**Aalto University
School of Economics**

Obstacles of XML-based electronic accounting reference

Information Systems Science

Master's thesis

Antti Juhava

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Department of Information and Service Economy
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AALTO UNIVERSITY SCHOOL OF ECONOMICS   **ABSTRACT**

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Research objectives
The use of electronic accounting reference in its newest form, constructed from the viewpoint of unified practices, seems to have fallen short. Because no proper research has been conducted to depict the reasons that effect on the adoption of electronic accounting reference, this thesis aims to find answers through the following research question: What reasons hinder the adoption of electronic accounting reference for incoming invoices in Finnish companies?

Research model
In order to depict reasons for the lack of adoption, the Fit-Viability theory, created by Liang and Wei (2004), is utilized in the thesis. The theory recognizes that fit- and viability-related issues have an impact on the adoption of technology. The Fit-related issues analyze the manner in which the technology meets its demands set by the task that needs to be done. The viability-related issues, in turn, analyze organization's readiness to adopt the technology in question.

Research methodology
The thesis includes an empiric case study in addition to the theory. This empiric case study focuses on four Finnish companies, and how their representatives have answered to a questionnaire, constructed with the help of Fit-Viability theory. Based on the analysis, the state of electronic accounting reference is depicted, and is placed to a four-field matrix created by Liang and Wei (2004). Based on the location in the matrix, suggestions how to improve the adoption of the electronic accounting reference in the future are made.

Main findings
The reasons for the lack of adoption are not unambiguous. Companies do see electronic accounting reference as a good investment, but the implementation demands resources, and companies need to make prioritization decisions amongst different options. Furthermore, as the electronic accounting reference-related claims received mixed answers in most of the cases, using resources to introduce the electronic accounting reference alone, most likely does not seem as a beneficial investment compared to other, less ambivalent, investment options. Companies' answers' calculated averages also suggest that the lack of adoption is explained with fit-related factors, and more specifically, technology-related factors. Additionally, the results indicate that "best practices" for invoice handling processes should be introduced. However, based on the limitations of this study, a broader research on the need for "best practices" should be conducted.

Key words: Electronic accounting reference, Fit-Viability theory, E-invoicing, XML, EDI, TEAPPSXML, Finvoice

AALTO YLIOPISTON KAUPPAKORKEAKOULU　　　　　　　　**TIIVISTELMÄ**

Tutkimuksen tavoitteet
Tiliöintiviitteen käyttöönotto uusimmassa, laskujenkäsittelyprosessin yhtenäistämistä tukevassa, muodossaan näyttää, väitetyistä hyödyistään huolimatta, jääneen vähäiseksi. Koska kunnollista tutkimusta ei olla tehty syiden alkuperästä, pyrkii tämä tutkielma selvittämään näitä syitä seuraavan tutkimuskysymyksen kautta: Mitkä syyt haittaavat sähköisen tiliöintiviitteen käyttöönottoa sen uusimmassa muodossa?

Viitekehys
Käyttöönoton vähäisyyttä pyritään selvittämään Liangin ja Wein (2004) luomalla sopivuus-toteuttamiskelpoisuusteorialla. Teorian kautta syitä pyritään määrittämään teknologian suoriutumista sille asetetuista vaatimuksista ja, toisaalta, yritysten valmiudessa ottaa tälläinen teknologia käyttöön.

Metodologia
Syiden selvittämiseksi, tutkielma on teorian lisäksi keskittynyt myös empiriaan. Empiirisessä osuudessa käydään läpi neljän yrityksen edustajien vastauksia tutkielmassa luotuun kyselyyn sekä analysoidaan vastaajien tarkennuksia ennaltalaadittun kyselyn vastauksiin. Analyysin perusteella sähköisen tiliöintiviitteen nykytila sijoitetaan lisäksi Liangin ja Wein (2004) rakentamaan nelikenttäiseen matriisiin, jonka perusteella voidaan vetää nopea yhteenveto, miten sähköisen tiliöintiviitteen osalta pitäisi jatkossa toimia.

Tulokset
Syyt käyttöönoton vähäisyydelle eivät ole yksiselitteisiä. Yritykset näkevät tiliöintiviitteen hyvänä investointina, mutta investoiminen vaatii resursseja ja yritysten täytyy myös samanaikaisesti tehdä priorisointia eri investointivaihtoehtojen väliltä. Lisäksi, tiliöintiviitteeseen liittyvät väittämät ovat useimmassa tapauksessa saaneet tämän tutkimuksen puitteissa ristiriitaisen vastaanoton, ja siten on oletettavaa, etteivät yritykset halua välttämättä investoida tälläiseen hankkeeseen, vaan valitsevat jonkin vähemmän ristiriitaisen investointikohteen. Yritysten vastausten perusteella käyttöönoton vähyys johtuu teknologian sopivuudesta johtuvista tekijöistä, ja tarkemmin sanottuna käytettävästä teknologiasta. Saadut tulokset myös viestivät parhaiden käytäntöjen tarpeellisuudesta laskunkäsittelyprosesseille. Tämän tukimuksen puutteista johtuen pitäisi kuitenkin toteuttaa laajempi tutkimus parhaiden käytäntöjen tarpeellisuudesta.

Avainsanat:　　　Sähköinen tiliöintiviite, sopivuus-toteuttamiskelpoisuusteoria, sähköinen laskutus, XML, EDI, TEAPPSXML, Finvoice

ACKNOWLEDGEMENTS

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TERMINOLOGY

3-corner model	=	Constructed by the buyer, the seller and an operator; the interoperability is totally managed by a single service provider and both the sender and the receiver must use the same system with the same standard
4-corner model	=	Constructed by the buyer, the seller and their own operators; the sender and receiver can utilize different systems and standards; if the standards differ from one another, the operators can translate the standards into a different format
AHSC	=	American Hospital Supply Corporation; developed the ASAP system that was completely controlled by AHSC
ANSI ASC X12	=	The official designation of the U.S. national standards body for the development and maintenance of Electronic Data Interchange (EDI) standards
ASAP	=	First IOS, developed by AHSC; proprietary by its nature
B2B	=	Abbreviation from business-to-business, typically used to describe commerce transactions between businesses
COBOL	=	One of the most known programming languages, abbreviated from "Common Business-Oriented Language"
DTD	=	Document type definition; assists in electronic document's elements and entities interpretation and display
E-invoice	=	Electronic invoice; an invoice sent or received in an electronic format

ebXML	= A modular suite of specifications that enables enterprises of any size and in any geographical location to conduct business over the Internet
EDI	= Electronic data interchange; structured transmission of data between organizations by electronic means; partially open IOS that operates in a 3-corner environment
UN/EDIFACT	= United Nations/Electronic Data Interchange For Administration, Commerce and Transport; the international Electronic Data Interchange (EDI) standard developed by the United Nations
Finvoice	= ebXML-based presentation method for e-invoices, developed by Finnish banks
Fit-Viability theory	= Originally introduced by Liang and Wei in 2004 to help to analyze why promising technologies fail and what factors contribute to such failure
HTML	= Abbreviation from Hyper Text Markup Language, basic language for Internet communication
IOS	= Abbreviation from Interorganizational systems; used to facilitate communications and coordination, mainly information flow, between organizations
IRR	= Abbreviation for "irrelevant". Utilized in the presentation of the questionnaire's results in this thesis
JAVA	= One of the most known programming languages
M-Commerce	= Short for Mobile Commerce, means the ability to conduct commerce using a mobile device

OASIS	= the Organization for the Advancement of Structured Information Standards
RTE	= Real-Time Economy program. RTE program was initiated by Tieto and Aalto University School of Economics to increase the efficiency of financial administration processes
SGML	= Standard Generalized Markup Language; an international text-processing standard
SME	= Small and medium-sized enterprises
TCP/IP	= Transmission Control Protocol / Internet Protocol; the set of communications protocols used for the Internet and other similar networks and named from two of the most important protocols in it
TDCC	= Transportation Data Coordinating Committee, developed EDI systems
TTF	= Task-technology fit theory; general idea is that IT is likely to impact individual performance positively and be used if the capabilities of the IT match the tasks that must be performed
TEAPPSXML	= A description that depicts invoices in a structured method, created by Tieto and Aditro
TIEKE	= the Finnish Information Society Development Centre
VAN	= Value-added network, formed when two or more companies want to communicate with each other, and by doing so, add value to their services or goods

VAT   = Value added tax; a form of consumption tax

XML   = eXtensible Markup Language; structured transmission of data between organizations by electronic means; Internet-based open IOS that operates in a 4-corner environment

1. Introduction

Interorganizational systems (IOS) are used to facilitate communications and coordination, i.e. information flow, between organizations (Ibrahim, 2004). These systems differ from internal, distributed information systems by allowing information to be sent across organizational boundaries (Johnston and Vitale, 1988). According to Ibrahim (2004), IOS have increased the efficiency and effectiveness of business transactions through this facilitation, whereas Johnston and Vitale (1988) argue that IOSs can bring significant competitive advantages, including lower costs, tighter links to customers and increased product differentiation.

One form of IOS is electronic invoicing, which is used by several organizations in Finland and growing in popularity (e.g. Nordea Bank, 2011). In electronic invoicing, invoices are sent in different electronic formats, such as XML and EDI, between companies that have the proper software in use. In the Finnish context, amongst XML-based invoices, two formats stand out in their adoption: Finvoice and TEAPPSXML (Pagero, 2011).

To further improve companies' process of handling electronic invoices, Penttinen (2010) has introduced the concept of electronic accounting reference for the XML-based electronic invoices. The electronic accounting reference itself is a chain of letters and numbers, which can be communicated on an electronic invoice or even on a paper invoice. Actually, the logic with the electronic accounting reference would be much the same as is with references in invoices targeted to consumers: based on the reference on the paid invoice, the company knows which person has paid which of his/her bills.

As the electronic accounting reference concept is rather new, and introduced only in the Finnish context due to the lack of widely standardized accounting practices, much research has not been conducted in this field of accounting automatization. However, despite the lack of supporting research, as well as research which does not support the introduction of electronic accounting reference, the related benefits make electronic accounting reference adoption an interesting research subject in the field of accounting. Actually, as the reference can be structured so that it includes various accounting dimensions, such as cost pool or project numbers, with a sophisticated enough accounting system invoice receivers

can automatically read the reference and spot the relevant information. This makes targeting the costs automatically to the right account possible, which, in turn, allows the disposal of unnecessary manual processing tasks.

Furthermore, as the electronic accounting reference would only be meaningful to the company processing the invoice, the companies sending invoices no longer need to allocate resources into understanding the buyer's accounting logic. If accounting references are not utilized, invoice senders typically must understand accounting processes of the receiver in order to construct the invoice in such format that it can be targeted to the right cost center and account at the receiver's end.

However, in case of regular paper invoices, the impact on the processing of invoices is less significant, as full potential of automation cannot be reached. This is because a company needs to use at least some manual labor for translating the invoices into electronic format or at least checking the end result if advanced scanner technology is utilized.

1.1 Research problem

As the electronic accounting reference technology has matured, it has gone through some changes. Previously, if companies utilized such reference, there was no specific field addressed for the reference. Thus, those companies wanting to use a reference often placed the reference in some field in their system, which was not reserved, or communicated the reference to the receiver with some other method. Furthermore, in Finvoice context, companies could utilize punctuation marks between numbers and letters, whereas in TEAPPSXML context such marks could not be used.

In order to address these issues, an update has been released for these XML-based formats. Through this update, a specific field, reserved completely for the accounting reference, was generated. Based on the desire to unify TEAPPSXML and Finvoice processes, the specifics related to the constructed field have been designed with both technologies' limitations in mind. Thus, due to this approach, the field is limited to 35 digits and allows no punctuation marks to be used. When the newest format of electronic accounting reference is later discussed in this thesis, the definition is based on this update and its characteristics.

Despite the improvement in the processing logic, unified approach and other later presented benefits, the introduction of the newest form of electronic accounting reference to the incoming invoice processing seems to have fallen short. This observation is based on researcher's personal experience on the issue through working for Penttinen and discussions held with him. Thus, companies either have not even introduced electronic accounting reference technologies to their electronic invoicing systems, or they are not willing to upgrade to the newest format. Additionally, if a company is utilizing electronic accounting references, it is more expectable that older versions of Finvoice and TEAPPSXML formats are in use.

Penttinen (2010) argues that there are two main reasons for the lack of adopting the electronic accounting reference. The first reason is that companies operating as buyers have not been able to establish a proper way for communicating the reference to the sellers. Thus, the sellers have not been effectively able to insert the reference to the invoice and in a way that the buyer desires. However, this reason does not explain why some companies that already use the electronic accounting reference technology have not upgraded their technology to its newest form. The second reason is that companies processing invoices have had technical challenges with the accounting reference's field's limitation to 35 digits. Additionally, companies have struggled with a lack of support by some financial administration software. Even though Penttinen (ibid.) has mentioned these reasons in his research, the actual findings have not been widely discussed and thus should need further examination before they can be generalized.

Thus, as no official research on the reasons hindering the adoption of electronic accounting reference has been conducted, this thesis attempts to fill this research gap and aims at extending previous knowledge on electronic accounting reference utilization. The focus of this thesis is also justified through the interests of the commissioner, Real-Time Economy program. The electronic accounting reference is originally a sub-project in the "Fully Integrated Accounting" project which is the third step of Real-Time Economy (RTE) program. RTE program was initiated by Tieto and Aalto University School of Economics to increase the efficiency of financial administration processes. The program started in 2006, and the initial focus was on electronic payments and electronic invoicing. In 2009, the focus of the program shifted into integrated accounting systems.

1.2 Research question and objectives

As Penttinen (2010) claims, electronic invoicing is currently a much discussed topic because of the time and cost benefits it can offer. Despite the possibility to further automate invoicing processing, the introduction of the electronic accounting reference to the incoming invoice processing, however, seems to have fallen short. Additionally, as no research has been conducted to depict the reasons behind the lack of adoption, this thesis aims to depict these reasons through the following research question:

- What reasons hinder the adoption of electronic accounting reference for incoming invoices in Finnish companies?

The focus of this thesis is thus in the incoming invoices and the systems established for processing them. The Finnish context was selected as the origins of research are in Finland. The scope was also limited to Finnish context, as the XML-based technologies vary amongst different countries, due to the different supported technologies and the lack of wider standardization.

In addition to the main research question, this thesis also aims to depict:

- Do companies have similar reasons for the lack of adoption?
- Is the lack of adoption explained with accounting reference-related or company-related issues?

Finding answers to these questions will assist in understanding the logic behind the lack of electronic accounting reference's adoption and possibly give guidelines how the adoption-issue should be resolved.

1.3 Research methodology

This thesis utilizes the Fit-Viability theory, first introduced by Liang and Wei in 2004, to depict reasons hindering the adoption of electronic accounting reference. The theory recognizes fit- and viability-related issues in adoption of technology. The fit-related issues analyze task-technology fit, i.e. the manner in which the technology meets its demands set

by the task that needs to be done. The viability-related issues, in turn, analyze organization's readiness to adopt the technology in question and are categorized as economic, organizational and IT infrastructure factors.

As this thesis is divided into theoretical part and an empirical part, the theory and analysis of electronic invoice and electronic accounting reference characteristics are utilized to construct a structured questionnaire for a comparative case study. The questionnaire is based on the Fit-Viability theory and is meant to support the claims of companies' representatives, when the results of held discussions are analyzed and compared. The fit-related contents of the questionnaire are based on the known benefits that the electronic accounting reference should establish and on the characteristics of electronic accounting reference technology. Furthermore, the viability related contents are based on the Fit-Viability theory presented in chapter 2. However, the viability elements have been revised to better meet the demands of this thesis, and thus discussions held with RTE's Esko Penttinen and Tieto's Harri Korhonen and Saila Toikka have affected the questionnaire from this part.

1.4 Scope

The constructed questionnaire is targeted to large companies in Finland that manage their own accounting. However, the narrow scope is justified as the idea here is to start depicting the elements hindering the adoption of electronic accounting reference from some level. The advantage with selecting large companies is that they can potentially impact other companies, such as their subcontractors and partners. If a change to current accounting process could be solidly justified, the change could actually start a snowball effect, starting from these large organizations and continuing through their suppliers and customers.

Thus, four large Finnish companies were targeted for this thesis and selected amongst the 50 largest companies from the Finnish Talouselämä-magazine's 500 largest companies list. In this list, Talouselämä (2011) listed the 500 largest Finnish companies based on their turnovers announced on the financial statements published on December 2010.

1.5 Findings

The reasons for the lack of adoption are not unambiguous. Companies do see electronic accounting reference as a good investment, but the implementation demands resources, and companies need to make prioritization decisions amongst different options. Furthermore, as the electronic accounting reference-related claims received mixed answers in most of the cases, using resources to introduce the electronic accounting reference alone, most likely does not seem as a beneficial investment compared to other, less ambivalent, investment options.

Furthermore, in the light of the research's other aims, companies do seem to have similar reasons for the lack of adoption. For example, some large companies have already implemented systems that carry out the tasks that the electronic accounting reference was designed to do. Even though these solutions may not be applicable to other companies, introducing the more unified practices-focused electronic accounting reference would create challenges for companies using their own systems, as their old processes would be changed and risks for errors, at least in the beginning, would be expected to increase. Companies' answers' calculated averages also suggest that the lack of adoption is explained with fit-related factors, and more specifically, technology-related factors.

Due to the aforementioned challenges, a broader research should be conducted. The new research should target both large companies and SMEs, and more specifically their current state with invoice processing-supporting systems and their opinions towards unified practices. If the companies using advanced systems are reluctant to implement the electronic accounting reference despite its benefits, but still agree with a majority of companies that unified practices are something worth striving for, companies' processes and systems should be further inspected in order to construct best practices for invoice handling. Additionally, The SMEs most likely will not have similar systems established, and, thus, their opinion regarding the electronic accounting reference most likely depends on the needed effort and resources. However, if the best practices could be constructed so that they could be made scalable for both large and smaller companies, the possible start-up investments would not become too large for smaller companies.

Additionally, this way the systems for smaller companies could be kept more easily understood, approached and implemented, but at the same time large companies could utilize the practices in a scale that may be broader, but meets their demands. Of course, the basics behind both of the protocols would still ensure efficient invoicing from a smaller system to a larger and vice versa. Thus, if needed, SMEs and larger companies could still operate together with the best practices protocol, and enjoying the benefits of a unified approach, but the smaller companies would not have to use as advanced and extensive systems and approaches as the bigger companies.

1.6 Structure of the thesis

This thesis comprises of seven chapters. This introductory chapter described the research problem, research question and objectives, methodology, scope and limitations of the thesis. In the second chapter, the Fit-Viability theory is presented. The chapter focuses on theory development, the characteristics of fit and viability, the manner in which fit and viability elements are constructed, and the reason for applying the theory to this thesis. The chapter also presents a framework for the a questionnaire, utilized in the empirical part of this thesis.

Chapter 3 deals with invoices, and especially invoice types, the process of sending e-invoices, different invoice formats, the process of processing incoming invoices and the benefits of electronic invoices. Chapter 3 also includes the more detailed inspection of electronic accounting reference, its benefits and why, despite the benefits, its adoption to the incoming invoice processing seems to have fallen short. The third chapter contributes to the fit-related elements applied in the questionnaire.

Chapter 4 addresses the case, starting with the considerations of suitability of the chosen case and questionnaire methodologies. The chapter also deals with the construction of the questionnaire. Chapter 5 presents the findings of the thesis, and chapter 6 discusses the findings in more detail. Finally, chapter 7 concludes the thesis with a research summary, states theoretical/practical implications, and limitations of the study, and makes suggestions for further research.

2. Fit-Viability theory

This chapter focuses on the Fit-Viability theory, which is utilized to construct a questionnaire for the empiric part of the thesis. Furthermore, with the help of the theory, companies' answers are further analyzed. This chapter discusses the theory in general, presents a framework often utilized alongside the theory, and focuses on the characteristics of the theory's both major elements.

2.1 The Fit-Viability theory

Fit-Viability Theory was originally introduced by Liang and Wei (2004) to help to analyze why promising technologies fail and what factors contribute to such failure. However, this instrument also provides useful guidelines for assessing the outcome of a new technology if it is brought to current organizational context (Liang et al., 2007). The theory consists of two different sections, fit-factors and viability-factors.

According to Venkatraman (1989), when deciding to utilize a specific concept of fit, two fundamental decisions need to be made. First, researchers have to choose the degree of specificity of the theoretical relationships amongst high and low degree. The degree of specificity thus indicates the level of precision in the functional form of fit. Second, the researchers have to either anchor the concept and possible tests of fit to a particular criterion or adopt a criterion-free specification. Venkatraman (ibid.) states that these two dimensions are best applied by employing them to identify six distinct perspectives of fit: moderation (criterion-specific, high degree of specificity, few variables in the equation), mediation (criterion-specific, medium degree of specificity, some variables in the equation), profile deviation (criterion-specific, low degree of specificity, many variables in the equation), matching (criterion-free, high degree of specificity, few variables in the equation), covariation (criterion-free, medium degree of specificity, some variables in the equation) or gestalts (criterion-free, low degree of specificity, many variables in the equation).

Even though Venkatraman (ibid.) views the issue in the light of strategic management, the logic and categorizations apply well to this research. Simply put, the moderation perspective, described by Venkatraman (ibid.), is utilized in situations where researchers

assert that an interaction between two variables exists, and that this interaction leads to a third variable. Thus, as Liang and Wei's (2004) fit measures technology's capability to succeed in the current organizational context in the demands set by a related task or tasks, this approach belongs to the moderation perspective. More specifically, as the criteria for measuring fit are identified based on task-technology fit theory, the task and technology are the variables, whose interaction leads to a specific level of fit.

