.

## **2 E-INVOICING IN BUSINESS PROCESS ELECTRONIZATION**

The digitalization of many business processes is resulting in a remarkable productivity gain. The primary benefits of electronic business solutions, like e-invoicing, involve dramatically reducing “clerical” transaction costs. Also fewer errors will result when off-line business procedures are automated. There are also secondary benefits from electronic solutions: they improve the speed and accuracy of information, useful feedback information and automatically monitored and reported customer data. Internet based information is cheap, more easily shared by several parties, available earlier, and moved in real-time when compared to traditional practices. (Vasarhelyi & Greenstein 2003)

The explosive consumption of paper in the office shows the need for paperless (or “less-paper”) office. It has been studied that professionals in business world spend about 60 per cent of their time handling different paper documents. It’s easy to understand that this is very inefficient (Liu & Stork 2000). Liu&Stork have found that

- large organizations lose one document every 12 seconds
- 3 % of all documents are incorrectly filed
- 7.5 % of documents are lost forever
- Disorganization in the workplace may cost executives even six weeks of time per year
- The average executive spends three hours per week hunting for mislabeled, misfiled or lost documents.

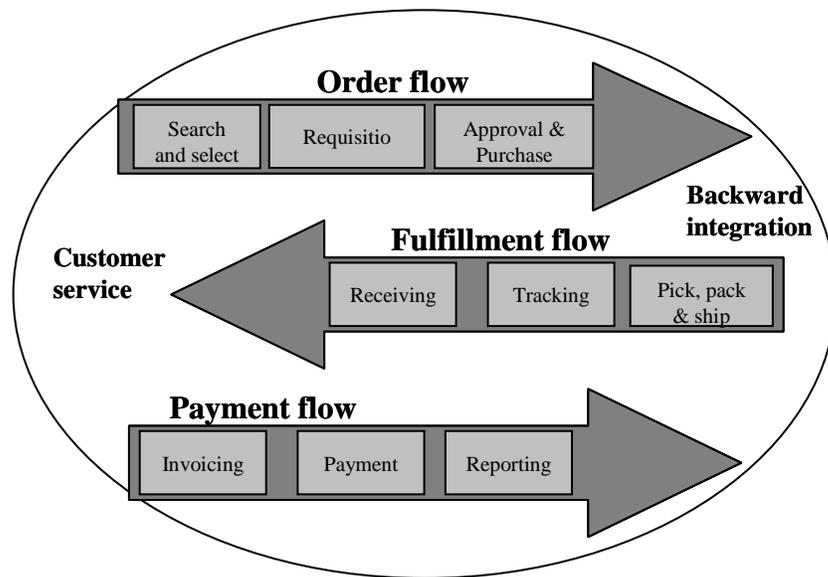
Effective strategies towards adoption of electronic business need to be based on good understanding about the costs and benefits of using these modern technologies. Identifying these costs and benefits can be quite difficult. Probably many purchasing and supplying processes will be fundamentally changed by the introduction of electronic solutions. Purchasing and supplying activities that are conducted with low levels of direct human contact such as mail order or telephone or EDI are more likely to be developed into electronic solutions than those that are more dependent on high levels of direct human

contact. The successful implementation of electronic business solutions requires a careful but rapid restructuring of traditional business processes in the organization. A company should analyze, design, improve and evaluate their business processes before implementation. (Voutilainen & Pentto 2003)

## **2.1 Invoicing in Order-delivery Chain**

Invoicing can be observed as part of the order-delivery chain in a company. The order-delivery process comprises three separate work flows: the order work flow, the fulfillment work flow and the payment work flow (see Fig. 3). These processes have to be supported by customer service and backward integration to accounting systems (Kalakota & Robinson 2001). Various employees are involved in these processes, on both the buying and the selling side. Buying companies do business with a large number of selling companies and vice versa. Information systems are a crucial part of the cooperation between the parties engaged in a chain. Traditional EDI-connections are one example of systems that are used for information flow. These particular systems are though expensive and inflexible. Because of this, organizations are now moving towards Internet based systems. (Heir et al. 2000)

Today, it is reasonable, that the whole process from order to delivery is electronic. The purchasing process begins with a need for a product. A company makes an order by an information system. That may be the company's own information system, a supplier's information system or that of an intermediary that offers or passes on the products of a number of different suppliers. The information systems of the various market parties are able to communicate with each other via the Internet. The selection, ordering and delivery processes are not affected by whether the information is stored in the company's own system, in the systems of one or more intermediaries or those on suppliers. (Kalakota & Robinson 2001)



**Figure 3 Three critical process flows (Kalakota & Robinson 2001)**

As the order is made, the supplier processes it. He keeps the buying organization informed of the status of orders and deliveries. The supplier identifies items and services in such a way that upon receipt or performance they can be automatically matched with the order. The invoice is also identified in a way that allows it to be matched to the order/delivery. This also applies to an invoice that may be required to be exchanged electronically. In turn, when payment is made, it is identified in a way that enables its entry into the suppliers' accounting system to be computerized. (Electronic Commerce Platform Nederland 2000)

Next the study will observe the process in more details. First there is the product selection process (before that there are some contracts and authorization made, but we study the process from the selection point forward). Selection of products can be done with browsing the desired products in electronic catalogues. After selection, the order is made and the supplier can proceed with delivery. If the standard delivery time or the quantities ordered cannot be complied with, the supplier sends a message. In other case the supplier may have to send an order confirmation message, even if the quantities and delivery times can be met. Such message may enable the buyer's system to store and process orders that were entered in the supplier system. Electronic purchasing offers both the buying and selling side the opportunity to plan deliveries and the associated logistical activities. It is possible that

ordered and delivered goods are not accepted by the buyer company. (Electronic Commerce Platform Nederland 2000)

The invoicing procedure is the next phase. There are several options for invoicing:

- Invoicing each other: An electronic invoice is sent for each order placed.
- Invoicing each delivery: An invoice is sent for each delivery made by the supplier to the buyer.
- Periodic invoicing with a collective invoice: Deliveries made over a certain period are grouped together and put on a single invoice.
- Pro forma sending of a credit note to the supplier: The buyer administers the orders placed and the deliveries received and informs the supplier of the amounts involved by issuing an electronic credit note.
- Invoicing (and paying) through an intermediary: The information on deliveries involving different suppliers and buyers is passed to an intermediary, who sends out collective invoices.
- Paying without an invoice (self-billing): The buyer pays on the basis of delivery information registered in the system. If required for tax, legal or auditing reasons, a pro forma invoice is sent.

If the electronic invoice has come from the ordering system, it will already have been checked by that system. The system must also be able to automatically reconcile outstanding and received payment with the delivery and invoice information. (Electronic Commerce Platform Nederland 2000)

## **2.2 Definition of Electronic Invoicing**

Beside to the EDI-based invoices there are now coming “cleverer” invoices, electronic invoices (e-invoices) that are part of the intensifying and electronization of financial management processes. The advantage of electronic invoice compared with EDI invoice is that in e-invoicing system the whole invoice is transferred and the invoice maintains its

form from sender to receiver (Erkkilä 2002). EDI invoices are more specified point-to-point systems between two companies (TIEKE. EDI/OVT-palvelut). The history of electronic invoices is quite short. The very first e-invoice was sent in October 1999 in Finland (Vahtera 2002). EU approved in 2003 a directive that requires all member countries to approve electronic invoices. The directive also unifies the required information content that each e-invoice must contain. This was an important step for the future of e-invoicing (Kokko 2003).

An electronic invoice is a modern, reliable and cost-efficient method of handling and processing invoicing for sales of goods, services and other charges. The invoice information is conveyed from the invoicing system of the issuer directly to the recipient's financial administration IT system (Nikunen 2002). E-invoice has the same functions as a paper invoice. It contains the same financial information and is designed to look like a conventional invoice when seen on the screen. The one difference lies in the transmission of the invoice. Sending, receiving, recycling and transferring the invoice to finance systems happens all electronically. Electronic invoicing method suits both large and small organizations (Fiilin 2003). E-invoicing aims to connect the billing, invoice handling and payment systems to Internet based techniques (Lätti 2000). These definitions exclude e-mail invoices or traditional EDI-invoices.

Still majority of the invoices are in paper format. The share of B2B electronic invoices in Finland was in 2002 only about 0.5 % of invoices, representing about 600,000 invoices. In 2003, the estimated percentage was about 3 %. 2004 the volume of e-invoices was four percent, which is an amount of about seven million invoices (eCommerce Service Center 2003). In 2002, 40 % of the 200 largest organizations in Finland had e-invoicing system partly in use and 17 % of them were about to get e-invoicing system at the moment (Kokko 2003). When a couple of large companies start to use e-invoicing, they will pressure their small partners to join them. A small enterprise will need only a work station, a browser and an Internet connection (Hillo 2003).

### **E-invoicing Formats**

There are parallel e-invoicing formats in Finland: Finvoice by the Finnish Bankers Association; eInvoice by Nordic e-invoicing Consortium; Teappsxml by TietoEnator; Postixml by Atkos; and Ecxml by Elma (see Table 1). These formats are usually called e-invoicing standards though they are not actually standardized but are formal like standards (Siltala 2003).

eInvoice and Finvoice are the most widely used formats in the above mentioned list. eInvoice is developed by Nordic e-invoice consortium. The banks and e-invoicing service providers in the consortium have agreed upon a common standard that enables eInvoices to be sent and received reliably in a common trunk network. This means that the invoicing traffic between the invoice issuer and invoice recipient is conveyed via a single channel even though the parties use the services of different e-invoicing service providers. The members of consortium include Nordic banks and e-invoicing service providers (Elisa Solutions Oy, Elma, Posti Oyj, TietoEnator, Nordea, OP bank Group and Sampo Bank). (eInvoice Consortium 2004)

Finvoice is the newest e-invoicing format, its pilot project started January 2003. Finvoice is a common format for electronic invoices designed by Finnish banks. It was designed using XML (Extensible markup Language) syntax. XML enables the invoice to be represented both in a form understood by the application and, using a browser, in a form corresponding to a paper invoice. Finvoice can be used only in B2B invoicing but the Finnish Bankers Association has started to develop Finvoice in order to make it compatible also in consumer invoicing. (The Finnish Bankers Association 2005)

There are about 250 different invoicing standards in Europe, so it is not very realistic to expect that we could get to the situation of just one standard. Different business lines have their own basis and needs. There has been defined minimum information content that each invoice must have. This information on the other hand specifies it as an invoice and on the other hand differentiates it from other invoices of that period (Hillo 2003).

**Table 1 Finnish e-invoicing formats**

<i>Format</i>	<i>Developer</i>	<i>Characteristics</i>
Finvoice	Finnish Bankers Association	The newest format, based on ebXML-standard among other things
eInvoice	Nordic e-invoicing Consortium	Built 2000, based on nordic definitions
ecXML	Elma Oyj	Developed by Elma
PostiXML	Atkos	Based on Post's needs, including postal address information etc.
TeappsXML	TietoEnator Oyj	Developed since 2000 to unify the services of TietoEnator

### **E-invoicing Addresses**

When sending electronic invoices to some company, the receiver of e-invoices needs a special address where the sender can direct the invoices to. Banks and operators generate these addresses to organizations. The receiver of e-invoices should know his e-invoicing address and EDI-code. The address is dependent on the operator used; it can be e-invoicing account, IBAN, Intermediator Code or EDI-code (Tietoyhteiskunnan kehittämiskeskus ry 2004).

TIEKE, Finnish Information Society Development Centre, “has a key networking role as a neutral and non-profit organization in promoting the efforts of its members, within the public and private sectors alike, with an ultimate goal to create viable tools and expertise for use in the information society.” TIEKE updates a special national e-invoicing address book which contains information about companies that send and/or receive electronic invoices. The purpose of the address book is to easier the introduction of e-invoicing and to promote the penetration by presenting the parties that use e-invoicing and the extent of the e-invoicing use. Operators and banks do all the updatings to the address book. (TIEKE www-pages)

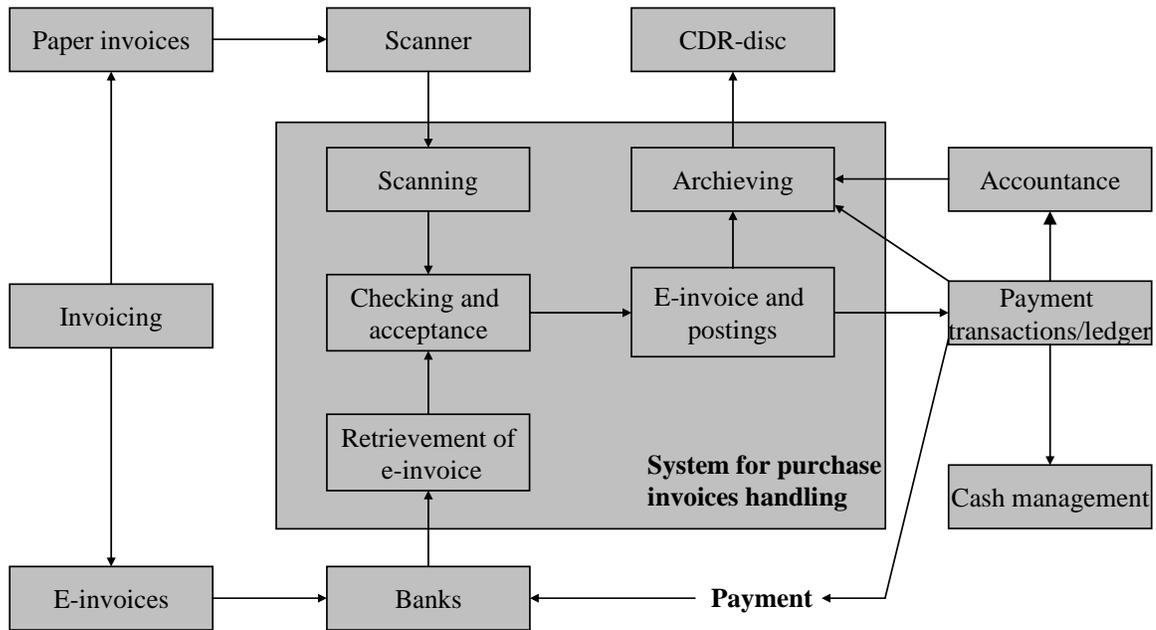
## **2.3 E-invoicing Process and Supporting Information Systems**

Although a simple document, the traditional paper invoice usually requires a number of cross-departmental checks before any payment can occur. The accounts, purchasing, (goods) receiving departments and the mailroom all play a part; and in most enterprises are not situated in the same physical location. The use of e-invoicing accelerates the processing of invoices considerably. (Vahtera 2002)

The invoicing process starts when the supplier sends a paper or electronic invoice and ends when the payment and achievement of the invoice have been done. Figure 4 presents the receiving of e-invoices, but also the scanning of paper invoices is presented in the figure. The majority of invoices are still in paper format. There are different resources attached to this process: work force, working rooms, different equipments, computer software and networks, and overall management and administration. The work force costs and software costs are direct costs of the process and the other costs are indirect costs of the process. (Voutilainen & Pentto 2003)

Basically the electronic invoicing process is quite similar to the manual process. Someone in the department has made a purchase, the goods have been received, and the supplier sends an invoice to the purchaser (Hillo 2003). If the supplier sends a paper invoice, it must be scanned to the electronic system. Electronically sent invoices come directly from the supplier's electronic system into the purchasing company (Voutilainen & Pentto 2003). The purchaser can also define his accountancy firm to be the receiver of e-invoices and then the accountancy firm takes care of the further actions (Pitkänen 2003).

After the checker has reviewed the invoice, it is sent electronically to an acceptor. When the electronic acceptance is made, the director or financial manager sends the invoice back to the accountant in the Finance Department of the city. The accountant transfers the electronic invoice data to bookkeeping and back office system. The accountant in the back office makes the similar payment procedures than in manual system. (Voutilainen & Pentto 2003)



**Figure 4 E-invoice receiving (Granlund & Malmi 2004)**

The archiving is quite different than in the manual process. The paper invoices have been detected after the scanning process. The exception is invoices of European Union projects; the original paper document must be archived. All the other invoices can be archived into the electronic archievement. (Voutilainen & Pentto 2003)

The important part of electronic invoicing is the supporting information systems. The task of information systems in order-delivery chain is to integrate all the activities together, in order to make the chain to operate in more effective way. The most essential information systems that support business in organizations are ERP- (Enterprise Resource Planning), SCM- (Supply Chain Management) and CRM-systems (Customer Relationship Management) (Kalakota & Robinson 2001). Here we present the ERP-systems and SCM-systems.

## **SCM**

Supply chain is the flow of products, services, information and money. Also the organizations and processes that participate in these flows belong to the supply chain

concept (Kalakota & Robinson 2001). The activities are not only intraorganizational as logistical activities can be, but inter-organizational.

SCM is the coordination of material, information, and financial flows between the participating enterprises in a business transaction. Interenterprise integration is a major focus of SCM.

- Material flows (physical product flowing from suppliers to customers through the chain, also reverse material flow, such as product returns and disposal)
- Information flows (demand forecasts, order transmissions, delivery status reports)
- Financial flows (credit card information, credit terms, payment schedules etc)

(Kalakota & Robinson 2001)

## **ERP**

The proper control of operations on an organization requires comprehensive information system that can be used to draw conclusions about the past events, current situation and the development in future. ERP-systems meet these requirements. ERP integrates information and information-based processes within and across functional areas in an organization. The main purpose of an ERP system is to support the operations of the company management in day-to-day operations, as well as in tactical and strategic decision-making. The main task of ERP-system is to update the information gathered from different operations in one concentrated data base. With ERP, it's possible to control for example orders, invoicing and accountancy. ERP aims to keep the information transparent, so that different parties have access to the same information at the same time. (Bowersox, Closs, & Cooper 2002)

The basic functional areas covered by an ERP are:

- Finance (Financial management, liquid assets, investment management, accounting (billing and payments) and assets management control)
- Logistics (Monitoring of sales, distribution, management of materials and/or products, warehousing and transport management, purchase management and order, inventory stocks, etc.

- Manufacturing (Analysis of the basic data required to manufacture products that are sold by the firm)
- Human Resources (Management of the employees of the firm)

(Bowersox, Closs, & Cooper 2002)

The next section presents the crucial part of the e-invoicing process: the intermediators.

## **2.4 Role of Third Party Intermediaries**

The e-invoicing operators and banks have an important role in the e-invoicing process. They make sure that transactions between companies function well. Because of these intermediaries, it is possible that the sender of an e-invoice uses a different form of an invoice than the receiver. The sender will not need any competence about different e-invoicing formats because the service provider will take care of the modifications between the sender and the receiver. So the receiver can accept the e-invoices in such form he desires, no matter what the format was when it was sent. In addition to basic e-invoices, the service provider transmits also complex invoices, appendices or the whole invoicing data, if needed (Hillo 2003). Figure 5 illustrates the sending and receiving of e-invoices between two companies and the roles of the e-invoicing operators and banks.

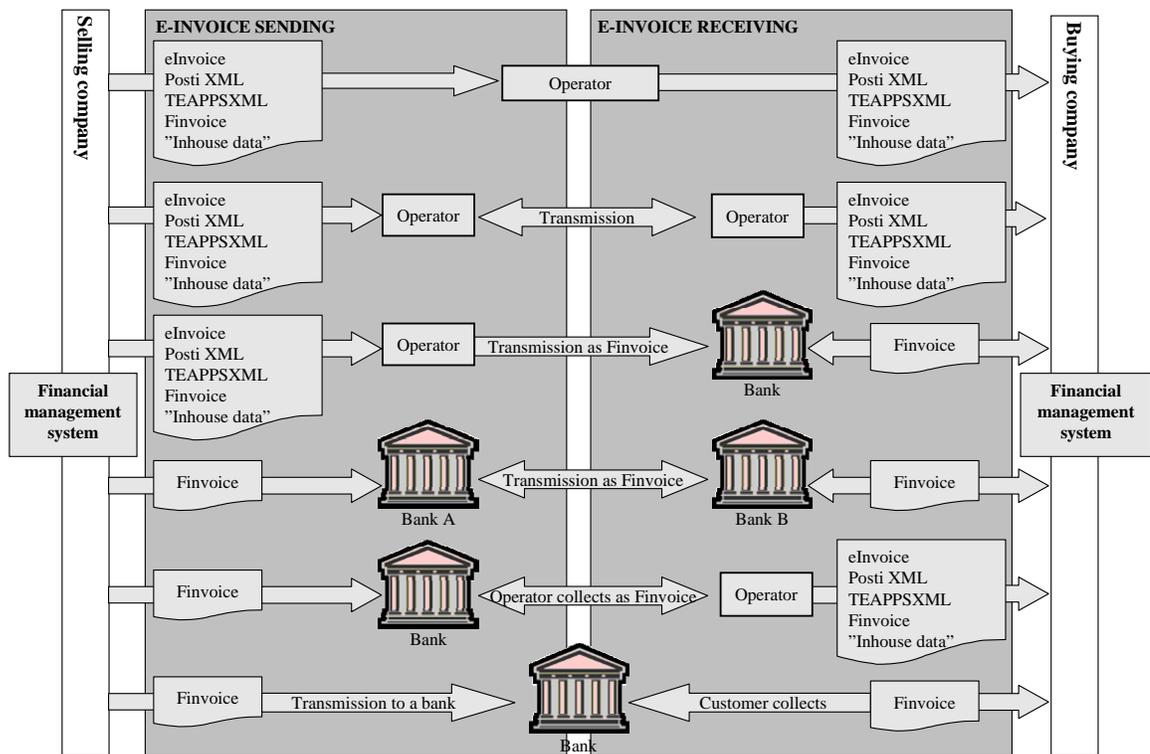


Figure 5 Sending and receiving of e-invoices (Tietoyhteiskunnan kehittämiskeskus, 2004)

### 2.4.1 Finnish E-invoicing Operators

It is possible to send electronic invoices directly to the receiver but it is recommended to use a certain electronic invoicing operator. It can be an impossible task to a company to test and keep up all the connections with all trading partners. It is easier to use an operator to do this. The operator between the business partners unifies the information exchanged between organizations. If the invoicing organization and the buyer organization use the services of different operators, these two operators take care of the e-invoicing traffic together and make it to work properly. (Vahtera 2002)

Finnish e-invoicing operators are for example Elisa Solutions, TietoEnator, Elma, Enfo etc. but also banks can practice as operators. When a company begins to use e-invoicing it gets a special e-invoicing address from his operator, this address is then informed to the suppliers of the company. Many operators offer e-invoicing services as ASP-service. E-

invoicing operators take care of the transmission of invoices, the follow-up of the traffic, archiving and they control that the invoices get to the buyer organization. Also other services can be offered by the operators. (Karkimo 2003)

The principal tasks for every e-invoicing operator are the same. Operator receives the e-invoicing data sent by the seller company, does the modifications needed and then sends the invoices to his customers, which are buyer organizations. The modifications are needed so that the buyer organization can handle the invoices in his systems (Nikunen 2002). E-invoices can be delivered to the buyer organization as e-invoices, EDIFACT-invoices, e-letter, e-mail invoices or even as paper invoices, depending on the buyer's systems (Vahtera 2002).

#### ***2.4.2 Banks as E-invoice Operators – Finvoice***

Banks can also act as e-invoicing operators and they make all the conversions needed between companies, just like the previously mentioned operators. For SMEs, it is probably easier to use their own banks as operators because they already have connections with banks. The existing connections make it possible to the companies to replace paper invoices using Finvoice, which can be forwarded through the banks just like payment transactions (Vahtera 2002). The activity of banks as e-invoicing operators was poor for some time ago because the connecting traffic between banks was missing. This meant that companies had to have connections to all possible banks, because banks did not transmit e-invoices to each other (Nikunen 2002). Along Finvoice these inter-bank connections started to work, first between Nordea and OP bank in January 2003 (Valli 2003).

Finvoice is a common format for electronic invoices designed by Finnish banks. Its information content is designed so that Finvoice can be used in different situations. Because of this, much of the information (for example order identifier) is both on the invoice and row level. In practice a Finvoice based invoice consists of three parts: 1. frame, which contains the information needed for the transmission, 2. specification, which contains the

information needed by the agreement process and accountancy, and 3. payment proposal, which contains the information needed for the paying. (Finnish Bankers Association 2005)

One target of Finvoice is that it makes it easy for organizations to start to use e-invoicing. This is because companies can begin to receive e-invoices without large changes in systems. In practice e-invoices can be opened with a browser and handled traditionally like paper outputs if the company wishes so (Pitkänen 2003). Naturally it is also possible and recommended to handle the whole invoicing process totally automated. When the buyer and supplier companies want to start to use e-invoicing as a Finvoice-service, they have to first agree it with each other and with their banks. The supplier company sends e-invoices to his own bank, which then transfers them to the buyer's bank. Buyer's bank delivers the invoices to the buyer for handling and payment (Pitkänen 2003).

## **2.5 Benefits of Electronization of Invoicing**

Organizations adopt new eBusiness solutions hoping to gain major benefits. Many of these possible benefits are connected with the possibilities to provide real-time information about the availability of products, order status, inventory levels and basic production data (Quayle 2002). The extensive access to information can be seen as the main benefit.

Innovations that are based on fast reaction ability, small costs and on information systems interests people or companies because the benefits are real and can be measured easily. The e-invoicing is one example of innovations in this category (Hillo 2003). Using electronic methods to generate, deliver and receive invoices have several benefits over paper invoicing. E-invoicing automates the routines of financial management processes, fastens the sending of invoices, saves money and time, because there's no need to print and post the paper versions. The circulation and approval of invoices become faster. The manual processing and mistakes decrease (Vahtera 2002). Partnerships between companies are tightened and companies will form stronger networks, they will also transport mutual information and documents safer and cheaper way (Hillo 2003).

There are also other documents, which could be transformed into electronic form. Companies do constantly different subscriptions, order confirmations, shipment notifications, reports, announcements etc. It is possible - and reasonable - to convert all of them to electronic form. When e-invoices are sent, documents of them will remain automatically in the electronic archive; there is no need for copying, punching or filing them, all this happens automatically. (Tuisku 2003)

The study presents the benefits from three viewpoints: cost savings, time savings and error decreasing.

### **Cost & time savings**

The most significant benefits in e-invoicing are related to the costs. The cost savings come from the disappearing paper transportation costs and reduction of archievement costs. With paper invoices also the approval process can last a very long time, especially if some employee is absent for a long time, due to illness etc. Retrieving a transaction can be done in less time, too, because the invoice data is stored in an electronic file that you can access in an instant. Better data management means also better financial management: a company can take advantage of early payment schemes, or choose to pay less important suppliers closer to the deadline.

The Helsinki Chamber of Commerce has calculated that the handling costs of one traditional invoice are 8,4-16,8 euro when the costs per one e-invoice are only 1,7-7,3 euro. It takes about 20 minutes to handle a traditional invoice and one to two minutes to handle an e-invoice. According to the Helsinki Chamber of Commerce, electronic invoicing saves 80-90 % of the costs. (The Helsinki Chamber of Commerce)

The eInvoice Consortium says that the handling costs of one traditional B2B invoice are about 30 euro. It includes the costs of the seller and the buyer organization. 80 % of the costs come to the buyer. Along the Consortium, costs can be halved. Also Antila claims that the sending and handling costs of one paper invoice are about 34 euro (Antila 2000). According to Nikunen, the handling costs of paper invoice in a large company are about 60

euro. There is not though any ready formula for calculating the savings gained with e-invoicing. The amount of savings depends on the processes of the organization, on the used technology; what are the financial management systems like and how are they developed (Nikunen 2002). The management should keep in mind, that the savings are not real if the company can't use the saved time efficiently in other processes (Voutilainen & Pento 2003). Table 2 comprises the costs of traditional invoice and electronic invoice.

**Table 2 Comparison of paper invoice and e-invoice**

<i>Assessor</i>	<i>Paper invoice</i>	<i>e-invoice</i>	<i>Savings</i>
The Helsinki Chamber of Commerce	8.4-16.8 e, handling time 20 minutes	1.7-7.3 e, handling time 1-2 minutes	80-90 %
Nikunen	From 60 e upward	Depends on organization's processes	
eInvoice Consortium	From 30 e upward	Approx. ½ of the costs of paper invoice (~15 e)	50 %

Costs depend also on whether the e-invoices are sent directly to the customer or via some intermediary (operator or bank) and how the storing of invoices is arranged. E-invoicing operators, banks and "invoice hotels" naturally charge from their services. Also the electronization level of the invoicing process affects the costs: if the invoice is received as a paper invoice, the scanning process brings some additional costs when compared to the situation when the incoming invoice is in electronic form from the beginning of the invoicing process (Voutilainen & Pento 2003).

In EDI-invoicing, the major costs come from building the connection between two organizations. With e-invoicing these kinds of investments are not needed; a company needs only an Internet connection and a browser. E-invoicing system can be integrated into the old invoicing system but if this is not possible, the company needs a new invoicing system, which can be obtained also as an ASP-service (Application Service Provider). Other costs come from sending and storing of e-invoices.

According to Vahtera, the best part of electronic invoicing isn't the disappearing of paper, but the possibilities it gives the future planning. This means that the traditional bookkeeping is concentrated on transaction recordings. Today, it is possible to observe the real time transactions; this makes it easier to predict (for example the cash flow) and plan the future. The benefits gained with the future planning can be a great motive for SMEs to adopt e-invoicing, because the cost savings will not be as extensive for them as for large companies. (Vahtera 2002)

### **Decreased errors**

Even if one's business does not use complicated accounting software, using e-invoices reduces the potential for errors to end up at the accounts. Since fewer people are involved in the invoicing process, the quantity and accuracy of e-invoice data is much higher than with traditional paper-based processing. Solving errors takes a long time- with e-invoicing a company will spend less time sorting out problems and more time running the business. (Vahtera 2002)

### **3 FACTORS AFFECTING INNOVATION ADOPTION**

This chapter describes some factors that are presented in literature and thought to have effect on innovation adoption. After the presentation of these factors some hypotheses are formed so that the effect of them can be measured in the empirical part of the study. First the innovation diffusion process and its elements are discussed. This study observes the e-invoicing adoption from the innovation diffusion viewpoint because the dissemination and acceptance of a new technology in a market or among parties in an industry is often referred to as diffusion. Electronic invoicing can be seen in a wider frame: it is part of eBusiness processes. The eBusiness set of processes can be divided into five groups: 1. revenue (sales, marketing, advertising, etc.), 2. service/electronic care (the new customer relationship management component), 3. expenditure or supply chain management (purchasing, logistics, delivery, etc.). 4. e-financial processes (accounting, finance, auditing and payments), and 5. asset management (human resources, fixed asset, research and development, etc.). (Vasarhelyi & Greenstein 2003).

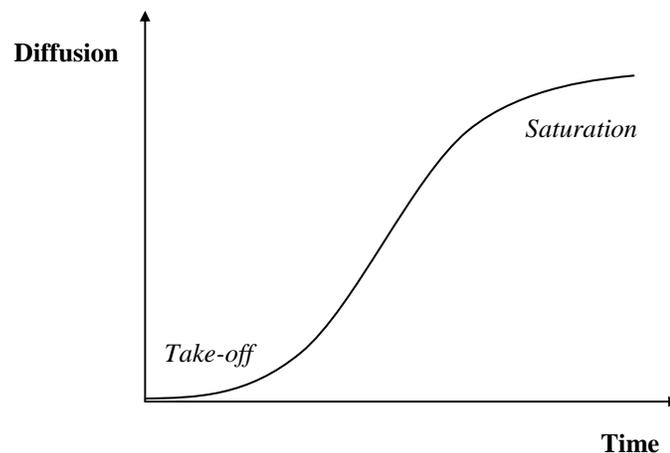
Several characteristics at the level of the individual firm have been studied in the literature to explain the adoption behavior. For example the adopter industry environment, organization characteristics, decision maker information-processing characteristics, the innovation characteristics, the supply side competitive environment (see for example Gatignon & Robertson 1989) etc. can be observed. Speed of adoption of an innovation is also dependent on the adoption of previous products and systems. For example, in communication, several product innovations have followed each other: fax, teletext, e-mail and the Internet, mobile phones, and ISDN technology. Because people already use these products, a new product innovation may be adopted pretty easily by the market. In other words, proper timing of the introduction may depend on consumer readiness to use the new system, which itself will be largely due to prior experience and innovativeness. Social learning (e.g. communication) will further contribute to the diffusion of these products and services. (Antonides, Amesz, & Hulscher 1999)

Adoption of eBusiness in SMEs has been lower than in large companies. Different factors can be found for that: low-level investments in IT, lack of resources and skilled workforce, limited growth strategies etc. This chapter presents some essential factors that may affect the adoption of innovations. Hypotheses are then formed so that the effect of these factors can be measured in the empirical part of the thesis. Chapter four processes the hypotheses and tests them with SPSS-analyses to find out if they have effect on e-invoicing adoption.

### **3.1 Diffusion of Innovations**

Diffusion theories have their origin in the explanation of the adoption of technological change by farmers. Since then the scope of diffusion theories and empirical research related to that has broadened. Diffusion can be defined as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers 1995). The general diffusion model is often represented by the S-curve model, with different timings of adoption ranging from innovators to laggards deciding the steepness of the curve (see Fig. 6). After its conception, an innovation spreads slowly at first, and then picks up speed as more and more people adopt it. Eventually it reaches a saturation level, where virtually everyone who is going to adopt the innovation has done so (The innovation diffusion game 2000). Many innovations require a long period, often of many years, from the time they become available to the time they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation (Rogers 1995). The rate of adoption is influenced by sets of variables and may be dependent on whether the innovation is a replacement or based on a completely new technology. (Hyttinen 2003)

The above mentioned definition of diffusion suggests, that the process of diffusion is considered revolving around four key elements: an idea or innovation; channels of communication to spread knowledge of the innovation; time during which diffusion takes place; and a social system of potential adopters where this occurs (Rogers 1995). In Chapter 3.1.1 the study shortly presents these elements.



**Figure 6 Innovation Diffusion Curve (Atkisson 2000)**

### **3.1.1 Elements of Diffusion**

#### **The innovation**

“An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption.” Innovations are not limited to new technical products but they also include new ideas or habits (Frank et al. 2003). It matters little whether or not an idea is objectively new; the perceived newness of the idea for the individual determines his reaction to it. If the idea is new to the individual, it is an innovation (Martins, Steil, & Todesco 2004).