Viability, in turn, measures organization's readiness to introduce the technology in question and it is analyzed through economic, organizational and IT infrastructure considerations (Liang et al., 2007). Even though the Fit-Viability theory has been mainly utilized in m-commerce, meaning the ability to conduct commerce using mobile technologies, the framework will be used in this thesis, as the goal of this thesis is to depict reasons for the electronic accounting reference's implementation to the incoming invoice processing falling short. Depicting these reasons is exactly what the theory was built to do.

2.2 The Fit-Viability Framework

In order to identify the factors affecting the success of technology and to develop guidelines for assessing its potential, a framework must be constructed (Liang and Wei, 2004). For measuring whether a technology is properly used, Tjan (2001) proposes the use of fit and viability dimensions in the evaluation of internet initiatives. In Tjan's (ibid.) research, fit measures the extent to which new network applications are consistent with the core competence, structure, value and culture of organization, whereas viability measures e.g. the extent to the value-added potential of new network applications, requirements of human resource and capital needs.

According to Tjan (2001, p.80), "by evaluating all Internet initiatives for viability and fit, a company can think practically and holistically about its digital portfolio". Companies can visually exercise such logic by placing each initiative of the portfolio on a simple matrix with fit as the horizontal axis and viability as the vertical axis (Liang et al., 2007). By dividing the matrix into four sections, company can roughly assess the best strategic decision for each initiative, thus, whether to invest in it, redesign it, sell it or spin it out, or kill it (Tjan, 2001). The matrix, adapted from Tjan (ibid.), is presented in figure 1.
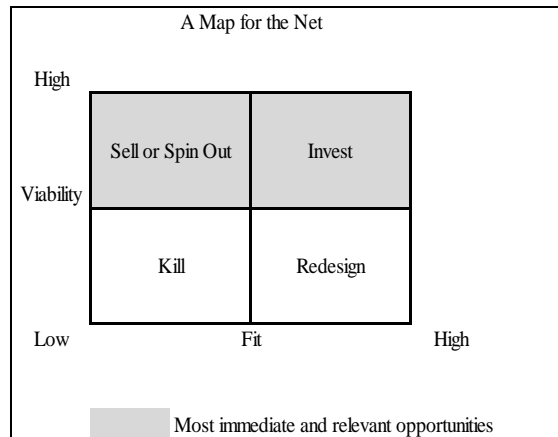
Figure 1: Original matrix for evaluating internet initiatives (Tjan, 2001)

Tjan (ibid.) argues that qualitative measures, such as alignment with core capabilities and organizational culture and values, will indicate overall fit-the likelihood of an investment working with a company's existing processes, capabilities, and culture, whereas quantitative measures, such as market-value potential and funding requirements, will help determine an investment's viability, or likely payoff.

With a similar ideology, Liang and Wei (2004) propose that these two dimensions could be adapted to construct a framework for m-commerce applications. Their research also simplifies the factors what fit and viability measure: fit measures the extent to which the capabilities of mobile technology meet the requirements, distinguished as mobility and reachability, of the task, and viability measures the extent to which the environment or organization are ready for such application, through economic costs and benefits, users' readiness to use, and the maturity of organizational infrastructure to support mobile technology (Liang et al., 2007).

Based on their research and Tjan's original matrix, Liang and Wei (2004) present an adjusted matrix for assessing m-commerce applications. In the new matrix, the four fields are: good target, organizational restructuring, find alternative technology, and forget it. This adjusted matrix, adapted from Liang and Wei (ibid.), is presented in figure 2.

Liang and Wei (2004) state that the targeted applications, or technologies in this case, should be the ones having a good fit between task and technology, and strong viability within the organization in order to succeed. For applications with good fit but poor

organizational viability, organizations, or person conducting the research, may examine whether organizational restructuring would help enhance the viability before implementation, whereas for low-fit applications, the organization should find technology that is viable in the organization, rather than making hasty decisions (Liang and Wei, ibid.).
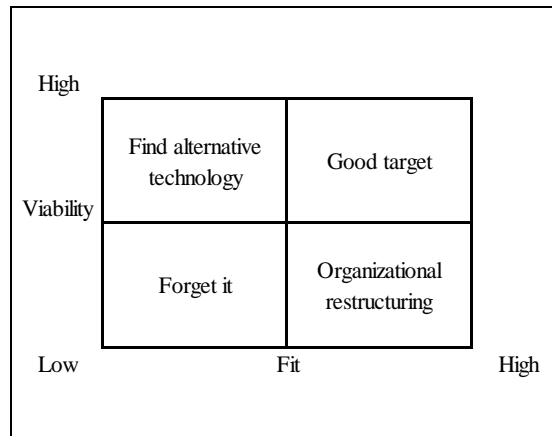
Figure 2: The adjusted matrix for assessing m-commerce applications (Liang and Wei, 2004)

2.3 Task-Technology fit

The first dimension in the framework is the fit between technology and the task. Task-technology fit (TTF) theory holds that IT is likely to impact individual performance positively and be used if the capabilities of the IT match the tasks that must be performed (Goodhue and Thompson, 1995). Here, technologies are the tools used in carrying out tasks. According to Goodhue and Thompson (ibid.), in information systems research, technology refers to computer systems, such as hardware, software, and data, as well as to user support services, such as training and help lines, provided to assist users in their tasks. Tasks, in turn, are defined as the actions carried out by individuals in turning inputs into outputs. Goodhue and Thompson (ibid.) state that the focus should be on task characteristics that might move a user to rely more heavily on IT.

Thus, TTF is the degree to which a technology assists it's user in performing tasks. More specifically, TTF is the correspondence between task requirements, individual abilities, and the functionality of the technology (Goodhue and Thompson, 1995), which together

lead to better performance. Liang et al. (2007) argue, however, that a more objective assessment of the match between task and technology can be reached by leaving the considerations regarding individual abilities out. Thus, in the Fit-Viability theory, fit only considers the nature of technology and the requirements of task itself, whereas individual factors are considered to be part of the organizational viability.

2.4 Viability

Viability is the other dimension alongside fit that must be taken into consideration. Viability assesses the fit between a technology and its associated users, as a task that is suitable for one organization may not be appropriate for another (Liang and Wei, 2004). Thus, viability refers to the extent to which the infrastructure of the organization is ready for the application (Liang et al., 2007). A viability assessment includes three aspects: economic, organizational, and societal (Liang and Wei, 2004).

The economic assessment determines whether a particular application is cost-beneficial, which includes, whether or not this assessment reduces the user's transaction cost, and hence leads to competitive advantages, and whether it provides an acceptable return on investment (Liang and Wei, 2004). From the transaction cost aspect, reducing transaction cost can increase customer's willingness to use a technology (Liang et al., 2007). Transaction costs include monitoring and coordination costs in a business process and major factors affecting these transaction costs are transaction frequency, uncertainty, and asset specificity (Liang and Wei, 2004). According to Liang et al. (2007), a high-transaction frequency can reduce transaction costs and hence increasing the usage of specific asset, whereas uncertainty will increase transaction costs due to high risks. Liang et al. (ibid.) also clarify that asset specificity covers five aspects, including human resource asset, location, physical asset, time and brand asset.

The organizational aspect primarily focuses on the user's willingness and ability to use the technology (Liang and Wei, 2004). However, Liang et al. (2007) argue that existing literature has identified additional factors belonging to this category, such as top management support and cognition, IS literacy of project team member, user's personality and past experiences, user satisfaction, usability and usage of the system and user

satisfaction. Based on their research, Liang et al. (ibid.) sum up that user satisfaction and system usage are the two common criteria for evaluating the performance, or success, of IS implementation. However, according to Liang et al. (ibid.), organizational factors should include process reengineering, and employee and top management support elements.

As Liang and Wei (2004) define the societal aspect to cover technology's implementation's general environment's maturity, it is more suitable to discuss this aspect as IT infrastructure-related factors. Actually, Liang et al. (2007) have restructured the aspects related to viability into economic, organizational and IT infrastructure related factors. However, as can be seen from the definition of organizational factors in this context, its categorization actually includes several personnel-related, e.g. societal, considerations. Thus, according to Liang et al. (2007), IT infrastructure of an organization has to include computing, information management and communication platforms, as IT infrastructure has to provide the necessary foundation to support technological operation, and enhance business development. IT infrastructure should also be measured by software and hardware maturity, data management and the competency of the IS staff.

2.5 Summary of the theory

Even though Liang et al. (ibid.) also provide system usage and user satisfaction tools for measuring the performance of adopting a technology to an organization, the overall performance of adoption is not included in this thesis, as the thesis is based on the assumption that introduction of the electronic accounting reference has fallen short, and thus its performance cannot be measured. Therefore, performance-related measurements aren't needed as far as this thesis is concerned, but could, instead, be implemented in other research if the electronic accounting reference becomes more widely adopted.

It can be concluded that the Fit-Viability questionnaire should cover separate task and technology assessments, when assessing fit. When it comes to viability, the theory suggests that the elements should be divided into economic, organizational and IT infrastructure sections. Economic considerations included cost analysis, risk assessments, human resources, and location, physical asset, time and brand asset considerations. In turn, organizational considerations should include process re-engineering factors, and employee

and management support factors. Finally, IT infrastructure factors should include software and hardware maturity, data management and the competency of the IS staff. Figure 3 summarizes the aforementioned categories.

Fit-related considerations	Viability-related considerations
Task - Measurements related to technology's capability to succeed in the current organizational context	**Economic** - Cost analysis considerations - Risk assessments considerations - Human resources considerations - Location considerations - Physical asset considerations - Time considerations - Brand asset considerations
Technology - Measurements related to organization's readiness to introduce a technology	**Organizational** - Process re-engineering factors - Employee and management support factors
	IT infrastructure - Software and hardware maturity - Data management - Competency of the IS staff

Figure 3: Fit-Viability questionnaire elements as proposed by theory

In the next chapter, the actual elements for fit assessments in electronic accounting reference context are depicted. Thus, the technologies through which the electronic accounting reference can be communicated are presented, as well as the electronic invoicing process, different invoice types, and electronic invoicing benefits. Furthermore, the chapter discusses the electronic accounting reference in more detail and presents its benefits. The chapter then concludes with the discussion why electronic accounting reference should be studied further in the academic field and why the topic of this thesis is justified.

3. Electronic invoicing and accounting reference

As the focus of this chapter is electronic invoicing and the electronic accounting reference, it is necessary to first define the concept of invoice and different invoice types before focusing on other issues. After the basic concepts have been presented, the most popular technologies, EDI and XML, are discussed, before the chapter continues with the discussion of XML-standard formats, the process of handling e-invoices and the benefits of e-invoices. Finally, the chapter concludes with detailed description of electronic accounting reference, its benefits and why additional research, such as this thesis, should still be conducted.

3.1 The definition of an invoice

An invoice is a document issued by a seller to the buyer that indicates that the buyer must pay the seller within a certain amount of days according to agreed or set paying terms. From sellers viewpoint the invoice is a sales invoice, whereas the buyer sees the invoice as a purchase invoice. An invoice states the products or services, their prices and amounts that have been provided by the seller to the buyer.

The following definition for invoice and its contents are extracted from Finnish Tax Administration (2003), which defines an invoice as a voucher or announcement that fulfills demand set to it by value added tax (VAT) legislation. An invoice can be delivered in either paper or, if the recipient has approved it, in electronic format. A collective invoice can also be addressed if several products or services are involved to the transaction, and an invoice can also construct from several separate documents. All such vouchers and announcements that include a change or reference to the original invoice are also viewed as invoices.

The VAT legislation states the mandatory information that has to be included in an invoice. The information includes e.g.:

- The date the invoice is issued
- Invoice identifier
- Seller's business identity code

- Seller's and buyer's names and addresses

- Quantity and nature of products, as well as broadness and nature of services

- Date of delivery for products, date of carrying out services or date of pre-payment

- Basis for taxes, price per unit without taxes, refunds and discounts

- Tax rate

- Tax payable

- Reference to the previous invoice if the new invoice includes changes to it

Now that the concept of an invoice has been generally described, the implementation of an invoice in the electronic context is discussed next.

3.2 Electronic invoicing

An electronic invoice, or e-invoice, is an invoice sent or received in an electronic format. In B2B e-invoicing, the invoice information is collected from the invoice issuer's invoicing system and sent to the recipient's financial administration IT system. Structured data format makes it possible to automatically feed the invoicing data into companies IT systems. This removes the need to save data manually. According to Itella Information (2011), an e-invoice has all the same information as a paper invoice, but due to the electronic format, all data is easily and automatically in the use of information systems. E-invoice's information can also be presented both in data format and as an electronic picture, which resembles the look of a paper invoice.

TIEKE (2011), the Finnish Information Society Development Centre, defines an electronic invoice as "modern, reliable, secure, cost-efficient and practically paperless method of handling and processing invoices for goods, services and other expenses". According to Itella Information (2011), receiving e-invoices also means cost savings for organizations, as it removes unnecessary work phases, improves the handling of invoices and even halves the invoice handling costs.

According to both TIEKE (2011) and Itella Information (2011), electronic invoicing (e-invoicing) suits both large and small companies, as well as private persons. Actually, as several users take on electronic invoicing, the benefits increase, making e-invoicing a

typical example of technology that enjoys major network effects. According to Itella Information (ibid.), an e-invoice is an especially good invoicing method in cases where organizations have several customers and the invoicing is based on contracts between the sender and receiver. TIEKE (ibid.) also sees electronic invoicing as a significant step towards the wider use of electronic business and spreading knowledge of it.

Note that as automation of invoicing processes, a major potential advantage in e-invoicing through electronic accounting reference, requires that invoice data is sent in a structured format (Penttinen, 2010), invoices that are sent as attachments, such as PDFs, in e-mails are not considered as electronic invoices.

3.3 Different invoice types

The following categorizations and definitions of invoices are based on Penttinen (2010). The presented categories are order-based invoices, contract-based invoices and non-order-based invoices. Categorization is important, as, according to Penttinen (ibid.), the invoice type defines the way how the accounting information is typically processed.

Order-based invoices

In order-based invoicing, the buyer places an order to the supplier electronically. The information related to this order is also saved to the buyer's ERP system. Generally, the buyer and seller also agree on some terms, which include e.g.: product/service to be purchased, delivery-related information, payment methods, terms of payment, and other invoice information, which help the buyer in targeting the cost to the right entity, such as address, reference information, contact persons and account information.

Contract-based invoices

Contract-based invoicing refers to invoices that are contractual in their nature and recurrent, thus charged monthly or yearly. These invoices typically include a small set of alternative row item identifiers and large amounts of row items, as purchasing companies want to separate the total cost into more specific information. An example of such invoice could, thus, be related to telecom services, which are then divided into e.g. phone and internet invoices with the help of row item identifiers, and then further separated into

singular rows. This separation for telephone subscriptions on the row level could, for example, be made with listing phone numbers in question alongside costs per each subscription.

Non-order-based invoices

The final category of invoices contains all other than order- or contract-based invoices. These invoices can further be categorized into one-time purchases, credit card invoices, and invoices that are created by the buyer.

One-time occasional purchases

One-time occasional purchases are spontaneous purchases of goods and services that are not registered to the ERP system as they are made. Examples of such purchases can be last-minute purchases to a conference or irregular purchases from web stores.

Credit card invoices

Credit card invoices are typically related to company credit cards, which are used to make various purchases by company's employees. Actually, these invoices often cause unnecessary manual work in the processing of the incoming credit card invoice. Additionally, targeting the credit card purchases to an exact account is challenging, in terms of automation, as credit card purchases cannot be separated into different categories that companies would like to separate them when purchases are made. Thus, same invoice can contain flight and gasoline purchases, and the only possible way to target these costs to right accounts is to manually go through each person's invoices and target costs based on the location information found from the invoice. This separation gets even more challenging, however, if, for example, gasoline and food is purchased from a gas station simultaneously with the same credit card. In such situations, separation is almost impossible if original receipts are not delivered to accounting. Such request, would then, however, result in even more manual work, not to mention the burden of saving the original receipts when making a credit card purchase.

Self-Billing

In self-billing, the buyer issues the invoice to himself and sends a copy of the invoice to the supplier with the payment. Such situations are common amongst tasks where the seller does not know the value of the good or services he or she is providing. Such an example can be found from recycling material business, where a company collects recyclable goods from, say, electronic goods reseller, estimates the value of the goods once put into pieces at its location, and then compensates the reseller from recyclable material, spare and valued parts.

3.4 E-invoice technologies

The process of sending e-invoices in Finland is mostly built around two interorganizational systems (IOS). Amongst these systems, the newer is Extensible Markup Language (XML) and the older is Electronical Data Interchange(EDI). The next discussed development phases and characteristics of EDI and XML solutions are based on Zhu et al. (2006), if not stated otherwise, and are described next.

3.4.1 History and characteristics of E-invoice technologies

IOS standards are a set of technical specifications that are agreed upon and used by interorganizational systems (IOS) developers to describe data formats and communication protocols, which enable computer-to-computer communications. These standards, or systems, differ with respect to the process of their development and scope of availability. The IOS have developed from proprietary to open systems in the course of time. There are three known development phases of the IOS, mainly proprietary, partially open, and open-standard systems. If a standard is developed and then available only to a closed set of users that require a private communication platform, such standard is described as a proprietary one. However, a standard developed by an open community using public communications platforms and software is considered as an open one. Based on this, open-standard IOS systems differ from earlier developed proprietary IOS such as the ASAP and relatively less open EDI systems. The three different "development phases" are presented in figure 4 (adapted from Zhu et al., 2006).

Each of these systems contain a content platform, a delivery platform and a trading partner base, which determine how open a system in question is. A content platform is a computerized system that translates private corporate data, mainly not-understandable numbers and letters, into a standardized format, which is recognized by the interorganizational system. Once the data has been standardized, it is transported with a delivery platform, which is a physical network used for data transmission. Finally, data is delivered to the relevant partners, who are in the trading partner base.

According to Zhu et al. (2006), the development of IOS started with the ASAP system. ASAP was developed by the American Hospital Supply Corporation (AHSC) for the healthcare industry. It enabled hospitals to order supplies with their own computers that were linked to AHSC's mainframes via a telephone network. However, the access and events in the network were completely controlled by AHSC, making ASAP a proprietary system. As the arrangement was highly customized and hospitals could only communicate with the AHSC, the system "locked" adopters resulting in a dedicated relationship.
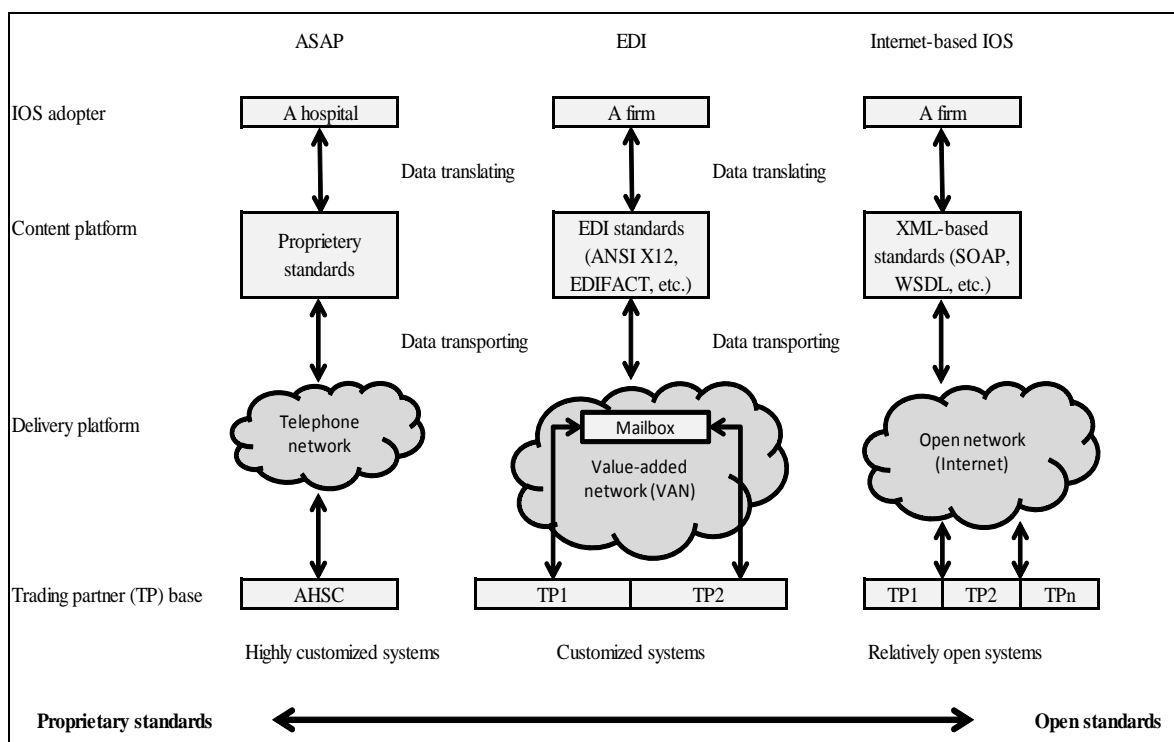
Figure 4: Move from proprietary to open standards (Zhu et al., 2006)

The next phase after ASAP was EDI, which differs from ASAP in communication protocols and data standards. EDI systems were developed in the early 1970's (Hsieh and Lin, 2004) when the transportation industry formed the Transportation Data Coordinating Committee (TDCC). The two most used EDI standards are ANSI ASC X12 and UN/EDIFACT, which are more open in their nature, compared to previous, individually made and supplier centered, standards.

EDI is delivered via private value-added network (VAN). A VAN is formed when two or more companies want to communicate with each other, and by doing so, add value to their services or goods (Ince, 2001). Thus, VAN's value increases as the number of its users increases. Even though EDI's content platform supports communication with a several companies in the trading partner base, but as the delivery platform is a privately owned VAN, where each adopter subscribes to a VAN mailbox and exchanges their messages with other adopters, EDI can only be described as partially open system.

The environment, where EDI-using companies operate, is referred to as the three-corner (3-corner) model. The participants of this model are the buyer, the seller and an operator between them. In the 3-corner model, the interoperability is totally managed by a single service provider. In such setting, different EDI standards amongst buyer and seller are not compatible, and thus both the sender and receiver must use the same system with the same standard. The model, adapted from the Commission of the European Communities, Expert Group on electronic invoicing (2009), is defined as presented in figure 5.
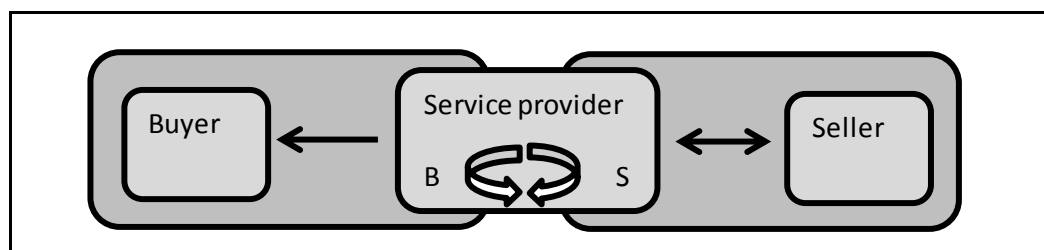
Figure 5: 3-corner model (The Commission of the European Communities, Expert Group on electronic invoicing, 2009)

Despite argued benefits with EDI (e.g. Hsieh & Lin, 2004 and Pfeiffer, 1992), users are concerned that some of these VANs charge additional feeds for inter-network connections,

and many of the networks are not interoperable with other ones. Additionally, EDI messages are composed of rigid and complex structures in order to maximize the efficiency of information exchange. However, this maximization of efficiency has, especially the early years of EDI, been important, when communications costs were much higher than nowadays.

Due to these mentioned characteristics, EDI standards are characterized by a complex, hard-to-learn format. Actually, according to Banerjee and Golhar (1994) and Zhu et al. (2006), the trading base is typically rather narrow and limited to large firms, mostly because of EDI's high degree of complexity and expensive set up (Hopeman et al., 2000). According to Banerjee and Golhar (1994), companies need to have several transactions to make EDI investments feasible. Actually, according to Nurmilaakso and Kotinurmi (2004), many SMEs use EDI only because their larger partners require its use. These characteristics mean that detailed technical negotiations based on the particular rigid standards need to be conducted when implementing EDI with new partners. This, in turn, often leads to high degrees of partner specific customization. Additionally, many of EDI's advantages also apply for next discussed XML-based formats.

Finally, according to Zhu et al. (2006), the most recent development phase after EDI is Internet-based IOS, which utilizes XML. XML is the effective standard for generating markup languages over the Internet, and several standards related to it have been highly accepted amongst a multitude of organizations. Here, the delivery platform is the Internet, thus characterizing these systems by openness of both the content and delivery platforms. These characteristics make Internet-based IOS substantially more open than EDI-based systems.

Next, XML's characteristics are discussed in more detail, as the technology is the backbone for later discussed electronic accounting reference. This discussion is followed by the presentation of the two most common XML-based standards in Finland.

3.4.2 The XML technology in detail

XML, or eXtensible Markup Language, was developed in the mid-1990s because of recognized limitations of the basic language for Internet communication, Hyper Text

Markup Language (HTML) (Power, 2005). XML was derived from Standard Generalized Markup Language (SGML), an international, but complex (Rezaee and Hoffman, 2001) text-processing standard (Nurmilaakso and Kotinurmi, 2004), and whereas traditional EDI integration is often implemented with older programming languages such as COBOL, over the previously mentioned tailor-made connection (VAN), XML usually uses Java over the Internet. According to Hsieh and Lin (2004), in XML, similar to HTML, authors use elements bracketed by open and close tags, but unlike in HTML, XML authors are not stuck with a fixed set of elements and entities, but can actually create their own ones. As XML runs over a TCP/IP based protocol, it can be used in every TCP/IP based network, such as the Internet (Vanderbist, 2002).

The following description further clarifies the definition of XML:" . . . [XML is] an industry standard designed to provide a structured mechanism for sharing and understanding business content [allowing] . . . an application to recognize a document type, individual data fields, and specific data located within a document. XML-enabled applications can parse data from a supplier's web site, interpret the data, and initiate the appropriate response or business transaction" (A.T. Kearney, 2000, p. 13; in Power, 2005).

Hsieh and Lin (2004) elaborate this definition further by defining XML as a method for defining structure in documents. According to Hsieh and Lin (ibid.), XML's philosophy is that the information of a document can be identified through a set of rules, with which a variety of software applications, such as Web browsers, can interpret, display or process data in these documents. Furthermore, when documents are written in XML, they cannot be displayed in a Web browser without an identified document type definition (DTD). With a DTD, the document's elements and entities can be interpreted and displayed according to the behavior of a parser and the user's client software. Through a style sheet the user can then define the look and feel of how the software displays the document.

In contrast to EDI, in XML setting companies operate in a four-corner (4-corner) model setting. Here, both the sender and receiver can have different operators. According to the Commission of the European Communities, Expert Group on electronic invoicing (2009), the sender and receiver can utilize different XML standards, which are, if necessary, translated by their operators. Actually, according to Tieto's Harri Korhonen (30.9.2011), in

Finland, most communications between operators are managed through TEAPPSXML standard, whereas the communications between sender and its operator and receiver and its operator are arranged around the operator's client's wishes.

Pan-European Public Procurement Online's (2011) adopted 4-corner model is constructed as presented in figure 6.
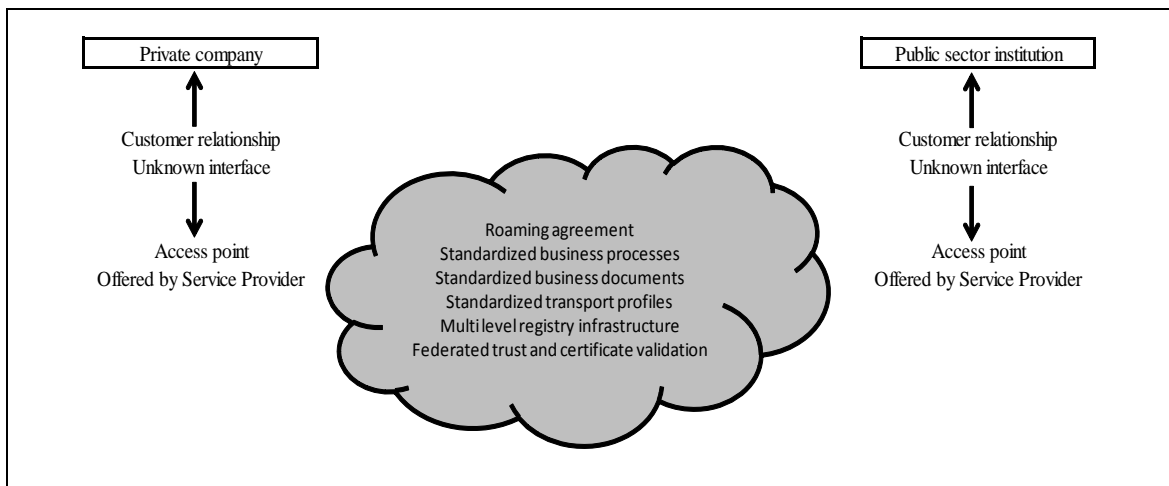
Figure 6: 4-corner model (Pan-European Public Procurement Online, 2011)

Note that in the setting presented above, other participant in the transaction is a public sector institution, but it could very well be another private company. The 4-corner model thus differs from the 3-corner model in that in 3-corner model the participating companies must sign a contract with the same service provider in order to construct a network, thus the number of contracts needed is equal to that of operators. In a 4-corner model, a participant needs only one service provider to become part of a network where every company that has taken same actions belongs. Thus, the 4-corner setting is more service provider-driven.

When it comes to the benefits of XML, Power (2005), claims that XML offers a flexible standard for the exchange of information between trading partners via the Internet, therefore establishing the exchange of rich information at a comparatively low cost. Furthermore, compared to HTML, XML adds meaning and semantics to text, taking it beyond mere formatting and thus allowing the content, rather than only the code, to be understood by a computer. Power (ibid.) also sees XML as scalable, without the need of

large modification, and much more approachable by non- specialist workers. Hopeman et al. (2000) also elaborate, that XML messages contain a lot of metadata, which makes these messages easy to read and debug.

According to Nurmilaakso & Kotinurmi (2004), the main problem with XML is that the arrival of new versions of used specifications and new standards can complicate organizations' selection of technologies, causing an overall slowdown in the adoption process. Another problem that exists with evolving technologies, such as XML, is the need to support many versions and different technologies, resulting in more costs. Actually, according to Nurmilaakso & Kotinurmi (ibid.), the multiple different frameworks that utilize XML have caused a problem of interoperability, starting from a lack of common vocabulary for terms used in business documents. Therefore, the use of XML to standardize business processes is still unproven, in comparison to EDI. Additionally, due to XML's easy-to-learn nature and low costs, it does not lock-in its users as well as EDI.

However, as Zhu et al. (2006) sum up, XML-based, open standards more likely facilitate cross-industry coordination, as XML standards are self-describing with flexible, easy-to-learn formats. XML is also much more scalable than EDI and requires significantly less specialist knowledge to operate. Additionally, XML requires less customization, a key feature of internet-based IOS that enables a broader trading partner base. Hopeman et al. (2000) also argue, that XML's set-up and accrued costs can be 20 times less than the costs of EDI.

XML, Internet-based interorganizational systems are also transmitted via the TCP/IP open standard protocol, a unified network-addressing scheme, meaning that these systems are globally interoperable and not limited to a certain group or organizations. Compared to EDI systems, communication costs are also much lower, making XML much more suitable for small and medium-sized firms. Additionally, as XML's network grows, the opportunity costs of joining the network decrease. This makes the network more attractive to the outside companies. Actually, due to its characteristics, Rezaee and Hoffman (2001) have described XML to be critical for the success of e-business.

Even though, XML and EDI could be seen as rival formats, Itella Information (2011) claims that Internet- and EDI-based invoicing should be seen as supporting methods of invoicing, as they are meant for different situations. According to Itella Information (ibid.), internet-based invoicing is suitable for regular and contract-based expense, goods or purchasing invoices, whereas EDI-invoicing is meant for situations where customization and close connections between the two parties are needed.

3.5 XML-standard formats

The previously presented XML is also a base for several e-invoicing standards (Zhu et al., 2006), such as the popular Finvoice and TEAPPSXML in Finnish context. The Finvoice format has been developed by Finnish banks, whereas TEAPPSXML was created by Tieto and Aditro. Both messaging formats are basically just invoice visualization formats that do not significantly differ from one another. The formats are introduced next.

3.5.1 Finvoice

According to The Federation of Finnish Financial Services (2007), Finvoice format is an ebXML-based presentation method for e-invoices and has been developed by Finnish banks. ebXML, or electronic business using XML, was started in 1999 as an initiative of OASIS and the United Nations/ECE agency CEFACT. OASIS, the Organization for the Advancement of Structured Information Standards) is a not-for-profit, international consortium that drives the development, convergence, and adoption of e-business standards and according to its Director of Communications Carol Geyer (2006), ebXML is a modular suite of specifications for business processes, core data components, collaboration protocol agreements, messaging and registries and repositories that enables enterprises of any size and in any geographical location to conduct business over the Internet. Using ebXML, companies have a standard method to exchange business messages, conduct trading relationships, communicate data in common terms and define and register business processes.

The Finvoice format itself is suitable for all size companies and can be presented both in application-understandable and human-understandable formats. This is established through the utilization of XML. Furthermore, Finvoice is typically used in such context where the

seller and buyer establish their invoicing connection through one bank or through their own banks. In such context the format of invoice does not need any conversion to different systems, but stays the same and is delivered between buyer and seller with the help of a bank or banks. Even though direct attachments cannot be linked with Finvoice messages, additional links to different web-pages can be attached to them.

3.5.2 TEAPPSXML

As mentioned previously, TEAPPSXML was created by Tieto and Aditro. According to Tieto (2011a), TEAPPSXML description depicts invoices in a structured method, just like Finvoice does. According to Tieto (2011b), TEAPPSXML has proven to be capable to provide a general invoice message description that is suitable for all types of invoices. According to Tieto (ibid.), TEAPPSXML also regards the needs of business processes, economic steering and economic administration when message description is concerned.

Even though TEAPPSXML is not ebXML-based, it does, according to Harri Korhonen (30.9.2011) allow a broader and more specific description of information on an invoice than Finvoice . Actually, according to Korhonen (ibid.), at the moment all e-invoice operators can both send and receive both TEAPPSXML and Finvoice messages, but typically TEAPPSXML is favored, especially in messaging between sender's and receiver's operators. This is due to the description benefits and the possibility to send PDF-attachments with TEAPPSXML.

3.6 The process of handling incoming invoices

According to Penttinen (2010), a typical B2B invoicing process begins with the arrival of the invoice to the buyer organization (see figure 7). Once arrived, the accounts payable clerk ensures that the received document is actually an invoice. The invoice is then forwarded for approval to the person responsible for that specific invoice, thus typically to the person who has placed the order.

According to Penttinen (ibid.), if a related purchase order can be found from company's ERP system, the invoice has to be matched with it, in order to make sure that the amount charged has not changed along the way. If the purchase order and price match, the

responsible person approves the invoice by signing it off. Once approved, the invoice is posted into the accounting system with the information such as cost pool information, project number, VAT code, general ledger account number etc. Finally, the invoice can be paid. The following figure (adapted from Penttinen, 2010) illustrates the whole described process.

Penttinen (ibid.) elaborates that, with the help of technology, it has long been possible to do the content approval step electronically. However, the most common method of exchanging invoices between buyers and sellers is still the paper format. Even though companies use scanning procedures to collect relevant data from paper invoices and converting the data into text-searchable format, this process is far from full automation. Scanning also has its challenges when paper invoices vary in their look. This challenge and the need of manual labor can also result in errors in the scanning process, meaning that each scanning result must be checked and possibly corrected. This spends time and money, as the types of scanners that are used are also quite expensive (Penttinen, 2010).
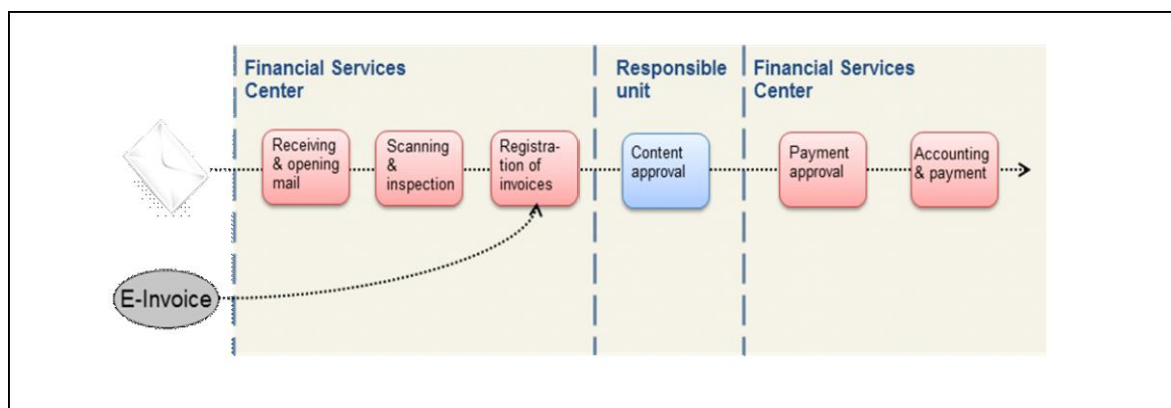
Figure 7: Incoming invoice processing (Penttinen, 2010)

To improve the invoicing process, the best option is electronic invoicing. E-invoicing eliminates the manual processes normally done before the content approval, improving the workflow in the handling department and also decreasing the errors that can occur during manual steps (Penttinen, 2010). Actually, although exact figures are not available, according to many studies e-invoices are increasing rapidly (e.g. Koch, 2011).

Previously, the most common method of sending invoice data electronically, was EDI-invoicing, a mailbox-based system, created typically for the needs of the sending and receiving organizations. As Itella Information (2011) clarifies, organizations can nowadays also send e-invoices to one another via Internet, through mediation networks. This can only be established if both the sender and receiver have purchased e-invoicing sending and receiving services from a service provider. The e-invoicing service providers, who more often work as operators between the sender and receiver, and the banks, more often enjoying the role of an intermediate, handle the set-up, maintenance, monitoring and backups for the network connections. The operators can actually convert e-invoice messages from a format to another, if the invoicing systems differ in senders' and receivers' end. The intermediates, however, don't convert messages if needed, which has resulted in additional costs for organizations needing to purchase the services of an operator instead of an intermediate.

According to TIEKE (2009), banks do not, for example, deliver a visual format of the invoice nor attachments, alongside electronic invoice data, all of which can be provided by an operator. Actually, attachments cause receivers extra work in all kinds of invoicing. This is why the e-invoicing system has been developed to such a good state in terms of functionality that attachments should not be needed necessarily. Also, in this context it should be mentioned that sending invoice information as attachment is not considered as an electronic invoice. Thus, sending invoice information via e-mail is not e-invoicing but sending data in a structured format is.

Despite the differences between operators and intermediacies, TIEKE (ibid.) clarifies that banks and e-invoicing service providers have agreed upon basic procedures that enable these invoices to be sent and received reliably in a common trunk network, meaning that the invoicing traffic between the sender and receiver is conveyed in a uniform manner even if the parties use the services of different e-invoicing service providers.

According to TIEKE (ibid.), as an e-invoice can graphically be presented similar as an invoice printed on a paper, invoice archiving, distribution and approval procedures can be facilitated by using the e-invoice. Actually, as a transmitter of electronic invoices, the e-invoicing service provider corresponds to the Post Office so the transferred data enjoys the

same privacy and protection as conventional mail. Additionally, many Nordic companies already use electronic archives, as e-invoicing is supported by EU-legislation and the legislation in Scandinavia imposes no hindrances on archiving electronic documents or utilizing e-invoice.

3.7 E-invoicing benefits

By now, it has been established that e-invoicing has several benefits. This section sums these benefits and uses the categorization of Penttinen (2010), thus financial, environmental and efficiency-related benefits.

Financial aspect

According to the estimations of The Finnish State Treasury and some Finnish companies (Penttinen and Hyytiäinen, 2008), an incoming paper invoice incurs costs of approximately 30-50€ on the receiving side. With electronic invoicing, costs can be cut by up to 80%. The Confederation of Finnish industries have estimated that this digitalization of B2B invoices alone could amount to 2.7 billion Euro savings (Penttinen, 2008).

Environmental aspect

The environmental aspect has become more and more important due to the increasing focus on corporate social responsibility. Estimated to over 29 billion letters annually, removing Europe's volume of bills would result in savings of 400,000 tons of paper, 12 million trees, 2,700 tons of ink, 165 million liters of diesel and 1,350 GWh of energy (Penttinen & Hyytiäinen, 2008).

Efficiency aspect

A more real-life case perspective on efficiency is described next. The following figure (Penttinen, 2008) presents the handling and processing of an incoming invoice in a micro level company.