In this study we concentrate on technological innovations. Rogers defines a technology as “a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome”. A technology usually has two components: a hardware aspect (the tool that embodies the technology as a material or physical object), and a software aspect (the information base for the tool). Technology almost always represents a mixture of hardware and software aspects. Rogers distinguish two kinds of information in respect for a technological innovation: Software information (What is the innovation?, How does it work?) and innovation-evaluation information (What will its advantages and disadvantages be in my situation?). (Rogers 1995)

### **Communication channels**

Communication is the process by which participants create and share information with one another in order to reach a mutual understanding. Diffusion is a particular type of communication where the message content that is exchanged is concerned with a new idea. The essence of the diffusion process is the information exchange through which one individual communicates a new idea to one or several others. (Rogers 1995)

It has been cited that informal communication act as channels of knowledge flow. These channels of communication facilitate knowledge diffusion. This could mean that informal channels are more effective in innovation adoption than formal channels. (Dahl & Pedersen 2004)

### **Time**

The third element in the diffusion process is time. The time dimension is involved in diffusion (1) in the innovation-decision process by which an individual passes from the first knowledge of an innovation through its adoption or rejection, (2) “in the innovativeness of an individual or other unit of adoption (the relative earliness/lateness with which an innovation is adopted) compared with other members of a system” and (3) in rate of adoption in a system, usually measured as the number of members of the system that adopt the innovation in a given time. (Rogers 1995)

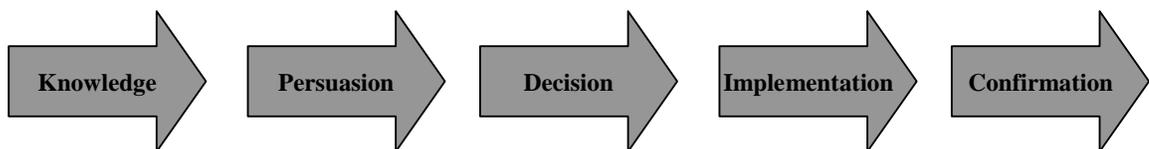
### **A Social System**

A social system is defined as “a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal”. The members/units of a social system may be individuals, informal groups, organizations etc. Each unit in a social system can be distinguished from other units. All members cooperate at least to the extent of seeking to solve a common problem in order to reach a mutual goal. This binds the system together. (Rogers 1995)

### **3.1.2 Innovation Adoption**

Adoption of an innovation refers to the stage where a technology is selected for use by an individual or an organization. The innovation diffusion in a certain unit involves the adoption of the innovation by individuals in that unit. Innovation adoption can be seen as a networking process among people, who become committed to the innovation through transactions. The adoption is a process in which an organization analyses the positive and negative aspects of an innovation on the basis of gathered information. Adoption takes place when the result of these analyses is positive. (Van de Ven 1986)

Innovation adoption means improved effectiveness or performance for an adopting organization. Organizations adopt innovations to respond to changes in their external and internal environments. There are two ways that innovations can come to organizations: they can be generated in an organization, or they can be adopted from another organization (Van de Ven 1986). The organizational adoption process can be seen as a decision process that leads through purchase to the implementation of an innovation. Innovation adoption is always based on the decision of an individual/unit. There are many models about innovation-decision process but the most frequently cited is Rogers' five-stage representation (see Fig. 7). The innovation decision process leading to institutionalization of usage may be conceptualized as a temporal sequence of steps through which an individual passes from initial knowledge of an innovation, to forming a favorable or unfavorable attitude toward it, to a decision to adopt or reject it, to putting the innovation to use, and to finally seeking reinforcement of the adoption decision made. (Rogers 1995)



**Figure 7 Innovation Decision Process (Rogers 1995)**

According to Rogers, adopters can be classified into five different categories. Adopters in the same category share similar socioeconomic status, personality values, and communication behavior. These categories are innovators, early adopters, early majority, late majority, and laggards. Innovators cover the first 2.5 percent of the adopters, early adopters cover the next 13.5 percent of adopters, early majority 34 percent, late majority 34 percent, and laggards 16 percent. (Rogers 1995)

### **3.2 Innovation Characteristics**

Innovation characteristics are the first variable group that we assume to have impact on innovation diffusion. Rogers defines five innovation characteristics that may influence the adoption of a certain innovation. These characteristics are relative advantage, compatibility, complexity, trialability and observability. (Rogers 1995)

#### **Relative Advantage**

Relative advantage refers to the degree to which adopting an innovation is perceived as being better than using the practice it supersedes (Teo & Pok 2003). In deciding whether or not to adopt an innovation, people or an organization decide whether it will make them better when compared with the older practice. The degree of relative advantage may be measured in economic terms, but convenience, social prestige and satisfaction are also important factors. This doesn't refer to the objective advantage but it refers to the perceived advantage by individual or other unit. The greater the perceived relative advantage of an innovation, the more rapid the rate of adoption will be (Rogers 1995).

There has been listed several criteria that people use to determine whether an innovation is better than what they currently have (Rogers 1995):

- *Economic profitability*: does this innovation increase my financial benefits or decrease my costs?
- *Low initial cost*: is this innovation cheaper to purchase?
- *Decrease in discomfort*: does this innovation make my life easier?

- *Social prestige*: will people think better of me if I have this innovation?
- *Savings in time and effort*: is this innovation quicker and easier to use?
- *Immediacy of the reward*: does the innovation benefit me now, or do I have to wait for the benefit to come about?

Many of the diffusion researches focuses on the criteria of economic profitability but many research indicates that people or organizations in different situations use different criteria for judging an innovation. Other issues like the timing of the benefits, incentives for adoption, and government mandates all make the question of relative advantage quite complex (Rogers, www-document).

*H1: The higher the perceived relative advantage of an innovation, the sooner it will be adopted.*

### **Compatibility**

Compatibility is the degree to which the innovation fits with the potential adopter's existing values, previous experiences and current needs. Organizations are more likely to adopt a technology if they think that it is consistent with their culture, values, preferred work practices, and existing IT infrastructure (Teo & Pok 2003). An innovation that is incompatible with the values and norms of a social system will not be adopted as rapidly as an innovation that is compatible (Rogers 1995).

Because the adoption of electronic commerce technologies often requires adopting firms to modify existing business practices and processes to gain benefits, it is understandable that organizational compatibility can impact the firm's adoption decision. Beatty et al (2001) have studied that there's a positive relationship between organizational compatibility and e-commerce technology adoption.

In addition to organizational compatibility, there is technological compatibility. Incompatibility of an innovation with a company's existing hardware, software,

networking, or telecommunications architecture may inhibit adoption. (Beatty, Shim, & Jones 2001)

*H2: The more compatible the innovation is perceived the sooner it will be adopted.*

### **Complexity**

Complexity represents the degree to which an innovation is perceived to be difficult to understand, learn or operate (Teo & Pok 2003). The introduction of a new technology can be uncomfortable for employees, especially if it requires them to change their existing business practices or acquire new skills (Beatty, Shim, & Jones 2001). New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings (Rogers 1995). Term “ease of use” can be used instead of complexity (Keil, Beranek, & Konsynski 1995).

*H3: Complexity of an innovation has a negative effect on innovation adoption.*

### **Trialability**

“Trialability is the degree to which an innovation may be experimented with on a limited basis”. Innovations that can be tried before decision will usually be adopted more quickly than innovations that are not divisible. The personal trying-out of an innovation is a way of making the innovation meaningful and to find out how it works under one’s own conditions (Martins, Steil, & Todesco 2004). Possible uncertainty of a potential adopter decreases if the innovation can be experimented (Rogers 1995).

Trialability is particularly important for early adopters and innovators. Trialability gives early adopters a way to understand the innovation. Later adopters can rely on the experiences and knowledge of the early adopters (Rogers 1995). Because of these facts, we argue that,

*H4: Trialability has a positive impact on innovation adoption.*

### **Observability**

Observability is the degree to which the results of an innovation are visible to others (Rogers 1995). The results of some innovations or ideas are easily observed and communicated to others, whereas some innovations are difficult to observe or to describe to others. Innovations that do not have clearly visible results are adopted at slower rates than innovations with obvious results (Al-Gahtani 2003).

*H5: The observability of an innovation is positively related to its rate of adoption.*

## **3.3 Organization Characteristics**

Different measures can be used to observe the impact of organizational characteristics on innovation diffusion. Here we present four of them: the size of an organization, age of an organization and the centralization of an organization.

### **Size**

One variable that often has been found in many studies to be positively related to the adoption rate of innovations is the size of the adopter organization. It's quite often used variable, partly because it is relatively easy to observe. It is generally expected that large companies are more capable, they may use process innovations more intensively and so earn more profits from adopting than smaller firms would, they might be less risk averse, they may be freer from financial constraints, and so on. (Geroski 2000)

Large firms generally feel more need to adopt innovations in order to support or improve their activities and productivity. Although the significant influence of size on adoption may be attributable to its interdependence with other variables, there are good reasons to expect large firms to adopt an innovation before small firms, in particular if there are economies of scale in the use of the innovation. (Gatignon & Robertson 1989)

*H6: Larger organizations adopt innovations sooner than smaller ones.*

## **Age**

Some studies have found that the age of an organization may be a variable that has effect on the innovation adoption (Frambach et al. 1998). The study conducted by Baptista (2001) for example showed that the organizational age has a positive effect on innovation diffusion. On the other hand it has been claimed, that new firms will be more flexible to the introduction of new technologies (Baptista 2000). In spite of this, this study proposes that:

*H7: The older the organization, the sooner the innovation is adopted.*

## **Centralization**

Centralization is one of the organizational characteristics that has been found to impact the innovation diffusion. Centralization is defined as the extent to which decision-making responsibility concentrates at the top levels of management. The greater the hierarchy of authority and less participation in decision-making, that exists in the organization, the greater the centralization (Gatignon & Robertson 1989). When decentralization gives individuals at lower levels increased power over their work, they will acquire a sense of work ownership and propose changes for improvement. (Dewar & Dutton 1986)

Four factors that may affect the centralization have been listed:

- the location of the actual decision-making function at particular points in the authority structure
- the promulgation of rules for decisions, which limit the discretion of subordinates
- the frequency of review procedures and control systems
- legitimate availability (Gatignon & Robertson 1989)

Somewhat inconsistent findings have been documented about the relationship between centralization and adoption of innovations. Centralization could facilitate the adoption of certain types of an innovation and not others. (Gatignon & Robertson 1989)

*H8: Centralization has a negative impact on innovation adoption.*

### 3.4 Managerial Characteristics

Top management commitment is critical to the success of small business systems (Premkumar & Roberts 1997). According to Rogers' model of an individual's innovation-adoption process, formation of a favourable or unfavourable attitude towards an innovation takes place before a decision to adopt is made. Also the commitment to the implementation phase is critical for companies. (Rogers 1995)

In the case of SMEs, the main decision-maker is the CEO. The management and especially the CEO are crucial in determining the innovative attitude in SMEs because the CEO's qualities determine the overall management style of the business. The rate at which SMEs change depends not only on a factor like business size but also on the abilities of the CEO and the extent to which he/she is able or prepared to devolve management (Thong 1995). Most managers are pro-innovation in their values, perceptions, and attitudes. The difficulties lie in the process of implementing these values, perceptions and attitudes (Sheth & Ram 1987).

CEO's perception of the adoption of IT is of prime importance. As the innovation is new to the CEO, he or she doesn't know whether it will be superior to the existing methods of operations. A degree of uncertainty exists because adoption of IT is risky, and each CEO will perceive the degree of risk or uncertainty associated with innovations differently. If the CEO perceives the benefits of IT adoption outweigh the risks, then the he or she is more likely to adopt the innovation (Thong 1995).

*H9: The more positive the attitude of the management toward innovations, the sooner the innovation is adopted.*

and

*H10: The more positive the attitude of the management toward innovation adoption, the sooner the innovation is adopted.*

## 3.5 Information Behavior

### **Active information behavior**

Innovation adoption is largely an information processing activity (Frambach, Barkema, Nootboom, & Wedel 1998). Before an innovation can be adopted, potential adopters must be aware that the innovation exists and that there is an opportunity to make full use of the innovation in the organization. Especially it is important to reduce the uncertainty about technical innovations, like e-invoicing, because organizations tend to avoid complicated technologies. (Rogers 1995)

A successful adoption process is often characterized by extensive communication (Zaltman, Duncan, & Holbeck 1984). The present study attempts to find out the best channels for information sharing. Different mechanisms of information transfer – common source and word of mouth – affect the pattern of diffusion over time (Geroski 2000). It is expected that the interpersonal knowledge transfer is better to alter opinions than the mass media (Mäkelä 2001).

Different characters of information or knowledge transfer affect the diffusion, for example the formality of communication and knowledge transfer costs affect negatively to the adoption of innovations in organizations, but the communication frequency has positive impact (Ebadi & Utterback 1984;Geroski 2000).

*H11: Active information behavior in the organization fastens innovation adoption.*

### **Receptiveness**

The degree to which an organization is receptive to new products or ideas will influence its propensity to adopt new products (Gatignon & Robertson 1989). To increase the receptiveness of a potential adopter, success stories from the previous adopters should be well publicized.

The formation of a favorable or unfavorable attitude towards an innovation precedes the decision to adopt. Companies pass through a number of stages, such as awareness and interest, before adopting the innovation. Company's attitude towards the adoption of new products, or in other words the receptiveness of an organization towards new ideas, appear to influence a company's decision to adopt an innovation. A company's attitude toward a frontier technology such as ERP is likely to correspond to that company's general attitude toward using information technology. (Waarts, van Everdingen, & van Hillegersberg 2002)

*H12: Receptiveness has a positive impact on innovation adoption.*

### **Versatile information**

It has been acknowledged that gathering versatile information accelerates innovation adoption in an organization. Koberg et al (1996) for example found that gathering firm-external information in addition to intraorganizational information affects positively with the innovation adoption. The present study assumes that gathering versatile information (inside and outside the company) accelerates innovation adoption.

*H13: The more versatile the information gathered, the more rapid is the innovation adoption.*

## **3.6 Perceived Voluntariness**

Technology acceptance may also be influenced by a mandate from superiors. Such influence has been recognized by Moore and Benbasat (1991) in the construct of perceived voluntariness. Although not a part of the original set of innovation characteristics proposed by Rogers, voluntariness was included by Moore and Benbasat as a determinant of usage behavior. Voluntariness is the extent to which potential adopters perceive the adoption decision to be nonmandated. The less voluntary the behavior, the less one's attitude toward usage predicts use (Karahanna, Straub, & Chervany 1999).

Not only is there inconclusive support for the role of external pressure in the theoretical formulations of technology acceptance models, empirical support has not been overwhelming either. With respect to managerial pressure or perceived voluntariness, only one study (Moore & Benbasat 1991) demonstrated its influence on acceptance behavior. Because of the study of Moore and Benbasat, the study hypothesizes that:

*H14. The higher the perceived voluntariness the sooner the innovation is adopted.*

### **3.7 Environmental factors**

In a complex business environment, it is expected that a company's adoption decision will be affected by the external environment. This is especially true for inter-organizational systems like e-invoicing, because it involves more than one organization or a network of organizations. The study presents two environmental factors that may have effect on innovation adoption, competitive pressures derived outside the company and network effects.

#### **Competitive Pressures**

Competitors can be important drivers in adopting an innovation (Thong 1995). The competitiveness here means the competition faced by the business in its particular industry. It has been studied, that competition generally increases the likelihood of innovation adoption. Intense rivalry between firms prompts them to pay close attention to each other's competitive moves, and therefore accept technological innovations relatively fast. Market competitiveness will play an important role especially in the adoption decision of the first group of potential adopters, who either seek to gain new competitive advantage in the market or want to avoid falling behind. (Waarts, van Everdingen, & van Hillegersberg 2002)

*H15: Competitive pressures accelerate innovation adoption.*

### **Networks Effects**

The value of certain technologies (telephones, railroads) depends on their widespread adoption. The value of telephone, for example, is proportional to the number of people who have such a service. Network effects can be seen also in EDI adoption. (Gatignon & Robertson 1989)

Network externalities can have two effects on diffusion: the lock-in effect, and a risk creating effect which can delay diffusion. When network externalities exist, early users risk making the “wrong” choice and becoming stranded with a technology that has failed to generate the network externalities it is potentially capable of. This may make early users reluctant to move first, and may delay the adoption bandwagon (this phenomena is sometimes called “excess inertia”). The consequence will be an initial convexity in the time path of diffusion. (Geroski 2000)

*H16: The amount of previous users of an innovation has a positive effect on innovation adoption.*

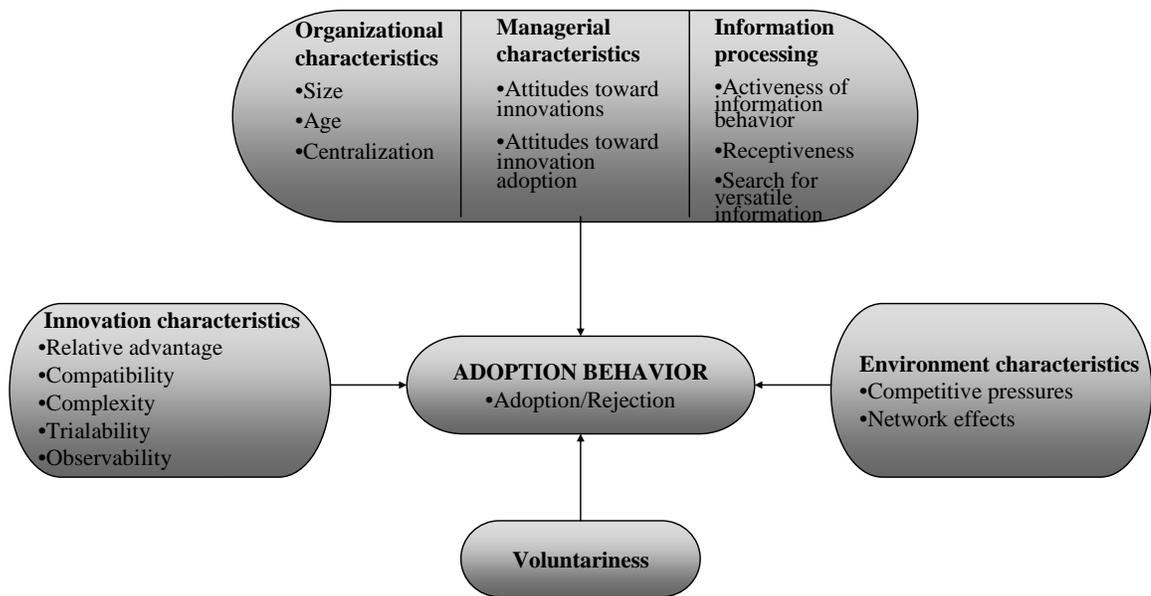
## **4 SURVEY OF E-INVOICING ADOPTION IN SOUTH KARELIAN SMES**

The data for the empirical part of the study was collected by a mail survey during March and April 2005. The sample was composed of 146 South Karelian companies which were named by ten large companies and the local communes to be the most invoicing companies of them. The questionnaire was targeted to the management level of the companies. Almost all of the companies were called before the questionnaire was sent to them. The survey was sent to 932 companies and response rate was 15.7 %. The quite small amount of respondents may influence the results of the analyses. The extent of adoption is measured by the level at which the e-invoicing is used, i.e. the penetration level of the system. It was expected that e-invoicing has quite low levels of market penetration among SMEs. The free comments of respondents about e-invoicing is presented in appendix 6.

Different methods are available for collecting quantitative data: interviews, telephone interviews, a mail survey, a web survey and an e-mail survey. In this thesis mail survey was used because it was supposed that it could best reach the SMEs; also e-mail survey was considered but it was abandoned due to the fact that all SMEs do not have access to Internet. Disadvantages of mail survey are its high costs and its slowness: it takes a long period to send the questionnaires and to wait the responses.

### **4.1 Adoption Model of the Study**

As a conclusion from theories in chapter two, the adoption model of this study is presented in figure 8. The dependent variable of concern in this research is the organizational adoption or rejection of an innovation: electronic invoicing. To explain adoption/rejection behavior, the study examines six sets of factors – innovation characteristics, environment characteristics, organization characteristics, manager characteristics, information share in the company and voluntariness.