The needed time and costs for each phase are depicted below the description of each step in figure 8. Here, the manual process is clearly the slowest and most expensive compared to other solutions. Penttinen (2008) argues that even a semi-automated process would

result in cost-savings, but clearly the most efficient process is the fully automated one. It is 14 times faster than a fully manual process and the costs are over eight times less (Penttinen, 2008).
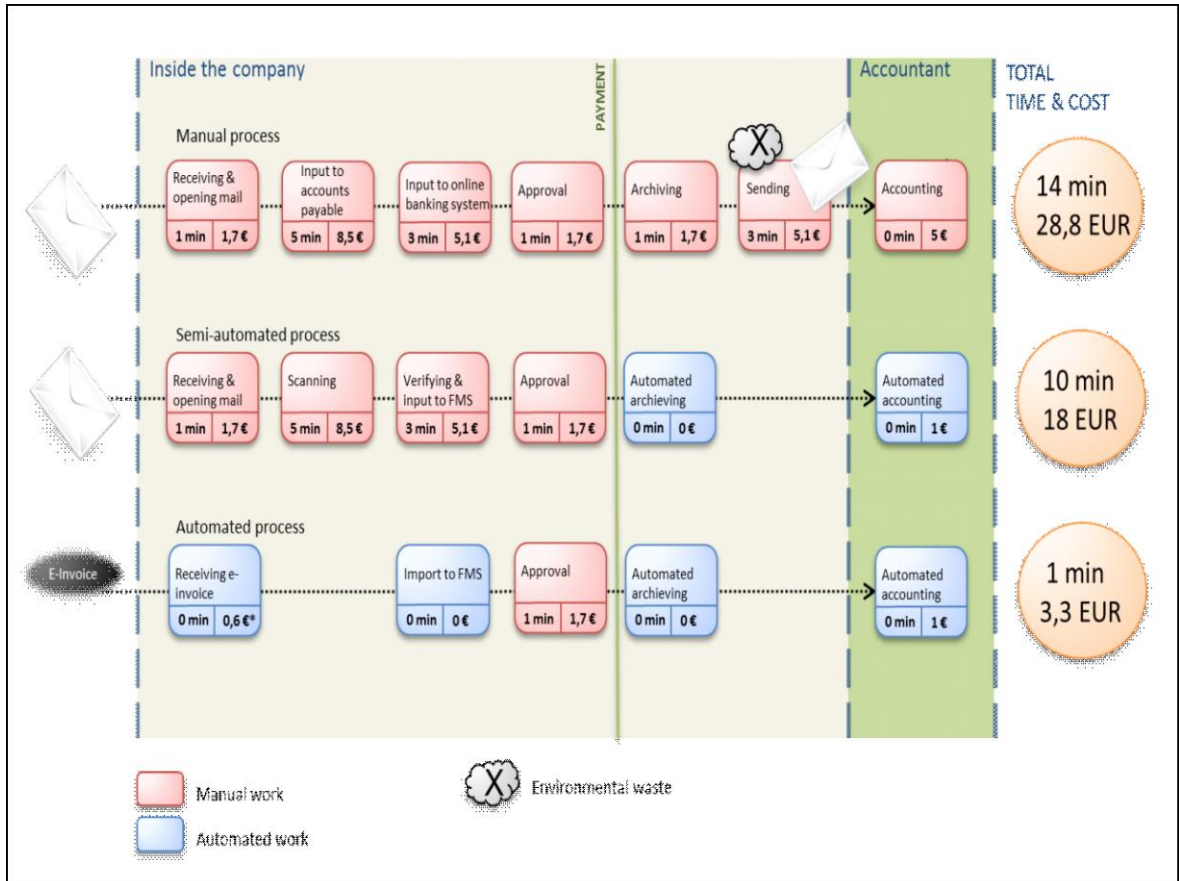
Figure 8: Handling of incoming invoice at micro level company (Penttinen, 2008)

As is described by Itella Information (2011), from the sender's point-of-view, e-invoicing makes the handling of invoices clearly more efficient. Manual processing is decreased, which helps companies to focus on other customer service. In addition, the sending expenses are decreased and the invoices reach buyers faster than ever before. E-invoicing also makes it possible to introduce electronic invoicing archives to companies.

According to Itella Information (2011), the receivers also receive several benefits from e-invoicing. Feeding the invoices in to the system no longer takes up manual labor that consumes time, effort and money. Scanning processes can also be stopped, as invoices can now be presented as an electronic picture, looking like the original paper invoice, with no

relevant information missing. The flexibility and ease-of-use of e-invoicing makes the recycling, inspection, approval and archiving of invoices more efficient.

3.8 Accounting reference

According to Penttinen (2010), electronic accounting reference is what really creates e-invoicing efficiency gains. The reference is created by buyer and added onto the invoice by the seller on an invoice or row level, and can include any distinguishable dimensions such as cost pool information, general ledger account or project number. Penttinen (ibid.) continues, by stating that the electronic accounting reference is used in order to automate the process of invoice posting into the accounting systems at the buyer side. This is a way for the seller to provide extra value for the services that they provide, resulting in the buyer having to do slightly less work themselves, and being able to focus on providing better services in other fields of service.

It is important to highlight the fact that it has been previously possible to attach accounting reference information to e-invoices. However, this information has varied in its format over Finvoice and TEAPPSXML formats. In addition, no specific field has been targeted to the communication of accounting reference in all invoicing systems.

In order to standardize these procedures, some changes to the original implementation had to be made. One of such changes has been the length of electronic accounting reference, which is now limited to 35 characters both in Finvoice and TEAPPSXML formats. Furthermore. separator marks, previously available in Finvoice context, cannot be used with the electronic accounting reference according to the new proposal.

In order to institute better understanding of electronic accounting reference, it has been visualized here. To be more precise, TEAPPSXML invoice is visualized first. The reference in question would be "40006400A7209B" and the previous method of utilizing accounting reference on invoices at invoice level would have been done as presented in figure 9.

In contrast the same accounting reference in TEAPPSXML context would be presented in invoice row level as presented in figure 10 (he invoice has two rows and the accounting information changes on different rows).

PAYER_POSTING_GROUP_DETAILS						
	POSTING_DEFAULT					
		ACCOUNT	4000			
		DIMENSIONS				
			DIMENSION (2)			
				LEVEL	DIMENSION_VALUE	DIMENSION_NAME
			1	1	6400	Cost center
			2	2	A7209B	Project number

Figure 9: Previous invoice-level presentation method in TEAPPSXML-context

DEFAULT_ROW_POSTING					
DEFAULT_ROW_POSTING					
		CREDIT_ACCOUNT	4000		
		DIMENSIONS			
			DIMENSION		
				LEVEL	1
				DIMENSION_VALUE	6400
				DIMENSION_NAME	Cost center
			DIMENSION		
				LEVEL	2
				DIMENSION_VALUE	A7209B
				DIMENSION_NAME	Project number
DEFAULT_ROW_POSTING					
		CREDIT_ACCOUNT	4000		
		DIMENSIONS			
			DIMENSION		
				LEVEL	1
				DIMENSION_VALUE	6600
				DIMENSION_NAME	Cost center
			DIMENSION		
				LEVEL	2
				DIMENSION_VALUE	A7209B
				DIMENSION_NAME	Project number

Figure 10: Previous row-level presentation method in TEAPPSXML-context

With the new proposal, the accounting reference would be communicated on invoice level as presented in figure 11.

Furthermore, the accounting reference on a row level has been presented in figure 12.

PAYER_POSTING_GROUP_DEFAULTS			
	POSTING_DEFAULT		
		ACCOUNT_REFERENCE	40006400A7209B
		REPORTING_CODE	CODE

Figure 11: New invoice-level presentation method in TEAPPSXML-context

DEFAULT_ROW_POSTING		
DEFAULT_ROW_POSTING		
	ACCOUNT_REFERENCE	40006400A7209B
	REPORTING_CODE	CODE
DEFAULT_ROW_POSTING		
	ACCOUNT_REFERENCE	40006400A7209B
	REPORTING_CODE	CODE

Figure 12: New row-level presentation method in TEAPPSXML-context

In Finvoice context, the utilization of separator marks in accounting references has previously been made possible. The look of the reference on an invoice level is depicted in figure 13.

AccountDimensionText	4000;6400;A7209B

Figure 13: Previous invoice-level presentation method in Finvoice-context

On a row level, the reference would be similar to that of invoice-level presentation. Figure 14 depicts this presentation method.

RowAccountDimensionText
4000;6400;A7209B
4000;6600;A7209B

Figure 14: Previous row-level presentation method in Finvoice-context

In order to unify the accounting process, the proposed changes in Finvoice context were related to the removal of separator marks. After the electronic accounting reference update, the row level accounting reference in Finvoice context is presented in figure 15.

RowAccountDimensionText
40006400A7209B
40006600A7209B

Figure 15: New row-level presentation method in Finvoice-context

Thus, the biggest change in both TEAPPSXML-context and Finvoice-context, was the fact that the whole reference could now be found from one field. In addition, previously utilized separator marks in Finvoice context were removed to unify the accounting reference protocol over different solutions.

3.8.1 The electronic accounting reference in different invoices

According to Penttinen (2010), in previously described order-based invoicing, the buyer can communicate the electronic accounting references to the supplier when placing an order. As many companies currently use automated matching systems for the order-based invoices, the relative advantage of the electronic accounting reference lies in the processing of non order-based invoices. Penttinen (ibid.) argues that larger companies tend to increase the level of order-based invoices due to the enhanced control and transparency, as well as due to the percentage of order-based invoices often being a key performance indicator for supply chain management.

In contract-based invoicing, Penttinen (ibid.) argues that due to the recurrent nature, small number of alternative row level identifiers and large amounts of data, the suppliers could maintain a chart of the customer's accounting information and then attach the accounting information to the row level items on the invoice. Penttinen (ibid.) also elaborates that the electronic accounting reference also allows the posted invoice information to be transferred

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on row-level, benefiting especially organizations that receive large amounts of row-specific invoice data. A typical example of such invoices being contract-based invoices.

With one-time occasional purchases Penttinen (ibid.) argues that the buyer could communicate the accounting reference to the seller when making the purchase. Due to the nature of these purchases, communications typically had to be arranged through a phone or web-page. Thus, the seller should have some kind of capability to add the electronic accounting reference to the sales order.

Penttinen (ibid.) also speculates that with credit card purchases, the credit card company could offer a possibility to add the accounting reference via an Internet service after the purchase has been done, whereas with self-billing the notion of electronic accounting references is obsolete as the buyer creates the invoice.

3.8.2 Electronic accounting reference benefits

The following recognized benefits are based on Penttinen (2010), if not mentioned otherwise. Thus, as Penttinen (ibid.) highlights, the sending of accounting references is the next logical step towards an increased automation after the sending and receiving of e-invoices has been established in an organization. There are multiple advantages associated to electronic accounting reference, mainly process efficiency, improved customer service and control and speed (adopted from Penttinen, 2010). These benefits are presented in figure 16.

In regard to process efficiency, the accounting reference removes unnecessary manual steps in the posting process, resulting in time savings in the invoice handling process. Actually, companies receiving invoices that contain large amounts of data benefit the most from electronic accounting reference. Additionally, when compared to the manual posting process, which can cost up to 20-25 Euros, changing to electronic accounting reference sounds rather logical. The introduction of electronic accounting reference also results in a decrease in paper consumption. Actually, with increased automation, even less paperwork is needed because in manual processing employees often print out the invoices.

Furthermore, companies are always trying to find new ways to provide value-added services to their customers. One such way would be to send a pre-accounted invoice to a buyer. Thus, suppliers are taking over some of their customer's tasks and therefore making the process much less work-intense for their customers. In some specific cases the customer might request the sending of invoice data with accounting information, in which situation the supplier is actually responding to a customer request and making sure that the business relationship continues. With electronic accounting reference, the relationship between buyer and seller can actually become more long-lasting.

Process efficiency	Removing unnecessary manual steps in posting
	Decreased costs (time & material savings)
Customer service	Responding to customer requests
	Long-term buyer-seller relationships
Speed and control	Improving the speed of posting and payment process
	Integrity of posting and invoice
	Cost control
	Fewer errors

Figure 16: Benefits of using the electronic account reference (Penttinen, 2010)

The final advantage consists of speed and control elements. Information becomes more reliable as less human intervention is needed, meaning basically less opportunities for human-related mistakes to take place in the invoice processing. Electronic accounting reference also promotes improved cost control and ease of surveillance. The process also takes a move more towards real-time financial reporting, as the estimates of pending invoices are improved. Additionally, the incoming invoice process is speeded up in general, as incoming invoices can be accepted faster as these invoices reach the right approves faster. This is enabled by using the accounting reference as a guideline, when sending invoices to the approvers. Actually, this results in faster posting of invoices, which then speeds up the whole payment process. Also, fewer payments will now run overdue, which results in lowered payment process costs.

3.8.3 Electronic accounting reference challenges

Even though the length of invoices varies greatly in companies, the processing of invoices in accounting is rather routine work by its nature (Harri Korhonen, 30.9.2011). The previous arrangement, where accounting information was separated in different fields in TEAPPSXML and separated with punctuation marks in Finvoices, meant, however, that invoice sender had to understand the receiver's accounting logic, so that the invoice could be sent in right format.

The new proposal is that both formats have one field for the accounting reference. The contents of this field can be completely created by the invoice receiver, and as the logic how the contents are understood can be completely decided at the receiver's end, the sender does no longer have to understand receiver's accounting processes. This new arrangement has been argued by e.g. Penttinen (2010) to serve all companies. For example, in a case of ten different customers, a supplier may in the worst case have to compose ten different invoices, all varying in their content, logic and possible visualization. This composing also demands the understanding of each customer's accounting procedures and invoicing system's capabilities. According to, eg. Harri Korhonen (30.9.2011), the electronic accounting reference could make these challenges obsolete.

What really makes the implementation of unified practices challenging, however, is the fact that companies may use older versions of Finvoice or TEAPPSXML, or even EDI solutions. In these versions companies then have found free fields where to communicate accounting reference information. Typically, companies at least differ in their need for detail in accounting, meaning that some companies demand more data on an invoice that others. This may allow these companies to depict the invoices in too much detail, than what would be needed for efficient accounting. These same companies may also send too much invoice information to their customers. This generates problems in these buying companies when they try to collect only the relevant data amongst irrelevant things. Additionally, as companies have sent their invoicing information in wrong format to their customers, manual work is needed to convert such data into right format at the buyer's end.

In sum, companies have not been that successful in agreeing for invoicing terms and considering unified accounting processes and practices. As no proper research has been made about the actual factors hindering the adoption of the electronic accounting reference, a solution towards unified practices in the field of accounting and invoice processing, the final part of this thesis focuses on this issue through a case study. Thus, a questionnaire related to factors hindering the adoption of electronic accounting reference in its newest form is constructed. The questionnaire is partly based on factors mentioned in the theory section of the thesis and partly on expert opinions. The questionnaire was targeted to the largest fifty companies in Finland and their returned answers will be reviewed and analyzed before the thesis is concluded.

4. Empirical case study

This chapter contains discussion about the chosen methodology, mainly about the case and questionnaire approach. After these considerations, the utilized questionnaire is constructed before moving on to the next chapter where findings are discussed.

4.1 Suitability of methodology

Before the construction of questionnaire and presentation of results, the suitability of case study as part of this thesis is analyzed alongside considerations regarding the advantages and disadvantages of utilizing questionnaires. According to Yin (2003), a case study is an empirical inquiry, which focuses on a contemporary phenomenon within its real-life context and boundaries between the phenomena. A case study is thus suitable for studying complex social phenomena.

Yin (ibid.) highlights that case studies can be explanatory, exploratory or descriptive in their nature. Explanatory research aims to explain an event in question, exploratory research is conducted for a problem that has not been clearly defined, and descriptive research describes data and characteristics about the population or phenomenon that is studied. The case studies can also be designed as single or multiple-case studies, utilizing qualitative, quantitative or both methods, and can include many variables of interest, multiple sources of evidence and theoretical propositions to guide the collection and analysis of data.

According to Yin (ibid.) case study analysis should be utilized when the focus of the study is to answer "how" and "why" questions, which is exactly the focus of this thesis. Additionally, according to Yin (ibid.) cases should be used when the researcher cannot manipulate the behavior of those involved in the study, the researcher wants to cover contextual conditions because they believe they are relevant to the phenomenon under study, and when the boundaries are not clear between the phenomenon and context.

Additionally, Yin (ibid.) lists typical criticisms towards case studies. The criticism, according to Yin (ibid.) is focused on the systematic handling of data, scientific generalization issues, and, finally, length and readability of case studies. However, this

criticism, according to Yin (ibid.), can be managed through systematic reporting of all evidence and generalizing results only to theoretical propositions, and not to population as in statistical research. Time and readability issues, on the other hand, purely depend on the choices of investigators.

According to John Milne (1999) of Aberdeen University, questionnaires come in many different forms and are often viewed as quick and easy to do, contrary to the actual work related to constructing them properly. Milne lists the disadvantages of questionnaires as follows:

- Questionnaires, like many evaluation methods occur after the event, so participants may forget important issues.
- Questionnaires are standardized so it is not possible to explain any points in the questions that participants might misinterpret.
- Open-ended questions can generate large amounts of data that can take a long time to process and analyze.
- Respondents may answer superficially especially if the questionnaire takes a long time to complete. The common mistake of asking too many questions should be avoided.
- Respondents may not be willing to answer the questions. They might not wish to reveal the information or they might think that they will not benefit from responding perhaps even be penalized by giving their real opinion.

According to Milne, the standardization disadvantage could be partially solved by piloting the questions on a small group of respondents. In terms of open-ended questions, data limitation could be achieved through limiting limit the space available to respondents so their responses are concise, or sample the respondents and survey only a portion of them. Finally, if the respondents are not willing to answer the questions truthfully or at all, the respondents should be told why the information is being collected and how the results will be beneficial. In such cases the respondents should also be asked to reply honestly and told that if their response is negative this is just as useful as a more positive opinion. One way to solve this kind of problem would be to make the questionnaire anonymous, which actually has been chosen as the approach for this thesis' questionnaire.

However, questionnaires also have advantages. Milne lists them as follows:

- The responses are gathered in a standardized way, so questionnaires are more objective than interviews.
- Questionnaires are relatively quick when collecting information.
- Information can potentially be collected from a large portion of a group

Mow that the lacks and benefits of the chosen methodologies have been discussed, this chapter continues with the actual construction of the questionnaire implemented alongside discussions with the participating companies and their representatives.

4.2 Constructing a questionnaire

This thesis utilizes the previously introduced Fit-Viability framework (see figure 3) as the backbone of the constructed questionnaire. In this thesis, fit-related task factors are extracted from the argued benefits of adopting electronic accounting reference in its proposed form. The constructed questionnaire thus aims to find out, whether organizations consider the electronic accounting reference to actually achieve such benefits and do these benefits actually matter in decision-making. fit-related technology elements, in turn, are extracted from electronic accounting reference's characteristics, which were previously presented. Finally, viability related elements, meaning economic, IT infrastructure and organizational considerations, are based on the Fit-Viability theory discussed in chapter 2. However, the viability elements have been revised to better meet the demands of this thesis, and thus discussions with RTE's Esko Penttinen and Tieto's Harri Korhonen and Saila Toikka have affected the questionnaire from this part.

4.2.1 Companies selected for the questionnaire

As mentioned in the introduction of this thesis, four large Finnish companies were targeted for this thesis and selected amongst the 50 largest companies from the Finnish Talouselämä-magazine's 500 largest companies list. In this list, Talouselämä (2011) listed the 500 largest Finnish companies based on their turnovers announced on the financial statements published on December 2010. The 50 largest companies by revenue are presented in table 1.

Table 1: 50 largest Finnish companies (Talouselämä, 2011)

Standing	Company	Revenue, millions of Euros	Standing	Company	Revenue, millions of Euros
1	Nokia*	42 446	26	Kemira	2 161
2	Neste Oil	11 892	27	HK-Scan	2 114
3	Stora Enso	10 297	28	Finnair	2 023
4	SOK	9 258	29	Teboil	2 003
5	UPM-Kymmene	8 924	30	Huhtamäki	1 952
6	Kesko	8 777	31	Oriola-KD	1 929
7	Sampo	6 515	32	Ahlstrom	1 894
8	Fortum	6 296	33	Lemminkäinen	1 892
9	Op-Pohjola-ryhmä	6 186	34	Itella	1 842
10	Metso	5 552	35	Eläke-Tapiola	1 839
11	Metsäliitto	5 377	36	Valio	1 822
12	Kone	4 987	37	Stockmann	1 822
13	Varma	4 888	38	RTF Auto	1 764
14	Ilmarinen	4 598	39	Amer Sports	1 740
15	Wärtsilä	4 553	40	Tieto	1 714
16	Tamro	4 387	41	Telia-Sonera Finland	1 713
17	Outokumpu	4 229	42	Veikkaus	1 690
18	YIT	3 788	43	HOK-Elanto	1 668
19	Nordea Pankki Suomi	3 635	44	Onvest	1 599
20	Nordea Henkivakuutus	2 792	45	Konecranes	1 546
21	Sanoma	2 761	46	Eläke-Fennia	1 518
22	Cargotec	2 575	47	Fazer	1 514
23	Rautaruukki	2 415	48	Wihuri	1 477
24	Luvata	2 372	49	Elisa	1 463
25	ABB	2 174	50	VR	1 423

As it was agreed with the respondents that they and their participating companies will not be mentioned by name, the names of the companies and their representatives have been changed. However, in order to achieve a level of credibility for the answers, the industries of the companies, as well as the positions of the representatives are briefly described next. Thus, the first company, company A, operates in the oil business, and its representative, person W, works as a system administrator in the financial services department. Company B operates in financial services industry, and its representative, person X, works in the invoice handling services department. Company C operates in the metal industry, and its representative, person Y, is a development manager in the finance department. Finally, company D operates in the employment pension industry, and its representative, person Z, works as financial service manager in the financial services department.

4.2.2 Basic information regarding the questionnaire

As mentioned before, the constructed questionnaire aimed to depict the factors hindering the introduction of electronic accounting reference in a specific field reserved only for it in TEAPPSXML and Finvoice technologies.

The questionnaire consists of two main parts, i.e. depicting companies' current invoicing situation in terms of invoicing and the electronic accounting reference, and fit-related and viability-related negative claims. The claims were decided to be presented in a negative format, as the reasons hindering the adoption are also negative in their nature. Furthermore, as no similar research has been previously conducted, the questionnaire includes 17 fit-related and 52 viability related claims.

As the first part of the questionnaire included only a couple of questions, this part is briefly described next, whereas the second part of the questionnaire will be presented in more detail later. Thus, in order to depict the current situation with processing invoices, companies were first asked the following questions:

- How much does your company receive invoices in different formats?
- Do you use the electronic accounting reference in its newest form?

Initially, the questionnaire also contained questions related to the estimated percentages of different invoice formats when sending and receiving invoices. However, as the representatives were not able to present any estimations regarding the use of formats, these questions were dropped out from the questionnaire.

As a structured questionnaire was utilized, the questionnaire did not include any open-ended questions. Instead, the respondents were asked to answer to the mostly negative claims through scoring the claims. The chosen method was a Likert scale, more specifically a scale from 1 to 7, where number one stands for "completely disagree" and number seven stands for "completely agree". However, as the questionnaire was quite extensive, as no previous research for this research question had been conducted, companies were also given the option to state if some of the claims were irrelevant in their case. Thus, number four (4), was chosen to depict any possible irrelevant factors, as it is in the middle of the chosen scale. Such answers are later marked as "IRR" (short for irrelevant), when answers are analyzed. If no answer to a question was given, it was scored with zero (0), and was not concluded to the average calculations, as were not the IRR-answers either.

As the selected claims are negative, agreeing to a claim means that the representative of the company in question regarded such reason as something that hinders the adoption of electronic accounting reference in the company in question. On the contrary, disagreeing with a negative claim states that that the issue in question is beneficial or does not hinder the adoption of the electronic accounting reference in the company.

The actual questionnaire sent to the companies can be found from the appendixes at the end of this thesis. However, the chosen claims are also presented next alongside discussion related to the reasons why these claims were selected for the questionnaire.

4.2.3 Fit-related questions

As mentioned previously, fit means accounting reference's suitability to the organization in question. Furthermore, as the theory stated, fit-related claims are divided into task and technology-related sections. The considered factors, in terms of task and technology, as well as the constructed questions, are presented next.

<u>Task</u>

As the task-related factors are related to the tasks that the technology has been designed to carry out, Penttinen's (2010) categorization regarding the benefits of accounting reference were selected as the focus of task-related questions. Thus, the following question categories were selected, amongst which are the constructed negative claims that are based on the characteristics of these categories:

- Process Efficiency
  - Accounting reference does not remove unnecessary manual steps in posting
  - Accounting reference does not reduce paper consumption
  - Accounting reference does not result in decreased costs through time and material savings
- Customer service
  - Accounting reference does not respond to our customers' requests / needs
  - Accounting reference does not contribute to long-term buyer-seller relationships

- Speed and control
  - o Accounting reference does not improve the speed of posting and payment process
  - o Accounting reference does not improve the integrity of posting and invoice
  - o Accounting reference does not improve cost control
  - o Accounting reference does not result in fewer errors made in accounting process
- Different invoicing
  - o Accounting reference is not suitable for order-based invoicing
  - o Accounting reference is not suitable for contract-based invoicing
  - o Accounting reference is not suitable for non-order-based invoicing
  - o Accounting reference is not suitable for company credit card purchases

The final claim regarding credit card purchases was added to the different invoicing-category of the questionnaire, as Penttinen highlighted the need of improved processing of these invoices in comparison to the one-time occasional purchases and self billing, also categorized to non-order-based invoices, in the discussions held with him on 22nd of September in 2011.

Technology

The technology-related factors are extracted from the third chapter of this thesis. Here, the focus is on electronic accounting reference's characteristics. Actual categories for claims were not constructed, as the claims are all related to characteristics and no need was seen for more detailed categories. Thus, the following claims were constructed based on the theory:

- The accounting reference's field's length (35 symbols) is too short for us
- Prohibiting punctuation marks in the reference is a problem for us
- The accounting reference is not suitable for large masses of invoices / detailed and lengthy invoices
- The accounting reference is still too much a work in progress technology/coding-wise (lacks standardization, too exposed for bugs, too exposed for lengthy downtime, etc.).

4.2.4 Viability-related questions

As mentioned previously, viability refers to organization's readiness to introduce a technology. Furthermore, as the theory stated, viability-related claims are divided into economic, organizational and IT infrastructure-related sections. The subcategories of the chosen claims in the questionnaire differ slightly from the categories presented in the Fit-Viability framework (see figure 3) as some other issues than the competency of IS staff and brand asset considerations were more emphasized by Harri Korhonen in the discussion held with him 30th of September in 2011. The considered factors, in terms of viability, as well as the constructed questions, are presented next.

<u>Economic</u>

According to Liang et al. (2007), economic feasibility factors include   two different aspects: First one assesses cost benefits in order to define, whether the investment can bring in adequate financial or intangible return, and thus reduce transaction costs, and the second assesses, whether IT can affect the transaction costs thus leading to competitive advantages to the organization.

Liang et al. (ibid.) argue that when defining the cost-benefit of an investment, e.g. net present value estimations can be considered. In turn, from the transaction cost aspect, reducing transaction cost can increase customer's willingness to use a technology. Here, asset specificity, or human resource asset, location, physical asset, time and brand asset, uncertainty, or high risks, and frequency affect the transaction costs (Liang et al., 2007). Based on these definitions, the following categories were selected and the claims formed as follows:

- Costs
  o Using electronic accounting reference in a specified field demands great start-up investments
  o Upgrading our system for accounting reference's transmission in a specific reserved field costs too much
  o Changing our system to unified accounting approach costs too much

- o We would need to upgrade our scanners in order to pick an accounting reference from paper invoices
- o Introducing the accounting reference would mean re-arranging our internal / external communications processes (takes too much resources, costs too much)
- Savings
- o Starting the use of accounting reference in a specific field does not pay back the original investments
- o Using accounting reference in a specific field does not create any savings for us
- o Changing our system to unified accounting approach does not create savings
- Risks
- o In our opinion accounting reference policies and technology are not enough mature for us and we are not willing to invest in something that may potentially become more costly than expected
- o The concept is too unclear for us, we do not want to make any invests in it
- o We cannot understand / do not agree with accounting reference's benefits and thus we are not willing to invest in such technology
- o Using accounting reference has already resulted in unexpected costs (for example, we have chosen a bank to deliver our invoices to the receiver in a wrong format, although we should have hired an operator that transforms the information to the receiver's demanded format) and we are not willing to invest until the procedure is more standardized
- o Changing our processes might result in someone sending us the invoice information in wrong format which would then lead to manual work (waste)
- Human assets
- o We need to train more people if we introduce the accounting reference
- o We need to lay off people if we introduce accounting reference, and we do not want to do that
- Uncertainty
- o Our business environment is so hectic / subject to frequent changes that we do not have time for introducing accounting reference / changing the current accounting process

- Frequency
  - Accounting is not that relevant in our day to day operations that we should check whether the current procedures could be updated
  - The current approach to accounting is good enough for us and does not need nor make it possible to create any more automation / savings out of it

Even though asset specificity's each element is not, at least, separately considered, based on the discussions held with Esko Penttinen on 22nd of September in 2011, the constructed categories and claims are thorough enough to depict the factors hindering the adoption of electronic accounting reference.

Organizational

The organizational aspect's primary focus is on the user's willingness and ability to use the technology (Liang and Wei, 2004). In turn, Liang et al. (2007) list top management support, user satisfaction, system use and usability, intension to use and benefit as factors that have been linked to organizational factors by recent study. Based on these definitions, the following categories were selected and the claims formed as follows:

- User support
  - Our system users do not support the accounting reference
  - Introducing accounting reference would lead to at least some accounting personnel moving to undesired jobs / tasks
  - Accounting reference would impact the logic / easiness of working negatively
- Top management support
  - Management does not support the introduction of accounting reference
- Benefit
  - In our opinion, the accounting reference does not provide competitive advantages over our rivals
  - In our opinion, the accounting reference affects our partnerships / contracts negatively (for example, some suppliers are not technically capable of transmitting the information we then would need)
  - Our customers (B2B) do not need the accounting reference

- o Our field does not use the accounting reference, and that's why we do not either
- o We do not see a need for unified practices in transmitting invoice information (so that all companies would have same procedures and same formats when it comes to sending or receiving invoices and deciding what information is attached)
- o We cannot effectively calculate/measure the total benefits (long-term period) of electronic accounting reference
- o We cannot effectively follow the accounting process benefits on a short-term
- Miscellaneous
- o The terminology is too unclear, all people do not understand relevant terms when it comes to accounting reference and accounting reference in electronic format

Miscellaneous category, although inherently not part of the categories listed by previous research, was selected as a part of the constructed questionnaire, as Harri Korhonen (30.9.2011) suggested that terminology-related challenges are relevant when considering the implementation of electronic accounting reference. As the organizational considerations were the best fit, by definition, to these terminology-related considerations, it was added alongside user support, top management support and benefits categories. Furthermore, measurement-related claims were constructed based on the discussion held with Saila Toikka on 5th of October in 2011.

IT infrastructure

Finally, according to Liang et al. (2007), IT infrastructure comprises of an IT platform and diverse information services, such as information management, communication channels, the structure

and control of the platform, and different functional application systems. Both of these elements are required for supporting the technology. Thus, based on these definitions, the following categories were selected and the claims formed as follows:

- Software and Hardware
- o We do not use e-invoicing, therefore we do not use electronic accounting references
- o Establishing a proper database for the accounting reference is too hard

- We communicate an accounting reference in another than specified field (for example a free text field, an unused field for other details etc.) to our customers (B2B) / suppliers
- Establishing the accounting reference field to our current systems is hard / impossible
- Our systems do not support accounting reference
- Introducing accounting reference would slow our accounting systems
- Maintaining the customer/purchaser data for accounting reference would be too complicated (keeping invoicing information up to date).
- Accounting reference data is not enough flexible for our needs in case changes/upgrades need to be made.
- We could not communicate the accounting references to our customers (B2B) / suppliers
- Our scanners cannot pick an accounting reference from a paper invoice, therefore we do not demand accounting references
- We cannot bring the information (customer, order, product) behind accounting reference properly to our accounting system (information would be in wrong format for our current systems)
- We cannot properly translate the information behind accounting reference
- We cannot change / would not want to change our accounting reference policies (how the invoice data currently arrives)
- With the new accounting reference standard, we would have a hard time sending the invoices in right format to our customers (B2B)/suppliers) and/or demanding invoices in right format to us
- With electronic accounting reference we do not know in which level the information is brought to and picked from our system (headline or row level)
- The accounting reference field in our systems would impact the user interface negatively (too many fields after introduction, too unclear interface)
- We cannot restrict our costs reporting to fit 35 symbols provided by accounting reference (we need more digits to report the cost location with the precision we need)
- Data management
- The database needed for accounting reference exposes us to information leaks

- The users of the data needed may deliberately use, save, distribute, manipulate it as protecting the data cannot be established well enough in our company
- Using accounting reference is too exposed to unintended user errors / mistakes
- The data needed for accounting reference becomes too transparent, as we cannot properly limit the access of different kinds of users to the data in our organization
- The accounting reference needs too much testing before it could be introduced in our organization

Here, the selected data management category is comparable to theory's proposed information management. Furthermore, software and hardware considerations were selected as the second category, as these considerations include the IT platform-related and diverse information services-related elements, which are needed for the supporting of technology.

Now that the contents of the actual questionnaire have been presented, the thesis continues with presenting the findings in the next chapter, before continuing with the analysis of respondents' answers and the analysis of discussions held with them.

5. Findings

In this chapter, the results of the conducted questionnaire are presented, before they are further discussed in chapter 6. This chapter first presents answers to the general questions about companies' current states with invoices, before moving on to the calculated averages for questionnaire sections, after which all answers are presented.

5.1 Current state

As previously mentioned, the companies were first asked about the relation of incoming electronic and paper invoices, as well as, whether or not the electronic accounting reference has been implemented in its newest form.

The amounts of incoming invoices in both formats are presented in percentages in table 2.

Table 2: Format of the incoming invoices

	A	B	C	D
Paper	61	17	50	55
Electronic	39	83	50	45

Based on the answers, companies still seem to be receiving the majority of the invoices in paper format, with the exception of company B. Even though the amount of incoming invoices in paper format could question the focus in electronic invoicing, as was previously mentioned in the beginning of this thesis, electronic invoicing is growing in popularity amongst companies.

Moving on to the current state of the electronic accounting reference, companies were unanimous in their current situation, as can be seen from table 3.

Table 3: Current situation with the electronic accounting reference

	A	B	C	D
Yes, both with sending and receiving				
Yes, but only with sending				
Yes, but only with receiving				
Not at all	X	*	X	X

* = Even though no answer was given, it is expected based on the answers that company B's situationr is similar to that of others

Thus, none of the companies have introduced the electronic accounting reference in its newest format. Next, the answers are analyzed in further detail in order for an answer to this reason.

5.2 Averages

The calculated average for fit-related answers was 3,27 and the average for viability-related answers was 2,99. As smaller numbers meant disagreeing with a claim, and the claims were negative in their tone, the averages show that in a scale from one to seven, the fit and viability are on the disagreeing side with the negative claims. Even though the difference of the averages was 0,28, when compared with each other, it seems that companies see fit-related negative claims more true than viability related. This is interesting, as there were only 17 fit-related claims in comparison to 52 viability-related claims.

When divided into main categories, fit-related task considerations average with 2,98, whereas technology considerations average with 4,21. The difference is a considerable 1,23 and needs to be analyzed further in the next chapter.

In turn, economic considerations average with 2,55, organizational considerations average with 3,50, and IT infrastructure-related considerations average with 3,08, when it comes to viability-related main categories. Thus, in the view of organizational considerations and IT infrastructure, companies seem to be less ready for the electronic accounting reference in its newest form than in the view of economic considerations. These differences will also be examined in more detail in the next chapter.

5.3 Exact answers

This section presents companies' exact answers to each claim presented in the questionnaire. The representatives were able to answer with a scale from one to seven, where number one stands for "completely disagree" and number seven stands for "completely agree". If the representative considered a claim as irrelevant in terms of how decisions are made in his/her company, the representative could score the answer with a number four. In the following tables, number four has been replaced with an abbreviation

"IRR" (irrelevant). Furthermore, if no answer was given, such claim was scored with a number zero (0), and was not calculated to the total average, as were not the "IRR" answers either.

As the next chapter concentrates on discussion, the answers are only presented here. However, this section highlights the claims discussed in the next chapter. More specifically, any claim averaging over 3,00 will be further analyzed in the next chapter. Additionally, any claim having more or less radically differing answers will also be highlighted here, and discussed in the next chapter.

5.3.1 Fit's task-related considerations

The first claims considered fit's task-related factors. As the claims' main categories were process efficiency, customer service, speed and control, and different invoicing, the answers are presented in a similar categorization in tables 4 to 7.

Process efficiency

The total calculated average for these process efficiency-related claims is 2,81. Thus, on average, the representatives see electronic accounting reference contributing to the process efficiency. Company B sees the removal of manual steps and reduced paper consumption quite differently than the rest of the companies, and the answers need some elaboration in the next chapter. In contrast, companies see the electronic accounting reference to contribute in decreased costs through time and material savings quite unanimously.

Table 4: Answers for process efficiency-related claims

	A	B	C	D	Average
Accounting reference does not remove unnecessary manual steps in posting	2	6	2	0	3,33
Accounting reference does not reduce paper consumption	3	5	2	0	3,33
Accounting reference does not result in decreased costs through time and material savings	2	1	2	2	1,75

Customer service

The total calculated average for these customer service-related claims is 4,25. As company A's and B's answers are polarized to the different ends on behalf of both customers'

requests and long-term buyer-seller relationships, these answers need to be further elaborated. Furthermore, as company D sees the long-term relations the same way as company B, especially company A's answer needs to be further elaborated.

Table 5: Answers for customer service-related claims

	A	B	C	D	Average
Accounting reference does not respond to our customers' requests / needs	1	6	0	0	3,50
Accounting reference does not contribute to long-term buyer-seller relationships	3	6	IRR	6	5,00

Speed and control

The total calculated average for these speed and control-related claims is 2,90. The companies are quite unanimous when it comes to electronic accounting reference's benefits for the speed of posting and payment process, as well as for the integrity of posting and invoice. However, the answers related to cost control improvement and fewer errors made in the accounting process differ amongst companies, and should be further elaborated.

Table 6: Answers for speed and control-related claims

	A	B	C	D	Average
Accounting reference does not improve the speed of posting and payment process	1	1	2	2	1,50
Accounting reference does not improve the integrity of posting and invoice	3	1	3	0	2,33
Accounting reference does not improve cost control	6	2	3	5	4,00
Accounting reference does not result in fewer errors made in accounting process	5	2	5	3	3,75

Different invoicing

The total calculated average for these different invoicing-related claims is 2,56. When looking at the averages for each claim, companies seem to be unanimous about the electronic reference's benefits for the order-based and non-order-based invoices, as well as for the credit card purchases. However, as company A sees the electronic accounting reference as not that suitable for order-based invoicing, this answer needs further elaboration. Also, company D's answer differs significantly from others' when it comes to non-order-based invoicing. Finally, A's and B's answers differ significantly from those of C's and D's when contract-based invoices are considered. This claim needs to be analyzed

in more detail, as A's and B's answers actually adjust the average, stating electronic accounting reference's suitability, to the negative side.

Table 7: Answers for different invoicing-related claims

	A	B	C	D	Average
Accounting reference is not suitable for order-based invoicing	5	3	1	2	2,75
Accounting reference is not suitable for contract-based invoicing	7	5	1	2	3,75
Accounting reference is not suitable for non-order-based invoicing	2	1	1	7	2,75
Accounting reference is not suitable for company credit card purchases	IRR	1	1	0	1,00

5.3.2 Fit's technology-related considerations

The second claims considered fit's technology-related factors. These claims did not split into different categories and are thus presented as one unit in table 8.

Table 8: Answers for technology-related claims

	A	B	C	D	Average
The accounting reference's field's length (35 symbols) is too short for us	IRR	5	2	0	3,50
Prohibiting punctuation marks in the reference is a problem for us	IRR	5	0	0	5,00
The accounting reference is not suitable for large masses of invoices / detailed and lengthy invoices	6	IRR	2	5	4,33
The accounting reference is still too much a work in progress technology/coding-wise (lacks standardization, too exposed for bugs, too exposed for lengthy downtime, etc.).	6	2	0	0	4,00

The total calculated average for these technology-related claims is 4,21. As can be seen from the calculated averages, companies, in average, consider electronic accounting reference's characteristics to be negative. However, three claims were considered as irrelevant by some company, and three claims were also not answered. Furthermore, when looking at each of the claims more closely, the answers are rather polarized, and in the case of prohibiting punctuation marks, only company B answered to the claim. Thus, each claim needs to be further analyzed in the next chapter.

5.3.3 Viability's economic considerations

The third claims considered viability's economic factors. These claims were further categorized into costs, savings, risks, human assets, uncertainty and frequency. The answers to these claims are presented in tables 9 to 14.

Costs

The total calculated average for these cost-related claims is 3,40. Four claims were considered as irrelevant, at least by one company, and company D did not answer to the first three claims. Despite this, electronic accounting reference seems to demand great start-up investments, but company B, scoring this claim as irrelevant, sees the introduction of unified accounting not to cost too much. However, company A's differing view to the costs of upgrading, as well as company D's differing view to upgrading of scanners and re-arrangement of communications processes need further elaboration, as these answers shift the total average of these claims to or closer to the negative side.

Table 9: Answers for costs-related claims

	A	B	C	D	Average
Using electronic accounting reference in a specified field demands great start-up investments	7	IRR	5	0	6,00
Upgrading our system for accounting reference's transmission in a specific reserved field costs too much	5	1	3	0	3,00
Changing our system to unified accounting approach costs too much	IRR	1	IRR	0	1,00
We would need to upgrade our scanners in order to pick an accounting reference from paper invoices	3	IRR	3	5	3,67
Introducing the accounting reference would mean re-arranging our internal / external communications processes (takes too much resources, costs too much)	3	IRR	2	5	3,33

Savings

The total calculated average for these savings-related claims is 1,56. Even though company D did not answer to any of these claims, companies seem to be unanimous that the electronic accounting reference does well in this category. Companies see that the reference pays back initial investments and creates savings itself, as well as through a possible transition into a more unified accounting approach.

Table 10: Answers for savings-related claims

	A	B	C	D	Average
Starting the use of accounting reference in a specific field does not pay back the original investments	2	1	2	0	1,67
Using accounting reference in a specific field does not create any savings for us	1	1	2	0	1,33
Changing our system to unified accounting approach does not create savings	1	1	3	0	1,67

Risks

The total calculated average for these risk-related claims is 2,37. Even though company D has not answered to the claims in this category either, companies also seem to be unanimous about the benefits of the electronic accounting reference when it comes to risk considerations. However, considering the maturity of electronic accounting reference policies and technology, company A's answer differs from others' and needs further elaboration. Furthermore, as A's and B's answers differ significantly from each other, when considering the possible results of changing processes, the answers need to be analyzed in more detail.

Table 11: Answers for risks-related claims

	A	B	C	D	Average
In our opinion accounting reference policies and technology are not enough mature for us and we are not willing to invest in something that may potentially become more costly than expected	5	1	3	0	3,00
The concept is too unclear for us, we do not want to make any invests in it	2	1	3	0	2,00
We cannot understand / do not agree with accounting reference's benefits and thus we are not willing to invest in such technology	3	1	2	0	2,00
Using accounting reference has already resulted in unexpected costs (for example, we have chosen a bank to deliver our invoices to the receiver in a wrong format, although we should have hired an operator that transforms the information to the receiver's demanded format) and we are not willing to invest until the procedure is more standardized	1	1	2	0	1,33
Changing our processes might result in someone sending us the invoice information in wrong format which would then lead to manual work (waste)	6	1	IRR	0	3,50

Human assets

The total calculated average for these human asset-related claims is 2,63. Even though the companies are unanimous in that the introduction of the electronic accounting reference would not lead to laying off people, A's and D's views differ from those of B and C in the need of training more people, and thus the difference needs to be elaborated in the next chapter.

Table 12: Answers for human assets-related claims

	A	B	C	D	Average
We need to train more people if we introduce the accounting reference	5	2	2	5	3,50
We need to lay off people if we introduce accounting reference, and we do not want to do that	1	3	2	1	1,75

Uncertainty

As can be seen from the table, the total calculated average for this uncertainty-related claim is 2,67. Based on the answers, companies do have time for introducing the electronic accounting reference if needed.