**Figure 8 Chosen adoption model of the study**

## 4.2 Questionnaire

Before the questionnaire formation, theory about innovation diffusion and innovation adoption was studied, mostly with the help of articles. Chapter 3 presented these theories and formed 16 hypotheses so that the factors affecting the e-invoicing adoption could be measured in this chapter. The questions were formed after the adoption model was designed. The questions were then designed to measure the hypotheses of this study. Every factor got its own questions so that the impact of every factor on adoption of e-invoicing could be measured. The number of questions was kept small because the aim was to keep the questionnaire as short as possible. However the questionnaire became quite long. Statements measuring the chosen factors are presented in appendix 5.

Most of the questions were formed in Likert-type scale ranging between 1 and 5, indicating the extent to which the answerers agreed or disagreed with each statement (1=strongly disagree... 5=strongly agree). The questionnaire was divided into seven categories: personal characteristics, organization characteristics, electronic invoicing, information processing, purchase decision, management characteristics and environment characteristics.

All the questions and their answers were not observed in this study, some of them were left for further analyses.

When a questionnaire is designed, it is important to pretest it before sending it to the actual respondents. The purpose of the pretest is to ensure that the expectations of the researcher in terms of the information that will be obtained from the questionnaire, are met. Pretest was composed also for the questionnaire of this study. (Aaker & Day 1990)

### **4.3 Description of the Respondents**

This chapter represents the respondents of the study. First the respondents' personal characteristics (position in the company, age, gender, education) are described and then the descriptive characteristics of the companies (establishment year, turnover, amount of personnel) are discussed.

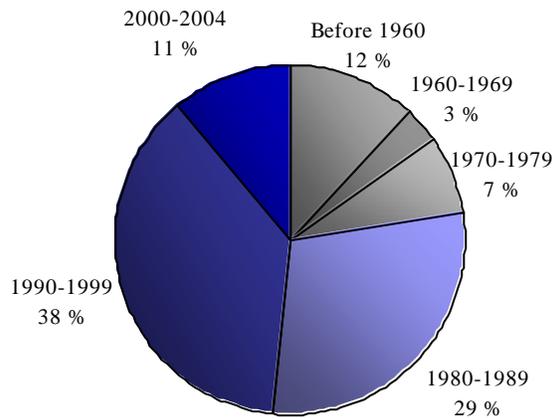
#### ***4.3.1 Personal Characteristics***

A person responsible for the decision concerning the purchase of e-invoicing was asked to participate in the survey during the prenotification phone calls. Usually, the respondent was the managing director/owner of the company. Though the questionnaire was dedicated to the management level, quite often the respondent was for example a secretary etc. 59 % of the respondents were men.

The age was one respondent characteristic studied in the questionnaire. The mean of the respondents' age was 46 years (19 minimum and 71 maximum). Also the education of the respondents was studied. 29 % of the respondents had received their only education from the elementary school, 53 % of the respondents had a college degree education and 16 % had graduated from university. Three respondents had completed their licentiate or Ph.D. studies. There were no differences in the answers between different education levels.

### 4.3.2 Characteristics of Responding Companies

The establishment year, turnover, amount of personnel and the field of business were studied to get a basic description of the companies. The companies in the study were established in 1983 on average. 83 % of the companies were established between the years 1971-2004. Figure 9 illustrates the establishment years of the respondent companies.



**Figure 9 Establishment Years of the Respondent Companies**

The average turnover of the companies in the year 2004 was 1.7 million euro, and companies employed 13 persons on average. 14 % of the companies employed just one person. 80 percent of the respondent companies employed 17 persons or less. The descriptive statistics of both turnover and amount of personnel are presented in Table 3.

**Table 3 Turnover and amount of personnel**

	Mean	Std. Deviation	Minimum	Maximum	N
Personnel	13	23,479	1	209	140
Turnover (million e)	1,702	3,945	0,03	28	123

The business fields were categorized along the Standard Industrial Classification established by Statistics Finland. The classification divides businesses into 18 categories. In

this study only 11 business fields were presented. Table 4. represents the business fields of the respondent companies.

**Table 4 Business fields of the respondent companies**

	N	%
Real estate, renting and business activities	30	22,9
Manufacturing	28	21,4
Wholesale and retail trade; repairing	25	19,1
Other community, social and personal service activities	13	9,9
Health and social work	11	8,4
Construction	10	7,6
Transport, storage and communication	6	4,6
Agriculture, hunting and forestry	3	2,3
Hotels and restaurants	2	1,5
Education	2	1,5
Electricity, gas and water supply	1	0,8

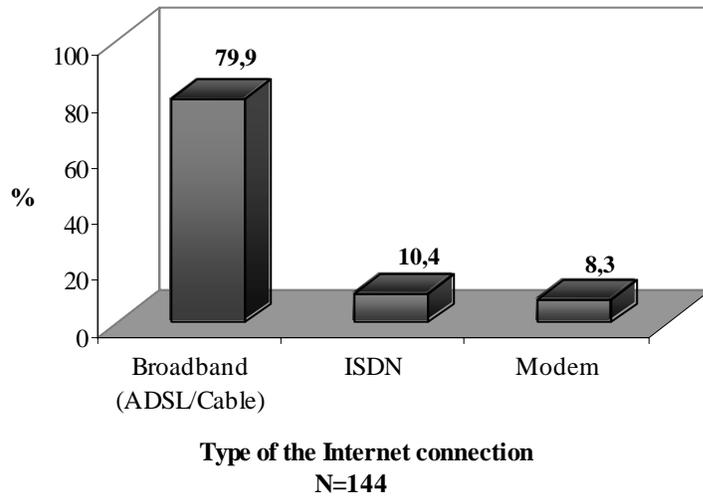
As it can be seen, most of the firms (22.9 %) were operating in the field of real estate, renting and business activities. Manufacturing (21.4 %) and wholesale and retail trade (19.1 %) were almost equally common.

### ***4.3.3 ICT-level in the Respondent Companies***

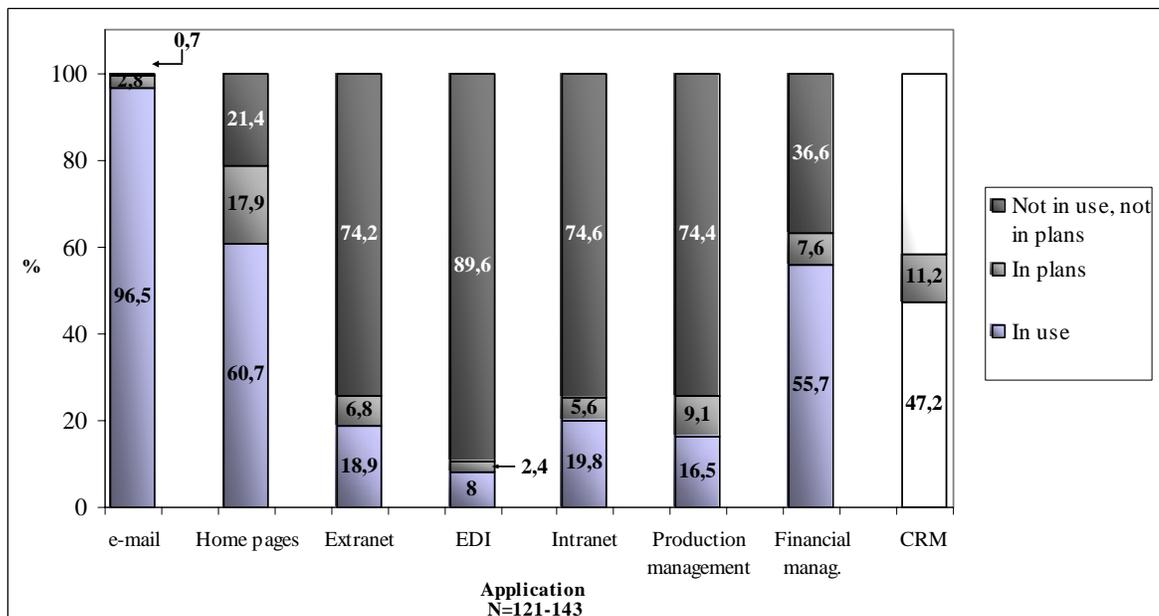
In the questionnaire, there were questions about the current level of ICT in the organizations. First of all, respondents were asked if they have Internet connection in their organization. Figure 10 indicates the existence of the Internet connection in the organizations. As the figure shows, a majority of the respondents (115 companies) had a broadband Internet. 15 companies had ISDN and 12 companies had modem. Two companies did not have Internet at all.

Companies were also asked if they use the following applications: e-mail, home pages, extranet (Internet-based inter-organizational information system), EDI, intranet, production control system, financial management system and customer relationship management system. Figure 11 presents the usage of certain applications. As we can see, most of the

companies use e-mail (96.5 %); only one company didn't even consider it. Also home pages (60.7 %), financial management applications (55.7 %) and customer management applications (47.2 %) were quite common in respondent companies.



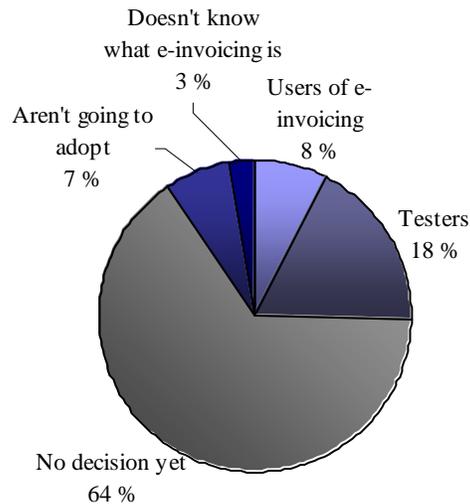
**Figure 10 Internet connections in the respondent organizations**



**Figure 11 Usage of ICT applications in the companies**

## 4.4 Adoption of E-invoicing

The respondent companies were asked about the adoption of electronic invoicing. The next figure shows the current situation.

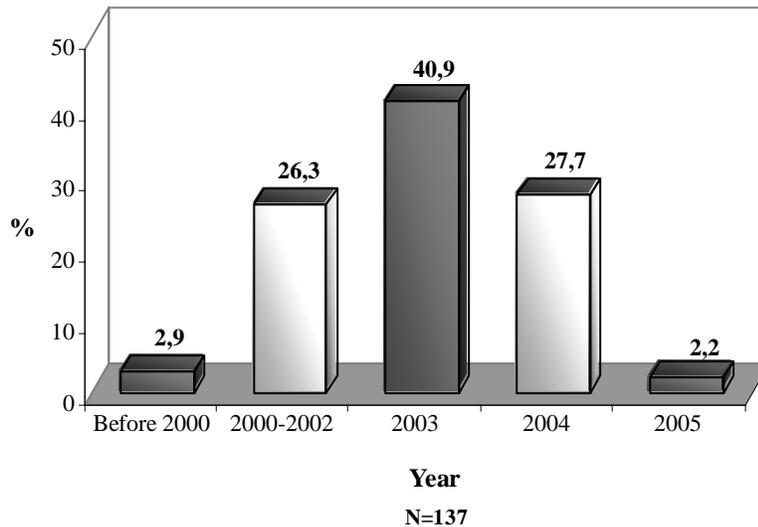


**Figure 12 Adoption of electronic invoicing**

At the time of the survey 8 percent (11 respondents) of the companies had adopted and were using electronic invoicing. 18 percent (26 respondents) of the companies were testing the sending/receiving their first e-invoices. This means that 26 % of the companies had the electronic invoicing system but only these 8 % of them used it properly. The majority of the companies (95 respondents) were aware of e-invoicing but had not made any decision about its adoption. 7 % (10 respondents) of companies weren't going to adopt e-invoicing at all. Four companies did not even know what electronic invoicing means. As a conclusion, we can say that 26 % of respondent companies were adopters, and 74 % non-adopters. From now on we will use this division (adopters/non-adopters) of companies in further analysis.

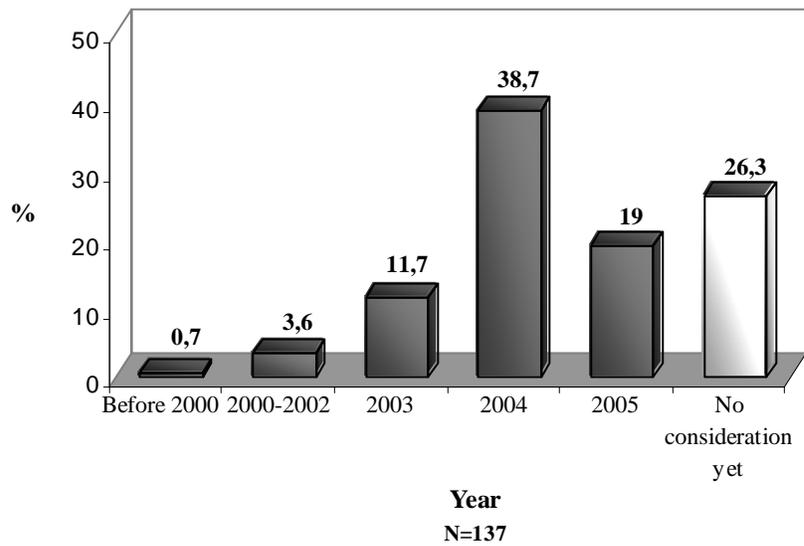
In the questionnaire, the companies were asked to indicate four time points concerning e-invoicing adoption: 1. the year when they became aware of the existence of electronic invoicing, 2. the year they considered the introduction of e-invoicing in their company, 3.

the year when the adoption decision was made, and 4. the year when they considered e-invoicing permanently established as part of company routines. These time points are presented in the next four figures. Figure 13. indicates the time when companies became aware of electronic invoicing.



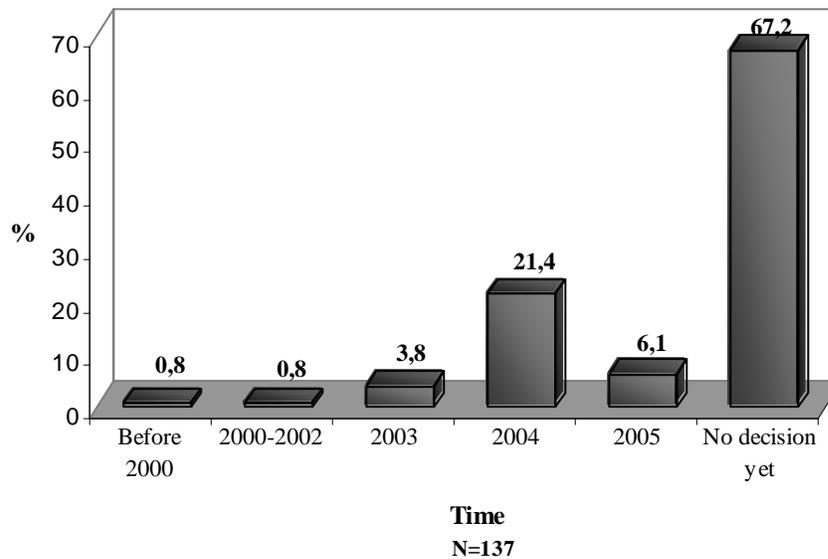
**Figure 13 Amount of companies becoming aware of e-invoicing**

As we can see, 40.9 percent of the companies became aware of e-invoicing two years ago, 27.7 percent last year and 26.3 percent became aware 3-5 years ago. Only a few company was introduced to e-invoicing over five years ago or then this year. Next we will look at the time when respondent companies considered electronic invoicing for the first time. As seen from Figure 14, 38.7 percent of companies considered this innovation for the first time last year and 19 percent considered it this year. Quite large proportion of respondents (26.3 %) had not considered e-invoicing at all yet.



**Figure 14 Time when companies considered e-invoicing for the first time**

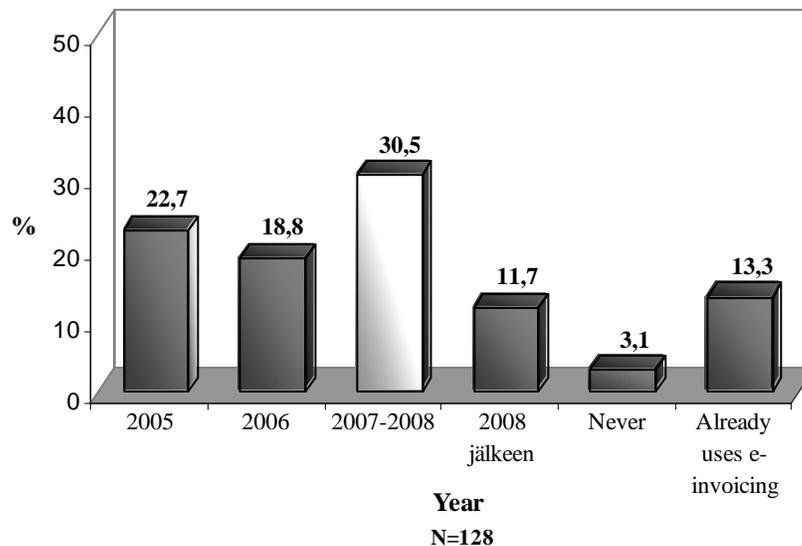
Respondents were also asked what was the year when the company had made the decision to adopt electronic invoicing. Figure 15 shows the decision times.



**Figure 15 Amount of companies making the decision to adopt e-invoicing**

The majority (67.2 %) of respondent companies have not decided about the adoption of electronic invoicing yet. About 1/5 of companies have made decision last year (2004). The

final question about the timing of e-invoicing adoption/rejection was the year that the company considered electronic invoicing to be in use in the company (Figure 16).