Table 13: Answers for uncertainty-related claim

	A	B	C	D	Average
Our business environment is so hectic / subject to frequent changes that we do not have time for introducing accounting reference / changing the current accounting process	3	IRR	3	2	2,67

Frequency

The total calculated average for these frequency-related claims is 2,25. Based on the average, companies consider accounting as relevant to their daily operations and also do not regard the current approach to be as optimized as it possibly could be. However, company D views its accounting process significantly more close to optimal than the other companies. This answer will be analyzed further in the next chapter.

Table 14: Answers for frequency-related claims

	A	B	C	D	Average
Accounting is not that relevant in our day to day operations that we should check whether the current procedures could be updated	3	1	2	1	1,75
The current approach to accounting is good enough for us and does not need nor make it possible to create any more automation / savings out of it	1	2	2	6	2,75

5.3.4 Viability's organization-related considerations

The fourth claims considered viability's organizational factors. These claims were further categorized into user support, top management support, benefit and miscellaneous sections. Representatives' answers to these claims are summarized in tables 15 to 18.

User support

The total calculated average for these user support-related claims is 3,44. The companies were unanimous in that their system users would support the electronic accounting reference. However, considering a transition to undesired jobs, company A's and B's answers differed significantly from those of C's and D's. Furthermore, as company B sees electronic accounting reference's impact on the logic and easiness of working differently

than companies A and D, these two high-averaged claims are further analyzed in the next chapter.

Table 15: Answers for user support-related claims

	A	B	C	D	Average
Our system users do not support the accounting reference	IRR	2	2	2	2,00
Introducing accounting reference would lead to at least some accounting personnel moving to undesired jobs / tasks	5	7	3	1	4,00
Accounting reference would impact the logic / easiness of working negatively	6	1	0	6	4,33

Top management support

As can be seen from the table, the total calculated average for this top management support-related claim is 1,75. Companies unanimously see electronic accounting reference being supported by the top management.

Table 16: Answers for top management support-related claim

	A	B	C	D	Average
Management does not support the introduction of accounting reference	2	3	1	1	1,75

Benefit

The total calculated average for these benefit-related claims is 3,61. The companies were unanimous in that a need for unified practices in transmitting invoice information exists. The companies were also unanimous in that their customers would need the electronic accounting reference. Even though this is not directly related to the process of incoming invoices, the claim was added, as an observed benefit, such as the one in question, may impact the incoming invoice process, even though it would be more related to the sending of invoices.

However, companies B and C considered the electronic accounting reference to impact their partnerships and contracts negatively, whereas company A considered the claim irrelevant and company D did not answer to the claim. Also, as companies C and D differed from company A in their opinion about competitive advantages, the total average of this claim moved to more negative side and should be further elaborated.

Regarding the total benefits, company C differed from companies A and B in its opinion in the long-term related claim, and company B differed from companies A and C in the short-term-related claim. Thus, the benefits-related claims are also further analyzed in next chapter.

Table 17: Answers for benefit-related claims

	A	B	C	D	Average
In our opinion, the accounting reference does not provide competitive advantages over our rivals	3	IRR	6	7	5,33
In our opinion, the accounting reference affects our partnerships / contracts negatively (for example, some suppliers are not technically capable of transmitting the information we then would need)	IRR	5	5	0	5,00
Our customers (B2B) do not need the accounting reference	3	1	3	0	2,33
Our field does not use the accounting reference, and that's why we do not either	IRR	3	5	1	3,00
We do not see a need for unified practices in transmitting invoice information (so that all companies would have same procedures and same formats when it comes to sending or receiving invoices and deciding what information is attached)	3	3	1	2	2,25
We cannot effectively calculate/measure the total benefits (long-term period) of electronic accounting reference	3	3	5	0	3,67
We cannot effectively follow the accounting process benefits on a short-term	3	5	3	0	3,67

<u>Miscellaneous</u>

As can be seen from the table, the total calculated average for this miscellaneous-related claim is 4,67. Companies A and B significantly differed from company C in their opinion about the clearness of terminology. The answers of this category are also analyzed further in the next chapter.

Table 18: Answers for miscellaneous-related claim

	A	B	C	D	Average
The terminology is too unclear, all people do not understand relevant terms when it comes to accounting reference and accounting reference in electronic format	6	6	2	0	4,67

5.3.5 Viability's IT infrastructure-related considerations

The final claims considered viability's IT infrastructure. These claims were further categorized into software and hardware, as well as into data management-related claims. The answers of the representatives are summarized in tables 19 and 20.

<u>Software and Hardware</u>

The total calculated average for these software and hardware-related claims is 3,25. The companies were unanimous in that they use electronic invoicing, establishing a proper database for the electronic accounting reference is not too hard, maintaining the relevant data would not be too complicated, the data is flexible enough in case of changes and updates, and that their scanners could pick up accounting references from paper invoices if the senders would use them. The companies A and C were also unanimous in that properly brining the information behind accounting reference is currently challenging.

Table 19: Answers for software and hardware-related claims

	A	B	C	D	Average
We do not use e-invoicing, therefore we do not use electronic accounting references	1	1	1	1	1,00
Establishing a proper database for the accounting reference is too hard	2	2	3	0	2,33
We communicate an accounting reference in another than specified field (for example a free text field, an unused field for other details etc.) to our customers (B2B) / suppliers	7	5	1	1	3,50
Establishing the accounting reference field to our current systems is hard / impossible	5	2	2	0	3,00
Our systems do not support accounting reference	5	3	5	2	3,75
Introducing accounting reference would slow our accounting systems	IRR	3	2	6	3,67
Maintaining the customer/purchaser data for accounting reference would be too complicated (keeping invoicing information up to date)	3	IRR	3	0	3,00
Accounting reference data is not enough flexible for our needs in case changes/upgrades need to be made.	3	3	3	0	3,00
We could not communicate the accounting references to our customers (B2B) / suppliers	2	IRR	5	0	3,50
Our scanners cannot pick an accounting reference from a paper invoice, therefore we do not demand accounting references	3	IRR	2	0	2,50
We cannot bring the information (customer, order, product) behind accounting reference properly to our accounting system (information would be in wrong format for our current systems)	5	IRR	5	0	5,00
We cannot properly translate the information behind accounting reference	5	2	0	0	3,50
We cannot change / would not want to change our accounting reference policies (how the invoice data currently arrives)	3	3	2	6	3,50
With the new accounting reference standard, we would have a hard time sending the invoices in right format to our customers (B2B)/suppliers) and/or demanding invoices in right format to us	5	IRR	3	0	4,00
With electronic accounting reference we do not know in which level the information is brought to and picked from our system (headline or row level)	5	3	0	0	4,00
The accounting reference field in our systems would impact the user interface negatively (too many fields after introduction, too unclear interface)	5	IRR	2	0	3,50
We cannot restrict our costs reporting to fit 35 symbols provided by accounting reference (we need more digits to report the cost location with the precision we need)	5	2	2	1	2,50

In several of the claims, company A differed in its views compared to others, increasing the total average of a claim to a more negative side. Furthermore, companies A and B significantly differed from companies C and D in their opinion about being able to communicate the electronic accounting reference in some other than specifically reserved field. Companies A and C also differed from companies B and D in that their systems would not that easily support the electronic accounting reference. Even though not directly related to the research focus, company C differed from company A's capability of being able to communicate electronic accounting references to B2B customers and suppliers. Finally, company D differed from other companies in seeing the electronic accounting reference to slow accounting systems and capability and willingness to change the way how the invoice data currently arrives. Due to the several differences, software and hardware claims are thoroughly analyzed in the next chapter.

Data management

The total calculated average for the final, data management-related claims is 2,50. Even though company D did not answer to these claims, and company A regarded the second claim irrelevant, companies were unanimous in that a database needed for the electronic accounting reference would not be exposed to information leaks, the database could be well enough protected, and the access to the data could also be properly limited. However, company D differed from other companies in its opinion that using an electronic accounting reference would be too exposed to unintended user errors and mistakes. Company A also differed from companies B and C in that the accounting reference would need too much testing before it could be implemented.

Table 20: Answers for data management-related claim

	A	B	C	D	Average
The database needed for accounting reference exposes us to information leaks	2	1	2	0	1,67
The users of the data needed may deliberately use, save, distribute, manipulate it as protecting the data cannot be established well enough in our company	IRR	1	2	0	1,50
Using accounting reference is too exposed to unintended user errors / mistakes	3	1	3	5	3,00
The data needed for accounting reference becomes too transparent, as we cannot properly limit the access of different kinds of users to the data in our organization	3	1	3	0	2,33
The accounting reference needs too much testing before it could be introduced in our organization	6	3	3	0	4,00

Next, chapter 6 analyses the reasons behind the differing answers. Where available, the opinions of companies' representatives are also presented.

6. Discussion

This chapter utilizes the adjusted matrix for assessing m-commerce applications (see figure 2) by Liang and Wei, (2004), when analyzing the answers of the companies. The chapter begins with general discussion about the model utilized and about the location of the electronic accounting reference in the matrix. Next, the previously highlighted answers are analyzed in more detail, before this chapter concludes with an analysis per each claim subcategory and a summary.

6.1 General discussion

When analyzing the results on a general level, the adjusted matrix for assessing m-commerce applications by Liang and Wei (2004) (see figure 2) is utilized. As the claims in the questionnaire were negative, and number one meant strongly disagreeing, whereas number seven meant strongly agreeing with a claim, the original matrix needed to be altered in order to serve the logic of the answers properly. Thus, in the new matrix, low average stands for good viability and/or fit, whereas high averages stand for poor fit and/or viability. The matrix has been constructed in figure 17.

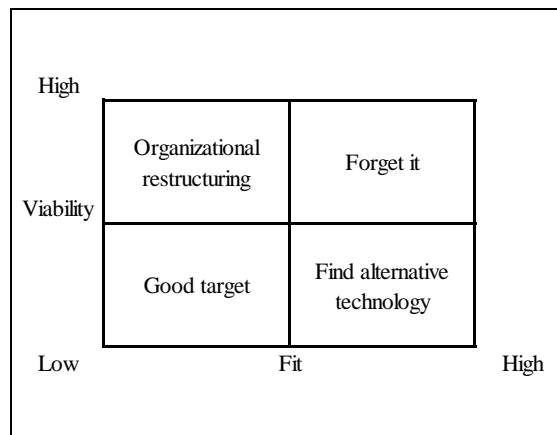Figure 17: The matrix for assessing the electronic accounting reference

In order to analyze each company's opinion about the electronic accounting reference, in terms of fit and viability, their answers' averages were calculated. The averages of companies A, B, C and D for fit and viability were 3,71 and 3,57, 3,25 and 2,27, 2,08 and 2,79, and 3,78 and 3,19 respectively. Number four (4) in both axes represents the point

where fit or viability shifts from low to high, as number four was in the middle of utilized Likert scale. The dark lines represent these transition points in the matrix. Companies' locations in this matrix are illustrated in figure 18.
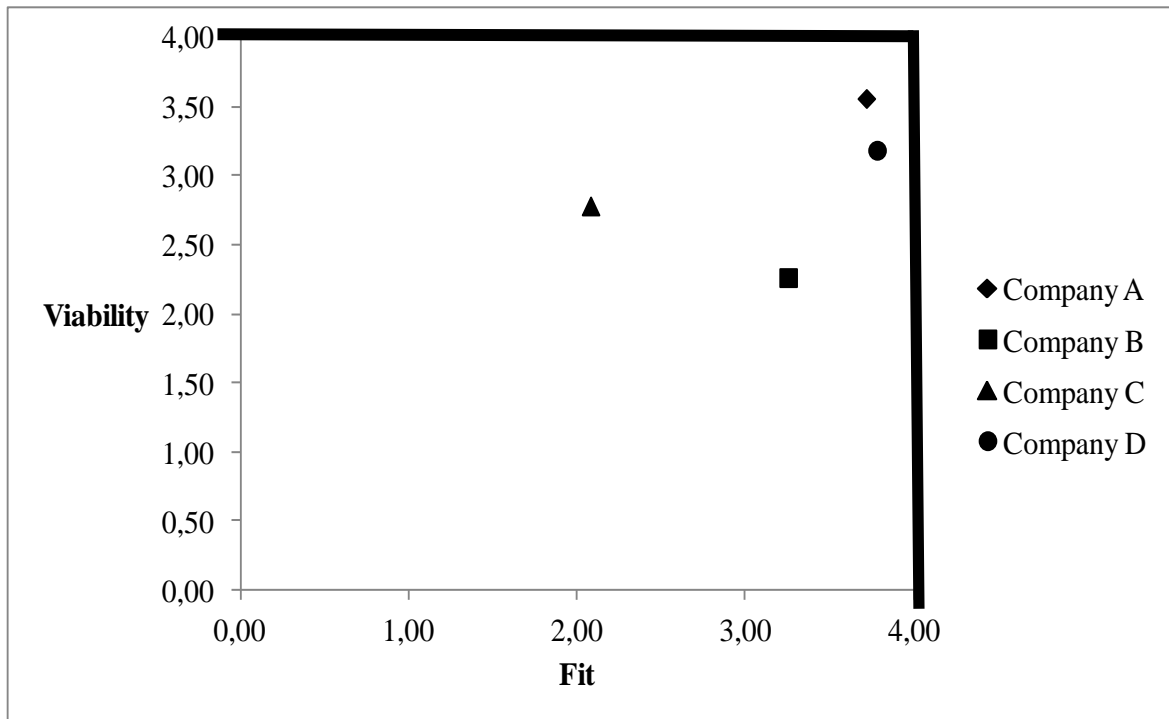
Figure 18: Companies' locations in the matrix

The first conclusion is that each company, in average, considers the electronic accounting reference as a good target for investment (compare the locations to figure 17). However, companies A and D are closer to the borders of the "Good target" quadrant, than companies B and C. This is most likely due to the fact that A and D have both elaborated in their answers that they have constructed a system for automatizing the processing of incoming invoices. This is also why their answers are located closer to "Find alternative technology" quadrant than "Organizational restructuring".

Next, the previously highlighted exact answers are discussed, before the discussion chapter concludes with the analysis of each subcategory related to fit and viability.

Savings- and top management support-related subcategories are not mentioned here, as was pointed out in the previous chapter that their results were clear (companies disagreed clearly with each of the negative claims related to these subcategories).

6.2.1 Fit's task-related considerations

The discussion about companies' fit's task-related claims' answers are divided into the subcategories previously introduced in the thesis.

Process efficiency

The first claim presented in table 2 regarded the electronic accounting reference's impact on removing unnecessary manual steps in posting. Whereas companies A and C answered with two, and company D did not comment the claim at all, company B's representative scored the claim with six. According to company B's representative X:"As our company is large, we use several systems linked to the invoice process. Even though we introduced the electronic accounting reference in its current form, it does not solve the challenge of transmitting the related information between some of our systems. This transmission needs human interaction in order for it to be successful". Thus, in a case where company is using several related systems in their day-to-day operations, accounting reference does not seem to be able to reduce the manual labor in contrast to situations where one system or systems provider's solutions are in use.

The second highlighted claim in table 2 was related to the electronic accounting reference's impact on paper consumptions. Whereas companies A and C believed that the reference would reduce the use of paper, scoring the claim with a three and a two respectively, company B scored the claim with a five. According to company B's representative X:" The electronic accounting reference does not solve the problem related to paper consumption totally in our company. Invoices still need to be officially accepted, meaning a print of the relevant material and an official signature to this printed document. Additionally, in the case of invoices arriving from other countries, electronic accounting references cannot be used at all, as the standards in different countries vary so much. This,

naturally, increases the paper consumption even more". Thus, purely in the scope of this thesis, companies should utilize official electronic identification procedures, comparable to the method of identifying yourself with your bank ID and password, if actual savings in paper consumption would be perceived as pursuable.

Customer service

Both of the claims related to customer service were previously highlighted in table 3. The differing opinions are explained with the fact that the questionnaire was mostly answered by persons working with the incoming invoices. As customer service elements would surely be more important for the outgoing invoices department, the answers are impacted by representatives' assumptions to the claims at stake. Thus, the first claim about the electronic accounting reference answering to customers' requests and needs was not even answered by companies C and D, and company A scored the claim with a one, whereas company B scored it with a six. Additionally, the second claim about the electronic accounting reference's impact to long-term buyer-seller relationships, was treated as irrelevant by company C, company A was once again disagreeing with the claim with a three, and companies B and D scored the claim with a six.

Speed and control

Amongst speed and control-related claims, the last two were previously highlighted in table 4. The first highlighted claim considered the electronic accounting reference's impact on not improving cost control. Whereas companies B and C disagreed with the claim with a two and three respectively, companies A and D respectively scored the claim with a six and a five. According to company D's representative Z:"I assume that currently, as we have constructed a system for automatically targeting invoices to right accounts and automatically circulating the invoices in our company, introducing the electronic accounting reference in this form would not contribute to our cost control". Thus, as both companies A and D actually have a system for improved automatization of handling incoming invoices, they do not regard the electronic accounting reference to be of assistance in cost control.

However, A's and D's answer differs from each other in the final highlighted claim that considers the electronic accounting reference's impact on the number of errors in the accounting process, With company A and C having scored the claim with a five and companies B and D scoring the claim with a two and a three respectively, it seems that in the light of fewer errors made, company A's automatized system is perhaps not as error-free as that of A's. However, according to company D's representative Z: "Errors will not decrease until the technology works without problems and the contents of the invoices will not change at all. As changes currently occur, however, the risks for errors made increase too". Still, the answers indicate that with or without accounting reference, there still is room for other solutions that could contribute to the decreased number of errors in the invoice processing.

Different invoicing

The three first claims (see table 5) from different invoicing-category were previously highlighted. The first claim, electronic accounting reference's suitability for order-based invoicing was scored with a five by company A, in contrast to B's, C's and D's respective three, one and two. When asked about this, company A's representative W commented:"We utilize an automated order and contract system, where the correct accounts are automatically suggested by our order system or automatically retrieved from another system that is linked to our orders. In this way, the incoming invoices can be, in the best case, fully automatically processed for accounting. This approach is contrary to the use electronic accounting reference, which still demands a lot of manual work. Thus, I personally see a completely automatized process more pursuable, than the upgrading of the electronic accounting reference itself". Thus, companies should strive for a complete automatization of the invoicing process, rather than just to the electronic accounting reference.

Company A and B were also on their own tracks when asked about the suitability for contract-based invoices, scoring the claim with a seven and a five respectively, in contrast to C's one and D's two. According to company B's representative X:" Our contracts have their own acquisition numbers, which do not meet the limitations set for electronic accounting reference." Thus, companies already utilizing other approaches than the

electronic accounting reference do not see it contributing to their current practices so much that it should be implemented. This can be seen from figure 17, the matrix that depicted companies' positions. Even though the electronic accounting reference is seen as a good investment target, below the surface it is not perceived equally attractive, at least not in all of the qualities that make it beneficial, especially if companies have had to implement some other approach to the problem in question.

Finally, from the viewpoint of electronic accounting reference's lack of suitability for non-order-based invoicing, whereas other companies were strongly against the claim, company D scored it with a seven. According to company D's representative Z:" From the viewpoint of targeting invoices to the right accounts, attaching accounting-related information to non-order-based invoices does result in any advantages". This means that such invoices already result in a lot of work. Thus, practices should be so clear that actually such purchases would be minimized or that they would have a clear protocol so that the need for manual work could be minimized.

6.2.2 Fit's technology-related considerations

When it comes to fit's technology-related claims (see table 6), the first, third and fourth claim was previously highlighted. The first claim, considering the field's length's shortness, was considered irrelevant by company A, but companies B and C had differing viewpoints to the claim, B scoring it with a five and C scoring it with a two. Based on the answers and my personal experience on companies' opinions, it would be better if no limitation existed. The limitation is, however, mostly due to Finvoice-format's limitations, and as changes are made rarely and making them demands a large project to be initiated, the problem cannot be expected to be solved in the near future. Limitlessness should, however, be pursued in the future.

With the next highlighted claim about the electronic accounting reference's lack of suitability for large masses and/or lengthy and detailed invoices, companies A and D agree with the claim, scoring it with a six and a five respectively. Company C rather strongly disagrees with it, scoring the claim with a two and company B treats the claim as irrelevant. However, according to company D's representative Z:" As such invoices

include several accounting rows and cost centers in our case, the possibilities for errors, when utilizing the electronic accounting reference, increase". Thus, with such companies that already implemented systems for automation, the electronic accounting reference, once again, seems to not be contributing to the invoice handling process the way it should be contributing.

Finally, regarding the final claim about the electronic reference being too much a work-in-progress, even though companies C and D did not answer anything to the claim, companies A and B disagreed in their opinions, scoring the claim with a six and two respectively. Most likely, the situation of current systems in use have an effect on the answers. As company A already has completed a system for automated processing of invoices, introducing the electronic accounting reference could impact the current logic negatively, and thus would need vast testing. With company B, the current systems perhaps are not as advanced and even a slight possibility for improvement is treated more positively given the current situation.

6.2.3 Viability's economic considerations

As with companies answers' analysis to the fit's task-related claims, the viability's economic considerations are also discussed in their own subcategories.

Costs

Table 7 elaborated companies' answers to the cost-related claims. Amongst these claims the second, fourth and fifth claim needed more analysis. First, company A's differing opinion to the claim about upgrading the current system can be explained through the fact that A already has an automatized system in place, and thus the costs to be larger than companies B and C. This can be due to the large number of needed changes to the current system, as well as needed resources for testing. Second, regarding the last two claims and company D's differing answers to the need for upgrading the scanners and need for re-arranging communications processes, the answers can be explained with the current state of technology and processes at company D. Thus, even though a similar company that has systems in place for automation, company A, differs in its opinion from company D, it is due to A's current capabilities with scanner technologies and readiness of communications

processes in comparison to company D. Actually, according to company D's representative Z: "Introducing the accounting reference to our incoming paper invoices could possibly increase the costs of scanning, as these services are purchased separately". These claims could, however, be researched further, so that generalizations could be made.