**Figure 16 Amount of companies starting to use e-invoicing**

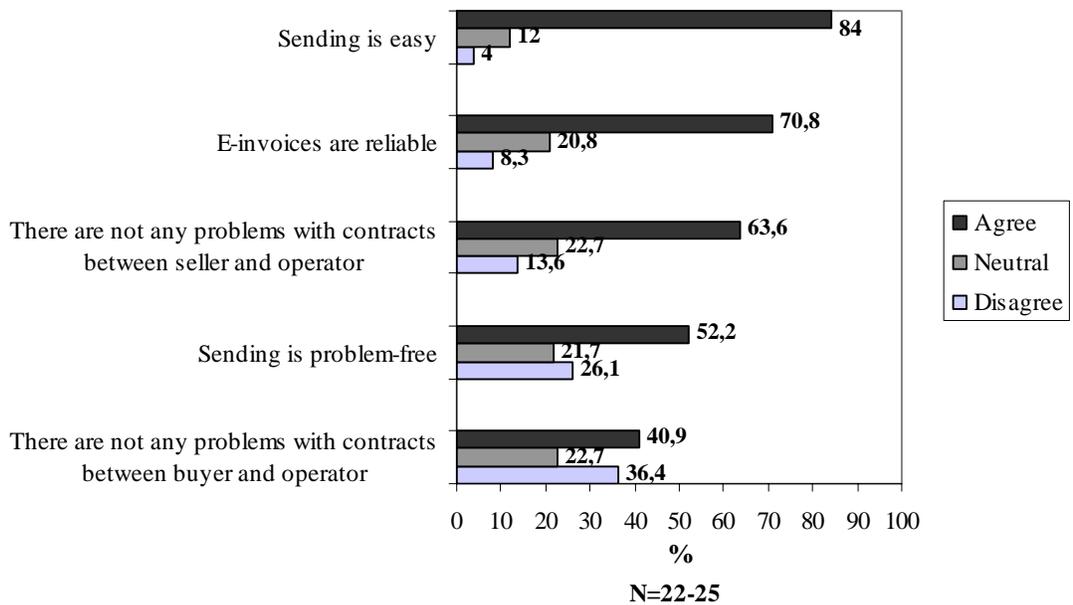
As we can see, 30.5 % of respondent companies are expected to start to use electronic invoicing in 2-3 years; this is later than the common expectations. About 40 % of the respondents will start to use e-invoicing this year or next year. 52.8 % of the companies already having e-invoicing system (users and testers, N=36), did not consider themselves as “users” but 50 % of these users/testers believed to start to use e-invoicing this year or next year. When this question was observed only from the viewpoint of current users, 90.9 % of respondents (10 companies) considered electronic invoicing to be a part of company’s activities. Although it has to be remembered that the amount of these e-invoicing users was only 11 companies.

56.1 % of the companies had not have any negotiations with e-invoicing suppliers, 23 % had negotiated with one supplier, 18.7 % with two or three supplier and three respondents (2.2 %) had negotiated with four or more supplier. Also the duration of these negotiations was explored: 22.1 % had have negotiations with suppliers for one to three months, 11.8 %

had negotiated for four to six months, 4.4 % had have negotiations for 7-11 months and 8.8. % had negotiated for one to two years.

#### 4.4.1 Respondents' Experiences about E-invoicing

Respondents were also asked about their experiences in electronic invoicing. One question was addressed only for the users of electronic invoicing and its purpose was to find out how easy e-invoicing is according to these current users. Figure 17. illustrates these arguments and the scores they got.



**Figure 17 Experiences of users of e-invoicing**

According to the respondent companies that use electronic invoicing, 84 % (21 companies) says that sending e-invoices is easy. Also quite large amount (70.8 %) of companies thinks that e-invoices travel reliably from seller to buyer. On the other hand only half of the users say that sending e-invoices is a problem-free event and 26.1 % says that there are problems concerning the sending of these invoices. When observing the usage from the contract viewpoint, we see that 36.4 % of respondents say that the receivers of the e-invoices have some problems with the contracts with operators/banks; 40.9 % of the respondents say

though that there do not exist any problems. 63.6 % of the companies do not see problems with contracts concerning the sender and his operator.

### **Experiences about operators and banks**

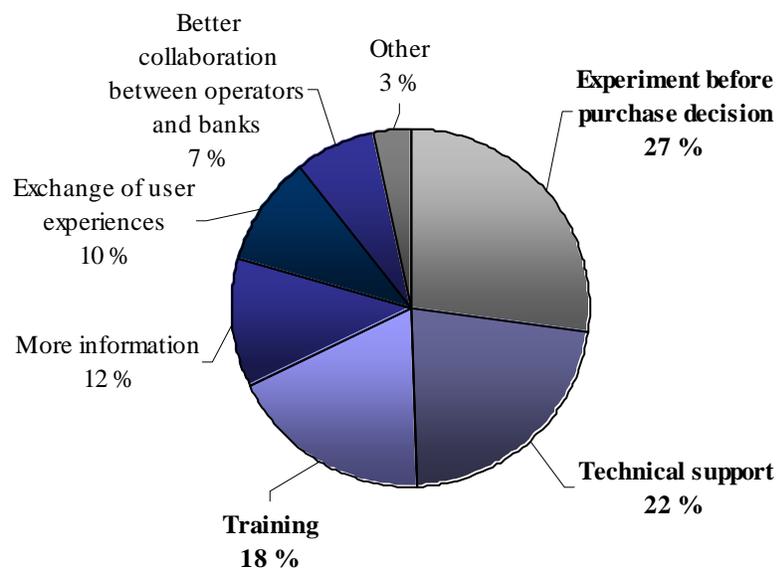
The opinions of respondent companies about e-invoicing operators and banks were also asked in the questionnaire. First we will observe the question concerning the *reliability of operators and banks*. 49.7 % of respondents say that operators are reliable partners, 10.8 % says that they are unreliable. Banks get better reliability grade: 79.2 % says that banks are reliable partners and only 2.8 % thinks that they are unreliable. This is easy to understand because companies already have connections with (and knowledge about) their banks.

Next we will look at the opinions about *collaboration between operators and banks*; although we have to admit that the respondents' knowledge about these ties is not necessarily very high among the South Karelian SMEs. This can be seen also in that many respondents' opinion is neutral. 22.2 % of companies' say that the collaboration between different operators isn't functioning well; almost as equal amount (23.7 %) says that collaboration operates well. 41.6 % says that collaboration between different banks is functioning well and 13.2 % thinks that inter-bank co-operation doesn't function. So banks get also better grades about the functioning of collaboration. Collaboration can be viewed also between the operators and banks. 39.7 % says that collaboration between operators and banks functions well; 15.5 % of respondents think that collaboration between these two isn't very good.

*Contracts* are one part of the complexity of electronic invoicing (see Chapter 2.6). When respondents were asked about the difficulties in the e-invoicing contracts with operators, only 14.5 % says that contracts are complicated and 36.6 % thinks that contracts are uncomplicated. Contracts with banks are seen as easy as contracts with operators: 13 % says that contracts with banks are difficult and about half of the respondents (48.9 %) say that they are easy to understand.

### **Actions that could facilitate adoption**

Respondents were also asked to point out the actions that could accelerate the adoption of electronic invoicing (see Figure 18). Respondents had to choose three best actions between six alternatives: 1. training, 2. chance to experiment e-invoicing before adoption decision, 3. support in technology issues, 4. more information, 5. exchange of experiences with users of e-invoicing and 6. better collaboration between operators and banks.



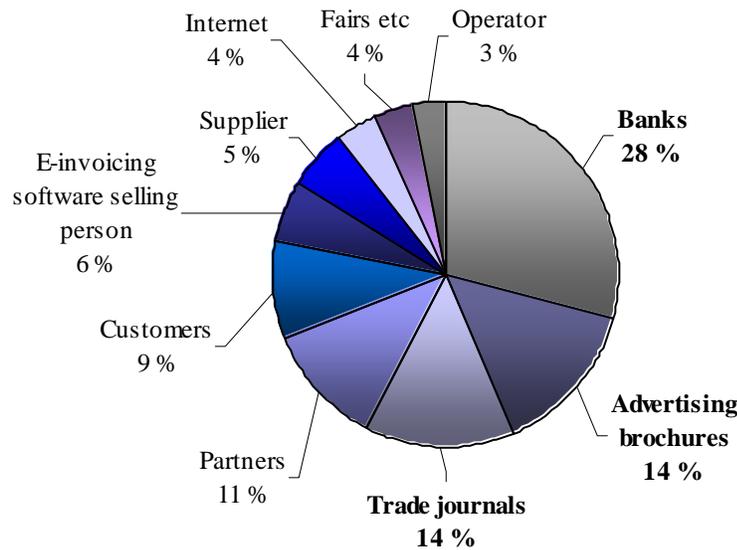
**Figure 18 Actions to speed-up the e-invoicing adoption**

The second alternative (experiment before adoption decision) was the most popular action among the respondents, 95 respondents chose it (it was 27.2 % of the 349 votes). 77 of the respondents (22.1 %) chose the technical support to be one of the most effective actions. Third popular was the training (18.3 %). 11.7 % of the votes said the information about the e-invoicing is important for the adoption. Fifth popular was the exchange of experiences (10 % of the votes) and last popular was the better collaboration between operators and banks (7.4 %). It was also possible to indicate other activities that could affect the adoption, this category got 3.2 % of the votes; usually the respondents of this category claimed that

the price should be lower. The three most popular alternatives are presented with bolded letters in Figure 18.

#### 4.4.2 E-invoicing Information Sources

Companies were asked about the information they have got concerning the electronic invoicing. The next figure indicates these sources and their frequency among the respondents of this study. The three most common sources are presented with bolded letters.



**Figure 19 Electronic invoicing information sources**

It has been pointed out that interpersonal communication is more effective to alter the opinions of potential adopters than mass media. As it can be calculated from the Figure 19, 62 % of the respondents have got their information from interpersonal connections (banks, partners, customers, software seller, supplier, operator). When the question was observed between the adopters and the non-adopters of e-invoicing, 81.8 % of the adopters gained the e-invoicing information from interpersonal ties; 58 % of the non-adopters got their information through interpersonal communication (see Table 5). This gives some evidence

that interpersonal communication affects e-invoicing adoption more than mass media (although the small number of adopters can influence this outcome).

**Table 5 Information sources between adopters and non-adopters**

	<b>Adopters</b>	<b>Non-adopters</b>
<i>Mass media</i>	18.2 %	42 %
<i>Interpersonal communication</i>	81.8 %	58 %

In the questionnaire it was also possible for the respondents to value these information sources according to their importance for the adoption decision. Respondents rated *banks, partners and customers to be the three most important information sources*. These were also the three most common sources for e-invoicing adopters. The three least important sources were competitors, fairs etc. and advertising brochures. Interpersonal sources were ranked more important than mass media.

Respondents were also asked if they feel they have got contradictory information about electronic invoicing. The majority (84.7 %) said that information was unanimous.

#### **4.4.3 Reasons for Non-adoption**

In the questionnaire there was one question that measured the reasons why non-adopters have not adopted electronic invoicing yet. Table 6 illustrates the reasons for e-invoicing rejection, according to the respondents. The five most significant reasons are illustrated with bolded letters; they are items that got more (or equal amount) “agree” votes than disagree votes. We can see that the pressure (suppliers, customers, competitors) outside the company is an important factor for adoption/rejection. Secondly, the benefits do not seem to be visible enough for possible adopters. Also respondents think that the amount of information received is too low.

**Table 6 Reasons for non-adoption of e-invoicing**

	Agree	Neutral	Disagree
<b>Our suppliers have not demanded.</b>	65.1	18,9	16
<b>Our customers have not demanded.</b>	63.2	13,2	23,6
<b>We are not convinced of the benefits of e-invoicing.</b>	48.6	19,6	31,8
<b>We have not got enough information about e-invoicing.</b>	38.3	32,7	29
<b>Our competitors do not use e-invoicing either.</b>	28,8	42,3	28,8
We do not want to change our invoicing routines.	28,3	20,8	50,9
We do not believe that the e-invoicing connections are operating well.	25,5	32,1	42,5
E-invoicing is too expensive.	24,5	36,8	38,7
We do not have a suitable person to take care of the implementation.	22,6	22,6	54,7
Integrating e-invoicing to our systems is difficult.	22,1	29,8	48,1
We have not found a suitable operator.	20,4	33	46,6
It takes too long to start to use e-invoicing.	18,9	38,7	42,5
We are concerned for the security issues.	17	29,2	53,8
We wait the actions of our competitors.	15,2	32,4	52,4
We are afraid to become too dependend on the operator.	14,2	36,8	49,1
Risks are too high.	14,2	32,1	53,8
E-invoicing is technologically too complicated.	13,1	35,5	51,4

## 4.5 Measurement Scale Formation

When beginning to analyze the data with SPSS, first the *factor analyses* is used to to identify underlying variables (factors), that explain the pattern of correlations among large number of variables. Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables. There are some general guidelines for how to consider the factor loadings gained: factor loadings greater than  $\pm 0.30$  are considered to meet the minimal level, factor loadings  $\pm 0.40$  are considered more important; and loadings  $\pm 0.50$  (or greater) are considered practically significant. These guidelines are suitable when the sample size is 100 or larger. (Hair et al. 1998)

Due to the factor analysis, some items were removed to gain better reliabilities for the measurement scale. *Reliability analysis* was conducted for both the original scale and the refined scale. Reliability is the extent to which a variable is consistent in what it is intended to measure. To test the reliability in this study we used Cronbach's alpha, which is the most widely used measure for reliability. Cronbach's alpha is a model of internal consistency, based on the average inter-item correlation. The generally agreed upon lower limit for this

alpha is 0.7 but it may decrease to 0.6 in exploratory research. (Hair, Anderson, Tatham, & Black 1998)

After factor and reliability analyses summated scales were formed. *Summated scales* is a method of combining several variables that measure the same concept into a single variable in an attempt to increase the reliability of the measurement. Usually the separate variables are summed and then their total (or average) score is used in the analysis (Hair, Anderson, Tatham, & Black 1998). Next we look at the measurements scales of this study.

### **Measurement scales of the study**

The reliability of each measure scale in this study (relative advantage for example) was studied. First the reliability of original scales was studied and then the reliability of refined scales; because of the factor analyses, some items had to be removed. Cronbach's alpha was used to measure the reliability of the scales. Table 7. shows the reliabilities for each item. The final scales are illustrated with bolded letters. The higher the alpha, the more reliable the scale is.

Two scales, observability and centralization had quite poor reliability, so some special concern is attached to them in further analysis. Next we will observe the factor analyses which were conducted separately for each category (innovation characteristics, organization characteristics, management characteristics, environment characteristics and information behavior).

**Table 7 Reliabilities of the measurement scales**

<b>Scale</b>	<b>Cronbach's alpha</b>	<b>Number of items</b>	<b>Number of cases</b>	<b>Mean</b>
<b>Relative advantage</b>	<b>0.879</b>	<b>5</b>	<b>133</b>	<b>3.308</b>
<b>Compatibility</b>	<b>0.566</b>	<b>2</b>	<b>133</b>	<b>3.139</b>
Complexity	0.633	3	135	3.299
<b>Complexity</b>	<b>0.655</b>	<b>2</b>	<b>135</b>	<b>3.393</b>
<b>Trialability</b>	<b>0.582</b>	<b>2</b>	<b>121</b>	<b>2.777</b>
<b>Observability</b>	<b>0.268</b>	<b>2</b>	<b>131</b>	<b>2.607</b>
Centralization	0.310	3	136	3.174
<b>Centralization</b>	<b>0.504</b>	<b>2</b>	<b>138</b>	<b>3.851</b>
Managerial attitudes toward innovations	0.393	3	139	3.585
<b>Managerial attitudes toward innovations</b>	<b>0.664</b>	<b>2</b>	<b>141</b>	<b>3.826</b>
<b>Managerial attitudes toward innovation adoption</b>	<b>0.657</b>	<b>3</b>	<b>141</b>	<b>3.500</b>
<b>Competitive pressures</b>	<b>0.620</b>	<b>4</b>	<b>141</b>	<b>3.227</b>
<b>Amount of previous users</b>	<b>0.835</b>	<b>2</b>	<b>137</b>	<b>2.770</b>
Activeness of information behavior	0.688	5	134	3.466
<b>Activeness of information behavior</b>	<b>0.691</b>	<b>3</b>	<b>138</b>	<b>3.237</b>
<b>Receptiveness</b>	<b>0.667</b>	<b>3</b>	<b>136</b>	<b>3.586</b>
<b>Versatile information</b>	<b>0.728</b>	<b>4</b>	<b>134</b>	<b>3.569</b>

### **Innovation characteristics**

Factor analyses with VARIMAX rotation was performed for innovation characteristics-scale. Factor rotation is an important tool in interpreting factors. It means that “the reference axes of the factors are turned about the origin until some other position has been reached.” The effect of rotating is to redistribute the variance from earlier factors to later ones in order to achieve a simpler, theoretically more meaningful factor pattern (Hair, Anderson, Tatham, & Black 1998). Results of factor analyses are presented in the following table (Table 8). Because of this factor analyses, one statement was dropped out. One item, observability, had to be removed completely from the factor analyses because it’s two items loaded improperly, secondly its reliability was very poor (see Table 7. for reliabilities). This means it is not possible to study the hypothesis 5 (*observability has a positive effect on innovation adoption*) reliably. Additionally, only three factors extracted, instead of four; complexity and compatibility loaded on the same factor.

Although the items measuring complexity and compatibility loaded on the same factor, they were separated, partly due to the findings from prior research that has clearly differentiated these two variables.

**Table 8 Factor analysis for innovation characteristics**

<b>Variable</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>
Relative advantage 1	0,760		
Relative advantage 2	0,882		
Relative advantage 3	0,860		
Relative advantage 4	0,735		
Relative advantage 5	0,751		
Complexity 1		0,544	
Complexity 2		0,795	
Compatibility 1		0,666	
Compatibility 2		0,678	
Trialability 1			0,792
Trialability 2			0,828
Eigenvalue	4,485	1,587	1,217
% of variance	40,776	14,430	11,067
Cumulative % of variance	40,776	55,206	66,273

### **Organizational structure**

Factor analyses with VARIMAX rotation was conducted also for the scales measuring the organizational structure (see Table 9). The factor analysis of this scale is not very informational because only one factor is under observation. One item was removed from the scale of centralization due to the reliability analyses. There were also the measure of organization size (amount of the personnel and turnover) and age that represent the organizational structure but these two measures can not be observed with factor analysis because they were analyzed with nominal scale.