Risks

Regarding risks, the two highlighted claims were related to maturity of the electronic accounting reference's policies and technology, and possible waste related to its implementation (see table 9). Company A agrees with the claims, scoring them with a five and six, in contrast to company B's ones and C's three and irrelevant. The logic is similar to that of A's previous elaborated answers. As was discussed before, A's representative W views the electronic accounting reference as something that needs a lot of testing. This can be directly linked with the answer to the first claim, and the reasons are also similar - A's current status with the automatized systems. The reasons behind A's answer to the second claim are most likely similar to those behind A's answer to the first claim: the current processes have been clarified to all relevant companies and changing the current processes or allowing exemptions in the shape of the electronic accounting reference could result in least efficient process, thus possibly creating even waste.

Human assets

Amongst human assets-related claims, the answers to the first one regarding the need of training more people needed to be further analyzed (see table 10). Once again, companies A and D agree with the claim, scoring it with a five each, whereas companies B and C score the claim with a two each. The reason behind the answers is once again that companies A and D have clarified to their employees how incoming invoices can most efficiently be processed with the help of their current systems supporting automatization. Thus, changing these optimized systems would demand more training, especially, if the workers are satisfied with the current system (as actually is the case with company D as we can see in the next subcategory section) and might oppose any changes to be made to the current system.

<u>Frequency</u>

Amongst the two claims related to frequency (see table 12), the second claim needed to be further elaborated. The claim considered the perceived state of current accounting approach, and only company D considered its current systems to be close to perfection. According to company D's representative Z:" In our current situation, where we utilize a system for automatically processing invoices and circulating them in our organization, introducing the electronic accounting reference in its current form would not increase the performance of this process". Thus, even company A, which has systems that support automatization in place, does not consider the current state of systems as something that could not be further improved. Interestingly enough, company A actually views this claim even more critically than companies B and C that have not commented to be using systems that support automatization at all.

<u>6.2.4 Viability's organization-related considerations</u>

Viability's organization-related claims' answer's analysis is divided here into user support, benefit and miscellaneous subcategories, as answers to only these subcategories' claims were previously highlighted.

<u>User support</u>

Regarding user support, the second and third claim need to be further elaborated (see table 13). First, companies A and B considered the introduction of the electronic accounting reference to lead into people working with undesired jobs and tasks. A scored the claim with a five and company B scored the claim with a seven, in contrast to C's three and D's one. The answer was explained by company B's representative X:"This is a matter of resources. If we were to implement the electronic accounting reference in its newest form, we would need to rearrange the work of our personnel, so that we could start making changes in our current systems and processes. These types of changes typically are so large and take much time that they are implemented through specific seasonal projects". Thus, implementing a change would need the contribution of current personnel, but the change would not affect the jobs of these people.

Companies A and D also saw the electronic accounting reference to impact the logic and/or easiness of working negatively. According to company D's representative Z:" Deploying a new technical solution always results in different kinds of challenges in the primary stages. If several such technical solutions exist, the possibilities for risks increase too". The implemented systems for automated approach most likely impact the answers of A and D as well, as the companies already have established their way of operating with incoming invoices.

Benefit

With benefit-related claims (see table 15), amongst the four highlighted, the first claim regarding electronic accounting reference's impact to competitive advantages over rivals resulted in interesting discussion. Companies C and D agreed with the claim, whereas company A slightly disagreed with it. According to company A's representative W:"Cost efficiency and the automatization of processes always improves competitiveness to some extent".

However, company C's representative Y commented:" Our answer is relevant for both incoming and sent invoices. Of course the internal efficiency would increase, if the relevant information would arrive automatically. Also, our sales department, dealing more with competition, has not requested for a technical solution, such as the electronic accounting reference, to be implemented, so I think implementing the electronic accounting reference in our company would not impact to our competitiveness". Company D's representative Z also elaborated:" We compete in efficiency, and such solutions already exist in our company". Thus, at least with incoming invoices, the electronic accounting reference does not seem to contribute to the competitive advantages. The case may be, despite company C's representative Y's comment, different with sent invoices.

The second claim about other companies' impact that operate in the same field was seen irrelevant by company A, as others' opinions should not impact your own doings. Companies B and A were disagreeing with the claim, and even though company C slightly agreed with the claim, the difference with claims can be explained with whether a company is a market follower or benchmarker or not. Of course, company C's answer

indicates that a generally accepted solution may have a positive impact to some of the companies considering its implementation, and thus controversial technologies may fail with their implementation in such companies.

The final two claims about short- and long-term benefit measurement should be researched further, as it would be interesting to see how several companies see the easiness of measuring and follow-up, and do these factors impact the introduction of the electronic accounting reference at all. Based on just rather close three answers, generalizations are hard to be made.

Miscellaneous

The answers to the only miscellaneous-related claim were presented in table 16. Based on A's and B's answer, it seems that more effort should be shown to clarify the terminology related to the electronic accounting reference. Even though company C scored the claim with a two, the sixes from both companies A and B indicate that the understanding of terminology seems to vary amongst companies and their personnel's knowhow.

6.2.5 Viability's IT infrastructure-related considerations

The final discussion considers companies' answers to viability's IT infrastructure-related claims. The analysis here is divided into the subcategories of software and hardware, as well as data management.

Software and hardware

Regarding companies answers to software and hardware-related claims (see table 17), several of these answers need further elaboration. Starting with the first previously highlighted claim, whether or not the participating companies communicate the electronic accounting reference in some other that the specific field reserved only for it, companies A and B seem to be utilizing other fields in contrast to companies C and D. The answers to this claim, even at a magnitude of four companies, show that clear rules regarding the use of electronic accounting reference are missing, and if unified practices in this field are seen as pursuable, these rules should be implemented across different industries.

The second highlighted claim about companies' systems not supporting the electronic accounting reference is of similar nature than the first highlighted claim: companies A and C see this as a problem, whereas companies B and D do not. The answers once again elaborate the current state in companies, in which some companies are using a system supporting automation, but the system is not that adjustable for changes in comparison to some other companies with similar solutions in use. The companies may also have not implemented any systems for enhanced automation of invoice processing, but still, depending on the current systems, changes that would improve the way of working, such as the electronic accounting reference, might still not be easily implemented. Thus, even at a scale of four companies, it can be seen that companies vary significantly from each other in their practices and processes when it comes to invoice processing. Thus, even in the terms of system readiness for changes, if unified practices are desired by several companies, clear suggestions with solid benefits should be presented to the companies.

The third highlighted claim considered the impact of the electronic accounting reference's implementation to the quickness of current systems in companies. According to company D's representative Z:" Introducing the electronic accounting reference would probably slow our systems, if we were to transform our practices from utilizing our current automatized approach to the utilization of the electronic accounting reference. The case would be different to us, if we had not yet implemented any automatization-based systems". This statement clarifies the different answers of companies A and D in several cases. Thus, if the companies have created systems that, in their opinion, are the best for invoice processing, it will be hard to justify a change to their current procedures, especially if such a change, such as the implementation of the electronic accounting reference, is not seen to be purely beneficial or without some kind of challenges. Instead, if striving for unified practices, the whole invoice handling process should be inspected from phase to phase and more universal guidelines should be tried to be established.

The fourth highlighted claim considered companies willingness to change their current policies. The answers were constant with the logic of companies' previous answers: Companies B and C were willing to change their current policies, whereas company D was against such a change. Furthermore, company A's answer was similar to that of companies B and C, again being consistent with its willingness to introduce changes to their current

policies, despite the systems supporting automation in place, in order to gain more process efficiency-related benefits. The answers, thus, indicate that companies would be willing to change their current policies or, at least, to upgrade them. Even though company D was against changes, its representative scored the claim with a six, indicating about the possibility for changes even in their case where the system is perceived to be working well for company D.

The fifth highlighted claim about the challenges of communicating the electronic accounting reference can be held similar to the scenario with the first and second highlighted claim in this category. Thus, company A does not see this as problematic as company C. Once again, the answers indicate that companies have established their own ways of working, and it depends on the proposed change in question which companies are more capable of implementing such changes and which are less capable. A's answer can be understood with its representative's answer to the first highlighted claim in the different invoicing-subcategory. As the systems support automatization and automatically retrieve relevant numbers to the purchase, some kind of systems for communicating the relevant information between it and the most used sellers most likely are in place. In contrast, company C manages the handling of incoming invoices in a different way, which does not demand as much collaboration with the seller in the sense of invoice-related information, and also due to this characteristic, demands more manual work at company C than what is needed at company A.

Finally, the last highlighted claims were those where only company A somewhat agreed with the claims, whereas other companies disagreed with it, considered it irrelevant, or did not answer to the claim. The answers to these claims can once again be explained with company A's situation. Thus agreeing with the negative claims indicates that if the electronic accounting reference would be introduced in company A, it would have several negative side-effects, at least in the beginning, as the implementation of the electronic accounting reference would create a disruption in a system that has been perceived to be working rather well. This statement is of course somewhat controversial with company A's representative W's opinions about the current state of their current systems. However, even though the representative W is pro-improvements, some of the answers, for example to the claims of this subcategory, indicate that even though there is always room for

improvements, the representative is not sure whether the electronic accounting reference, at least by itself, is the best solution for their company.

Data management

The final highlighted answers (see table 18) to questionnaire's claims consider data management-subcategory. The first highlighted claim considers the electronic accounting reference being too exposed to unintended user errors and mistakes. Companies A, B and C disagree with this claim, whereas company D somewhat agrees. This is due to its representative Z being confident with the way how the invoice processing has been arranged in company D, and what the impact of the introduction of the electronic accounting reference would be in its case.

The final highlighted claim regards testing needed for the electronic accounting reference. Even though company D has not answered to the claim, company A has agreed with it in contrast to company B's and C's opinions. A's answer is constant with the logic used in previous questions. With the previous claims regarding technology and risks, company A's representative W considered the electronic accounting reference to be a too much work-in-progress and not mature enough. Thus, company A has a working system in place and is thus more critical when considering possible changes to it.

Next, the findings from this discussion chapter is summarized, before the thesis is ended with the conclusion chapter.

6.3 Answers per each subcategory

In order to assist with the depicting of current situation with the electronic accounting reference's implementation, companies' answers' averages to each subcategory were placed to the previously introduced matrix that assess the electronic accounting reference. First, viability-related answers per each subcategory's calculated average were calculated with fit kept as the previously calculated average. Table 21 summarizes these figures.

Next, fit-related answers per each subcategory's calculated average were calculated with viability held as constant. The results are presented in table 22.

Table 21: Averages for each viability's subcategory

	Viability	Fit
Costs	3,40	3,27
Savings	1,56	
Risks	2,37	
Human assets	2,63	
Uncertainty	2,67	
Frequency	2,25	
User support	3,44	
Top management support	1,75	
Benefit	3,61	
Miscellaneous	4,67	
Software and Hardware	3,25	
Data management	2,50	

Table 22: Averages for fit's each subcategory

	Viability	Fit
Process Efficiency	2,99	2,81
Customer service		4,25
Speed and control		2,90
Different invoicing		2,56
Technology		4,21

Finally, in terms of each sub category, the averages of companies' combined answers were placed to the matrix (see figure 19).
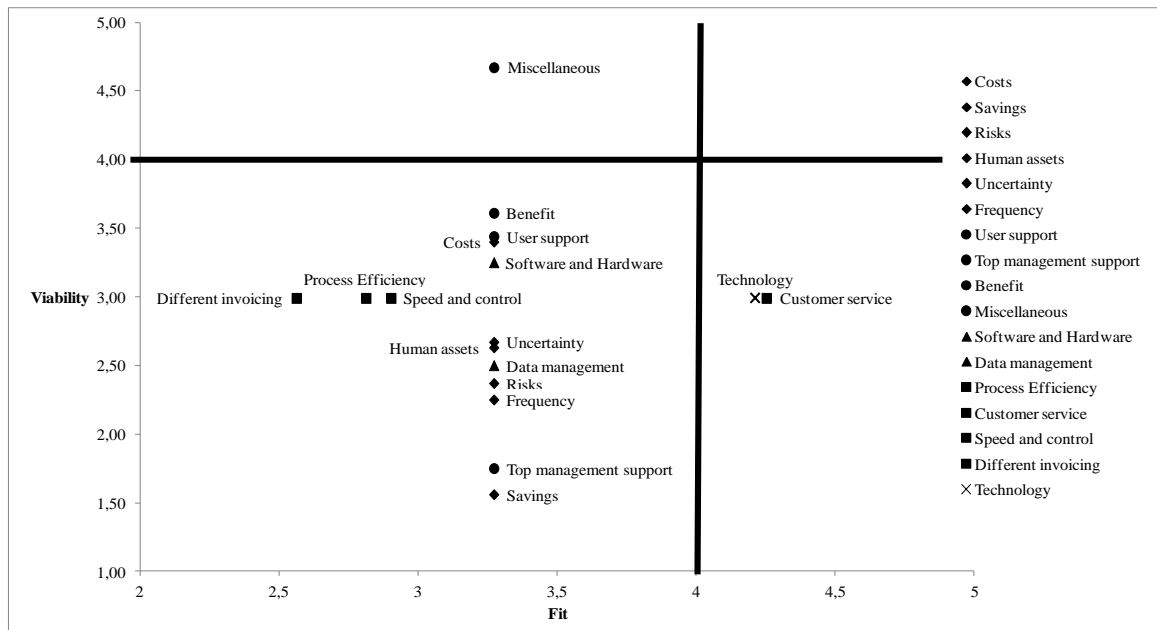

Figure 19: The averages of companies' answers to each sub category

Thus, with fit held as constant, uncertainty-, human assets-, data management-, risks-, frequency-, top management support- and savings-related categories average with under 3.

Benefit-, user support-, costs- and software and hardware-related subcategories, in turn, average with over 3 but with less than 4.

Starting with benefit-related subcategory, it seems that the customers of the participating companies, as well as the companies in their industry, are interested in the electronic accounting reference, but measuring the related benefits is not perceived that simple. Additionally, the electronic accounting reference does not create advantages over competition, at least with incoming invoices, and companies are also worried that changing the invoicing practices impact their subcontractors and partners negatively. With user support-related subcategory, the problem is not with the support, but with the perceived trouble and the need of resources that are linked with the implementation of the electronic accounting reference. Furthermore, the participating companies were not that unanimous in how the electronic accounting reference actually would contribute to the logic and easiness of working.

As mentioned before, as companies A and D already have implemented their invoicing processing automatization systems, their answers impact the average of the cost-related subcategory. Additionally, company C perceived the electronic accounting reference's startup investments large. Finally, despite having 17 related claims, the software and hardware-related subcategory averaged rather well, with 3,25. The average is also mostly impacted by company A's answers related to several claims (communicating the reference in another field, establishing a field for it to the current systems, system support, translating the information behind accounting reference, sending and receiving the invoices in right format, the level of arriving information in the case of electronic accounting reference, negative impact on the user interface and restricting the costs reporting to 35 symbols), even though company C has its own view on communicating the electronic accounting reference to customers and company D having its own opinions on accounting reference slowing their accounting systems and changing the current policies. Both A's and D's answers can be understood, as they have systems supporting the automatization already in place.

The final viability-related subcategory, miscellaneous subcategory, averaged with over 4,5 and is located in the "Organizational restructuring" quadrant, in contrast to the other

viability-related subcategories. As the miscellaneous subcategory only included a claim about companies understanding the related terminology, it can be concluded that participants interested in the wider implementation of the electronic accounting reference, such as the Real-Time Economy group, should work together with the companies behind Finvoice and TEAPPSXML formats and come up with solutions that would clarify the related terminology.

When viability is held as constant, different invoicing-, process efficiency- and speed- and control-related subcategories average with under 3. However, technology- and customer service-related subcategories average with over 4 and are located in the "Find alternative technology" quadrant. What partially explains technology-related subcategory's location in the matrix is the fact that the answers are dominated by one or two companies depending on the claim. Company B regards the electronic accounting reference's field's length too short and the prohibiting of punctuation marks problematic, whereas company A regards both claims irrelevant, company C does not comment on the second claim and company D does not comment on each of the claims. Furthermore, companies A and D regard the electronic accounting reference as not suitable for large masses of invoices or for detailed and lengthy invoices, whereas company B regards this claim as irrelevant. This is due to companies A and D already having the automatized systems in place. Finally, Company A regards the electronic accounting reference still a work-in-progress, whereas companies C and D do not comment on the claim.

Finally, customer service-related subcategory's location is most likely due to the companies viewing the electronic accounting reference as not contributing the customer service when it comes to incoming invoices and increased efficiency in processing them. The case could be different if outgoing invoices were inspected, although company C's representative Y previously elaborated that their sales department has not asked after the implementation of the electronic accounting reference.

6.4 Summary

Amongst the original 69 claims, companies unanimously disagreed with 26 of these claims. The only subcategories, where companies did not unanimously disagree with at

least one claim, were fit's customer service and technology subcategories, as well as viability's miscellaneous subcategory. In contrast, companies unanimously agreed with just four claims: the prohibition of punctuation marks being a problem (only one company scored the claim), need for large start-up investments, electronic accounting reference's introduction's negative impact on partnerships and contracts, and the bringing of the information behind the reference to the systems being challenging.

Interestingly, companies disagreed with every negative claim related to top management support, uncertainty and savings. Based on this, companies seem to have time for improving their invoice handling process. Companies also agree that the implementation would create savings and that the top management would support such an improvement. However, companies also treated many of the cost-related claims as irrelevant, a fact that rarely exists when investment decisions are made. Additionally, with 31 claims, only three of the participating four companies scored the claim on a scale from 1 to 3 or 5 to 7. With 16 claims, only two companies answered to a claim in a similar scale and with two claims only one company scored the claim. As this adds up to 49 out of the total of 69 claims, with 39 of the total number of claims getting a mixed reaction simultaneously, the indication is that before generalizations can be made, the subject should be researched in a larger scale.

However, the results indicate that even though company D did answer significantly less questions than the other three participating companies, and the answers of companies A and D still somewhat dominating the calculated averages, the electronic accounting reference seems not to be something worth striving for that vigorously if a company already has a system for invoice processing automatization in place. This would suggest that the electronic accounting reference would be better suitable for companies still lacking automatized solutions, as it still offers several agreed benefits, and thus SMEs' opinions about the electronic accounting reference should also be researched further, as they tend to have smaller systems in use compared to larger companies.

However, as large companies, with or without an automatized processing system, see unified practices in accounting as something worth striving for, the electronic accounting reference alone does not seem to be worth investing. Instead, based on the answers, it is

suggested that a more extensive research, targeted for both large companies and SMEs, would be conducted. This research should divide companies into categories based on their size and to those with their own automatization-supporting solutions in place and to those not utilizing as advanced systems. If the companies using advanced systems are reluctant to implement the electronic accounting reference, despite its benefits, but these same companies still agree with a majority of companies that unified practices are something worth striving for, companies' processes and systems should be further inspected in order to construct best practices for invoice handling. The electronic accounting reference should be a part of these best practices, due to the benefits it can offer to the invoice processing, but it seems that in order to be widely implemented, especially in companies with their own advanced systems, it should be attached alongside a wider package improving current procedures.

The SMEs most likely will not have similar systems established, and, thus, their opinion regarding the electronic accounting reference most likely depends on the needed effort and resources. However, if the best practices could be constructed so that they could be made scalable for both large and smaller companies, the possible start-up investments would not become too large for smaller companies. Additionally, this way the systems for smaller companies could be kept more easily understood, approached and implemented, but at the same time large companies could utilize the practices in a scale that may be broader, but meets their demands. Of course, the basics behind both of the protocols would still ensure efficient invoicing from a smaller system to a larger and vice versa.

Thus, to answer the research question, the reasons are not unambiguous. Companies do see electronic accounting reference as a good investment, but the implementation demands resources, and companies need to make prioritization decisions amongst different options. Furthermore, as the electronic accounting reference-related claims received mixed answers in most of the cases, using resources to introduce the electronic accounting reference alone, most likely does not seem as a beneficial investment compared to other, less ambivalent, investment options. This is why previously presented larger research should be conducted, so that conclusions about introducing best practices could be made.

Furthermore, in the light of the research's other aims, companies do seem to have similar reasons for the lack of adoption. For example, some large companies have already implemented systems that carry out the tasks that the electronic accounting reference was designed to do. Even though these solutions may not be applicable to other companies, introducing the more unified practices-focused electronic accounting reference would create challenges for companies using their own systems, as their old processes would be changed and risks for errors, at least in the beginning, would be expected to increase. Companies' answers' calculated averages also suggest that the lack of adoption is explained with fit-related factors, and more specifically, technology-related factors. Even though the answers may be biased, as companies are estimating themselves when it comes to viability, especially the worries of companies with automatization-supporting systems have been clearly brought up and seem legit and understandable.

7. Conclusions

This chapter concludes the thesis. It summarizes the research, presents practical implications, limitations of the study, and finally ends with suggestions for further study.

7.1 Research summary

This research introduced electronic invoicing and the electronic accounting reference, a technical solution used alongside it in XML-based electronic invoices. The research was built around the assumption that the introduction of such reference has fallen short in Finnish companies and targeted four large companies based on the turnover at the end of 2010 amongst the top 50 Finnish companies. With the help of Fit-Viability theory, a questionnaire was constructed in order to depict, whether the reason is behind the technology and how it manages its tasks (fit) or behind companies' capabilities to implement such a technology (viability).