**Table 9 Factor analysis for organizational structure**

<b>Variables</b>	<b>Factor 1</b>
Centralization 1	0,819
Centralization 2	0,819
Eigenvalue	1,342
% of variance	67,097
Cumulative % of variance	67,097

### **Managerial attitudes**

Managerial attitudes were observed with two different scales: managerial positive attitudes toward innovations, and managerial positive attitudes toward innovation adoption. Two factors extracted on the VARIMAX rotated factor analysis (see Table 10). One item had to be removed from the scale measuring the managerial attitudes toward innovations because it did not load properly on the right factor and the reliability was better after the reduction.

**Table 10 Factor analysis for managerial attitudes**

<b>Variables</b>	<b>Factor 1</b>	<b>Factor 2</b>
Managerial attitudes toward innovations 1	0,870	
Managerial attitudes toward innovations 2	0,803	
Managerial attitudes toward innovation adoption 1		0,758
Managerial attitudes toward innovation adoption 2		0,558
Managerial attitudes toward innovation adoption 3		0,854
Eigenvalue	2,199	1,162
% of variance	43,974	23,246
Cumulative % of variance	43,974	67,22

### **Environmental influence**

Environmental influences were measured with two dimensions: the general competitive pressures and network effects. VARIMAX rotation was applied also with this factor analysis (see Table 11). Two factors were extracted, just like it was expected.

**Table 11 Factor analysis for environmental influence**

<b>Variables</b>	<b>Factor 1</b>	<b>Factor 2</b>
Competitive pressures 1	0,708	
Competitive pressures 2	0,770	
Competitive pressures 3	0,499	
Competitive pressures 4	0,745	
Amount of previous users 1		0,918
Amount of previous users 2		0,921
Eigenvalue	2,045	1,597
% of variance	34,079	26,619
Cumulative % of variance	34,079	60,699

**Information behavior**

Two dimensions measured the information processing in the organizations, search for the versatile information and activeness of information search. Two items in the scale activeness of information search had to be removed because they did not load properly on the factor analysis (see Table 12).

**Table 12 Factor analysis for information behavior**

<b>Variables</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>
Versatile information 1	0,787		
Versatile information 2	0,667		
Versatile information 3	0,726		
Versatile information 4	0,699		
Activeness of information behavior 1		0,684	
Activeness of information behavior 2		0,845	
Activeness of information behavior 3		0,781	
Receptiveness 1			0,598
Receptiveness 2			0,727
Receptiveness 3			0,541
Eigenvalue	3,862	1,298	1,065
% of variance	38,623	12,983	10,653
Cumulative % of variance	38,623	51,605	62,258

## 4.6 Determining the Factors Affecting E-invoicing Adoption

In this chapter, we attempt to find the factors that affect the adoption of electronic invoicing. Previously formed hypotheses were tested with Mann-Whitney-test. All the hypotheses were presented in Chapter 4. Table 13 summarizes these hypotheses and shows their hypothesized effect which follows the innovation adoption theories.

**Table 13 Hypotheses of the study**

<b>Hypotheses</b>	<b>Effect on adoption</b>
<i>H1: Relative advantage</i>	+
<i>H2: Compatibility</i>	+
<i>H3: Complexity</i>	-
<i>H4: Trialability</i>	+
<i>H5: Observability</i>	+
<i>H6: Size of an organization</i>	+
<i>H7: Age of an organization</i>	+
<i>H8: Centralization</i>	-
<i>H9: Management's positive attitude toward innovations</i>	+
<i>H10: Management's positive attitude toward innovation adoption</i>	+
<i>H11: Active information behavior</i>	+
<i>H12: Receptiveness</i>	+
<i>H13: Search for versatile information</i>	+
<i>H14: Perceived voluntariness</i>	+
<i>H15: Competitive pressures</i>	+
<i>H16: Amount of previous users of an innovation</i>	+

As a conclusion of the hypotheses testing, Table 14 was drawn. All variables were tested with Mann-Whitney but perceived voluntariness with Crosstabulation. That is because perceived voluntariness was measured with a nominal scale. Tests were conducted with the summated scales of each variable. If the Sigma is smaller than 0.05, it means that the measure has an impact on e-invoicing adoption. Table 14 shows that relative advantage, compatibility, complexity, observability (remember the low reliability), receptiveness and the attitudes of management toward innovations seem to have effect on innovation adoption, in other words these hypotheses were supported (Sigma is less than 0.05). Table 15 summarizes the hypotheses and the results of testing them. Chapter 4.7 analyses the results in more detail.

**Table 14 Hypotheses tests**

	<b>Mann-Whitney U</b>	<b>Z</b>	<b>Sig.</b>
Relative advantage	862.0	-4.249	0.000
Compatibility	1010.5	-3.648	0.000
Complexity	1303.0	-2.145	0.032
Trialability	1144.0	-1.949	0.051
Observability	1083.0	-3.015	0.003
Size of an organization (turnover)	1213.0	-1.401	0.161
Size of an organization (amount of employees)	1849.5	-0.108	0.914
The age of an organization	1942.0	-0.088	0.930
Centralization	1719.0	-0.405	0.685
Management's attitude toward innovations	1375.0	-2.330	0.020
Management's attitude toward innovation adoption	1509.5	-1.665	0.096
Active information behavior	1454.0	-1.868	0.062
Receptiveness	1295.5	-2.520	0.012
Search for versatile information	1756.5	-0.305	0.760
Competitive pressures	1330.0	-2.662	0.008
Amount of previous users	1593.5	-1.111	0.267
	<b>Continuity correction (Yates)</b>	<b>Sig.</b>	
Perceived voluntariness	0.078	0.780	

**Table 15 Results of the hypotheses testing**

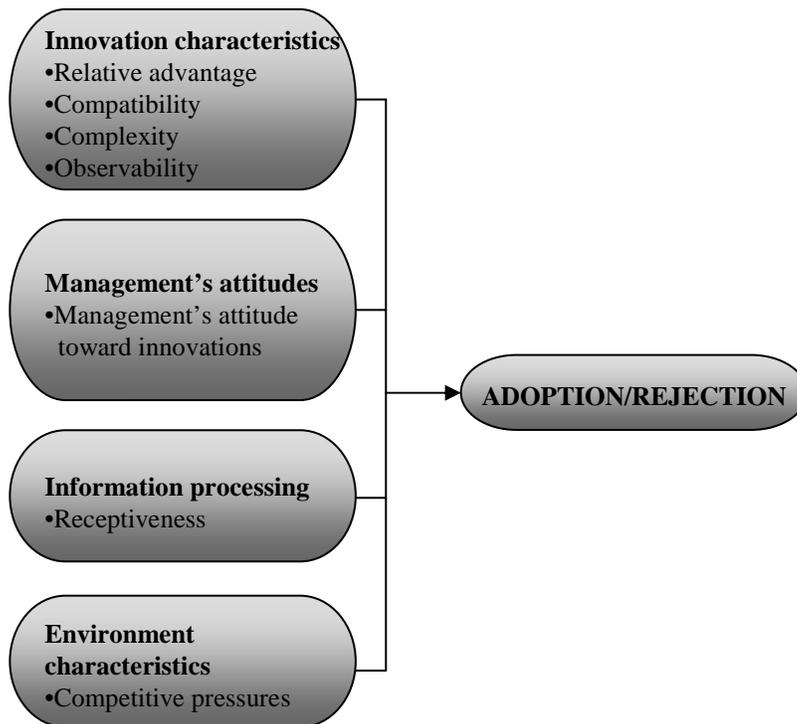
<b>Hypothese</b>	<b>Hypothesized effect on adoption</b>	<b>Result</b>
<i>H1: Relative advantage</i>	+	<i>Supported</i>
<i>H2: Compatibility</i>	+	<i>Supported</i>
<i>H3: Complexity</i>	-	<i>Supported</i>
<i>H4: Trialability</i>	+	<i>Rejected</i>
<i>H5: Observability</i>	+	<i>Supported</i>
<i>H6: Size of an organization</i>	+	<i>Rejected</i>
<i>H7: Age of an organization</i>	+	<i>Rejected</i>
<i>H8: Centralization</i>	-	<i>Rejected</i>
<i>H9: Management's positive attitude toward innovations</i>	+	<i>Supported</i>
<i>H10: Management's positive attitude toward innovation adoption</i>	+	<i>Rejected</i>
<i>H11: Active information behavior</i>	+	<i>Rejected</i>
<i>H12: Receptiveness</i>	+	<i>Supported</i>
<i>H13: Search for versatile information</i>	+	<i>Rejected</i>
<i>H14: Perceived voluntariness</i>	+	<i>Rejected</i>
<i>H15: Competitive pressures</i>	+	<i>Supported</i>
<i>H16: Amount of previous users of an innovation</i>	+	<i>Rejected</i>

## 4.7 Assessment of the Results

Theory that was explored in chapter four suggested several factors that affect innovation adoption, but this study found only seven significant factors for the adoption or rejection of electronic invoicing (see Fig. 20). As explored in the previous section, seven of the 16

hypotheses were supported and nine were rejected. This study explored the adoption with many different scales (innovation characteristics, organizational characteristics, managerial characteristics, information processing, and environment characteristics).

Innovation characteristics were explored with five items: relative advantage, compatibility, complexity, observability and trialability. Four of the hypotheses concerning these characteristics were supported; trialability was rejected. It has to be noted that the Sigma for trialability was 0.051 that means that the hypothesis concerning the trialability was almost supported.



**Figure 20 Factors affecting the e-invoicing adoption**

In Chapter 4.4.1 Figure 18 presented the actions that could facilitate the adoption of e-invoicing, according to the respondents of the study. Experiment before purchase decision was voted to be the most important action for adoption. So despite the rejection of the hypothesis measuring trialability of the innovation, its importance should not be

underestimated. This leads to the conclusion that the role of innovation characteristics should not be underestimated. Adequate amount of information will help possible adopters to evaluate the innovation better which in turn will affect their perception of the innovation characteristics. The next points can be taken into consideration when aiming to increase the adoption of e-invoicing: 1. the advantages of the e-invoicing should be well published for potential adopters, 2. e-invoicing should seem compatible for companies, 3. the complexity of e-invoicing should be minimized, 4. the benefits of e-invoicing should be visible enough and 5. it might be important for potential adopters to have a possibility to experiment e-invoicing before purchase decision (though the hypothesis concerning trialability was not supported).

The attitudes of management toward innovations seem to have effect on e-invoicing adoption, but the attitudes toward the adoption/implementation process do not have effect on adoption. This is understandable; the attitude toward innovations is more relative, because it determines the adoption decision, this means that the decision is made before the implementation and in implementation phase the decision will be confirmed or in some cases rejected.

Information processing in organizations was measured with two items: active information behavior and search for versatile information. Only the activeness proved to have some effect on adoption. If company searches information especially outside its own environment on regular basis, its knowledge about the innovation increases and it will more likely adopt the innovation.

Two items were used to measure the environment characteristics: competitive pressures and network effects. The hypothesis concerning the network effects was rejected and only competitive pressures seem to have effect on e-invoicing adoption. Companies may think that their position in the competition decline if they refuse to use electronic methods in invoicing and their competitors have the systems required for e-invoicing.

All the three hypotheses concerning organizational characteristics were rejected. In other words, size, age and centralization of the respondent companies do not have effect on e-invoicing adoption. It was perhaps little surprising that size does not have any effect on adoption. The study strongly assumed that turnover and/or amount of personnel in the company would have positive effect on adoption, because larger companies are traditionally thought to have more resources for new purchases. When assessing the results of this research, it has to be remembered that the response rate that was only 15.6 %. It can have some effect on the results.

The study hypothesized that perceived voluntariness has a positive effect on e-invoicing adoption. The hypothesis was rejected. In spite of this outcome, lack of the pressure outside the company was the most significant factor why companies have not adopted e-invoicing (see Chapter 4.4.4, Table 6). An example of the external pressure concerning e-invoicing adoption can be found in Sweden. Volvo required its suppliers to send their invoices in electronic format. Large organizations in other countries could perhaps follow this example when aiming to raise the penetration level of electronic invoicing. (Elma Electronic Trading 2004)

In addition to the tested hypotheses, a couple of factors that could affect the e-invoicing adoption were found among the answers. These are *lack of information* and *lack of demand outside the company*. These two items seemed to be crucial for potential adopters; many of the respondents claimed that the information received is not adequate. Also many of the respondents said that they need more demand from the environment before they start to use e-invoicing. These can be seen as challenges for different parties that are trying to rise the penetration level.

## 5 CONCLUSIONS

Decision process is a continuous process. The decision maker goes through stages that lead to the decision to adopt the innovation, to reject it, or to gather more information, either actively or passively (Gatignon & Robertson 1989). At a certain point of time, organizations can be divided as adopters or non-adopters. The mail survey of this study was conducted in March and April 2005. At that time, 26 % of South Karelian companies had adopted e-invoicing and 74 % had not done so. The study shows that there is still much work to do with these non-adopters. They have to be convinced of the potential benefits that can be achieved with invoicing electronization. One action that could facilitate this process is to spread enough information for potential adopters. Also large organizations and cities have a significant role here. The most important reason for non-adoption among SMEs was the lack of pressure from their partners.

The present study explored 16 hypotheses, seven of them were proved to have impact on e-invoicing adoption, and nine were rejected. Results of the hypotheses test were presented in the previous chapter. As a conclusion from these analyses, the next proposals were made for parties that work for the increasing of the penetration level of e-invoicing:

- The characteristics of e-invoicing should be well published to possible adopters of e-invoicing. Adequate amount of information about e-invoicing is important for companies when they make their decisions about it.
- Enterprises need more information about e-invoicing.
- Especially the management of a company should be convinced of the benefits of e-invoicing.
- Companies should be made to see that e-invoicing can be compatible with their activities.
- Experiment before purchase decision is important for potential adopters.
- Large organizations, cities etc. should encourage their partners to use e-invoicing.

One fact that may delay the diffusion of e-invoicing is the existence of several e-invoicing standards. Companies may feel it difficult to evaluate the different options and to choose between them. On the other hand, SMEs usually use the services of their bank and then the standard is Finvoice. It would be an ideal situation if all the companies used the same standard. Understandably this is a difficult goal to achieve.

Some companies may partly wait for the comments of European Commission on the electronic invoicing before they are ready for any implementations. VAT directive 2001/115/EY, that comments e-invoicing, was nationally brought into force in January 2004. It has been written in the directive that Commission presents a proposal in the end of the year 2008 in order to change the requirements which concern e-invoicing. Therefore, the current directive is kind of a special permit. This fact may partly delay the diffusion of e-invoicing, at least in international scale.

Some organizations may consider electronic invoicing too complicated because it involves process re-engineering, at least to some extent. Process re-engineering is essential if a company wishes to gain the maximal benefits that e-invoicing has to offer. Therefore e-invoicing is not just about information systems renewing, it is also about process modernizing. Process re-engineering is more complicated than “plain” information systems implementation. The changes the e-invoicing requires from financial management may feel too difficult for some SMEs.

The present study shows the need for more intensive promotion of electronic invoicing because many of the companies have not made any decision concerning this innovation. Penetration level should be rapidly raised to gain the benefits e-invoicing. This study explored the current situation of e-invoicing in South Karelia. The approach of this study gave general results of the situation of e-invoicing today. In the follow-up studies of B2B e-invoicing there are some issues that are important to solve: the problems encountered by companies when starting to use e-invoicing, solutions to these problems, and the different paths of the take-offs of e-invoicing use. In future it is also possible to study e-invoicing between companies and private consumers.

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In operation   
 In test 

		RECEIVER (receives eInvoices from)										
SENT (sent invoices to)	Anilinker	Basware	Elma	Sampo	Nordea	Enfo	TietoEnator	WM-Data	Osuuspankki	TeliaSonera	C3i	Elisa
Anilinker												
Basware												
Elma												
Sampo												
Nordea												
Enfo												
TietoEnator												
WM-Data												
Osuuspankki												
TeliaSonera												
C3i												
These service providers use the technology of another operator												
Elisa												

APPENDIX 1. CONNECTIVITY  
 TABLE OF THE E-INVOICING  
 LIVINGLAB TESTS

## APPENDIX 2. THE CONTRACT TABLE OF THE E-INVOICING LIVINGLAB TESTS

Situation 4.1.2005

RECEIVER

SENT fill only this row

	Basware	Elma	Sampo	Nordea	Enfo	TietoEnator	WM-data Novo	Osuuspankki	TeliaSonera	C3i	Anilinker (Basware)	Elisa (Elma)	SCe (Enfo)
Basware				€				€					
Elma				€				€					
Sampo													
Nordea													
Enfo				€				€					
TietoEnator													
WM-data Novo													
Osuuspankki													
TeliaSonera													
C3i		€	€	€		€		€	€			€	
Anilinker (Basware)													
Elisa (Elma)													
Servinet Communication SCe (Enfo)				€				€					

1. We have an intermediary contract with our customer, he needs no other contracts.
2. In addition to case 1., also another operator/bank charges his own fees.
3. In addition to our intermediary contract, the customer has to make contract also with another operator/bank.
4. In addition to case 3, also another operator/bank charges his own fees.
5. Connection is not operating.



LASKU - Tiekien testi - 15 . 6 . 2004

Page 1 of 1

**APPENDIX 3. THE TEST**  
**L A S K U** E-INVOICE OF THE E-  
INVOICING LIVINGLAB TESTS

Myyjä:  
Y-tunnus: 9876543-2  
Tiekien testi  
Yhteyshenkilön nimi  
[yhteys@kunta.fi](mailto:yhteys@kunta.fi)

Ostaja:  
Ostaja Oy  
Rauhalantie 8  
01700 VANTAA

Laskun päiväys: 15 . 6 . 2004  
Laskun numero: 164  
Tilaus / sopimus: ostajan viite  
Ostajan asiakasno: FI1234567-8

Laskun eräpäivä: 25 . 6 . 2004  
Laskun määrä: 162,00 euroa  
Saajan pankkitili: 500015-281  
Maksun saajan nimi: Tiekien testi  
Viitenumero: 2004538

Maksun tilanne: Maksettava  
Maksuehto: 10 p netto  
Viivästystiedot: Viivästyskorko 10,5  
Viivästyskorko: 10,5

Toimitusosoite: Kunnan koulu  
Koulutie 5  
99900 Tiekien testi

Toimituspäivä: 10 . 9 . 2004  
Toimitustapa: autokuljetus

Tuote/palvelu	Tuotetunnus	Toimitettu määrä	a-hinta Toimitus.pvm (jak)	Alv%	Alv-määrä Veroton määrä	Yhteensä
Lisätiedot: Tästä testataan yksinkertaista laskua.						
Tuotteen nimi xx	12345	5 kpl	3,05 2 . 12 . 2004	22	3,35 15,25	18,60
Tuotteen nimi yy	12346	10 kpl	11,75	22	25,90 117,50	143,40

**LASKU YHTEENSÄ: 162,00 euroa**

**ALV-erittely:**  
Veroton määrä: 132,75  
Alv 22 %: 29,25

**Virtuaaliviivakoodi:**  
257800750155447000162000000000000000200453805010700002

Tiekien testi  
Kuntakatu 1  
99900 xxxnkunta

Puhelin: (02) 12345  
Telefax: (02) 2345678  
WWW-osoite: [www.xxxnkunta.fi](http://www.xxxnkunta.fi)  
Sähköposti: [laskuttaja@xxxnkunta.fi](mailto:laskuttaja@xxxnkunta.fi)

Kotipaikka: Tiekien testi  
Y-tunnus: [9876543-2](mailto:9876543-2)

FI27 5780 0750 1554 48 / OKOYFIHH  
FI28 2001 2212 2222 32 / NDEAFIHH  
FI29 8312 3331 2332 31 / PSPBFIHH

**A. VASTAAJAN TAUSTATIEDOT**

1. Asemanne yrityksessä: \_\_\_\_\_
2. Ikäanne: \_\_\_\_\_ vuotta
3. Sukupuolenne: nainen / mies
4. Koulutustasonne (ympyröi oikea vaihtoehto)
  - Perusasteen tutkinto (ammattikoulu tms.)
  - Opistoasteen tutkinto (amk, insinööri, tms.)
  - Korkeakoulu- tai yliopistotutkinto (DI, KTM, tms.)
  - Jatkotutkinto (liseniaatti, tohtori)

**B. YRITYKSEN OMINAISUUDET**

1. Yrityksenne toimipisteen postinumero: \_\_\_\_\_
2. Yrityksenne perustamisvuosi: \_\_\_\_\_
3. Yrityksenne toimiala: \_\_\_\_\_
4. Vakituisten työntekijöiden määrä vuonna 2004: \_\_\_\_\_
5. Yrityksenne liikevaihto vuonna 2004: \_\_\_\_\_ e
6. Onko yrityksellänne Internet-yhteys ja jos, niin millainen?

Kyllä,

- Kiinteä (laajakaistainen) yhteys, esim. ADSL/kaapeli-yhteys
  - ISDN-yhteys
  - Modeemiyhteys
  - Muu, mikä: \_\_\_\_\_
- Yrityksellämme ei ole Internet-yhteyttä

## APPENDIX 4.

**7. Käytättekö tai suunnitteletteko seuraavien tietotekniikan sovellusten käyttöönottoa? Laita rasti oikeaan ruutuun ja täydennä pääasiallisilla ohjelmistoilla.**

	Käytössä	Suunnitteilla otettavaksi käyttöön	Ei vielä käytössä eikä suunnitteilla
a) sähköposti			
b) omat kotisivut			
c) ekstranet (Internet-tekniikoihin perustuva organisaatioiden välinen tiedonsiirtojärjestelmä)			
d) EDI/OVT (määrämuotoinen organisaatioiden tietojärjestelmien välinen tiedonsiirtojärjestelmä)			
e) intranet (Internet-tekniikoita käyttävä organisaation sisäinen verkko)			
f) tuotannonohjaukseen tarkoitettu ohjelmisto Mikä? _____			
g) taloushallinnon hoitoon tarkoitettu ohjelmisto? Mikä? _____			
h) asiakastietojen hallintaan tarkoitettu ohjelmisto Mikä? _____			

**8. Miten hyvin seuraavat väittämät sopivat yrityksenne toimintatapaan? Ympyröikää sopivin vaihtoehto siten, että 1=täysin eri mieltä...5=täysin samaa mieltä.**

	täysin samaa mieltä		täysin eri mieltä		
• Ylin johto antaa ohjeistuksen suunnitelmista poikkeavissa tilanteissa.	5	4	3	2	1
• Yrityksemme kehottaa työntekijöitään osallistumaan päätöksentekotilanteisiin.	5	4	3	2	1
• Työntekijöiden täytyy pyytää neuvoja työnjohdolta pienienkin ongelmien kohdalla.	5	4	3	2	1
• Yrityksessämme uskotaan uusien tuotteiden ja palveluiden tuovan tehokkuutta yrityksemme toimintaan.	5	4	3	2	1

## APPENDIX 4.

- Yrityksemme kokeilee ennakkoluulottomasti uusia tuotteita ja teknologioita. 5 4 3 2 1
- Työntekijämme sopeutuvat helposti teknologisiin muutoksiin. 5 4 3 2 1

### 9. Miten yrityksenne työntekijät jakautuvat koulutusasteittain?

Peruskoulu/kansakoulu	_____	%
Ammattikoulu/lukio	_____	%
Ammattikorkeakoulu/opistotaso	_____	%
Korkeakoulu/yliopisto	_____	%
Lisensiaatti/tohtori	_____	%

### 10. Tässä kysymyksessä tarkastellaan yrityksenne resursseja. Ympyröikää asteikolta 1-5 sopivin vaihtoehto kuvaamaan yrityksenne tilannetta siten, että 1=resurssia on niukasti saatavilla...5=resurssia on runsaasti saatavilla.

	<u>runsaasti</u>				<u>niukasti</u>
• Taloudelliset resurssit	5	4	3	2	1
• Laitteet ja koneisto	5	4	3	2	1
• Tietotekninen osaaminen	5	4	3	2	1
• Ammattitaitoinen työvoima	5	4	3	2	1
• Materiaalit	5	4	3	2	1
• Osaavat johtajat	5	4	3	2	1

## C. VERKKOLASKUTUS

### 1. Käyttääkö yrityksenne verkkolaskutusta? Ympyröi sopivin vaihtoehto.

- Kyllä, käytämme verkkolaskutusta
- Olemme tällä hetkellä kokeilemassa ensimmäisten verkkolaskujen toimivuutta

**Emme,**

- Olemme tietoisia verkkolaskutuksesta, mutta emme ole vielä tehneet päätöksiä sen suhteen.
- Olemme tietoisia verkkolaskutuksesta, mutta emme aio hankkia sitä yritykseemme
- Emme ole kuulleetkaan verkkolaskutuksesta. (Jos vastasitte tähän, siirtykää osioon ”F. Yritysjohdo”)

*Seuraavassa (kysymykset 2-5) on esitetty väitteitä koskien aikatauluanne verkkolaskutukseen siirtymisessä. Ympyröi oikea vaihtoehto.*

**2. Yrityksemme kuuli ensimmäisen kerran verkkolaskutuksesta...**

- yli 5 vuotta sitten
- 3-5 vuotta sitten
- 2 vuotta sitten
- viime vuonna
- tänä vuonna

**3. Harkitsimme ensimmäisen kerran siirtyvämmme verkkolaskutukseen...**

- yli 5 vuotta sitten
- 3-5 vuotta sitten
- 2 vuotta sitten
- viime vuonna
- tänä vuonna
- emme ole harkinneet verkkolaskutuksen käyttöönottoa

**4. Yrityksemme teki päätöksen verkkolaskutukseen siirtymisestä...**

- yli 5 vuotta sitten
- 3-5 vuotta sitten
- 2 vuotta sitten
- viime vuonna
- tänä vuonna
- emme ole tehneet lopullista päätöstä verkkolaskutukseen siirtymisen suhteen.

**5. Yrityksemme ottaa verkkolaskutuksen käyttöön...**

- tänä vuonna
- ensi vuonna
- 2-3 vuoden kuluttua
- yli 3 vuoden kuluttua

## APPENDIX 4.

- ei koskaan
- olemme jo ottaneet verkkolaskutuksen käyttöön

**6. Miten käytätte verkkolaskutusta tai miten olette suunnitelleet käyttävänne sitä?** Laita vaihtoehdot tärkeysjärjestykseen (numero 1 sen vaihtoehdon kohdalle, jota pääasiassa käytätte, numero 2 seuraavaksi käytetyimmän kohdalle jne.). Valitse vähintään yksi tapa. Jos ette aio siirtyä verkkolaskutuksen käyttöön, siirtykää kysymykseen 8.

- \_\_\_ Käytämme pankkien tarjoamia internet-palveluja
- \_\_\_ Käytämme verkkolaskuoperaattorin toimittamia palveluja ja tuotteita
- \_\_\_ Käytämme sovellusvuokrauspalveluja (ASP)
- \_\_\_ Käytämme taloushallinnon ohjelmaa/järjestelmää (esim. Passeli)
- \_\_\_ Muu tapa, mikä? \_\_\_\_\_

**7. Miten haluatte käyttää verkkolaskutusta (Ympyröi oikea vaihtoehto):**

- Haluamme pääasiassa vastaanottaa verkkolaskuja
- Haluamme pääasiassa lähettää verkkolaskuja
- Haluamme sekä lähettää että vastaanottaa verkkolaskuja

**8. Koetteko te, että yritystänne painostetaan siirtymään verkkolaskutukseen?**

- Ei
- Kyllä

**Jos vastasitte edelliseen kysymykseen kyllä, mistä merkittävin painostus on lähtöisin?** Ympyröi sopivimmat (enintään 3) vaihtoehdot.

- Asiakkaan suunnalta
- Toimittajan suunnalta
- Tilitoimiston suunnalta
- Kilpailutilanteesta
- Operaattorin suunnalta
- Pankin suunnalta
- Muu osapuoli, mikä? \_\_\_\_\_

**9. Mikäli ette ole vielä siirtyneet tai ole lainkaan siirtymässä verkkolaskutukseen, miten hyvin seuraavat väittämät pitävät paikkansa?** Ympyröikää sopivin vaihtoehto siten, että 1=täysin eri mieltä...5=täysin samaa mieltä. (Jos käytätte jo verkkolaskutusta, siirtykää kysymykseen 10.)

*Yrityksemme ei ole vielä siirtynyt / ole lainkaan siirtymässä verkkolaskutukseen, koska...*

## APPENDIX 4.

	<u>täysin samaa mieltä</u>		<u>täysin eri mieltä</u>		
...verkkolaskutukseen siirtyminen vie liikaa aikaa.	5	4	3	2	1
... käyttöönoton riskit ovat liian suuret.	5	4	3	2	1
... emme ole löytäneet sopivaa palveluntarjoajaa.	5	4	3	2	1
... pelkäämme tulevamme liian riippuvaisiksi palveluntarjoajasta.	5	4	3	2	1
... verkkolaskutus on teknologian puolesta liian monimutkaista.	5	4	3	2	1
... olemme huolissamme tietoturvasta.	5	4	3	2	1
... verkkolaskutus on liian kallista.	5	4	3	2	1
... yrityksessämme ei ole sopivaa henkilöä huolehtimaan käyttöönotosta.	5	4	3	2	1
... verkkolaskutuksen integrointi nykyisiin järjestelmiin on vaikeata.	5	4	3	2	1
... emme ole vakuuttuneita verkkolaskutuksen tuomista hyödyistä.	5	4	3	2	1
... emme ole saaneet tarpeeksi tietoa verkkolaskutuksesta.	5	4	3	2	1
... kilpailijammekaan eivät käytä verkkolaskutusta.	5	4	3	2	1
... emme halua muuttaa laskutusrutiinejamme.	5	4	3	2	1
... asiakkaamme eivät ole sitä vaatineet.	5	4	3	2	1
... toimittajamme eivät ole sitä vaatineet.	5	4	3	2	1
... odotamme kilpailijoiden toimenpiteitä verkkolaskutuksen suhteen.	5	4	3	2	1
... emme usko verkkolaskutus-yhteyksien toimivan vielä kunnolla.	5	4	3	2	1

**10. Miten hyvin seuraavat väittämät pitävät paikkansa, kun tarkastelette verkkolaskutuksen ominaisuuksia? Mikäli ette vielä käytä verkkolaskutusta, arvioikaa seuraavia väittämiä tämän hetkisten tietojenne perusteella. (1=täysin eri mieltä... 5=täysin samaa mieltä)**

<i>Käyttö ja käyttöönotto</i>	<u>täysin samaa mieltä</u>		<u>täysin eri mieltä</u>		
• Verkkolaskutuksen käyttöönotto on vaivatonta.	5	4	3	2	1

## APPENDIX 4.

• Olen nähnyt verkkolaskutuksen käyttöä muissa yrityksissä.	5	4	3	2	1
• Verkkolaskutuksen käyttö on helppoa.	5	4	3	2	1
• Yrityksen työntekijät oppivat helposti käyttämään verkkolaskutusta	5	4	3	2	1
• Pystyimme tutustumaan verkkolaskutukseen ennen ostopäätöstä.	5	4	3	2	1
<i>Vaikutukset työhön</i>					
• Verkkolaskutuksen käyttö tehostaa laskutusprosessia.	5	4	3	2	1
• Verkkolaskutus helpottaa työntekoa	5	4	3	2	1
<i>Muut hyödyt</i>					
• Verkkolaskutuksen avulla yrityksemme asiakaspalvelu paranee.	5	4	3	2	1
• Verkkolaskutuksen käyttö parantaa yrityskuvaamme.	5	4	3	2	1
• Yrityksemme saa huomattavan kilpailuedun verkkolaskutuksen ansiosta.	5	4	3	2	1
• Verkkolaskutuksen avulla saavutettava hyöty on selkeästi havaittavissa.	5	4	3	2	1
<i>Sopivuus yritykselle</i>					
• Verkkolaskutus sopii hyvin työntekijöiden nykyisiin työtapoihin.	5	4	3	2	1
• Verkkolaskutus sopii hyvin tarpeisiimme.	5	4	3	2	1
• Verkkolaskutus on yhteensopiva yrityksen nykyisten laitteistojen ja ohjelmistojen kanssa.	5	4	3	2	1

## APPENDIX 4.

**11. Nämä kysymykset on tarkoitettu verkkolaskutusta jo käyttäville yrityksille. Jos ette käytä verkkolaskutusta, siirtykää seuraavaan kysymykseen.** Arvioi seuraavia väittämiä kokemustenne mukaan (asteikolla 1=täysin eri mieltä... 5=täysin samaa mieltä)

	<u>täysin samaa mieltä</u>		<u>täysin eri mieltä</u>		
• Verkkolaskujen lähettäminen on vaivatonta.	5	4	3	2	1
• Verkkolaskut menevät luotettavasti perille	5	4	3	2	1
• Verkkolaskujen lähetyksessä ei ole ollut ongelmia	5	4	3	2	1
• Laskut eivät ole toisinaan menneet perille, koska laskujen vastaanottaja ei ollut tehnyt tarvittavia sopimuksia operaattorin/pankin kanssa.	5	4	3	2	1
• Laskut eivät ole toisinaan menneet perille, koska laskujen lähettäjä ei ollut tehnyt tarvittavia sopimuksia operaattorin/pankin kanssa.	5	4	3	2	1

**12. Miten arvioisitte mielikuvianne verkkolasku-operaattorien ja pankkien toiminnasta seuraavien väittämien avulla?** (asteikolla 1=täysin eri mieltä... 5=täysin samaa mieltä)

	<u>täysin samaa mieltä</u>		<u>täysin eri mieltä</u>		
• Operaattorit ovat luotettavia yhteistyökumppaneita.	5	4	3	2	1
• Pankit ovat luotettavia yhteistyökumppaneita.	5	4	3	2	1
• Yhteistyö operaattoreiden välillä ei ole toimivaa.	5	4	3	2	1
• Yhteistyö pankkien välillä ei ole toimivaa.	5	4	3	2	1
• Yhteistyö operaattoreiden ja pankkien välillä ei ole toimivaa.	5	4	3	2	1
• Operaattorit painostavat/painostivat yritystämme siirtymään verkkolaskutukseen.	5	4	3	2	1
• Pankit painostavat/painostivat yritystämme siirtymään verkkolaskutukseen	5	4	3	2	1
• Sopimukset operaattorien kanssa ovat hankalia	5	4	3	2	1
• Sopimukset pankkien kanssa ovat hankalia	5	4	3	2	1

**13. Mitkä toimenpiteet mielestänne edistäisivät verkkolaskutuksen leviämistä?**  
Ympyröi sopivimmat vaihtoehdot (korkeintaan 3 kohtaa).

- Käyttäjäkoulutuksen saaminen
- Mahdollisuus kokeilla verkkolaskutusta ennen ostopäätöstä
- Teknisen tuen hyvä saatavuus
- Tiedottamisen lisääminen

- Käyttäjäkokemusten jakaminen
- Parempi yhteistyö operaattorien ja pankkien kesken
- Muu, mikä? \_\_\_\_\_

#### **D. INFORMAATIOLÄHTEET**

**1. Miten yrityksenne on kuullut verkkolaskutuksesta?** (Ympyröi oikeat vaihtoehdot, max. 3)

- Mainosmateriaali
- Ammattilehdet
- Verkkolaskutus -ohjelmiston myyntihenkilö otti yhteyttä
- Kilpailijoiden kautta
- Yhteistyökumppaneiden kautta
- Asiakkailta
- Toimittajilta
- Internetistä
- Messuilla tai asiakastilaisuudessa
- Operaattorilta
- Pankilta
- Muuten, miten? \_\_\_\_\_

**2. Kuinka monen eri toimittajan kanssa yrityksenne on käynyt neuvotteluja verkkolaskujen hankintaa koskien?**

- 1 toimittajan kanssa
- 2-3 toimittajan kanssa
- useamman toimittajan kanssa
- emme ole käyneet neuvotteluja

**3. Arvioikaa kuinka monta yhteistä kokousta tai neuvottelua yrityksellänne on ollut toimittajien kanssa liittyen verkkolaskutuksen hankintaan.**

- 1 kokous/neuvottelu
- 2-4 kokousta/neuvottelua
- 5 tai useampi neuvottelu/kokous
- emme ole käyneet neuvotteluja

**4. Kuinka kauan olette käyneet keskustelua verkkolaskutuksen käyttöönotosta toimittajien kanssa?**

- 1-3 kk
- 4-6 kk
- 7-11 kk

## APPENDIX 4.

- 1-2 vuotta
- kauemmin
- emme ole käyneet keskustelua käyttöönotosta

### 5. Oletteko saaneet eri toimijoilta ristiriitaista tietoa verkkolaskutuksesta?

- Kyllä
- Ei

### 6. Kuinka tärkeitä seuraavat tiedonlähteet ovat verkkolaskutuksen hankintapäätöksen kannalta? (1=ei lainkaan tärkeä... 5=erittäin tärkeä)

	<u>erittäin tärkeä</u>			<u>ei lainkaan tärkeä</u>	
• Mainosmateriaali	5	4	3	2	1
• Toimittajayritysten myyntihenkilöt	5	4	3	2	1
• Ammattilehdet	5	4	3	2	1
• Messut tai asiakastilaisuudet	5	4	3	2	1
• Internet	5	4	3	2	1
• Kilpailijat	5	4	3	2	1
• Yhteistyökumppanit	5	4	3	2	1
• Operaattorit	5	4	3	2	1
• Pankit	5	4	3	2	1
• Asiakkaat	5	4	3	2	1
• Toimittajat	5	4	3	2	1

*Seuraavilla kysymyksillä pyritään hahmottamaan tiedon etsintää & kulkua yrityksessänne.*

### 7. Miten seuraavat väittämät sopivat yrityksenne toimintaan? Ympyröikää sopivin vaihtoehto siten, että 1=täysin eri mieltä... 5=täysin samaa mieltä.