Through an empiric case study, the research was able to indicate that one clear reason for the lack of adoption are the existing systems that are already doing the tasks that the electronic accounting reference was designed to do. This is supported by companies' answers' average that indicates that the electronic accounting reference is not doing as well in terms of fit as in terms of viability. More specifically, challenges related to the technology, and not the task, were highlighted by companies.

Furthermore, it seems that as the electronic accounting reference awakes different feelings depending on the subcategory that is under inspection, making investments to such a technology possibly perceived more problematic than to some other technology with less contradictory opinions. Thus, the electronic accounting reference may not be able to get the resources it needs for implementation in its current state.

In order to tackle these challenges, a more extensive research should be implemented. The new research should target both large companies and SMEs, in order to make broader generalizations possible. This research should divide companies into categories based on their size and to those with their own automatization-supporting solutions in place and to those not utilizing as advanced systems. If the companies using advanced systems are

reluctant to implement the electronic accounting reference, despite its benefits, but these same companies still agree with a majority of companies that unified practices are something worth striving for, companies' processes and systems should be further inspected in order to construct best practices for invoice handling. The electronic accounting reference could then be a part of these best practices, as the results of this thesis show that it most likely will not be seen as an attractive investment by companies that have built solutions to carry out the tasks of the electronic accounting reference.

The SMEs most likely will not have similar systems established, and, thus, their opinion regarding the electronic accounting reference most likely depends on the needed effort and resources. However, if the best practices could be constructed so that they could be made scalable for both large and smaller companies, the possible start-up investments would not become too large for smaller companies. Additionally, this way the systems for smaller companies could be kept more easily understood, approached and implemented, but at the same time large companies could utilize the practices in a scale that may be broader, but meets their demands. Of course, the basics behind both of the protocols would still ensure efficient invoicing from a smaller system to a larger and vice versa. Thus, if needed, SMEs and larger companies could still operate together with the best practices protocol, and enjoying the benefits of a unified approach, but the smaller companies would not have to use as advanced and extensive systems and approaches as the bigger companies.

7.2 Theoretical and practical implications

As previously mentioned, a broader research should be conducted next, in order to depict the possibility for invoice handling best practices. As argued by Zhu et al. (2006), innovations related to standards are a primary driver of industrial productivity, and in order to drive standardization, IT adoption and diffusion must take place, even though companies could see this aspect the other way around. According to Zhu et al. (ibid.), without a wide adoption, benefits from such IT inventions fall short, even though these inventions, when becoming standards, could help companies seize a significant competitive edge. Additionally, companies holding on to older standards or lagging in their adoption may also lose their established competitive edge.

Thus, an "invoice handling best practices"-campaign should be initiated next, by e.g. the RTE program, in order for the invoice processing to take a step closer to standardized practices. This is not possible, however, without the collaboration of companies currently perceiving their processes and systems performing well. Ultimately, only the sharing of utilized practices can help the researchers to understand the current situation in the field and to help them in constructing best practices. As Zhu et al. (ibid.) put it, innovations related to standards are a primary driver of industrial productivity.

7.3 Limitations

Despite finding a believable reason for the research question, this research has its limitations. First, focusing on one country is a clear limitation, as many companies nowadays operate in several countries. Second, leaving out SMEs and their opinions towards electronic accounting reference is an additional limitation, as SMEs construct a large majority of companies operating in the Finnish context and might provide further insight why the majority of Finnish companies have not introduced the electronic accounting reference. Third, the number of participating companies also proposes a limitation to the thesis, as their opinions only construct a small sample amongst Finnish companies.

Additionally, as analyzed previously, the chosen methodologies also have their lacks that question the accuracy of the received information from the companies. The final limitation concerns companies' answers to the questionnaire. With 31 claims, only three of the participating four companies scored the claim on a scale from 1 to 3 or 5 to 7. With 16 claims, only two companies scored a claim in a similar scale and with two claims only one company scored the claim. This adds up to 49 not completely answered claims out of the total of 69 claims. Furthermore, company D did only answer to 30 claims in total, whereas companies A and C answered to 60 and company B answered to 57.

7.4 Suggestions for further study

As previously suggested, a more extensive research, in terms of incoming invoices, targeted for both large companies and SMEs, should be conducted. This research should then divide companies into categories based on their size and to those with their own

automatization-supporting solutions in place and to those not utilizing as advanced systems. If the companies using advanced systems are reluctant to implement the electronic accounting reference, despite its benefits, but these same companies still agree with a majority of companies that unified practices are something worth striving for, companies' processes and systems should be further inspected in order to construct best practices for invoice handling.

As previously stated, the SMEs most likely will not have similar systems established, and, thus, their opinion regarding the electronic accounting reference most likely depends on the needed effort and resources. However, if the best practices can be constructed so that they can be made scalable for both large and smaller companies, the possible start-up investments would not become too large for smaller companies. Additionally, this way the systems for smaller companies could be kept more easily understood, approached and implemented, but at the same time large companies could utilize the practices in a scale that may be broader, but meets their demands. Of course, the basics behind both of the protocols would still ensure efficient invoicing from a smaller system to a larger and vice versa. Thus, if needed, SMEs and larger companies could still operate together with the best practices protocol, and enjoying the benefits of a unified approach, but the smaller companies would not have to use as advanced and extensive systems and approaches as the bigger companies.

Finally, if the adoption of the electronic accounting reference becomes successful through the best practices or some other solution, future research could concentrate on the impact that the electronic accounting reference provides to the overall performance of invoice handling in companies.

References

A.T. Kearney (2000), "Building the B2B Foundation: Positioning Net Market Makers for Success", A.T. Kearney, New York, NY

Banerjee, S. & Golhar, D. Y. (1994), "Electronic data interchange: Characteristics of users and nonusers", *Information & Management*, Vol. 26, No. 2, pp. 65-74

Finnish Tax Administration (2003), "Laskua koskevat vaatimukset arvonlisäverotuksessa", http://www.vero.fi/fi-FI/Syventavat_veroohjeet/Verohallinnon_ohjeet/2003/Laskua_koskevat_vaatimukset_arvonlisaver%2810160%29#4.%20Laskun%20k%C3%A4site1, accessed 17.10.2011

Geyer, C. (2006), "About ebXML", http://ebxml.org/geninfo.htm, accessed 27.10.2011

Goodhue, D. L. & Thompson, R. L. (1995), "Task-Technology Fit and Individual Performance", *MIS Quaterly*, Vol. 19, No. 2, pp. 213-236

Hopeman, D., Munro, D. & Ricker, J. (2000), "Data Administration Newsletter", http://www.tdan.com/print/4838, accessed 17.10.2011

Hsieh, C. & Lin, B. (2004) "Impact of standardization on EDI in B2B development", *Industrial Management + Data Systems*, Vol. 104, No. 1, pp. 68-77

Ibrahim, M. (2004) "Studying Interorganizational Systems Using Multiple Perspectives", *ACM International Conference Proceeding Series,* Vol. 60, pp. 319-324

Ince, D. (2001), "Value-added network", http://www.encyclopedia.com/doc/1O12-valueaddednetwork.html, accessed 17.10.2011

Itella Information Oy (2011), "Mikä on verkkolasku?", https://www.verkkolasku.info/a/ec/vlinfo/info, accessed 17.10.2011

Johnston, H. & Vitale, M. (1988), "Creating competitive advantage with interorganizational systems", *MIS Quarterly*, Vol. 12, No. 2, pp. 153-165

Koch, B. (2011), "Billentis: E-invoicing/e-billing in Europe- International market overview & forecast", http://www.billentis.com/ebilling_e-invoicing_European_Market_Overview_2011.pdf, accessed 17.10.2011

Liang, T.-P. & Wei, C.-P. (2004), "Introduction to the Special Issue: Mobile Commerce Applications", *International Journal of Electronic Commerce*, Vol. 8, No. 3, pp. 7-17

Liang, T.-P., Huang, C.-W., Yeh, Y.-H. & Lin, B. (2007), "Adoption of mobile technology in business: a fit-viability model", *Industrial Management & Data Systems*, Vol. 107, No. 8, pp. 1154-1169

Milne, J. (1999), "Questionnaires: Advantages and Disadvantages", http://www.icbl.hw.ac.uk/ltdi/cookbook/info_questionnaires/index.html, accessed 17.10.2011

Nordea Bank (2011), "E-palvelut yrityksille", http://www.nordea.fi/Yritykset+ja+yhteis%C3%B6t/Internet-+ja+mobiilipalvelut/Neuvoja+Internet-+ja+mobiilipalveluista/E-palvelut+yrityksille/942532.html, accessed 17.10.2011

Nurmilaakso, J-M. & Kotinurmi, P. (2004), "A review of XML-based supply-chain integration", *Production Planning & Control*, Vol. 15, No. 6, pp. 608-621

Pagero (2011), "Tiedostomuodot", http://www.pagero.fi/fi/SAHKOINEN-LASKUTUS/TIEDOSTOMUODOT/, accessed 13.12.2011

Pan-European Public Procurement Online (2011), "Four corner model", http://www.peppol.eu/News/news-archive/four_corner_model_v1.jpg/image_view_fullscreen, accessed 17.10.2011

Penttinen, E. (2008), "Electronic Invoicing Initiatives in Finland and in the European Union – Taking the Steps towards the Real-Time Economy. Contributors Dorota, K., Harald, B., Hyytiäinen, M., Kuivalahti, T., Penttinen, E., Poteri, J. and Turunen, T.", *Helsinki School of Economics series B-95*

Penttinen, E. (2010) "Electronic invoicing as a platform for exchanging accounting information- the electronic accounting reference concept", *Aalto University Publication*, ISSN 0356-889X; B-118

Penttinen, E. & Hyytiäinen, M. (2008), "The Adoption of Electronic Invoicing in Finnish Private and Public Organizations", European Conference in Information Systems (ECIS), Dublin, Ireland, June 8-11 2008

Pfeiffer, H. K. C. (1992), "The Diffusion of Electronics Data Interchange", Springer-Verlag, New York, NY

Power, D. (2005), "Supply chain management integration and implementation: a literature review", *Supply Chain Management*, Vol. 10, pp. 252-263

Rezaee, Z. & Hoffman, C. (2001), "XBRL – Standardized Electronic Financial Reporting", *Internal Auditor*, Vol. 58, No. 4, pp. 46-51

Talouselämä (2011), "Talouselämä 500", http://www.talouselama.fi/te500/?view=ranklist&begin=1&end=100, accessed 17.10.2011

The Commission of the European Communities, Expert Group on electronic invoicing (2009, November), "Final Report of the Expert Group on e-Invoicing", http://ec.europa.eu/internal_market/consultations/docs/2009/e-invoicing/report_en.pdf, accessed 17.10.2011

The Federation of Finnish Financial Services (2007), "Finvoice-tuotekuvaus", http://www.finvoice.info/, accessed 17.10.2011

TIEKE - Tietoyhteiskunnan kehittämiskeskus ry. (2011), "eInvoice", "http://www.tieke.fi/in_english/_ebusiness/einvoice/, accessed 17.10.2011

TIEKE - Tietoyhteiskunnan kehittämiskeskus ry. (1.9.2009), " Verkkolaskufoorumissa toimivien välittäjien kriteeristö", http://www.tieke.fi/mp/db/file_library/x/IMG/38657/file/Valittajakriteerit_01092009.pdf, accessed 17.10.2011

Tieto (2011a), "TEAPPSXML descriptions of Tieto invoice messages", http://www.tieto.com/what-we-offer/consulting-and-thought-leadership/financial-value-chain/e-invoicing-services/18860, accessed 17.10.2011

Tieto (2011b), "TEAPPSXML – versio 2.7.2", http://www.tieto.fi/palvelut/konsultointi-ja-digitaaliset-ratkaisut/talouden-arvoketju/verkkolaskupalvelut/ohjeita-ja-kuvauksia/teappxml-kuvaukset/teappsxml---versio-272, accessed 17.10.2011

Tjan, A. K. (2001), "Finally, a Way to Put Your Internet Portfolio in Order", *Harvard Business Review*, Vol. 79, No. 2, pp. 76-85

Vanderbist, D. (2002), "XML versus EDI", http://www.econ.kuleuven.be/tew/academic/infosys/members/vdbist/Discussion%20paper%20XML%20-%20EDI.pdf, accessed 17.10.2011

Venkatraman, N. (1989), "The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence", *Academy of Management Review*, Vol. 14, No 3, pp. 423-444

Yin, R. (2003), "Case study research: Design and methods (3rd ed.)", Thousand Oaks, CA: Sage

Zhu, K., Kraemer, K., Gurbaxani, V. & Xu, S. (2006), "Migration to open-standard interorganizational systems: network effects, switching costs and path dependency", *MIS Quarterly*, Vol. 30, Special issue, pp. 515-539

Expert discussions:

Esko Penttinen, 22.9.2011

Harri Korhonen, 30.9.2011 and 17.10.2011

Saila Toikka, 5.10.2011

Discussions with company representatives:

Company A's representative W, questionnaire returned on 29.11.2011 and discussions held on 16.12.2011

Company B's representative X, questionnaire returned on 28.11.2011 and discussions held on 21.12.2011

Company C's representative Y, questionnaire returned on 5.12.2011 and discussions held on 21.12.2011

Company D's representative Z, questionnaire returned on 12.12.2011 and discussions held on 20.12.2011

<u>Appendices</u>

<u>Appendix 1: Constructed questionnaire</u>

<u>Factors hindering the introduction of electronic accounting reference in its current form</u>

This questionnaire aims to depict the factors hindering the introduction of electronic accounting reference <u>in a specific field reserved only for it</u> in TEAPPSXML/Finvoice technologies. This questionnaire consists of two main parts, i.e. depicting your company's current invoicing situation in terms of current systems and their usage, and fit-related and viability-related negative claims. Fit means accounting reference's suitability to current organizational state and viability refers to organization's readiness to introduce such technology. Fit-related claims are divided into task and technology-related sections, whereas viability-related claims consist of economic, organizational and IT infrastructure-related sections.

Thus, the questionnaire mostly consists of negative claims related to electronic accounting reference, and the scoring is done through a Likert scale (1 – 7) shown below:

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree
(number 4 = irrelevant factor to us)

As the claims are negative, agreeing to a claim means that you think such reason stated in the claim is something that hinders the adoption of electronic accounting reference in your company. On the contrary, disagreeing with a negative claim states that you actually think that the issue stated in the claim is beneficial or doesn't hinder the adoption of the electronic accounting reference in your company.

I would hope that you would score all the claims, to which you as a person/organization have some kind of an opinion. In such cases where you don't have a specific opinion about the claim, I'd hope that you would score the claim with number 4.

Note that some of the claims may be controversial to your opinions/discoveries/conducted research. This kind of approach is intentional, as your possible disagreement to some claims is important in creating discussion about the benefits versus lacks of the electronic

accounting reference. However, the main focus of this questionnaire is still on the claims with which you agree the most.

The names of organizations and people taking part to this survey will not be published in the thesis. The companies taking part to this survey will be thus introduced anonymously, but it is made clear in the thesis what the industries these companies operate in are and that the companies targeted are amongst 50 largest companies, in terms of revenue, in Finland.

Thank you!

PART 1: Current situation

(The percentages asked below can be rough estimates, and by no means should they stop you from answering to the questions in Part 2)

How much does your company receive invoices in different formats?

____% Paper

____% Electronic

If your company uses XML-based B2B communications with invoicing, does it use electronic accounting references **in their newest form** (own separate field, 35-mark limit, no punctuation marks) when sending or receiving invoices?

____Yes, both with sending and receiving

____Yes, but only with sending

____Yes, but only with receiving

____Not at all

If your company uses XML-based B2B communications, but you have not implemented an electronic accounting reference in its newest form (own separate field, 35-mark limit, no punctuation marks), please elaborate what elements/issues hinder the introduction of the reference and/or its newest form on the following pages. If the questionnaire lacks some elements that have been important in your decision-making, I would hope that you would list such elements to the final page of this file.

PART 2: Different elements hindering the adoption

Fit-related questions

<u>Task</u>

Process Efficiency

Accounting reference does not remove unnecessary manual steps in posting

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference does not reduce paper consumption

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference does not result in decreased costs through time and material savings

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Customer service

Accounting reference does not respond to our customers' requests / needs

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference does not contribute to long-term buyer-seller relationships

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Speed and control

Accounting reference does not improve the speed of posting and payment process

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference does not improve the integrity of posting and invoice

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference does not improve cost control

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference does not result in fewer errors made in accounting process

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Different invoicing

Accounting reference is not suitable for order-based invoicing

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference is not suitable for contract-based invoicing

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference is not suitable for non-order-based invoicing

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference is not suitable for company credit card purchases

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

<u>Technology</u>

The accounting reference's field's length (35 symbols) is too short for us

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Prohibiting punctuation marks in the reference is a problem for us

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The accounting reference is not suitable for large masses of invoices / detailed and lengthy invoices

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The accounting reference is still too much a work in progress technology/coding-wise (lacks standardization, too exposed for bugs, too exposed for lengthy downtime, etc.).

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Viability-related questions

<u>Economic</u>

Costs

Using electronic accounting reference in a specified field demands great start-up investments

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Upgrading our system for accounting reference's transmission in a specific reserved field costs too much

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Changing our system to unified accounting approach costs too much

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We would need to upgrade our scanners in order to pick an accounting reference from paper invoices

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Introducing the accounting reference would mean re-arranging our internal / external communications processes (takes too much resources, costs too much)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Savings

Starting the use of accounting reference in a specific field does not pay back the original investments

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Using accounting reference in a specific field does not create any savings for us

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Changing our system to unified accounting approach does not create savings

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Risks

In our opinion accounting reference policies and technology are not enough mature for us and we are not willing to invest in something that may potentially become more costly than expected

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The concept is too unclear for us, we do not want to make any invests in it

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot understand / do not agree with accounting reference's benefits and thus we are not willing to invest in such technology

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Using accounting reference has already resulted in unexpected costs (for example, we have chosen a bank to deliver our invoices to the receiver in a wrong format, although we should have hired an operator that transforms the information to the receiver's demanded format) and we are not willing to invest until the procedure is more standardized

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Changing our processes might result in someone sending us the invoice information in wrong format which would then lead to manual work (waste)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Human assets

We need to train more people if we introduce the accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We need to lay off people if we introduce accounting reference, and we do not want to do that

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Uncertainty

Our business environment is so hectic / subject to frequent changes that we do not have time for introducing accounting reference / changing the current accounting process

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Frequency

Accounting is not that relevant in our day to day operations that we should check whether the current procedures could be updated

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The current approach to accounting is good enough for us and does not need nor make it possible to create any more automation / savings out of it

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

<u>Organizational</u>

User support

Our system users do not support the accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Introducing accounting reference would lead to at least some accounting personnel moving to undesired jobs / tasks

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference would impact the logic / easiness of working negatively

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Top management support

Management does not support the introduction of accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Benefit

In our opinion, the accounting reference does not provide competitive advantages over our rivals

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

In our opinion, the accounting reference affects our partnerships / contracts negatively (for example, some suppliers are not technically capable of transmitting the information we then would need)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Our customers (B2B) do not need the accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Our field does not use the accounting reference, and that's why we do not either

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We do not see a need for unified practices in transmitting invoice information (so that all companies would have same procedures and same formats when it comes to sending or receiving invoices and deciding what information is attached)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot effectively calculate/measure the total benefits (long-term period) of electronic accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot effectively follow the accounting process benefits on a short-term

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Miscellaneous

The terminology is too unclear, all people do not understand relevant terms when it comes to accounting reference and accounting reference in electronic format

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Software and Hardware

We do not use e-invoicing, therefore we do not use electronic accounting references

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Establishing a proper database for the accounting reference is too hard

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We communicate an accounting reference in another than specified field (for example a free text field, an unused field for other details etc.) to our customers (B2B) / suppliers

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Establishing the accounting reference field to our current systems is hard / impossible

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Our systems do not support accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Introducing accounting reference would slow our accounting systems

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Maintaining the customer/purchaser data for accounting reference would be too complicated (keeping invoicing information up to date).

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Accounting reference data is not enough flexible for our needs in case changes/upgrades need to be made.

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We could not communicate the accounting references to our customers (B2B) / suppliers

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Our scanners cannot pick an accounting reference from a paper invoice, therefore we do not demand accounting references

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot bring the information (customer, order, product) behind accounting reference properly to our accounting system (information would be in wrong format for our current systems)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot properly translate the information behind accounting reference

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot change / would not want to change our accounting reference policies (how the invoice data currently arrives)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

With the new accounting reference standard, we would have a hard time sending the invoices in right format to our customers (B2B)/suppliers) and/or demanding invoices in right format to us

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

With electronic accounting reference we do not know in which level the information is brought to and picked from our system (headline or row level)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The accounting reference field in our systems would impact the user interface negatively (too many fields after introduction, too unclear interface)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

We cannot restrict our costs reporting to fit 35 symbols provided by accounting reference (we need more digits to report the cost location with the precision we need)

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Data management

The database needed for accounting reference exposes us to information leaks

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The users of the data needed may deliberately use, save, distribute, manipulate it as protecting the data cannot be established well enough in our company

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Using accounting reference is too exposed to unintended user errors / mistakes

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The data needed for accounting reference becomes too transparent, as we cannot properly limit the access of different kinds of users to the data in our organization

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

The accounting reference needs too much testing before it could be introduced in our organization

Completely disagree -----1-----2-----3-----4-----5-----6-----7----- Completely agree

(number 4 = irrelevant factor to us)

Other factors not mentioned in this questionnaire:

Thank you for your time and interest!