	<u>täysin samaa mieltä</u>		<u>täysin eri mieltä</u>		
• Työntekijämme vaihtavat keskenään aktiivisesti tietoa ja ideoita	5	4	3	2	1
• Yrityksemme kerää jatkuvasti palautetta asiakkailtaan.	5	4	3	2	1
• Yrityksemme seuraa koko ajan toisissa yrityksissä tapahtuvia teknologisia muutoksia.	5	4	3	2	1
• Hankimme aktiivisesti tietoa toimintaympäristömme muutoksista.	5	4	3	2	1

## APPENDIX 4.

- Yrityksessämme tieto kulkee pääasiassa vain virallisia 5 4 3 2 1 kanavia pitkin
- Yrityksessämme luetaan säännöllisesti oman alan 5 4 3 2 1 erikoiskirjallisuutta
- Keräämme paljon tietoa myös alamme ulkopuolella 5 4 3 2 1 olevista asioista
- Pyrimme lisäämään osaamistamme ulkoa saamamme 5 4 3 2 1 tiedon avulla.
- Osaamisen ja tietotaidon leviämisen kannalta pidämme 5 4 3 2 1 tiimityöskentelyä tärkeänä työmuotona.

### E. HANKINTAPÄÄTÖS

*Seuraavissa kysymyksissä tarkastellaan verkkolaskutuksen hankintapäätöstä. Jos yrityksenne ei ole tehnyt hankintapäätöstä verkkolaskutukseen siirtymisestä, siirtykää osioon F. ”Yritysjohdo”.*

**1. Kuinka monta henkilöä yrityksessänne osallistui verkkolaskutuksen hankintapäätökseen?**

\_\_\_\_\_ henkilöä

Jos hankintapäätökseen osallistui vain yksi henkilö, siirtykää osioon F. Yritysjohdo.

**2. Keitä yrityksessänne osallistui hankintapäätökseen? Merkitkää kunkin henkilön rooli tärkeysjärjestyksessä.**

Henkilö 1 \_\_\_\_\_

Henkilö 2 \_\_\_\_\_

Henkilö 3 \_\_\_\_\_

Henkilö 4 \_\_\_\_\_

Henkilö 5 \_\_\_\_\_

Henkilö 6 \_\_\_\_\_

**3. Miten hyvin seuraavat väittämät kuvaavat verkkolaskutuksen hankintapäätöksen tehneen ryhmän toimintaa? Ympyröikää sopivin vaihtoehto siten, että 1=täysin eri mieltä... 5=täysin samaa mieltä.**

- |   | täysin samaa mieltä |   | täysin eri mieltä |   |   |
|---|---------------------|---|-------------------|---|---|
| • Ryhmän jäsenet tunsivat toisensa hyvin.   | 5                   | 4 | 3                 | 2 | 1 |
| • Ryhmän jäsenet tekivät yhdessä tiimityötä | 5                   | 4 | 3                 | 2 | 1 |

## APPENDIX 4.

- Ryhmän jäsenten välillä ei ollut erimielisyyksiä 5 4 3 2 1
- Muut työntekijät häiritsivät hankintapäätösryhmän toimintaa. 5 4 3 2 1

### F. YRITYSJOHTO

1. Mikä on yrityksenne ylimpien johtohenkilöiden keski-ikä (noin)? \_\_\_\_\_ vuotta

2. Miten yrityksenne ylempien johtohenkilöiden koulutus jakautuu?

- Peruskoulu/kansakoulu \_\_\_\_\_ %
- Ammattikoulu/lukio \_\_\_\_\_ %
- Ammattikorkeakoulu /opistotasoa \_\_\_\_\_ %
- Korkeakoulu/yliopisto \_\_\_\_\_ %
- Lisensiaatti/tohtori \_\_\_\_\_ %

3. Kuinka kauan nykyinen ylin johto on ollut yrityksen palveluksessa (keskimäärin)?

\_\_\_\_\_ vuotta

4. Miten hyvin seuraavat väittämät kuvaavat yrityksenne johdon asennoitumista uusien tuotteita ja palveluita kohtaan? Ympyröikää sopivin vaihtoehto asteikolta 1-5 siten, että 1=täysin eri mieltä... 5=täysin samaa mieltä.

- |   | täysin samaa mieltä |   |   | täysin eri mieltä |   |  |
|---|---------------------|---|---|-------------------|---|--|
|   | 5                   | 4 | 3 | 2                 | 1 |  |
| • Yrityksen ylin johto on halukas investoimaan uusiin tuotteisiin ja teknologioihin                             | 5                   | 4 | 3 | 2                 | 1 |  |
| • Yrityksemme johtohenkilöt etsivät aktiivisesti uusia tapoja parantaa yrityksen tehokkuutta.                   | 5                   | 4 | 3 | 2                 | 1 |  |
| • Innovaatioiden omaksumisen taustalla ei ole strategista suunnittelua.   | 5                   | 4 | 3 | 2                 | 1 |  |
| • Ylin johto huolehtii siitä, että uusien tuotteiden taustalla olevaan tekniikkaan tutustutaan perusteellisesti | 5                   | 4 | 3 | 2                 | 1 |  |
| • Innovaatioiden käyttöönottovaiheeseen pyritään kiinnittämään mahdollisimman vähän resursseja.                 | 5                   | 4 | 3 | 2                 | 1 |  |
| • Johtotason henkilöt sitoutuvat mahdollisimman vähän innovaatioiden hankintaan.                                | 5                   | 4 | 3 | 2                 | 1 |  |

## APPENDIX 4.

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| • Yrityksemme johto huolehtii siitä, että innovaatioidenkäyttöön ottoon varataan tarpeeksi resursseja. | 5 | 4 | 3 | 2 | 1 |
| • Käytämme ulkopuolisia asiantuntijoita kontrolloimaan resurssejamme innovaatioita hankittaessa.       | 5 | 4 | 3 | 2 | 1 |

### G. YMPÄRISTÖN VAIKUTUS

1. Arvioi kuinka monta kilpailijaa yrityksellänne on keskimäärin? (Ympyröi oikea vaihtoehto)

- 1-5 kilpailijaa
- 6-10 kilpailijaa
- 11–20 kilpailijaa
- enemmän

2. Arvioi kuinka monta yhteistyökumppania yrityksellänne on? (Ympyröi oikea vaihtoehto)

- 1-5 yhteistyökumppani
- 6-10 yhteistyökumppania
- 11-20 yhteistyökumppania
- enemmän

3. Miten hyvin seuraavat väittämät kuvaavat yritystänne? Ympyröikää sopivin vaihtoehto asteikolta 1-5 siten, että 1=täysin eri mieltä... 5=täysin samaa mieltä.

- |  | <u>täysin samaa mieltä</u> |   | <u>täysin eri mieltä</u> |   |   |
|--|----------------------------|---|--------------------------|---|---|
| • Yrityksemme täytyy jatkuvasti etsiä uusia markkinointikanavia pärjätäksemme kilpailijoille                   | 5                          | 4 | 3                        | 2 | 1 |
| • Toimialallamme kilpailu on kireää.   | 5                          | 4 | 3                        | 2 | 1 |
| • Joudumme kilpailemaan osaavasta työvoimasta.   | 5                          | 4 | 3                        | 2 | 1 |
| • Joudumme jatkuvasti seuraamaan markkinoille tulevia teknologisia uudistuksia pysyäksemme mukana kilpailussa. | 5                          | 4 | 3                        | 2 | 1 |
| • Verkkolaskua käyttävien yritysten määrä vaikuttaa/vaikutti päätökseemme siirtyä verkkolaskutukseen.          | 5                          | 4 | 3                        | 2 | 1 |

## APPENDIX 4.

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| • Yhteistyökumppaniemme päätökset<br>verkkolaskutukseen siirtymisestä<br>vaikuttavat/vaikuttivat vahvasti omaan<br>päätökseemme. | 5 | 4 | 3 | 2 | 1 |
|--|---|---|---|---|---|

**Lopuksi voitte antaa vapaata kommenttia liittyen verkkolaskutukseen.**

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**KIITOS VASTAUKSESTANNE!**

**MUISTATHAN TÄYTTÄÄ ARVONTALIPUKKEEN, JOS HALUAT  
OSALLISTUA ARVONTAAN!**

**APPENDIX 5. THE FACTORS  
AND THE STATEMENTS  
MEASURING THEM**

***STUDIED FACTORS AND THE STATEMENTS MEASURING THEM***

**A. ORGANIZATION CHARACTERISTICS**

**Centralization**

1. The top management gives the instructions in abnormal situations. (Ylin johto antaa ohjeistuksen suunnitelmista poikkeavissa tilanteissa.)
2. Our company encourages the employees to take part in the decision making. (Yrityksemme kehottaa työntekijöitä osallistumaan päätöksentekotilanteisiin.)
3. The employees have to ask the management for advices even with small problems. (Työntekijöiden täytyy pyytää neuvoja työnjohdolta pienienkin ongelmien kohdalla.)

**Size**

1. Turnover
2. Personnel

**Age**

1. Establishing year

**B. PERCEIVED INNOVATION CHARACTERISTICS**

**Relative advantage**

1. The use of e-invoicing intensifies the invoicing process. (Verkkolaskutuksen käyttö tehostaa laskutusprosessia.)
2. We can service our customers better if we use e-invoicing. (Verkkolaskutuksen avulla yrityksemme asiakaspalvelu paranee.)
3. The use of e-invoicing improves our image. (Verkkolaskutuksen käyttö parantaa yrityskuvaamme.)
4. Our company gains a great competitive edge if we use e-invoicing. (Yrityksemme saa huomattavan kilpailuedun verkkolaskutuksen ansiosta.)
5. E-invoicing eases working. (Verkkolaskutus helpottaa työntekoa.)

**Compatibility**

1. E-invoicing is compatible with our needs. (Verkkolaskutus sopii hyvin tarpeisiimme.)

## **APPENDIX 5.**

2. E-invoicing is compatible with our employees' current working manners. (Verkkolaskutus sopii hyvin työntekijöiden nykyisiin työtapoihin.)
3. E-invoicing is compatible with our current hardware and software. (Verkkolaskutus on yhteensopiva yrityksen nykyisten laitteistojen ja ohjelmistojen kanssa.)

### **Complexity**

1. E-invoicing is easy. (Verkkolaskutuksen käyttö on helppoa.)
2. Our employees can easily learn to use e-invoicing. (Yrityksen työntekijät oppivat helposti käyttämään verkkolaskutusta.)
3. It is easy to start to use e-invoicing. (Verkkolaskutuksen käyttöönotto on vaivatonta.)

### **Trialability**

1. We were able to become familiar with e-invoicing before purchase decision. (Pystyimme tutustumaan verkkolaskutukseen ennen ostopäätöstä.)

### **Observability**

1. The benefits of e-invoicing are easy to see. (Verkkolaskutuksen avulla saavutettava hyöty on selkeästi havaittavissa.)
2. We have seen the use of e-invoicing in other companies. (Olen nähnyt verkkolaskutuksen käyttöä muissa yrityksissä.)

## **C. VOLUNTARINESS**

1. Do you feel that you are forced to start to use e-invoicing? (Koetteko te, että teidän on pakko siirtyä verkkolaskutukseen?)

## **D. MANAGERIAL ATTITUDES**

### **Managerial attitudes toward innovations**

1. The top management looks after that the technology of the new products is well learned. (The top management is willing to invest in new products and technologies. (Yrityksen ylin johto on halukas investoimaan uusiin tuotteisiin ja teknologioihin.)
2. The management searches actively new ways to improve the effectiveness of our company. (Yrityksemme johtohenkilöt etsivät aktiivisesti uusia tapoja parantaa yrityksen tehokkuutta.)
3. There is no strategic planning behind the innovation adoption. (Innovaatioiden omaksumisen taustalla ei ole strategista suunnittelua.)

## APPENDIX 5.

### **Managerial attitudes toward innovation adoption**

1. The top management looks after that the technology behind new products is well learned. (Ylin johto huolehtii siitä, että uusien tuotteiden taustalla olevaan tekniikkaan tutustutaan perusteellisesti.)
2. The top management do not engage properly on the innovation adoption. (Johtotason henkilöt sitoutuvat mahdollisimman vähän innovaatioiden hankintaan.)
3. The top management looks after that enough resources are attached to innovation adoption. (Johto huolehtii siitä, että innovaatioiden käyttöönottoon varataan tarpeeksi resursseja.)

## **E. ENVIRONMENTAL INFLUENCES**

### **Competitive pressures**

1. Our company has to continuously search for new marketing channels to manage the competition. (Yrityksemme täytyy jatkuvasti etsiä uusia markkinointikanavia pärjätäksemme kilpailijoille.)
2. The competition in our line of business is tough. (Toimialallamme kilpailu on kireää.)
3. We have to compete to get capable employees. (Joudumme kilpailemaan osaavasta työvoimasta.)
4. We have to observe the new technologies continuously in order to stay on the competition. (Joudumme jatkuvasti seuraamaan markkinoille tulevia teknologisia uudistuksia pysyäksemme mukana kilpailussa.)

### **Network externalities**

1. The number of companies using e-invoicing did affect our decision about e-invoicing. (Verkkolaskua käytävien yritysten määrä vaikuttaa/vaikutti päätökseemme siirtyä verkkolaskutukseen.)
2. The decisions of our partners did affect our decision about e-invoicing. (Yhteistyökumppaniemme päätökset verkkolaskutukseen siirtymisestä vaikuttavat vahvasti omaan päätökseemme.)

## **F. INFORMATION PROCESSING**

### **Activeness of information behavior**

1. We gather regularly feedback from our customers. (Yrityksemme kerää jatkuvasti palautetta asiakkailtaan.)
2. We observe regularly the technological changes in other companies. (Yrityksemme seuraa koko ajan toisissa yrityksissä tapahtuvia teknologisia muutoksia.)

## **APPENDIX 5.**

3. Our employees exchange information and ideas actively. (Työntekijämme vaihtavat keskenään aktiivisesti tietoa ja ideoita.)
4. We gather information about changes in our environment continuously. (Hankimme aktiivisesti tietoa toimintaympäristömme muutoksista.)

### **Receptiveness**

1. Our company believes that new products and services can help the company to be more effective. (Yrityksessämme uskotaan uusien tuotteiden ja palveluiden tuovan tehokkuutta yrityksemme toimintaan.)
2. Our company is open-minded toward new products and technologies. (Yrityksemme kokeilee ennakkoluulottomasti uusia tuotteita ja teknologioita.)
3. Our employees can adjust easily to technological changes. (Työntekijämme sopeutuvat helposti teknologisiin muutoksiin.)

### **Versatile information**

1. We read the literature about our line of business regularly. (Yrityksessämme luetaan säännöllisesti oman alan erikoiskirjallisuutta.)
2. We also gather information of the issues that are outside our line of business. (Keräämme paljon tietoa myös alamme ulkopuolella olevista asioista.)

## APPENDIX 6. RESPONDENTS' FREE COMMENTS ABOUT E-INVOICING

- Nobody wants to be the first one to start to use e-invoicing. There are still so many paper invoices that companies don't feel it necessary to use e-invoicing. Many companies might feel it more secure to use traditional paper invoices.
- Electronic invoicing is a very good idea, when it functions without problems, it increases the effectiveness of working a lot. Of course these savings depend on the amount of invoices!
- The cost of implementing e-invoicing to a company are very big. "Payback" time is very long!
- We need more information.
- We are going to start to use e-invoicing as soon as possible. The current system modifications delay this process.
- E-invoicing is very suitable for companies that use computers and use Internet for bank services. E-invoicing increases the positive picture of a company.
- E-invoicing isn't as simple as it is told to be.
- SMEs require clear savings in time and money before they dare to start to use e-invoicing.
- E-invoicing, the "big unknown". There is information available but it is hard to find enough time for the implementation.
- The savings gained with e-invoicing concern companies in which several employees handle the invoices. In a small company there is just one person that deals with the selling and purchase invoices. The implementation brings costs.
- We have nothing against e-invoicing but we will start to use it when we improve our other systems. It will be relevant after couples of years.
- I think the biggest barrier for adoption is that companies feel that the e-invoice flow in the systems is unreliable and slow!
- We will start to use e-invoicing as soon as our bank fixes the required technical preconditions. It has been up to them!

## **APPENDIX 6.**

- We have received e-invoices for a year now. Our experiences are positive in general. On the other hand, our suppliers have had problems, they have sent about 100 invoices for a second time because of a programming error. E-invoices are clear and error-free.
- We will switch over to e-invoicing when our suppliers are ready for that.
- E-invoicing isn't necessarily proper way for one man companies.
- Information about e-invoicing is adequate. Are there any courses/lectures about it?
- Switching to e-invoicing isn't easy because it's hard to know the implementing costs.
- The only reason why we don't use e-invoicing is that our customers (UPM and cities) have not pressured us to use it.
- Our invoicing is quite simple so e-invoicing doesn't seem very reasonable and necessary.
- We do not use e-invoicing because the majority of our customers are private persons.